PROJECT NO.: SPACPAXB0002

PRELIMINIARY HYDROLOGY AND HYDRAULICS REPORT

-FOR-

~~SPACE CENTER EXPANSION FLAG LOT~~

PROJECT ADDRESS:	NORTH OF INTERSECTION OF ENTERPRISE WAY AND NISQUALLI ROAD
APN(S):	3090-571-17
LOT(S)/PARCEL(S):	Parcel 4 of Parcel Map 16201 MB 202 Page 67 to 70
PLANNING APPLICTION #:	TBD
GRADING PERMIT #:	TBD
BUILDING PERMIT #:	TBD
PREPARED FOR:	BRE Space Paxbello, LLC 3401 Etiwanda Avenue Jurupa Valley, CA 91752 Tom Cruikshank Office: (909)-223-9035 tcruikshank@linklogistics.com
PREPARED BY:	Bret Jensen Thorpe, P.E.,P.M.
DATE PREPARED:	May 10, 2023

DAVID EVANS AND ASSOCIATES INC.

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DAVID EVANS AND ASSOCIATES INC.

SECTION I. PROJECT DESCRIPTION

PROJECT CONTEXT

The project site is vacant and lies east of Enterprise Way and is surrounded by industrial businesses on the north, west and south sides of the property and a railway owned by BNSF that runs around the north and east side of the site. The project will install 202 parking stalls with associated pavement areas, a forty-foot-wide drive aisle, and utilities such as water, sewer and drainage infrastructure such as storm drainpipes and inlets. The property is currently about 438,000 square feet of undeveloped land with utilities that serves the existing site. The project is in the City of Victorville, CA east of ~~the intersection of~~ Enterprise Way ~~Nutro Way at the end of an access road for Nutro Way~~. The project area of study is 10.06 acres that include the area bounded by the property lines of the site along with the private driveway entrance south of the project.

In addition to the proposed improvements, the project area will have a dual-purpose detention/infiltration basin located on the north side of the property, which will be utilized to detain the increase of volume due to the increase of impervious surface area. The report hereon will calculate design storm flow rates at designated points of interest for the 100, 10, and 2-year storm event and will be used to size drainage facilities for the site.

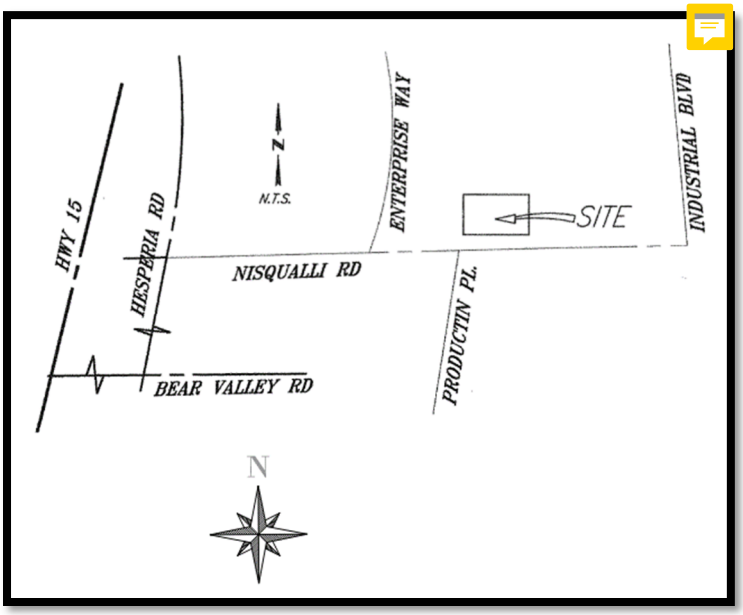


Figure 0-1: Vicinity Map

EXISTING DRAINAGE FACILITIES

There is one existing drainage facility east of ~~our~~ project site. Referring to Appendix B Proposed Condition Hydrology Map and the approved March 8, 2005 Improvement Plans PM 16201 (P-602); Sheet 12A in Appendix G, the existing facility is a grated inlet with a 24" storm drain line that drains to the existing basin north of the railway, the outlet pipe from the basin then drains east and connect to the existing trapezoidal channel, denoted as j-01 in the City of Victorville's Master Plan of Drainage.

PURPOSE

The purpose of the enclosed Hydrology Study is to evaluate anticipated flows for the 100-year storm event and provide sizing recommendations for the onsite drainage facilities. Additionally, this study will verify the proposed basin capacity, for the purpose of mitigating the increase in onsite runoff of the proposed flag lot. Calculations are based on the methodologies outlined in the San Bernardino County Flood Control and Water Conservation District Hydrology Manual (SBCHM).

SECTION II. EXISTING (PRE-DEVELOPED) HYDROLOGIC CONDITIONS

The ~~projects~~ existing condition is mostly undeveloped so for the purposes of comparing the pre and post condition hydrology, the existing condition is modeled as undeveloped with a pervious ratio of 1. A aerial topographic survey was used to show the existing condition flow path, which was used for the hydrology analysis. As shown in Appendix B Existing Condition Hydrology Map, the existing flows traverse the site in a generally south to north direction with an average gentle slope of 2%.

Soil classification for the site is predominantly Class ‘C’ soils, which is described as moderately high runoff potential. Generally, Class ‘C’ soils have slow infiltration rates when thoroughly wetted and consisting chiefly of soils with moderately fine to fine texture, which have a slow rate of water transmission. The soil classification boundary limit is based on the Web Soil Survey, which is referenced in Appendix G of this report.

The reader is advised to refer to the 'Existing Condition Hydrology Map' included in the Appendix of this report for additional information on the existing hydrologic characteristics of the site. Hydrologic calculations are also included in the Appendix C.

SECTION III. PROPOSED (POST-DEVELOPMENT) HYDROLOGIC CONDITIONS

ONSITE FLOWS

The ~~project~~ is a commercial/industrial ~~site that will be~~ used as extended parking space for the existing industrial site south of the project. The project will expand approximately 438,200 square feet of pavement area with 202 parking stalls. The drainage path follows the existing condition pattern, where flows generally sheet flow north towards the proposed detention /infiltration basin, which will be used for the purpose of peak flow mitigation of the 10-year and 100-year storm event and function for the purpose of water quality for the 2-year storm event. The basin will include an outlet structure with an orifice at an elevation of 1.5' that will convey the storm water to the existing storm drain facilities north of the project. Per the Developed condition Hydrology map in Appendix B the basin will have a volume capacity of 74,000 cubic feet.

The project will construct storm drain inlet and underground storm drainpipes to convey the onsite drainage to the proposed basin. Drainage will ultimately drain to the existing offsite trapezoidal channel, on the projects easterly boundary. The reader is advised to refer to the 'Proposed Condition Hydrology Map' included in the Appendix B of this report for additional information on the proposed hydrologic characteristics of the site. Hydrologic calculations are also included in the Appendix C.

OFFSITE FLOWS

There is no offsite drainage tributary to the site. Any drainage from the existing developments around the project drain to their respective basins through existing storm drain.

SECTION IV. METHODOLOGY

HYDROLOGY

Hydrologic calculations for the project were performed using the methods outlined in the San Bernardino County Hydrology Manual, which include the Rational Method and Unit hydrograph method. The 2-Year, 10-Year and 100-Year design storm was analyzed using the Rational Method, which was used to calculate peak flow rates that will be used for the purpose of sizing drainage infrastructure. The 10-Year and 100-Year, 24-Hour storm events will be analyzed using the Unit Hydrograph Method, which was used to verify the basin capacity and ensure the project meets the mitigation criteria for the purpose of downstream flooding. The AMC value used for the Unit Hydrograph Analysis was an AMC of 2, based on the location of the project in Figure ADD-1, which is based on the San Bernardin County Addendum to the County Hydrology Manual, which is referenced in this report in Appendix G.

INLET SIZING

Curb Inlet capacities will be based on the 100-year storm event and sized using Flow Master V8i. While performing calculations, flows were distributed and accounted for when the ponding depth suggested flow contributing to downstream catch basin, then to subsequent storm drain lines. Calculations will be documented in Appendix F of this report.

PIPE SIZING

The calculated peak flow was summed at the inlet of the storm drain system. The storm drain will be analyzed using WSGP Water Surface Profile Gradient, to document the HGL and ensure that the storm drain has sufficient capacity. Calculations will be documented in Appendix F of this report.

WATER QUALITY BMP SIZING

The project will incorporate one type of water quality BMP. The BMP will be the proposed detention/ infiltration basin, it will be used to treat the storm water for the 2-year 1 hour storm event. Please refer to the project WQMP, which documents the design for the proposed BMPs.

SECTION V. SUMMARY OF RESULTS

The following section provides a summary of the results of the enclosed hydrologic analysis for the Space Center Expansion project. The reader shall refer to the Appendix included with this report for complete calculations.

Unit Hydrograph Summary Table					
Area ID	**Acreage (ac)**	**$Q_{100\text{-Yr }24\text{-Hr}}$ (cfs)**	**$Vol_{100\text{-Yr }24\text{-Hr}}$ (acft)**	**$Q_{10\text{-Yr }24\text{-Hr}}$ (cfs)**	**$Vol_{10\text{-Yr }24\text{-Hr}}$ (acft)**
Existing Condition					
Ex. Area A	10.06	*15.5*	2.0	*7.4*	1.0
Developed Condition					
Dev. Area A	10.06	24.0	2.6	12.8	1.5
Mitigated Condition					
Mit. Total:	10.06	*7.1*	2.6	*4.7*	1.5

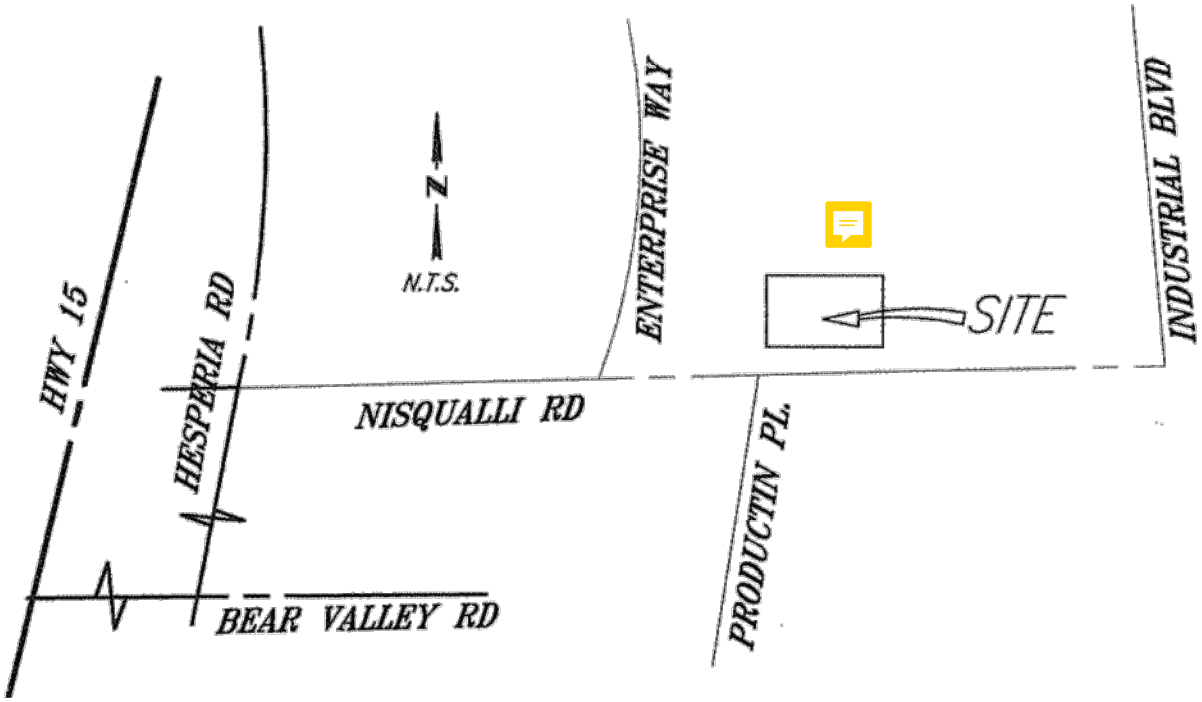
Rational Method Summary Table							
Area ID	**Acreage (ac)**	**Q_2 (cfs)**	**TC_{2yr} (min)**	**Q_{10} (cfs)**	**TC_{10yr} (min)**	**Q_{100} (cfs)**	**TC_{100yr} (min)**
Existing Condition	10.06	2.4	34.8	6.5	31.1	14.2	28.51
Proposed Condition	10.06	6.6	19.0	12.7	17.4	24.2	16.0

SECTION VI. CONCLUSION

Based on the design criteria of the site and the above summary table, the project has demonstrated that it has sufficient volume to mitigate the excess runoff and volume for the site, for the 100-year 24-hour event and the 10-year 24-hour event. All proposed drainage facilities have been adequately sized to convey storm water away from the proposed building and ensure flooding does not occur on any critical infrastructure onsite. For additional information on the design parameters used, refer to the enclosed report, specifically, Appendix C for the hydrologic calculations, Appendix E, and F for the detention basin hydraulics/sizing.

APPENDIX A – VICINITY MAP

- Vicinity Map



N

DAVID EVANS AND ASSOCIATES INC.
18484 Outer Hwy 18N Suite 225
Apple Valley, CA 92307
Phone: 760.524.9100

VICINITY MAP

CITY OF VICTORVILLE

APPENDIX B – HYDROLOGY MAPS

- Pre-Developed Condition Hydrology Map
- Post-Developed Condition Hydrology Map

MAP LEGEND

100.00 249.97 FS — NODE DESIGNATION

D / 0.18 AC — DMA ID / ACREAGE

DRAINGE AREA BOUNDARY

L=200' — FLOW LENGTH / FLOW LINE

DRAINAGE AREA BOUNDARY FOR UNIT HYDROGRAPH ANALYSIS (10.06 ACRES)

DIRECTION OF FLOW

N

60 0 60 120
scale 1"= 60' feet

Hydrology Summary Table			2 Year				10 Year				100 Year			
Flow Type	Node	Area (ac)	Q (cfs)	TC (min)	Cum. Tc (min)	Cumm Q (cfs)	Q (cfs)	TC (min)	Cum. Tc (min)	Cum Q (cfs)	Q (cfs)	TC (min)	Cum. Tc (min)	Cum Q (cfs)
Initial Area	100-101	0.50	0.30	15.50	15.50	0.30	0.60	15.50	15.50	0.60	1.15	15.50	15.50	1.15
Improved Channel Flow	101-102	0.50	0.04	10.50	26.00	0.34	0.21	8.75	24.25	0.81	0.54	7.36	22.86	1.69
Improved Channel Flow	102-103	9.06	2.01	8.76	34.76	2.35	5.65	6.87	31.12	6.46	12.52	5.65	28.51	14.21
Confluence Main Stream	100-103	10.06	-	-	34.76	2.35	-	-	31.12	6.46	-	-	28.51	14.21

103 2895.10 EG

102 2902.40 EG

101 2906.43 EG

100 2912.62

L=685'

L=518'

L=518'

A1 — 0.50 AC

A2 — 0.50 AC

A3 — 9.06 AC

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Temecula, CA 92590
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SPACE CENTER EXPANSION
HYDROLOGY EXHIBIT

SPACE CENTER EXPANSION FLAG LOT
EXISTING CONDITION HYDROLOGY MAP

CITY OF VICTORVILLE — CALIFORNIA

SUBMITTAL STATUS

CHECKED BY: CHECKED BY
DESIGNED BY: JFA
DRAWN BY: JFA

FIRST SUBMITTAL DATE: XXX

PROJECT NO.
SPACBRES0002

SHEET NO.
1 OF 1

Plot Date: 1/16/2023 8:59 AM
Save Date: 1/13/2023 4:08 PM
By: Jose Aguilar
By: JFA
File: P:\SISPACBRES0001\0600\INFO\0670\Reports\Phase 2 Flag\Hydrology Report\CADB_1_Existing Condition Hydrology Exhibit.dwg

MAP LEGEND

100.00 249.97 FS — NODE DESIGNATION

D / 0.18 AC — DMA ID / ACREAGE

DRAINGE AREA BOUNDARY

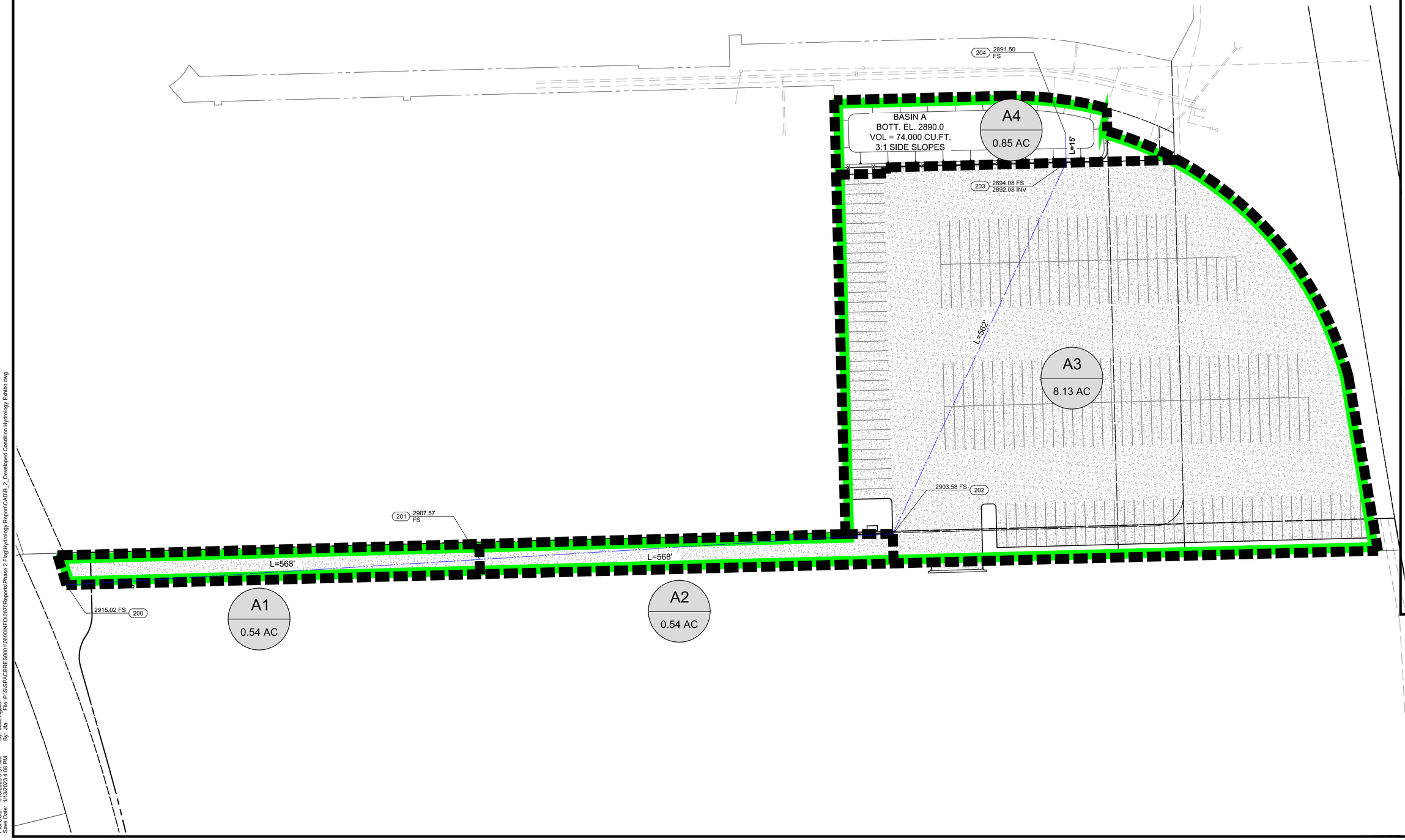
DRAINAGE AREA BOUNDARY DRAINING TO BASIN (10.06 ACRES)

L=200' — FLOW LENGTH / FLOW LINE

N

60 0 60 120
scale 1" = 60' feet

Hydrology Summary Table			2 Year				10 Year				100 Year			
Flow Type	Node	Area (ac)	Q (cfs)	TC (min)	Cum. Tc (min)	Cumm Q (cfs)	Q (cfs)	TC (min)	Cum. Tc (min)	Cum Q (cfs)	Q (cfs)	TC (min)	Cum. Tc (min)	Cum Q (cfs)
Initial Area	200-201	0.54	0.62	9.14	9.14	0.62	1.09	9.15	9.15	1.09	1.95	9.14	9.14	1.95
Street Flow	201-202	0.54	0.21	6.63	15.77	0.83	0.45	5.72	14.87	1.54	0.92	4.94	14.09	2.87
Improved Channel Flow	202-203	8.13	5.39	3.08	18.86	6.22	10.25	2.40	17.27	11.80	19.51	1.88	15.96	22.37
Pipe Flow	203-204	-	-	0.09	18.95	6.22	-	0.08	17.35	11.80	-	0.06	16.03	22.37
SubArea Flow	204-204	0.85	0.39	-	18.95	6.61	0.89	-	17.35	12.68	1.83	-	16.03	24.21
Confluence Main Stream	200-204	-	-	-	18.95	6.61	-	-	17.35	12.68	-	-	16.03	24.21



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SPACE CENTER EXPANSION HYDROLOGY EXHIBIT

SPACE CENTER EXPANSION FLAG LOT

DEVELOPED CONDITION HYDROLOGY MAP

CITY OF VICTORVILLE — CALIFORNIA

SUBMITTAL STATUS

CHECKED BY: CHECKED BY
DESIGNED BY: JFA
DRAWN BY: JFA

FIRST SUBMITTAL DATE: XXXX

PROJECT NO.
SPACBRES0001

SHEET NO.
1 OF 1

Plot Date: 11/6/2023 8:51 AM
Save Date: 11/3/2023 4:08 PM
By: Jose Aguilar
By: JFA
File: P:\SIS\PACBRES0001\0600\INFO\0670\Reports\Phase 2 Flag\Hydrology Report\CADB_2_Developed Condition Hydrology Exhibit.dwg

APPENDIX C – RATIONAL METHOD ANAYSIS

- Existing Condition Area A1 to A3, 2-Year Design Storm
- Existing Condition Area A1 to A3, 10-Year Design Storm
- Existing Condition Area A1 to A3, 100-Year Design Storm
- Developed Onsite Area A1 to A4, 2-Year Design Storm
- Developed Onsite Area A1 to A4, 10-Year Design Storm
- Developed Onsite Area A1 to A4, 100-Year Design Storm

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/16/23

Space Center Expansion Phase 2 Flag
Existing Condition for Area A (A1-A3)
2 Year Design Storm Frequency
Refer to Appendix B Existing Condition Hydrology Map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.358 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 518.000(Ft.)
Top (of initial area) elevation = 2912.620(Ft.)
Bottom (of initial area) elevation = 2906.430(Ft.)
Difference in elevation = 6.190(Ft.)
Slope = 0.01195 s(%)= 1.19
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.503 min.
Rainfall intensity = 0.923(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.642
Subarea runoff = 0.296(CFS)
Total initial stream area = 0.500(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

++

Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.207(Ft.), Average velocity = 0.822(Ft/s)
******* Irregular Channel Data ***********

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      0.352(CFS)
  '     '     flow top width =      4.136(Ft.)
  '     '    velocity=    0.822(Ft/s)
  '     '     area =      0.428(Sq.Ft)
  '     '     Froude number =     0.451

Upstream point elevation =  2906.430(Ft.)
Downstream point elevation =  2902.400(Ft.)
Flow length =   518.000(Ft.)
Travel time  =   10.50 min.
Time of concentration =   26.00 min.
Depth of flow =   0.207(Ft.)
Average velocity =   0.822(Ft/s)
Total irregular channel flow =     0.352(CFS)
Irregular channel normal depth above invert elev. =   0.207(Ft.)
Average velocity of channel(s) =   0.822(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      0.643(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.529
Subarea runoff =      0.044(CFS) for    0.500(Ac.)
Total runoff =      0.340(CFS)
Effective area this stream =        1.00(Ac.)
Total Study Area (Main Stream No. 1) =        1.00(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.204(Ft.), Average velocity =   0.815(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.326(Ft.), Average velocity =   1.304(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      1.386(CFS)
  '     '     flow top width =      6.521(Ft.)
  '     '    velocity=    1.304(Ft/s)
  '     '     area =      1.063(Sq.Ft)
  '     '     Froude number =     0.569
```

```
Upstream point elevation =  2902.400(Ft.)
Downstream point elevation =  2895.100(Ft.)
Flow length =   685.000(Ft.)
Travel time  =    8.76 min.
Time of concentration =   34.76 min.
Depth of flow =   0.326(Ft.)
Average velocity =   1.304(Ft/s)
Total irregular channel flow =     1.386(CFS)
Irregular channel normal depth above invert elev. =   0.326(Ft.)
Average velocity of channel(s) =   1.304(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      0.525(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.445
Subarea runoff =      2.010(CFS) for    9.060(Ac.)
Total runoff =      2.350(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.397(Ft.), Average velocity =   1.488(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.060(Ac.)
Runoff from this stream =      2.350(CFS)
Time of concentration =   34.76 min.
Rainfall intensity =     0.525(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Summary of stream data:

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


1      2.35    10.060     34.76    0.265      0.525
Qmax(1) =
          1.000 *    1.000 *     2.350) + =       2.350

Total of 1 main streams to confluence:
Flow rates before confluence point:
       3.350
Maximum flow rates at confluence using above data:
        2.350
Area of streams before confluence:
       10.060
Effective area values after confluence:
       10.060


Results of confluence:
```

Total flow rate = 2.350(CFS)
Time of concentration = 34.761 min.
Effective stream area after confluence = 10.060(Ac.)
Study area average Pervious fraction(Ap) = 1.000
Study area average soil loss rate(Fm) = 0.265(In/Hr)
Study area total = 10.06(Ac.)
End of computations, Total Study Area = 10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 86.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/13/23

Space Center Expansion Project Phase 2 Flag
Existing Condition for Area A (A1-A3)
10 Year Design Storm Frequency
Refer to Appendix B Existing Condition Hydrology Map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.618 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 518.000(Ft.)
Top (of initial area) elevation = 2912.620(Ft.)
Bottom (of initial area) elevation = 2906.430(Ft.)
Difference in elevation = 6.190(Ft.)
Slope = 0.01195 s(%)= 1.19
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.503 min.
Rainfall intensity = 1.594(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.750
Subarea runoff = 0.598(CFS)
Total initial stream area = 0.500(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

++

Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.272(Ft.), Average velocity = 0.987(Ft/s)
******* Irregular Channel Data **********

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      0.730(CFS)
  '     '     flow top width =      5.440(Ft.)
  '     '    velocity=    0.987(Ft/s)
  '     '     area =      0.740(Sq.Ft)
  '     '     Froude number =     0.472

Upstream point elevation =  2906.430(Ft.)
Downstream point elevation =  2902.400(Ft.)
Flow length =   518.000(Ft.)
Travel time  =    8.75 min.
Time of concentration =   24.25 min.
Depth of flow =   0.272(Ft.)
Average velocity =   0.987(Ft/s)
Total irregular channel flow =     0.730(CFS)
Irregular channel normal depth above invert elev. =   0.272(Ft.)
Average velocity of channel(s) =   0.987(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      1.165(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.695
Subarea runoff =      0.212(CFS) for    0.500(Ac.)
Total runoff =      0.810(CFS)
Effective area this stream =        1.00(Ac.)
Total Study Area (Main Stream No. 1) =        1.00(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.283(Ft.), Average velocity =   1.013(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.470(Ft.), Average velocity =   1.663(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      3.666(CFS)
  '     '     flow top width =      9.392(Ft.)
  '     '    velocity=    1.663(Ft/s)
  '     '     area =      2.205(Sq.Ft)
  '     '     Froude number =     0.605
```

```
Upstream point elevation =  2902.400(Ft.)
Downstream point elevation =  2895.100(Ft.)
Flow length =   685.000(Ft.)
Travel time  =    6.87 min.
Time of concentration =   31.12 min.
Depth of flow =   0.470(Ft.)
Average velocity =   1.663(Ft/s)
Total irregular channel flow =     3.666(CFS)
Irregular channel normal depth above invert elev. =   0.470(Ft.)
Average velocity of channel(s) =   1.663(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      0.979(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.656
Subarea runoff =      5.650(CFS) for    9.060(Ac.)
Total runoff =      6.460(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.581(Ft.), Average velocity =   1.916(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.060(Ac.)
Runoff from this stream =      6.460(CFS)
Time of concentration =   31.12 min.
Rainfall intensity =     0.979(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Program is now starting with Main Stream No. 2
End of computations, Total Study Area =           10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  86.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/13/23

Space Center Expansion Project Phase 2 Flag
Existing Condition for Area A (A1 to A3)
100 Year Design Storm Frequency
Refer to Appendix B Existing Condition Hydrology Map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.090 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 86.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.265(In/Hr)
Initial subarea data:
Initial area flow distance = 518.000(Ft.)
Top (of initial area) elevation = 2912.620(Ft.)
Bottom (of initial area) elevation = 2906.430(Ft.)
Difference in elevation = 6.190(Ft.)
Slope = 0.01195 s(%)= 1.19
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 15.503 min.
Rainfall intensity = 2.811(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.815
Subarea runoff = 1.146(CFS)
Total initial stream area = 0.500(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.265(In/Hr)

++

Process from Point/Station 101.000 to Point/Station 102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.352(Ft.), Average velocity = 1.173(Ft/s)
******* Irregular Channel Data ***********

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      1.458(CFS)
  '     '     flow top width =      7.050(Ft.)
  '     '    velocity=    1.173(Ft/s)
  '     '     area =      1.242(Sq.Ft)
  '     '     Froude number =     0.493

Upstream point elevation =  2906.430(Ft.)
Downstream point elevation =  2902.400(Ft.)
Flow length =   518.000(Ft.)
Travel time  =    7.36 min.
Time of concentration =   22.86 min.
Depth of flow =   0.352(Ft.)
Average velocity =   1.173(Ft/s)
Total irregular channel flow =     1.458(CFS)
Irregular channel normal depth above invert elev. =   0.352(Ft.)
Average velocity of channel(s) =   1.173(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      2.142(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.789
Subarea runoff =      0.543(CFS) for    0.500(Ac.)
Total runoff =      1.689(CFS)
Effective area this stream =        1.00(Ac.)
Total Study Area (Main Stream No. 1) =        1.00(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.372(Ft.), Average velocity =   1.217(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.629(Ft.), Average velocity =   2.021(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              5.00
       2             50.00              0.00
       3            100.00              5.00
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      8.001(CFS)
  '     '     flow top width =     12.585(Ft.)
  '     '    velocity=    2.021(Ft/s)
  '     '     area =      3.959(Sq.Ft)
  '     '     Froude number =     0.635
```

```
Upstream point elevation =  2902.400(Ft.)
Downstream point elevation =  2895.100(Ft.)
Flow length =   685.000(Ft.)
Travel time  =    5.65 min.
Time of concentration =   28.51 min.
Depth of flow =   0.629(Ft.)
Average velocity =   2.021(Ft/s)
Total irregular channel flow =     8.001(CFS)
Irregular channel normal depth above invert elev. =   0.629(Ft.)
Average velocity of channel(s) =   2.021(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Rainfall intensity =      1.835(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.770
Subarea runoff =     12.524(CFS) for    9.060(Ac.)
Total runoff =     14.213(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.265(In/Hr)
Depth of flow =   0.781(Ft.), Average velocity =   2.333(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     10.060(Ac.)
Runoff from this stream =     14.213(CFS)
Time of concentration =   28.51 min.
Rainfall intensity =     1.835(In/Hr)
Area averaged loss rate (Fm) =    0.2651(In/Hr)
Area averaged Pervious ratio (Ap) = 1.0000
Program is now starting with Main Stream No. 2
End of computations, Total Study Area =           10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  86.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/13/23

Space Center Expansion Project Phase 2 Flag
Developed Condition for Area A1 to A3
2 Year Design Storm Frequency
Please Refer to Appendix B Developed Condition Hydrology map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.358 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 568.000(Ft.)
Top (of initial area) elevation = 2915.020(Ft.)
Bottom (of initial area) elevation = 2907.570(Ft.)
Difference in elevation = 7.450(Ft.)
Slope = 0.01312 s(%)= 1.31
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.142 min.
Rainfall intensity = 1.336(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.863
Subarea runoff = 0.623(CFS)
Total initial stream area = 0.540(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.055(In/Hr)

++

Process from Point/Station 201.000 to Point/Station 202.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 2907.570(Ft.)
End of street segment elevation = 2903.580(Ft.)
Length of street segment = 568.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)

```
Width of half street (curb to crown)  =  20.000(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 [1] side(s) of the street
Distance from curb to property line  =   3.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(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 =      0.756(CFS)
Depth of flow =   0.146(Ft.), Average velocity =   1.428(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.276(Ft.)
Flow velocity =   1.43(Ft/s)
Travel time =    6.63 min.     TC =   15.77  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      0.912(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.846
Subarea runoff =      0.211(CFS) for    0.540(Ac.)
Total runoff =      0.833(CFS)
Effective area this stream =        1.08(Ac.)
Total Study Area (Main Stream No. 1) =        1.08(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Street flow at end of street =      0.833(CFS)
Half street flow at end of street =      0.833(CFS)
Depth of flow =   0.151(Ft.), Average velocity =   1.463(Ft/s)
Flow width (from curb towards crown)=   7.547(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2903.580(Ft.)
Downstream point elevation =  2894.080(Ft.)
Channel length thru subarea  =   562.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      3.557(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      3.557(CFS)
Depth of flow =   0.117(Ft.), Average velocity =   3.036(Ft/s)
Channel flow top width =   10.000(Ft.)
Flow Velocity =    3.04(Ft/s)
Travel time  =    3.08 min.
Time of concentration =   18.86 min.
Critical depth =      0.158(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      0.805(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.839
Subarea runoff =      5.385(CFS) for    8.130(Ac.)
Total runoff =      6.218(CFS)
Effective area this stream =        9.21(Ac.)
Total Study Area (Main Stream No. 1) =        9.21(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.164(Ft.), Average velocity =   3.783(Ft/s)
Critical depth =      0.230(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2892.080(Ft.)
Downstream point/station elevation =  2891.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =     6.218(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.218(CFS)
Normal flow depth in pipe =    9.59(In.)
Flow top width inside pipe =   14.41(In.)
Critical Depth =   12.08(In.)
Pipe flow velocity =      7.51(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    18.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    18.95 min.
Rainfall intensity =      0.802(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
Subarea runoff =      0.389(CFS) for    0.850(Ac.)
Total runoff =      6.607(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.073(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
```

Stream flow area = 10.060(Ac.)
Runoff from this stream = 6.607(CFS)
Time of concentration = 18.95 min.
Rainfall intensity = 0.802(In/Hr)
Area averaged loss rate (Fm) = 0.0726(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1760
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	6.61	10.060	18.95	0.073	0.802

Qmax(1) =
1.000 * 1.000 * 6.607) + = 6.607

Total of 1 main streams to confluence:
Flow rates before confluence point:
7.607
Maximum flow rates at confluence using above data:
6.607
Area of streams before confluence:
10.060
Effective area values after confluence:
10.060

Results of confluence:
Total flow rate = 6.607(CFS)
Time of concentration = 18.945 min.
Effective stream area after confluence = 10.060(Ac.)
Study area average Pervious fraction(Ap) = 0.176
Study area average soil loss rate(Fm) = 0.073(In/Hr)
Study area total = 10.06(Ac.)
End of computations, Total Study Area = 10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.176
Area averaged SCS curve number = 70.4

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/13/23

Space Center Expansion Project Phase 2 Flag
Developed Condition for Area A1 to A3
10 Year Design Storm Frequency
Please Refer to Appendix B Developed Condition Hydrology Map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.618 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

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

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 568.000(Ft.)
Top (of initial area) elevation = 2915.010(Ft.)
Bottom (of initial area) elevation = 2907.570(Ft.)
Difference in elevation = 7.440(Ft.)
Slope = 0.01310 s(%)= 1.31
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.145 min.
Rainfall intensity = 2.306(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff = 1.094(CFS)
Total initial stream area = 0.540(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.055(In/Hr)

++
Process from Point/Station 201.000 to Point/Station 202.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 2907.570(Ft.)
End of street segment elevation = 2903.580(Ft.)
Length of street segment = 568.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)

```
Width of half street (curb to crown)  =  20.000(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 [1] side(s) of the street
Distance from curb to property line  =   3.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(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 =      1.362(CFS)
Depth of flow =   0.181(Ft.), Average velocity =   1.654(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.072(Ft.)
Flow velocity =   1.65(Ft/s)
Travel time =    5.72 min.     TC =   14.87  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      1.641(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.870
Subarea runoff =      0.448(CFS) for    0.540(Ac.)
Total runoff =      1.542(CFS)
Effective area this stream =        1.08(Ac.)
Total Study Area (Main Stream No. 1) =        1.08(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Street flow at end of street =      1.542(CFS)
Half street flow at end of street =      1.542(CFS)
Depth of flow =   0.190(Ft.), Average velocity =   1.706(Ft/s)
Flow width (from curb towards crown)=   9.505(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2903.580(Ft.)
Downstream point elevation =  2894.080(Ft.)
Channel length thru subarea  =   562.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =      6.715(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      6.715(CFS)
Depth of flow =   0.172(Ft.), Average velocity =   3.898(Ft/s)
Channel flow top width =   10.000(Ft.)
Flow Velocity =    3.90(Ft/s)
Travel time  =    2.40 min.
Time of concentration =   17.27 min.
Critical depth =      0.242(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      1.478(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.867
Subarea runoff =     10.253(CFS) for    8.130(Ac.)
Total runoff =     11.795(CFS)
Effective area this stream =        9.21(Ac.)
Total Study Area (Main Stream No. 1) =        9.21(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.243(Ft.), Average velocity =   4.857(Ft/s)
Critical depth =      0.352(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2892.080(Ft.)
Downstream point/station elevation =  2891.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    11.795(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.795(CFS)
Normal flow depth in pipe =   12.87(In.)
Flow top width inside pipe =   16.25(In.)
Critical Depth =   15.67(In.)
Pipe flow velocity =      8.72(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    17.35 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    17.35 min.
Rainfall intensity =      1.473(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.856
Subarea runoff =      0.886(CFS) for    0.850(Ac.)
Total runoff =     12.681(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.073(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
```

Stream flow area = 10.060(Ac.)
Runoff from this stream = 12.681(CFS)
Time of concentration = 17.35 min.
Rainfall intensity = 1.473(In/Hr)
Area averaged loss rate (Fm) = 0.0726(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1760
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	12.68	10.060	17.35	0.073	1.473

Qmax(1) =
1.000 * 1.000 * 12.681) + = 12.681

Total of 1 main streams to confluence:
Flow rates before confluence point:
13.681
Maximum flow rates at confluence using above data:
12.681
Area of streams before confluence:
10.060
Effective area values after confluence:
10.060

Results of confluence:
Total flow rate = 12.681(CFS)
Time of concentration = 17.346 min.
Effective stream area after confluence = 10.060(Ac.)
Study area average Pervious fraction(Ap) = 0.176
Study area average soil loss rate(Fm) = 0.073(In/Hr)
Study area total = 10.06(Ac.)
End of computations, Total Study Area = 10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.176
Area averaged SCS curve number = 70.4

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2014 Version 9.0
Rational Hydrology Study Date: 01/13/23

Space Center Expansion Project Phase 2 Flag
Developed Condition for Area A1 to A3
100 Year Design Storm Frequency
Please Refer to Appendix B Developed Condition Hydrology map

Program License Serial Number 6385

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.090 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

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

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.055(In/Hr)
Initial subarea data:
Initial area flow distance = 568.000(Ft.)
Top (of initial area) elevation = 2915.020(Ft.)
Bottom (of initial area) elevation = 2907.570(Ft.)
Difference in elevation = 7.450(Ft.)
Slope = 0.01312 s(%)= 1.31
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.142 min.
Rainfall intensity = 4.068(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff = 1.950(CFS)
Total initial stream area = 0.540(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.055(In/Hr)

++

Process from Point/Station 201.000 to Point/Station 202.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****

Top of street segment elevation = 2907.570(Ft.)
End of street segment elevation = 2903.580(Ft.)
Length of street segment = 568.000(Ft.)
Height of curb above gutter flowline = 6.0(In.)

```
Width of half street (curb to crown)  =  20.000(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 [1] side(s) of the street
Distance from curb to property line  =   3.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   0.000(Ft.)
Gutter hike from flowline =  0.000(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 =      2.445(CFS)
Depth of flow =   0.226(Ft.), Average velocity =   1.915(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  11.300(Ft.)
Flow velocity =   1.91(Ft/s)
Travel time =    4.94 min.     TC =   14.09  min.
 Adding area flow to street
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      3.006(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.884
Subarea runoff =      0.918(CFS) for    0.540(Ac.)
Total runoff =      2.869(CFS)
Effective area this stream =        1.08(Ac.)
Total Study Area (Main Stream No. 1) =        1.08(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Street flow at end of street =      2.869(CFS)
Half street flow at end of street =      2.869(CFS)
Depth of flow =   0.240(Ft.), Average velocity =   1.993(Ft/s)
Flow width (from curb towards crown)=  11.997(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =  2903.580(Ft.)
Downstream point elevation =  2894.080(Ft.)
Channel length thru subarea  =   562.000(Ft.)
Channel base width  =   10.000(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   0.000
Estimated mean flow rate at midpoint of channel =     12.658(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     12.658(CFS)
Depth of flow =   0.254(Ft.), Average velocity =   4.992(Ft/s)
Channel flow top width =   10.000(Ft.)
Flow Velocity =    4.99(Ft/s)
Travel time  =    1.88 min.
Time of concentration =   15.96 min.
Critical depth =      0.367(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 69.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.055(In/Hr)
Rainfall intensity =      2.754(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.882
Subarea runoff =     19.506(CFS) for    8.130(Ac.)
Total runoff =     22.374(CFS)
Effective area this stream =        9.21(Ac.)
Total Study Area (Main Stream No. 1) =        9.21(Ac.)
Area averaged Fm value =    0.055(In/Hr)
Depth of flow =   0.360(Ft.), Average velocity =   6.220(Ft/s)
Critical depth =      0.539(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  2892.080(Ft.)
Downstream point/station elevation =  2891.500(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.012
No. of pipes = 1  Required pipe flow  =    22.374(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    22.374(CFS)
Normal flow depth in pipe =   15.63(In.)
Flow top width inside pipe =   22.87(In.)
Critical Depth =   20.23(In.)
Pipe flow velocity =     10.33(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    16.03 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 86.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.265(In/Hr)
Time of concentration =    16.03 min.
Rainfall intensity =      2.746(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.876
Subarea runoff =      1.834(CFS) for    0.850(Ac.)
Total runoff =     24.208(CFS)
Effective area this stream =       10.06(Ac.)
Total Study Area (Main Stream No. 1) =       10.06(Ac.)
Area averaged Fm value =    0.073(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
```

Stream flow area = 10.060(Ac.)
Runoff from this stream = 24.208(CFS)
Time of concentration = 16.03 min.
Rainfall intensity = 2.746(In/Hr)
Area averaged loss rate (Fm) = 0.0726(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1760
Summary of stream data:

Stream No.	Flow rate (CFS)	Area (Ac.)	TC (min)	Fm (In/Hr)	Rainfall Intensity (In/Hr)
1	24.21	10.060	16.03	0.073	2.746

Qmax(1) =
1.000 * 1.000 * 24.208) + = 24.208

Total of 1 main streams to confluence:
Flow rates before confluence point:
25.208
Maximum flow rates at confluence using above data:
24.208
Area of streams before confluence:
10.060
Effective area values after confluence:
10.060

Results of confluence:
Total flow rate = 24.208(CFS)
Time of concentration = 16.026 min.
Effective stream area after confluence = 10.060(Ac.)
Study area average Pervious fraction(Ap) = 0.176
Study area average soil loss rate(Fm) = 0.073(In/Hr)
Study area total = 10.06(Ac.)
End of computations, Total Study Area = 10.06 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.176
Area averaged SCS curve number = 70.4

APPENDIX D – UNIT HYDROGRAPH ANALYSIS

- Existing Condition, Area A (A1 to A3) - 10-Year 24 Hour Design Storm
- Existing Condition, Area A (A1 to A3) - 100-Year 24 Hour Design Storm
- Developed Condition, Area A (A1-A4) - 10-Year 24 Hour Design Storm
- Developed Condition, Area A (A1-A4) - 100-Year 24 Hour Design Storm

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

Study date 01/13/23

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6385

Space Center Expansion Project Phase 2 Flag
Existing Condition Area A1 to A3
10 Year 24 Hour Storm Event
Please Refer to Appendix B Existing Condition Hydrology Map

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
10.06	1	0.62
Rainfall data for year 10		
10.06	6	1.27
Rainfall data for year 10		
10.06	24	2.23

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
86.0	86.0	10.06	1.000	0.265	1.000	0.265

Area-averaged adjusted loss rate Fm (In/Hr) = 0.265

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC2)		Yield Fr
10.06	1.000	86.0	86.0	1.63	0.460

Area-averaged catchment yield fraction, Y = 0.460
Area-averaged low loss fraction, Yb = 0.540
User entry of time of concentration = 0.519 (hours)
++
Watershed area = 10.06(Ac.)
Catchment Lag time = 0.415 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 20.0706
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.265(In/Hr)
Average low loss rate fraction (Yb) = 0.540 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.293(In)
Computed peak 30-minute rainfall = 0.502(In)
Specified peak 1-hour rainfall = 0.618(In)
Computed peak 3-hour rainfall = 0.961(In)
Specified peak 6-hour rainfall = 1.270(In)
Specified peak 24-hour rainfall = 2.230(In)

Rainfall depth area reduction factors:
Using a total area of 10.06(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.293(In)
30-minute factor = 1.000 Adjusted rainfall = 0.502(In)
1-hour factor = 1.000 Adjusted rainfall = 0.618(In)
3-hour factor = 1.000 Adjusted rainfall = 0.961(In)
6-hour factor = 1.000 Adjusted rainfall = 1.270(In)
24-hour factor = 1.000 Adjusted rainfall = 2.230(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 121.66 (CFS))		
1	0.997	1.213
2	4.530	4.298
3	11.349	8.296
4	26.366	18.271
5	43.523	20.873
6	55.189	14.194
7	62.955	9.448
8	68.573	6.835
9	73.097	5.504
10	76.723	4.411
11	79.718	3.644
12	82.217	3.041
13	84.360	2.607
14	86.297	2.357
15	87.981	2.049
16	89.366	1.684
17	90.544	1.433
18	91.644	1.338
19	92.619	1.186
20	93.520	1.097
21	94.289	0.936
22	94.972	0.830

23	95.627	0.797
24	96.163	0.652
25	96.684	0.634
26	97.112	0.521
27	97.474	0.440
28	97.806	0.405
29	98.020	0.260
30	98.221	0.244
31	98.446	0.273
32	98.687	0.293
33	98.928	0.293
34	99.168	0.293
35	99.408	0.292
36	99.578	0.207
37	99.704	0.153
38	99.829	0.153
39	100.000	0.076

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2931	0.2931
2	0.3609	0.0678
3	0.4075	0.0467
4	0.4443	0.0367
5	0.4750	0.0308
6	0.5017	0.0267
7	0.5255	0.0237
8	0.5470	0.0215
9	0.5666	0.0197
10	0.5848	0.0182
11	0.6018	0.0170
12	0.6177	0.0159
13	0.6379	0.0202
14	0.6572	0.0193
15	0.6757	0.0185
16	0.6935	0.0178
17	0.7106	0.0171
18	0.7272	0.0165
19	0.7432	0.0160
20	0.7587	0.0155
21	0.7737	0.0150
22	0.7883	0.0146
23	0.8026	0.0142
24	0.8164	0.0139
25	0.8299	0.0135
26	0.8431	0.0132
27	0.8560	0.0129
28	0.8687	0.0126
29	0.8810	0.0124
30	0.8931	0.0121
31	0.9050	0.0119
32	0.9166	0.0116
33	0.9280	0.0114
34	0.9392	0.0112
35	0.9503	0.0110
36	0.9611	0.0108
37	0.9717	0.0106
38	0.9822	0.0105
39	0.9925	0.0103
40	1.0027	0.0102
41	1.0127	0.0100
42	1.0225	0.0099
43	1.0323	0.0097

44	1.0418	0.0096
45	1.0513	0.0095
46	1.0606	0.0093
47	1.0698	0.0092
48	1.0789	0.0091
49	1.0879	0.0090
50	1.0968	0.0089
51	1.1056	0.0088
52	1.1142	0.0087
53	1.1228	0.0086
54	1.1313	0.0085
55	1.1396	0.0084
56	1.1479	0.0083
57	1.1561	0.0082
58	1.1642	0.0081
59	1.1723	0.0080
60	1.1802	0.0079
61	1.1881	0.0079
62	1.1959	0.0078
63	1.2036	0.0077
64	1.2112	0.0076
65	1.2188	0.0076
66	1.2263	0.0075
67	1.2337	0.0074
68	1.2411	0.0074
69	1.2484	0.0073
70	1.2557	0.0072
71	1.2628	0.0072
72	1.2700	0.0071
73	1.2771	0.0071
74	1.2842	0.0071
75	1.2912	0.0070
76	1.2982	0.0070
77	1.3051	0.0069
78	1.3119	0.0069
79	1.3187	0.0068
80	1.3255	0.0068
81	1.3322	0.0067
82	1.3388	0.0067
83	1.3454	0.0066
84	1.3520	0.0066
85	1.3585	0.0065
86	1.3650	0.0065
87	1.3714	0.0064
88	1.3778	0.0064
89	1.3841	0.0063
90	1.3904	0.0063
91	1.3967	0.0063
92	1.4029	0.0062
93	1.4091	0.0062
94	1.4152	0.0061
95	1.4213	0.0061
96	1.4273	0.0061
97	1.4334	0.0060
98	1.4394	0.0060
99	1.4453	0.0059
100	1.4512	0.0059
101	1.4571	0.0059
102	1.4629	0.0058
103	1.4687	0.0058
104	1.4745	0.0058
105	1.4803	0.0057
106	1.4860	0.0057

107	1.4916	0.0057
108	1.4973	0.0056
109	1.5029	0.0056
110	1.5085	0.0056
111	1.5140	0.0056
112	1.5196	0.0055
113	1.5251	0.0055
114	1.5305	0.0055
115	1.5360	0.0054
116	1.5414	0.0054
117	1.5468	0.0054
118	1.5521	0.0054
119	1.5574	0.0053
120	1.5627	0.0053
121	1.5680	0.0053
122	1.5733	0.0052
123	1.5785	0.0052
124	1.5837	0.0052
125	1.5889	0.0052
126	1.5940	0.0051
127	1.5991	0.0051
128	1.6042	0.0051
129	1.6093	0.0051
130	1.6144	0.0051
131	1.6194	0.0050
132	1.6244	0.0050
133	1.6294	0.0050
134	1.6344	0.0050
135	1.6393	0.0049
136	1.6442	0.0049
137	1.6491	0.0049
138	1.6540	0.0049
139	1.6589	0.0049
140	1.6637	0.0048
141	1.6685	0.0048
142	1.6733	0.0048
143	1.6781	0.0048
144	1.6828	0.0048
145	1.6876	0.0047
146	1.6923	0.0047
147	1.6970	0.0047
148	1.7017	0.0047
149	1.7063	0.0047
150	1.7110	0.0046
151	1.7156	0.0046
152	1.7202	0.0046
153	1.7248	0.0046
154	1.7294	0.0046
155	1.7339	0.0046
156	1.7385	0.0045
157	1.7430	0.0045
158	1.7475	0.0045
159	1.7520	0.0045
160	1.7564	0.0045
161	1.7609	0.0044
162	1.7653	0.0044
163	1.7697	0.0044
164	1.7741	0.0044
165	1.7785	0.0044
166	1.7829	0.0044
167	1.7872	0.0044
168	1.7916	0.0043
169	1.7959	0.0043

170	1.8002	0.0043
171	1.8045	0.0043
172	1.8088	0.0043
173	1.8130	0.0043
174	1.8173	0.0042
175	1.8215	0.0042
176	1.8257	0.0042
177	1.8299	0.0042
178	1.8341	0.0042
179	1.8383	0.0042
180	1.8425	0.0042
181	1.8466	0.0042
182	1.8508	0.0041
183	1.8549	0.0041
184	1.8590	0.0041
185	1.8631	0.0041
186	1.8672	0.0041
187	1.8712	0.0041
188	1.8753	0.0041
189	1.8793	0.0040
190	1.8834	0.0040
191	1.8874	0.0040
192	1.8914	0.0040
193	1.8954	0.0040
194	1.8994	0.0040
195	1.9034	0.0040
196	1.9073	0.0040
197	1.9113	0.0039
198	1.9152	0.0039
199	1.9191	0.0039
200	1.9230	0.0039
201	1.9269	0.0039
202	1.9308	0.0039
203	1.9347	0.0039
204	1.9386	0.0039
205	1.9424	0.0039
206	1.9462	0.0038
207	1.9501	0.0038
208	1.9539	0.0038
209	1.9577	0.0038
210	1.9615	0.0038
211	1.9653	0.0038
212	1.9691	0.0038
213	1.9728	0.0038
214	1.9766	0.0038
215	1.9803	0.0037
216	1.9841	0.0037
217	1.9878	0.0037
218	1.9915	0.0037
219	1.9952	0.0037
220	1.9989	0.0037
221	2.0026	0.0037
222	2.0063	0.0037
223	2.0099	0.0037
224	2.0136	0.0037
225	2.0172	0.0036
226	2.0209	0.0036
227	2.0245	0.0036
228	2.0281	0.0036
229	2.0317	0.0036
230	2.0353	0.0036
231	2.0389	0.0036
232	2.0425	0.0036

233	2.0461	0.0036
234	2.0496	0.0036
235	2.0532	0.0036
236	2.0567	0.0035
237	2.0603	0.0035
238	2.0638	0.0035
239	2.0673	0.0035
240	2.0708	0.0035
241	2.0743	0.0035
242	2.0778	0.0035
243	2.0813	0.0035
244	2.0848	0.0035
245	2.0882	0.0035
246	2.0917	0.0035
247	2.0951	0.0034
248	2.0986	0.0034
249	2.1020	0.0034
250	2.1054	0.0034
251	2.1089	0.0034
252	2.1123	0.0034
253	2.1157	0.0034
254	2.1191	0.0034
255	2.1224	0.0034
256	2.1258	0.0034
257	2.1292	0.0034
258	2.1325	0.0034
259	2.1359	0.0034
260	2.1392	0.0033
261	2.1426	0.0033
262	2.1459	0.0033
263	2.1492	0.0033
264	2.1525	0.0033
265	2.1559	0.0033
266	2.1592	0.0033
267	2.1624	0.0033
268	2.1657	0.0033
269	2.1690	0.0033
270	2.1723	0.0033
271	2.1755	0.0033
272	2.1788	0.0033
273	2.1821	0.0032
274	2.1853	0.0032
275	2.1885	0.0032
276	2.1918	0.0032
277	2.1950	0.0032
278	2.1982	0.0032
279	2.2014	0.0032
280	2.2046	0.0032
281	2.2078	0.0032
282	2.2110	0.0032
283	2.2142	0.0032
284	2.2173	0.0032
285	2.2205	0.0032
286	2.2237	0.0032
287	2.2268	0.0032
288	2.2300	0.0031

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0031	0.0017	0.0014
2	0.0032	0.0017	0.0015

3	0.0032	0.0017	0.0015
4	0.0032	0.0017	0.0015
5	0.0032	0.0017	0.0015
6	0.0032	0.0017	0.0015
7	0.0032	0.0017	0.0015
8	0.0032	0.0017	0.0015
9	0.0032	0.0017	0.0015
10	0.0032	0.0017	0.0015
11	0.0032	0.0018	0.0015
12	0.0033	0.0018	0.0015
13	0.0033	0.0018	0.0015
14	0.0033	0.0018	0.0015
15	0.0033	0.0018	0.0015
16	0.0033	0.0018	0.0015
17	0.0033	0.0018	0.0015
18	0.0033	0.0018	0.0015
19	0.0033	0.0018	0.0015
20	0.0033	0.0018	0.0015
21	0.0034	0.0018	0.0015
22	0.0034	0.0018	0.0016
23	0.0034	0.0018	0.0016
24	0.0034	0.0018	0.0016
25	0.0034	0.0018	0.0016
26	0.0034	0.0018	0.0016
27	0.0034	0.0019	0.0016
28	0.0034	0.0019	0.0016
29	0.0035	0.0019	0.0016
30	0.0035	0.0019	0.0016
31	0.0035	0.0019	0.0016
32	0.0035	0.0019	0.0016
33	0.0035	0.0019	0.0016
34	0.0035	0.0019	0.0016
35	0.0035	0.0019	0.0016
36	0.0035	0.0019	0.0016
37	0.0036	0.0019	0.0016
38	0.0036	0.0019	0.0016
39	0.0036	0.0019	0.0017
40	0.0036	0.0019	0.0017
41	0.0036	0.0020	0.0017
42	0.0036	0.0020	0.0017
43	0.0036	0.0020	0.0017
44	0.0037	0.0020	0.0017
45	0.0037	0.0020	0.0017
46	0.0037	0.0020	0.0017
47	0.0037	0.0020	0.0017
48	0.0037	0.0020	0.0017
49	0.0037	0.0020	0.0017
50	0.0037	0.0020	0.0017
51	0.0038	0.0020	0.0017
52	0.0038	0.0020	0.0017
53	0.0038	0.0020	0.0017
54	0.0038	0.0021	0.0018
55	0.0038	0.0021	0.0018
56	0.0038	0.0021	0.0018
57	0.0039	0.0021	0.0018
58	0.0039	0.0021	0.0018
59	0.0039	0.0021	0.0018
60	0.0039	0.0021	0.0018
61	0.0039	0.0021	0.0018
62	0.0039	0.0021	0.0018
63	0.0040	0.0021	0.0018
64	0.0040	0.0021	0.0018
65	0.0040	0.0022	0.0018

66	0.0040	0.0022	0.0019
67	0.0040	0.0022	0.0019
68	0.0041	0.0022	0.0019
69	0.0041	0.0022	0.0019
70	0.0041	0.0022	0.0019
71	0.0041	0.0022	0.0019
72	0.0041	0.0022	0.0019
73	0.0042	0.0022	0.0019
74	0.0042	0.0023	0.0019
75	0.0042	0.0023	0.0019
76	0.0042	0.0023	0.0019
77	0.0042	0.0023	0.0020
78	0.0043	0.0023	0.0020
79	0.0043	0.0023	0.0020
80	0.0043	0.0023	0.0020
81	0.0043	0.0023	0.0020
82	0.0044	0.0023	0.0020
83	0.0044	0.0024	0.0020
84	0.0044	0.0024	0.0020
85	0.0044	0.0024	0.0020
86	0.0044	0.0024	0.0020
87	0.0045	0.0024	0.0021
88	0.0045	0.0024	0.0021
89	0.0045	0.0024	0.0021
90	0.0046	0.0025	0.0021
91	0.0046	0.0025	0.0021
92	0.0046	0.0025	0.0021
93	0.0046	0.0025	0.0021
94	0.0047	0.0025	0.0021
95	0.0047	0.0025	0.0022
96	0.0047	0.0025	0.0022
97	0.0048	0.0026	0.0022
98	0.0048	0.0026	0.0022
99	0.0048	0.0026	0.0022
100	0.0048	0.0026	0.0022
101	0.0049	0.0026	0.0022
102	0.0049	0.0026	0.0023
103	0.0049	0.0027	0.0023
104	0.0050	0.0027	0.0023
105	0.0050	0.0027	0.0023
106	0.0050	0.0027	0.0023
107	0.0051	0.0027	0.0023
108	0.0051	0.0028	0.0023
109	0.0051	0.0028	0.0024
110	0.0052	0.0028	0.0024
111	0.0052	0.0028	0.0024
112	0.0052	0.0028	0.0024
113	0.0053	0.0029	0.0024
114	0.0053	0.0029	0.0025
115	0.0054	0.0029	0.0025
116	0.0054	0.0029	0.0025
117	0.0055	0.0029	0.0025
118	0.0055	0.0030	0.0025
119	0.0056	0.0030	0.0026
120	0.0056	0.0030	0.0026
121	0.0056	0.0030	0.0026
122	0.0057	0.0031	0.0026
123	0.0057	0.0031	0.0026
124	0.0058	0.0031	0.0027
125	0.0058	0.0032	0.0027
126	0.0059	0.0032	0.0027
127	0.0059	0.0032	0.0027
128	0.0060	0.0032	0.0028

129	0.0061	0.0033	0.0028
130	0.0061	0.0033	0.0028
131	0.0062	0.0033	0.0028
132	0.0062	0.0034	0.0029
133	0.0063	0.0034	0.0029
134	0.0063	0.0034	0.0029
135	0.0064	0.0035	0.0030
136	0.0065	0.0035	0.0030
137	0.0066	0.0035	0.0030
138	0.0066	0.0036	0.0030
139	0.0067	0.0036	0.0031
140	0.0068	0.0036	0.0031
141	0.0069	0.0037	0.0032
142	0.0069	0.0037	0.0032
143	0.0070	0.0038	0.0032
144	0.0071	0.0038	0.0033
145	0.0071	0.0038	0.0033
146	0.0072	0.0039	0.0033
147	0.0073	0.0039	0.0034
148	0.0074	0.0040	0.0034
149	0.0075	0.0040	0.0035
150	0.0076	0.0041	0.0035
151	0.0077	0.0042	0.0036
152	0.0078	0.0042	0.0036
153	0.0079	0.0043	0.0037
154	0.0080	0.0043	0.0037
155	0.0082	0.0044	0.0038
156	0.0083	0.0045	0.0038
157	0.0085	0.0046	0.0039
158	0.0086	0.0046	0.0039
159	0.0088	0.0047	0.0040
160	0.0089	0.0048	0.0041
161	0.0091	0.0049	0.0042
162	0.0092	0.0050	0.0042
163	0.0095	0.0051	0.0044
164	0.0096	0.0052	0.0044
165	0.0099	0.0053	0.0045
166	0.0100	0.0054	0.0046
167	0.0103	0.0056	0.0047
168	0.0105	0.0057	0.0048
169	0.0108	0.0058	0.0050
170	0.0110	0.0059	0.0051
171	0.0114	0.0062	0.0053
172	0.0116	0.0063	0.0054
173	0.0121	0.0065	0.0056
174	0.0124	0.0067	0.0057
175	0.0129	0.0070	0.0059
176	0.0132	0.0071	0.0061
177	0.0139	0.0075	0.0064
178	0.0142	0.0077	0.0066
179	0.0150	0.0081	0.0069
180	0.0155	0.0084	0.0071
181	0.0165	0.0089	0.0076
182	0.0171	0.0092	0.0079
183	0.0185	0.0100	0.0085
184	0.0193	0.0104	0.0089
185	0.0159	0.0086	0.0073
186	0.0170	0.0092	0.0078
187	0.0197	0.0106	0.0091
188	0.0215	0.0116	0.0099
189	0.0267	0.0144	0.0123
190	0.0308	0.0166	0.0142
191	0.0467	0.0221	0.0246

192	0.0678	0.0221	0.0457
193	0.2931	0.0221	0.2710
194	0.0367	0.0198	0.0169
195	0.0237	0.0128	0.0109
196	0.0182	0.0098	0.0084
197	0.0202	0.0109	0.0093
198	0.0178	0.0096	0.0082
199	0.0160	0.0086	0.0074
200	0.0146	0.0079	0.0067
201	0.0135	0.0073	0.0062
202	0.0126	0.0068	0.0058
203	0.0119	0.0064	0.0055
204	0.0112	0.0061	0.0052
205	0.0106	0.0057	0.0049
206	0.0102	0.0055	0.0047
207	0.0097	0.0052	0.0045
208	0.0093	0.0050	0.0043
209	0.0090	0.0048	0.0041
210	0.0087	0.0047	0.0040
211	0.0084	0.0045	0.0039
212	0.0081	0.0044	0.0037
213	0.0079	0.0042	0.0036
214	0.0076	0.0041	0.0035
215	0.0074	0.0040	0.0034
216	0.0072	0.0039	0.0033
217	0.0071	0.0038	0.0033
218	0.0070	0.0038	0.0032
219	0.0068	0.0037	0.0031
220	0.0067	0.0036	0.0031
221	0.0065	0.0035	0.0030
222	0.0064	0.0034	0.0029
223	0.0063	0.0034	0.0029
224	0.0061	0.0033	0.0028
225	0.0060	0.0032	0.0028
226	0.0059	0.0032	0.0027
227	0.0058	0.0031	0.0027
228	0.0057	0.0031	0.0026
229	0.0056	0.0030	0.0026
230	0.0055	0.0030	0.0025
231	0.0054	0.0029	0.0025
232	0.0054	0.0029	0.0025
233	0.0053	0.0028	0.0024
234	0.0052	0.0028	0.0024
235	0.0051	0.0028	0.0024
236	0.0051	0.0027	0.0023
237	0.0050	0.0027	0.0023
238	0.0049	0.0027	0.0023
239	0.0049	0.0026	0.0022
240	0.0048	0.0026	0.0022
241	0.0047	0.0026	0.0022
242	0.0047	0.0025	0.0022
243	0.0046	0.0025	0.0021
244	0.0046	0.0025	0.0021
245	0.0045	0.0024	0.0021
246	0.0045	0.0024	0.0021
247	0.0044	0.0024	0.0020
248	0.0044	0.0024	0.0020
249	0.0043	0.0023	0.0020
250	0.0043	0.0023	0.0020
251	0.0042	0.0023	0.0019
252	0.0042	0.0023	0.0019
253	0.0042	0.0022	0.0019
254	0.0041	0.0022	0.0019

255	0.0041	0.0022	0.0019
256	0.0040	0.0022	0.0019
257	0.0040	0.0022	0.0018
258	0.0040	0.0021	0.0018
259	0.0039	0.0021	0.0018
260	0.0039	0.0021	0.0018
261	0.0039	0.0021	0.0018
262	0.0038	0.0021	0.0018
263	0.0038	0.0020	0.0017
264	0.0038	0.0020	0.0017
265	0.0037	0.0020	0.0017
266	0.0037	0.0020	0.0017
267	0.0037	0.0020	0.0017
268	0.0036	0.0020	0.0017
269	0.0036	0.0019	0.0017
270	0.0036	0.0019	0.0016
271	0.0036	0.0019	0.0016
272	0.0035	0.0019	0.0016
273	0.0035	0.0019	0.0016
274	0.0035	0.0019	0.0016
275	0.0034	0.0019	0.0016
276	0.0034	0.0018	0.0016
277	0.0034	0.0018	0.0016
278	0.0034	0.0018	0.0016
279	0.0034	0.0018	0.0015
280	0.0033	0.0018	0.0015
281	0.0033	0.0018	0.0015
282	0.0033	0.0018	0.0015
283	0.0033	0.0018	0.0015
284	0.0032	0.0017	0.0015
285	0.0032	0.0017	0.0015
286	0.0032	0.0017	0.0015
287	0.0032	0.0017	0.0015
288	0.0032	0.0017	0.0015

Total soil rain loss = 1.05(In)
Total effective rainfall = 1.18(In)
Peak flow rate in flood hydrograph = 7.40(CFS)

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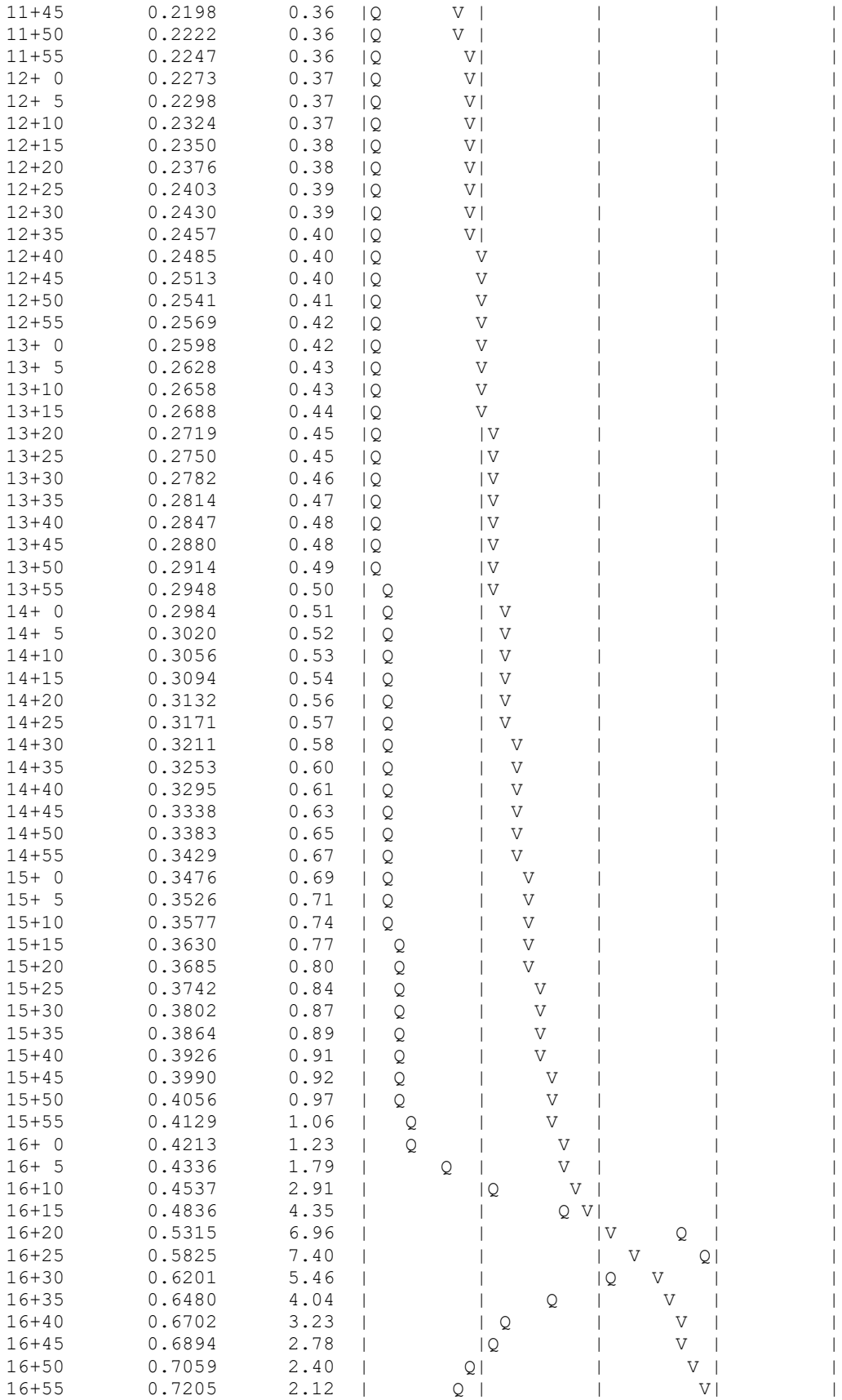
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0002	0.02	Q	|	|	|	|
0+20	0.0005	0.05	Q	|	|	|	|
0+25	0.0011	0.08	Q	|	|	|	|
0+30	0.0017	0.10	Q	|	|	|	|
0+35	0.0025	0.11	Q	|	|	|	|
0+40	0.0033	0.12	Q	|	|	|	|
0+45	0.0042	0.13	Q	|	|	|	|
0+50	0.0052	0.14	Q	|	|	|	|
0+55	0.0062	0.14	Q	|	|	|	|
1+ 0	0.0072	0.15	Q	|	|	|	|
1+ 5	0.0082	0.15	Q	|	|	|	|
1+10	0.0093	0.16	Q	|	|	|	|

1+15	0.0104	0.16	Q	|	|	|	|
1+20	0.0115	0.16	Q	|	|	|	|
1+25	0.0127	0.16	Q	|	|	|	|
1+30	0.0138	0.17	Q	|	|	|	|
1+35	0.0150	0.17	Q	|	|	|	|
1+40	0.0162	0.17	Q	|	|	|	|
1+45	0.0174	0.17	Q	|	|	|	|
1+50	0.0186	0.18	Q	|	|	|	|
1+55	0.0198	0.18	Q	|	|	|	|
2+ 0	0.0210	0.18	Q	|	|	|	|
2+ 5	0.0223	0.18	Q	|	|	|	|
2+10	0.0235	0.18	Q	|	|	|	|
2+15	0.0248	0.18	QV	|	|	|	|
2+20	0.0260	0.18	QV	|	|	|	|
2+25	0.0273	0.19	QV	|	|	|	|
2+30	0.0286	0.19	QV	|	|	|	|
2+35	0.0299	0.19	QV	|	|	|	|
2+40	0.0312	0.19	QV	|	|	|	|
2+45	0.0325	0.19	QV	|	|	|	|
2+50	0.0338	0.19	QV	|	|	|	|
2+55	0.0351	0.19	QV	|	|	|	|
3+ 0	0.0365	0.19	QV	|	|	|	|
3+ 5	0.0378	0.19	QV	|	|	|	|
3+10	0.0391	0.19	QV	|	|	|	|
3+15	0.0405	0.20	QV	|	|	|	|
3+20	0.0418	0.20	QV	|	|	|	|
3+25	0.0432	0.20	QV	|	|	|	|
3+30	0.0445	0.20	QV	|	|	|	|
3+35	0.0459	0.20	QV	|	|	|	|
3+40	0.0473	0.20	QV	|	|	|	|
3+45	0.0486	0.20	QV	|	|	|	|
3+50	0.0500	0.20	Q V	|	|	|	|
3+55	0.0514	0.20	Q V	|	|	|	|
4+ 0	0.0528	0.20	Q V	|	|	|	|
4+ 5	0.0542	0.20	Q V	|	|	|	|
4+10	0.0556	0.20	Q V	|	|	|	|
4+15	0.0570	0.20	Q V	|	|	|	|
4+20	0.0584	0.21	Q V	|	|	|	|
4+25	0.0599	0.21	Q V	|	|	|	|
4+30	0.0613	0.21	Q V	|	|	|	|
4+35	0.0627	0.21	Q V	|	|	|	|
4+40	0.0641	0.21	Q V	|	|	|	|
4+45	0.0656	0.21	Q V	|	|	|	|
4+50	0.0670	0.21	Q V	|	|	|	|
4+55	0.0685	0.21	Q V	|	|	|	|
5+ 0	0.0700	0.21	Q V	|	|	|	|
5+ 5	0.0714	0.21	Q V	|	|	|	|
5+10	0.0729	0.21	Q V	|	|	|	|
5+15	0.0744	0.22	Q V	|	|	|	|
5+20	0.0759	0.22	Q V	|	|	|	|
5+25	0.0774	0.22	Q V	|	|	|	|
5+30	0.0789	0.22	Q V	|	|	|	|
5+35	0.0804	0.22	Q V	|	|	|	|
5+40	0.0819	0.22	Q V	|	|	|	|
5+45	0.0834	0.22	Q V	|	|	|	|
5+50	0.0849	0.22	Q V	|	|	|	|
5+55	0.0865	0.22	Q V	|	|	|	|
6+ 0	0.0880	0.22	Q V	|	|	|	|
6+ 5	0.0896	0.22	Q V	|	|	|	|
6+10	0.0911	0.23	Q V	|	|	|	|
6+15	0.0927	0.23	Q V	|	|	|	|
6+20	0.0943	0.23	Q V	|	|	|	|
6+25	0.0958	0.23	Q V	|	|	|	|

6+30	0.0974	0.23	Q V	|	|	|	|
6+35	0.0990	0.23	Q V	|	|	|	|
6+40	0.1006	0.23	Q V	|	|	|	|
6+45	0.1022	0.23	Q V	|	|	|	|
6+50	0.1038	0.24	Q V	|	|	|	|
6+55	0.1055	0.24	Q V	|	|	|	|
7+ 0	0.1071	0.24	Q V	|	|	|	|
7+ 5	0.1088	0.24	Q V	|	|	|	|
7+10	0.1104	0.24	Q V	|	|	|	|
7+15	0.1121	0.24	Q V	|	|	|	|
7+20	0.1137	0.24	Q V	|	|	|	|
7+25	0.1154	0.24	Q V	|	|	|	|
7+30	0.1171	0.25	Q V	|	|	|	|
7+35	0.1188	0.25	Q V	|	|	|	|
7+40	0.1205	0.25	Q V	|	|	|	|
7+45	0.1222	0.25	Q V	|	|	|	|
7+50	0.1239	0.25	|Q V	|	|	|	|
7+55	0.1257	0.25	|Q V	|	|	|	|
8+ 0	0.1274	0.25	|Q V	|	|	|	|
8+ 5	0.1292	0.25	|Q V	|	|	|	|
8+10	0.1309	0.26	|Q V	|	|	|	|
8+15	0.1327	0.26	|Q V	|	|	|	|
8+20	0.1345	0.26	|Q V	|	|	|	|
8+25	0.1363	0.26	|Q V	|	|	|	|
8+30	0.1381	0.26	|Q V	|	|	|	|
8+35	0.1399	0.26	|Q V	|	|	|	|
8+40	0.1418	0.27	|Q V	|	|	|	|
8+45	0.1436	0.27	|Q V	|	|	|	|
8+50	0.1455	0.27	|Q V	|	|	|	|
8+55	0.1473	0.27	|Q V	|	|	|	|
9+ 0	0.1492	0.27	|Q V	|	|	|	|
9+ 5	0.1511	0.27	|Q V	|	|	|	|
9+10	0.1530	0.28	|Q V	|	|	|	|
9+15	0.1549	0.28	|Q V	|	|	|	|
9+20	0.1568	0.28	|Q V	|	|	|	|
9+25	0.1588	0.28	|Q V	|	|	|	|
9+30	0.1607	0.28	|Q V	|	|	|	|
9+35	0.1627	0.29	|Q V	|	|	|	|
9+40	0.1647	0.29	|Q V	|	|	|	|
9+45	0.1667	0.29	|Q V	|	|	|	|
9+50	0.1687	0.29	|Q V	|	|	|	|
9+55	0.1707	0.29	|Q V	|	|	|	|
10+ 0	0.1728	0.30	|Q V	|	|	|	|
10+ 5	0.1748	0.30	|Q V	|	|	|	|
10+10	0.1769	0.30	|Q V	|	|	|	|
10+15	0.1790	0.30	|Q V	|	|	|	|
10+20	0.1811	0.31	|Q V	|	|	|	|
10+25	0.1832	0.31	|Q V	|	|	|	|
10+30	0.1853	0.31	|Q V	|	|	|	|
10+35	0.1875	0.31	|Q V	|	|	|	|
10+40	0.1897	0.32	|Q V	|	|	|	|
10+45	0.1919	0.32	|Q V	|	|	|	|
10+50	0.1941	0.32	|Q V	|	|	|	|
10+55	0.1963	0.32	|Q V	|	|	|	|
11+ 0	0.1985	0.33	|Q V	|	|	|	|
11+ 5	0.2008	0.33	|Q V	|	|	|	|
11+10	0.2031	0.33	|Q V	|	|	|	|
11+15	0.2054	0.34	|Q V	|	|	|	|
11+20	0.2078	0.34	|Q V	|	|	|	|
11+25	0.2101	0.34	|Q V	|	|	|	|
11+30	0.2125	0.35	|Q V	|	|	|	|
11+35	0.2149	0.35	|Q V	|	|	|	|
11+40	0.2173	0.35	|Q V	|	|	|	|



17+ 0	0.7334	1.88	| Q |	|	|	V|
17+ 5	0.7452	1.70	| Q |	|	|	V |
17+10	0.7560	1.57	| Q |	|	|	V |
17+15	0.7659	1.44	| Q |	|	|	|V |
17+20	0.7748	1.29	| Q |	|	|	|V |
17+25	0.7829	1.18	| Q |	|	|	|V |
17+30	0.7906	1.12	| Q |	|	|	| V |
17+35	0.7978	1.04	| Q |	|	|	| V |
17+40	0.8046	0.98	| Q |	|	|	| V |
17+45	0.8108	0.91	| Q |	|	|	| V |
17+50	0.8167	0.86	| Q |	|	|	| V |
17+55	0.8224	0.82	| Q |	|	|	| V |
18+ 0	0.8276	0.76	| Q |	|	|	| V |
18+ 5	0.8326	0.73	| Q |	|	|	| V |
18+10	0.8372	0.68	| Q |	|	|	| V |
18+15	0.8416	0.63	| Q |	|	|	| V |
18+20	0.8458	0.60	| Q |	|	|	| V |
18+25	0.8496	0.55	| Q |	|	|	| V |
18+30	0.8532	0.53	| Q |	|	|	| V |
18+35	0.8569	0.53	| Q |	|	|	| V |
18+40	0.8605	0.52	| Q |	|	|	| V |
18+45	0.8640	0.51	| Q |	|	|	| V |
18+50	0.8675	0.50	|Q |	|	|	| V |
18+55	0.8708	0.49	|Q |	|	|	| V |
19+ 0	0.8739	0.45	|Q |	|	|	| V |
19+ 5	0.8769	0.43	|Q |	|	|	| V |
19+10	0.8797	0.41	|Q |	|	|	| V |
19+15	0.8823	0.38	|Q |	|	|	| V |
19+20	0.8848	0.35	|Q |	|	|	| V |
19+25	0.8871	0.34	|Q |	|	|	| V |
19+30	0.8895	0.34	|Q |	|	|	| V |
19+35	0.8917	0.33	|Q |	|	|	| V |
19+40	0.8940	0.32	|Q |	|	|	| V |
19+45	0.8962	0.32	|Q |	|	|	| V |
19+50	0.8983	0.31	|Q |	|	|	| V |
19+55	0.9004	0.31	|Q |	|	|	| V |
20+ 0	0.9025	0.30	|Q |	|	|	| V |
20+ 5	0.9046	0.30	|Q |	|	|	| V |
20+10	0.9066	0.29	|Q |	|	|	| V |
20+15	0.9086	0.29	|Q |	|	|	| V |
20+20	0.9105	0.28	|Q |	|	|	| V |
20+25	0.9125	0.28	|Q |	|	|	| V |
20+30	0.9144	0.28	|Q |	|	|	| V |
20+35	0.9162	0.27	|Q |	|	|	| V |
20+40	0.9181	0.27	|Q |	|	|	| V |
20+45	0.9199	0.27	|Q |	|	|	| V |
20+50	0.9217	0.26	|Q |	|	|	| V |
20+55	0.9235	0.26	|Q |	|	|	| V |
21+ 0	0.9253	0.26	|Q |	|	|	| V |
21+ 5	0.9270	0.25	|Q |	|	|	| V |
21+10	0.9288	0.25	|Q |	|	|	| V |
21+15	0.9305	0.25	Q |	|	|	| V |
21+20	0.9322	0.24	Q |	|	|	| V |
21+25	0.9338	0.24	Q |	|	|	| V |
21+30	0.9355	0.24	Q |	|	|	| V |
21+35	0.9371	0.24	Q |	|	|	| V |
21+40	0.9387	0.23	Q |	|	|	| V |
21+45	0.9403	0.23	Q |	|	|	| V |
21+50	0.9419	0.23	Q |	|	|	| V |
21+55	0.9435	0.23	Q |	|	|	| V |
22+ 0	0.9450	0.23	Q |	|	|	| V |
22+ 5	0.9466	0.22	Q |	|	|	| V |
22+10	0.9481	0.22	Q |	|	|	| V |

22+15	0.9496	0.22	Q	|	|	|	V |
22+20	0.9511	0.22	Q	|	|	|	V |
22+25	0.9526	0.22	Q	|	|	|	V |
22+30	0.9541	0.21	Q	|	|	|	V |
22+35	0.9555	0.21	Q	|	|	|	V |
22+40	0.9570	0.21	Q	|	|	|	V |
22+45	0.9584	0.21	Q	|	|	|	V |
22+50	0.9598	0.21	Q	|	|	|	V |
22+55	0.9612	0.20	Q	|	|	|	V |
23+ 0	0.9626	0.20	Q	|	|	|	V |
23+ 5	0.9640	0.20	Q	|	|	|	V|
23+10	0.9654	0.20	Q	|	|	|	V|
23+15	0.9668	0.20	Q	|	|	|	V|
23+20	0.9681	0.20	Q	|	|	|	V|
23+25	0.9695	0.20	Q	|	|	|	V|
23+30	0.9708	0.19	Q	|	|	|	V|
23+35	0.9721	0.19	Q	|	|	|	V|
23+40	0.9734	0.19	Q	|	|	|	V|
23+45	0.9748	0.19	Q	|	|	|	V|
23+50	0.9761	0.19	Q	|	|	|	V|
23+55	0.9773	0.19	Q	|	|	|	V|
24+ 0	0.9786	0.19	Q	|	|	|	V|
24+ 5	0.9799	0.18	Q	|	|	|	V|
24+10	0.9811	0.18	Q	|	|	|	V|
24+15	0.9822	0.16	Q	|	|	|	V|
24+20	0.9831	0.13	Q	|	|	|	V|
24+25	0.9839	0.10	Q	|	|	|	V|
24+30	0.9844	0.08	Q	|	|	|	V|
24+35	0.9849	0.07	Q	|	|	|	V|
24+40	0.9853	0.06	Q	|	|	|	V|
24+45	0.9856	0.05	Q	|	|	|	V|
24+50	0.9859	0.04	Q	|	|	|	V|
24+55	0.9862	0.04	Q	|	|	|	V|
25+ 0	0.9864	0.03	Q	|	|	|	V|
25+ 5	0.9866	0.03	Q	|	|	|	V|
25+10	0.9868	0.03	Q	|	|	|	V|
25+15	0.9869	0.02	Q	|	|	|	V|
25+20	0.9871	0.02	Q	|	|	|	V|
25+25	0.9872	0.02	Q	|	|	|	V|
25+30	0.9873	0.02	Q	|	|	|	V|
25+35	0.9874	0.01	Q	|	|	|	V|
25+40	0.9875	0.01	Q	|	|	|	V|
25+45	0.9875	0.01	Q	|	|	|	V|
25+50	0.9876	0.01	Q	|	|	|	V|
25+55	0.9877	0.01	Q	|	|	|	V|
26+ 0	0.9877	0.01	Q	|	|	|	V|
26+ 5	0.9877	0.01	Q	|	|	|	V|
26+10	0.9878	0.01	Q	|	|	|	V|
26+15	0.9878	0.00	Q	|	|	|	V|
26+20	0.9878	0.00	Q	|	|	|	V|
26+25	0.9879	0.00	Q	|	|	|	V|
26+30	0.9879	0.00	Q	|	|	|	V|
26+35	0.9879	0.00	Q	|	|	|	V|
26+40	0.9879	0.00	Q	|	|	|	V|
26+45	0.9879	0.00	Q	|	|	|	V|
26+50	0.9879	0.00	Q	|	|	|	V|
26+55	0.9879	0.00	Q	|	|	|	V|
27+ 0	0.9879	0.00	Q	|	|	|	V|
27+ 5	0.9880	0.00	Q	|	|	|	V|
27+10	0.9880	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 01/13/23

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6385

Space Center Expansion Project Phase 2 Flag
Existing Condition Area A1 to A3
100 Year 24 Hour Storm Event
Please Refer to Appendix B Existing Condition Hydrology Map

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
10.06	1	1.09
Rainfall data for year 100		
10.06	6	2.09
Rainfall data for year 100		
10.06	24	3.64

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
86.0	86.0	10.06	1.000	0.265	1.000	0.265

Area-averaged adjusted loss rate Fm (In/Hr) = 0.265

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC2)		Yield Fr
10.06	1.000	86.0	86.0	1.63	0.611

Area-averaged catchment yield fraction, Y = 0.611
Area-averaged low loss fraction, Yb = 0.389
User entry of time of concentration = 0.475 (hours)
++
Watershed area = 10.06(Ac.)
Catchment Lag time = 0.380 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 21.9298
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.265(In/Hr)
Average low loss rate fraction (Yb) = 0.389 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.517(In)
Computed peak 30-minute rainfall = 0.885(In)
Specified peak 1-hour rainfall = 1.090(In)
Computed peak 3-hour rainfall = 1.625(In)
Specified peak 6-hour rainfall = 2.090(In)
Specified peak 24-hour rainfall = 3.640(In)

Rainfall depth area reduction factors:
Using a total area of 10.06(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.517(In)
30-minute factor = 1.000 Adjusted rainfall = 0.885(In)
1-hour factor = 1.000 Adjusted rainfall = 1.089(In)
3-hour factor = 1.000 Adjusted rainfall = 1.625(In)
6-hour factor = 1.000 Adjusted rainfall = 2.090(In)
24-hour factor = 1.000 Adjusted rainfall = 3.640(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 121.66 (CFS))		
1	1.127	1.371
2	5.256	5.024
3	13.944	10.570
4	32.477	22.548
5	48.903	19.985
6	59.520	12.916
7	66.486	8.476
8	71.821	6.490
9	75.989	5.071
10	79.394	4.143
11	82.151	3.353
12	84.489	2.846
13	86.579	2.542
14	88.362	2.169
15	89.778	1.722
16	91.035	1.530
17	92.168	1.379
18	93.186	1.237
19	94.088	1.097
20	94.839	0.915
21	95.565	0.883
22	96.159	0.723

23	96.725	0.689
24	97.176	0.549
25	97.571	0.480
26	97.892	0.390
27	98.111	0.267
28	98.340	0.278
29	98.600	0.317
30	98.863	0.320
31	99.126	0.320
32	99.389	0.320
33	99.579	0.232
34	99.717	0.167
35	99.854	0.167
36	100.000	0.083

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5170	0.5170
2	0.6365	0.1195
3	0.7188	0.0823
4	0.7836	0.0648
5	0.8378	0.0543
6	0.8849	0.0471
7	0.9268	0.0419
8	0.9647	0.0379
9	0.9994	0.0347
10	1.0315	0.0321
11	1.0614	0.0299
12	1.0895	0.0281
13	1.1217	0.0322
14	1.1523	0.0306
15	1.1816	0.0293
16	1.2097	0.0281
17	1.2366	0.0270
18	1.2626	0.0260
19	1.2877	0.0251
20	1.3119	0.0242
21	1.3354	0.0235
22	1.3582	0.0228
23	1.3803	0.0221
24	1.4019	0.0215
25	1.4228	0.0210
26	1.4433	0.0204
27	1.4632	0.0199
28	1.4827	0.0195
29	1.5017	0.0190
30	1.5204	0.0186
31	1.5386	0.0182
32	1.5565	0.0179
33	1.5740	0.0175
34	1.5912	0.0172
35	1.6081	0.0169
36	1.6246	0.0166
37	1.6409	0.0163
38	1.6568	0.0160
39	1.6726	0.0157
40	1.6880	0.0155
41	1.7032	0.0152
42	1.7182	0.0150
43	1.7330	0.0148
44	1.7475	0.0145
45	1.7618	0.0143
46	1.7760	0.0141

47	1.7899	0.0139
48	1.8036	0.0137
49	1.8172	0.0136
50	1.8306	0.0134
51	1.8438	0.0132
52	1.8569	0.0131
53	1.8698	0.0129
54	1.8825	0.0127
55	1.8951	0.0126
56	1.9075	0.0124
57	1.9198	0.0123
58	1.9320	0.0122
59	1.9441	0.0120
60	1.9560	0.0119
61	1.9677	0.0118
62	1.9794	0.0117
63	1.9910	0.0115
64	2.0024	0.0114
65	2.0137	0.0113
66	2.0249	0.0112
67	2.0360	0.0111
68	2.0470	0.0110
69	2.0579	0.0109
70	2.0687	0.0108
71	2.0793	0.0107
72	2.0899	0.0106
73	2.1015	0.0116
74	2.1130	0.0115
75	2.1244	0.0114
76	2.1357	0.0113
77	2.1469	0.0112
78	2.1580	0.0111
79	2.1690	0.0110
80	2.1799	0.0109
81	2.1908	0.0109
82	2.2016	0.0108
83	2.2123	0.0107
84	2.2229	0.0106
85	2.2335	0.0106
86	2.2440	0.0105
87	2.2544	0.0104
88	2.2647	0.0103
89	2.2750	0.0103
90	2.2852	0.0102
91	2.2953	0.0101
92	2.3054	0.0101
93	2.3154	0.0100
94	2.3253	0.0099
95	2.3352	0.0099
96	2.3450	0.0098
97	2.3547	0.0097
98	2.3644	0.0097
99	2.3740	0.0096
100	2.3836	0.0096
101	2.3931	0.0095
102	2.4026	0.0095
103	2.4120	0.0094
104	2.4213	0.0093
105	2.4306	0.0093
106	2.4398	0.0092
107	2.4490	0.0092
108	2.4582	0.0091
109	2.4672	0.0091

110	2.4763	0.0090
111	2.4853	0.0090
112	2.4942	0.0089
113	2.5031	0.0089
114	2.5119	0.0088
115	2.5207	0.0088
116	2.5295	0.0088
117	2.5382	0.0087
118	2.5468	0.0087
119	2.5555	0.0086
120	2.5640	0.0086
121	2.5726	0.0085
122	2.5811	0.0085
123	2.5895	0.0084
124	2.5979	0.0084
125	2.6063	0.0084
126	2.6146	0.0083
127	2.6229	0.0083
128	2.6311	0.0082
129	2.6393	0.0082
130	2.6475	0.0082
131	2.6556	0.0081
132	2.6637	0.0081
133	2.6718	0.0081
134	2.6798	0.0080
135	2.6878	0.0080
136	2.6957	0.0080
137	2.7037	0.0079
138	2.7115	0.0079
139	2.7194	0.0078
140	2.7272	0.0078
141	2.7350	0.0078
142	2.7427	0.0077
143	2.7504	0.0077
144	2.7581	0.0077
145	2.7658	0.0076
146	2.7734	0.0076
147	2.7810	0.0076
148	2.7885	0.0076
149	2.7961	0.0075
150	2.8036	0.0075
151	2.8110	0.0075
152	2.8185	0.0074
153	2.8259	0.0074
154	2.8332	0.0074
155	2.8406	0.0073
156	2.8479	0.0073
157	2.8552	0.0073
158	2.8625	0.0073
159	2.8697	0.0072
160	2.8769	0.0072
161	2.8841	0.0072
162	2.8913	0.0072
163	2.8984	0.0071
164	2.9055	0.0071
165	2.9126	0.0071
166	2.9196	0.0071
167	2.9266	0.0070
168	2.9337	0.0070
169	2.9406	0.0070
170	2.9476	0.0070
171	2.9545	0.0069
172	2.9614	0.0069

173	2.9683	0.0069
174	2.9751	0.0069
175	2.9820	0.0068
176	2.9888	0.0068
177	2.9956	0.0068
178	3.0023	0.0068
179	3.0091	0.0067
180	3.0158	0.0067
181	3.0225	0.0067
182	3.0292	0.0067
183	3.0358	0.0067
184	3.0424	0.0066
185	3.0490	0.0066
186	3.0556	0.0066
187	3.0622	0.0066
188	3.0687	0.0065
189	3.0753	0.0065
190	3.0818	0.0065
191	3.0882	0.0065
192	3.0947	0.0065
193	3.1011	0.0064
194	3.1076	0.0064
195	3.1140	0.0064
196	3.1203	0.0064
197	3.1267	0.0064
198	3.1331	0.0063
199	3.1394	0.0063
200	3.1457	0.0063
201	3.1520	0.0063
202	3.1582	0.0063
203	3.1645	0.0062
204	3.1707	0.0062
205	3.1769	0.0062
206	3.1831	0.0062
207	3.1893	0.0062
208	3.1954	0.0062
209	3.2016	0.0061
210	3.2077	0.0061
211	3.2138	0.0061
212	3.2199	0.0061
213	3.2260	0.0061
214	3.2320	0.0061
215	3.2381	0.0060
216	3.2441	0.0060
217	3.2501	0.0060
218	3.2561	0.0060
219	3.2620	0.0060
220	3.2680	0.0060
221	3.2739	0.0059
222	3.2798	0.0059
223	3.2858	0.0059
224	3.2916	0.0059
225	3.2975	0.0059
226	3.3034	0.0059
227	3.3092	0.0058
228	3.3150	0.0058
229	3.3209	0.0058
230	3.3267	0.0058
231	3.3324	0.0058
232	3.3382	0.0058
233	3.3440	0.0058
234	3.3497	0.0057
235	3.3554	0.0057

236	3.3611	0.0057
237	3.3668	0.0057
238	3.3725	0.0057
239	3.3782	0.0057
240	3.3838	0.0057
241	3.3894	0.0056
242	3.3951	0.0056
243	3.4007	0.0056
244	3.4063	0.0056
245	3.4118	0.0056
246	3.4174	0.0056
247	3.4230	0.0056
248	3.4285	0.0055
249	3.4340	0.0055
250	3.4395	0.0055
251	3.4450	0.0055
252	3.4505	0.0055
253	3.4560	0.0055
254	3.4615	0.0055
255	3.4669	0.0054
256	3.4723	0.0054
257	3.4778	0.0054
258	3.4832	0.0054
259	3.4886	0.0054
260	3.4940	0.0054
261	3.4993	0.0054
262	3.5047	0.0054
263	3.5100	0.0053
264	3.5154	0.0053
265	3.5207	0.0053
266	3.5260	0.0053
267	3.5313	0.0053
268	3.5366	0.0053
269	3.5419	0.0053
270	3.5471	0.0053
271	3.5524	0.0053
272	3.5576	0.0052
273	3.5629	0.0052
274	3.5681	0.0052
275	3.5733	0.0052
276	3.5785	0.0052
277	3.5837	0.0052
278	3.5888	0.0052
279	3.5940	0.0052
280	3.5991	0.0052
281	3.6043	0.0051
282	3.6094	0.0051
283	3.6145	0.0051
284	3.6196	0.0051
285	3.6247	0.0051
286	3.6298	0.0051
287	3.6349	0.0051
288	3.6400	0.0051

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0051	0.0020	0.0031
2	0.0051	0.0020	0.0031
3	0.0051	0.0020	0.0031
4	0.0051	0.0020	0.0031
5	0.0051	0.0020	0.0031

6	0.0051	0.0020	0.0031
7	0.0052	0.0020	0.0032
8	0.0052	0.0020	0.0032
9	0.0052	0.0020	0.0032
10	0.0052	0.0020	0.0032
11	0.0052	0.0020	0.0032
12	0.0052	0.0020	0.0032
13	0.0053	0.0020	0.0032
14	0.0053	0.0021	0.0032
15	0.0053	0.0021	0.0032
16	0.0053	0.0021	0.0032
17	0.0053	0.0021	0.0033
18	0.0053	0.0021	0.0033
19	0.0054	0.0021	0.0033
20	0.0054	0.0021	0.0033
21	0.0054	0.0021	0.0033
22	0.0054	0.0021	0.0033
23	0.0054	0.0021	0.0033
24	0.0055	0.0021	0.0033
25	0.0055	0.0021	0.0034
26	0.0055	0.0021	0.0034
27	0.0055	0.0022	0.0034
28	0.0055	0.0022	0.0034
29	0.0056	0.0022	0.0034
30	0.0056	0.0022	0.0034
31	0.0056	0.0022	0.0034
32	0.0056	0.0022	0.0034
33	0.0057	0.0022	0.0035
34	0.0057	0.0022	0.0035
35	0.0057	0.0022	0.0035
36	0.0057	0.0022	0.0035
37	0.0057	0.0022	0.0035
38	0.0058	0.0022	0.0035
39	0.0058	0.0023	0.0035
40	0.0058	0.0023	0.0035
41	0.0058	0.0023	0.0036
42	0.0058	0.0023	0.0036
43	0.0059	0.0023	0.0036
44	0.0059	0.0023	0.0036
45	0.0059	0.0023	0.0036
46	0.0059	0.0023	0.0036
47	0.0060	0.0023	0.0036
48	0.0060	0.0023	0.0037
49	0.0060	0.0023	0.0037
50	0.0060	0.0024	0.0037
51	0.0061	0.0024	0.0037
52	0.0061	0.0024	0.0037
53	0.0061	0.0024	0.0037
54	0.0061	0.0024	0.0037
55	0.0062	0.0024	0.0038
56	0.0062	0.0024	0.0038
57	0.0062	0.0024	0.0038
58	0.0062	0.0024	0.0038
59	0.0063	0.0024	0.0038
60	0.0063	0.0025	0.0038
61	0.0063	0.0025	0.0039
62	0.0064	0.0025	0.0039
63	0.0064	0.0025	0.0039
64	0.0064	0.0025	0.0039
65	0.0065	0.0025	0.0039
66	0.0065	0.0025	0.0040
67	0.0065	0.0025	0.0040
68	0.0065	0.0025	0.0040

69	0.0066	0.0026	0.0040
70	0.0066	0.0026	0.0040
71	0.0067	0.0026	0.0041
72	0.0067	0.0026	0.0041
73	0.0067	0.0026	0.0041
74	0.0067	0.0026	0.0041
75	0.0068	0.0026	0.0041
76	0.0068	0.0027	0.0042
77	0.0069	0.0027	0.0042
78	0.0069	0.0027	0.0042
79	0.0069	0.0027	0.0042
80	0.0070	0.0027	0.0042
81	0.0070	0.0027	0.0043
82	0.0070	0.0027	0.0043
83	0.0071	0.0028	0.0043
84	0.0071	0.0028	0.0043
85	0.0072	0.0028	0.0044
86	0.0072	0.0028	0.0044
87	0.0072	0.0028	0.0044
88	0.0073	0.0028	0.0044
89	0.0073	0.0029	0.0045
90	0.0073	0.0029	0.0045
91	0.0074	0.0029	0.0045
92	0.0074	0.0029	0.0045
93	0.0075	0.0029	0.0046
94	0.0075	0.0029	0.0046
95	0.0076	0.0030	0.0046
96	0.0076	0.0030	0.0047
97	0.0077	0.0030	0.0047
98	0.0077	0.0030	0.0047
99	0.0078	0.0030	0.0048
100	0.0078	0.0030	0.0048
101	0.0079	0.0031	0.0048
102	0.0079	0.0031	0.0048
103	0.0080	0.0031	0.0049
104	0.0080	0.0031	0.0049
105	0.0081	0.0032	0.0049
106	0.0081	0.0032	0.0050
107	0.0082	0.0032	0.0050
108	0.0082	0.0032	0.0050
109	0.0083	0.0032	0.0051
110	0.0084	0.0033	0.0051
111	0.0084	0.0033	0.0052
112	0.0085	0.0033	0.0052
113	0.0086	0.0033	0.0052
114	0.0086	0.0034	0.0053
115	0.0087	0.0034	0.0053
116	0.0088	0.0034	0.0053
117	0.0088	0.0034	0.0054
118	0.0089	0.0035	0.0054
119	0.0090	0.0035	0.0055
120	0.0090	0.0035	0.0055
121	0.0091	0.0036	0.0056
122	0.0092	0.0036	0.0056
123	0.0093	0.0036	0.0057
124	0.0093	0.0036	0.0057
125	0.0095	0.0037	0.0058
126	0.0095	0.0037	0.0058
127	0.0096	0.0037	0.0059
128	0.0097	0.0038	0.0059
129	0.0098	0.0038	0.0060
130	0.0099	0.0038	0.0060
131	0.0100	0.0039	0.0061

132	0.0101	0.0039	0.0061
133	0.0102	0.0040	0.0062
134	0.0103	0.0040	0.0063
135	0.0104	0.0041	0.0064
136	0.0105	0.0041	0.0064
137	0.0106	0.0041	0.0065
138	0.0107	0.0042	0.0065
139	0.0109	0.0042	0.0066
140	0.0109	0.0043	0.0067
141	0.0111	0.0043	0.0068
142	0.0112	0.0044	0.0068
143	0.0114	0.0044	0.0070
144	0.0115	0.0045	0.0070
145	0.0106	0.0041	0.0065
146	0.0107	0.0042	0.0065
147	0.0109	0.0042	0.0066
148	0.0110	0.0043	0.0067
149	0.0112	0.0044	0.0068
150	0.0113	0.0044	0.0069
151	0.0115	0.0045	0.0070
152	0.0117	0.0045	0.0071
153	0.0119	0.0046	0.0073
154	0.0120	0.0047	0.0074
155	0.0123	0.0048	0.0075
156	0.0124	0.0048	0.0076
157	0.0127	0.0050	0.0078
158	0.0129	0.0050	0.0079
159	0.0132	0.0051	0.0081
160	0.0134	0.0052	0.0082
161	0.0137	0.0054	0.0084
162	0.0139	0.0054	0.0085
163	0.0143	0.0056	0.0087
164	0.0145	0.0057	0.0089
165	0.0150	0.0058	0.0091
166	0.0152	0.0059	0.0093
167	0.0157	0.0061	0.0096
168	0.0160	0.0062	0.0098
169	0.0166	0.0064	0.0101
170	0.0169	0.0066	0.0103
171	0.0175	0.0068	0.0107
172	0.0179	0.0070	0.0109
173	0.0186	0.0073	0.0114
174	0.0190	0.0074	0.0116
175	0.0199	0.0078	0.0122
176	0.0204	0.0080	0.0125
177	0.0215	0.0084	0.0131
178	0.0221	0.0086	0.0135
179	0.0235	0.0091	0.0143
180	0.0242	0.0094	0.0148
181	0.0260	0.0101	0.0159
182	0.0270	0.0105	0.0165
183	0.0293	0.0114	0.0179
184	0.0306	0.0119	0.0187
185	0.0281	0.0109	0.0171
186	0.0299	0.0116	0.0183
187	0.0347	0.0135	0.0212
188	0.0379	0.0147	0.0231
189	0.0471	0.0183	0.0288
190	0.0543	0.0211	0.0331
191	0.0823	0.0221	0.0602
192	0.1195	0.0221	0.0974
193	0.5170	0.0221	0.4949
194	0.0648	0.0221	0.0427

195	0.0419	0.0163	0.0256
196	0.0321	0.0125	0.0196
197	0.0322	0.0125	0.0197
198	0.0281	0.0109	0.0171
199	0.0251	0.0098	0.0153
200	0.0228	0.0089	0.0139
201	0.0210	0.0082	0.0128
202	0.0195	0.0076	0.0119
203	0.0182	0.0071	0.0111
204	0.0172	0.0067	0.0105
205	0.0163	0.0063	0.0099
206	0.0155	0.0060	0.0094
207	0.0148	0.0057	0.0090
208	0.0141	0.0055	0.0086
209	0.0136	0.0053	0.0083
210	0.0131	0.0051	0.0080
211	0.0126	0.0049	0.0077
212	0.0122	0.0047	0.0074
213	0.0118	0.0046	0.0072
214	0.0114	0.0044	0.0070
215	0.0111	0.0043	0.0068
216	0.0108	0.0042	0.0066
217	0.0116	0.0045	0.0071
218	0.0113	0.0044	0.0069
219	0.0110	0.0043	0.0067
220	0.0108	0.0042	0.0066
221	0.0106	0.0041	0.0064
222	0.0103	0.0040	0.0063
223	0.0101	0.0039	0.0062
224	0.0099	0.0039	0.0061
225	0.0097	0.0038	0.0060
226	0.0096	0.0037	0.0058
227	0.0094	0.0037	0.0057
228	0.0092	0.0036	0.0056
229	0.0091	0.0035	0.0055
230	0.0089	0.0035	0.0055
231	0.0088	0.0034	0.0054
232	0.0087	0.0034	0.0053
233	0.0085	0.0033	0.0052
234	0.0084	0.0033	0.0051
235	0.0083	0.0032	0.0051
236	0.0082	0.0032	0.0050
237	0.0081	0.0031	0.0049
238	0.0080	0.0031	0.0049
239	0.0078	0.0031	0.0048
240	0.0077	0.0030	0.0047
241	0.0076	0.0030	0.0047
242	0.0076	0.0029	0.0046
243	0.0075	0.0029	0.0046
244	0.0074	0.0029	0.0045
245	0.0073	0.0028	0.0045
246	0.0072	0.0028	0.0044
247	0.0071	0.0028	0.0044
248	0.0071	0.0027	0.0043
249	0.0070	0.0027	0.0043
250	0.0069	0.0027	0.0042
251	0.0068	0.0027	0.0042
252	0.0068	0.0026	0.0041
253	0.0067	0.0026	0.0041
254	0.0066	0.0026	0.0040
255	0.0066	0.0026	0.0040
256	0.0065	0.0025	0.0040
257	0.0064	0.0025	0.0039

258	0.0064	0.0025	0.0039
259	0.0063	0.0025	0.0039
260	0.0063	0.0024	0.0038
261	0.0062	0.0024	0.0038
262	0.0062	0.0024	0.0038
263	0.0061	0.0024	0.0037
264	0.0061	0.0024	0.0037
265	0.0060	0.0023	0.0037
266	0.0060	0.0023	0.0036
267	0.0059	0.0023	0.0036
268	0.0059	0.0023	0.0036
269	0.0058	0.0023	0.0035
270	0.0058	0.0022	0.0035
271	0.0057	0.0022	0.0035
272	0.0057	0.0022	0.0035
273	0.0056	0.0022	0.0034
274	0.0056	0.0022	0.0034
275	0.0056	0.0022	0.0034
276	0.0055	0.0021	0.0034
277	0.0055	0.0021	0.0033
278	0.0054	0.0021	0.0033
279	0.0054	0.0021	0.0033
280	0.0054	0.0021	0.0033
281	0.0053	0.0021	0.0033
282	0.0053	0.0021	0.0032
283	0.0053	0.0020	0.0032
284	0.0052	0.0020	0.0032
285	0.0052	0.0020	0.0032
286	0.0052	0.0020	0.0031
287	0.0051	0.0020	0.0031
288	0.0051	0.0020	0.0031

Total soil rain loss = 1.20(In)
Total effective rainfall = 2.44(In)
Peak flow rate in flood hydrograph = 15.54(CFS)

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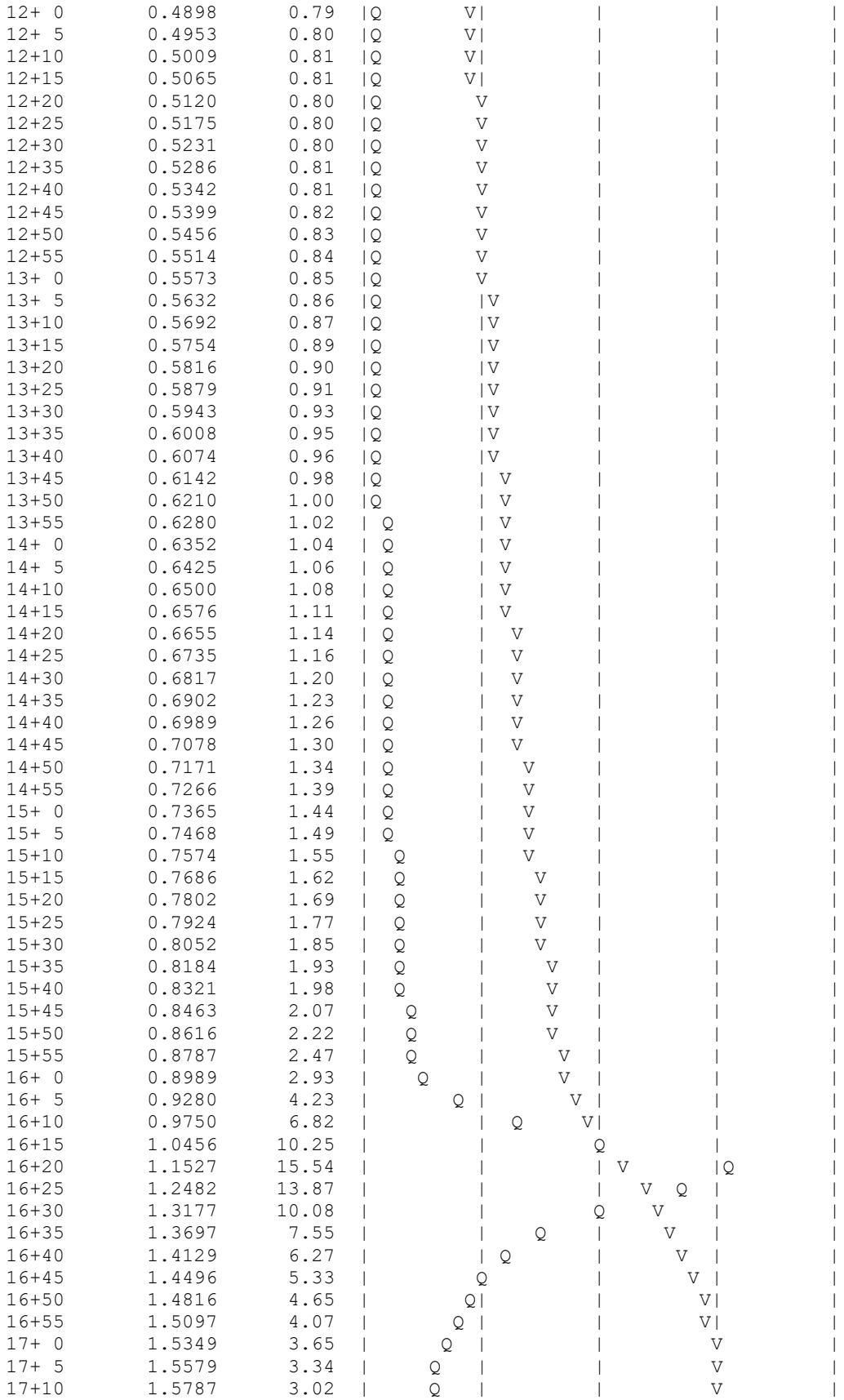
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0002	0.02	Q	|	|	|	|
0+15	0.0005	0.05	Q	|	|	|	|
0+20	0.0014	0.12	Q	|	|	|	|
0+25	0.0026	0.18	Q	|	|	|	|
0+30	0.0042	0.23	Q	|	|	|	|
0+35	0.0059	0.25	Q	|	|	|	|
0+40	0.0078	0.27	Q	|	|	|	|
0+45	0.0098	0.29	Q	|	|	|	|
0+50	0.0119	0.30	Q	|	|	|	|
0+55	0.0140	0.31	Q	|	|	|	|
1+ 0	0.0163	0.32	Q	|	|	|	|
1+ 5	0.0186	0.33	Q	|	|	|	|
1+10	0.0209	0.34	Q	|	|	|	|
1+15	0.0233	0.35	Q	|	|	|	|
1+20	0.0257	0.35	Q	|	|	|	|
1+25	0.0282	0.36	Q	|	|	|	|

1+30	0.0307	0.36	Q	|	|	|	|
1+35	0.0333	0.37	Q	|	|	|	|
1+40	0.0358	0.37	Q	|	|	|	|
1+45	0.0384	0.38	Q	|	|	|	|
1+50	0.0410	0.38	Q	|	|	|	|
1+55	0.0437	0.38	Q	|	|	|	|
2+ 0	0.0463	0.39	Q	|	|	|	|
2+ 5	0.0490	0.39	Q	|	|	|	|
2+10	0.0517	0.39	QV	|	|	|	|
2+15	0.0544	0.39	QV	|	|	|	|
2+20	0.0571	0.40	QV	|	|	|	|
2+25	0.0599	0.40	QV	|	|	|	|
2+30	0.0627	0.40	QV	|	|	|	|
2+35	0.0654	0.40	QV	|	|	|	|
2+40	0.0682	0.41	QV	|	|	|	|
2+45	0.0710	0.41	QV	|	|	|	|
2+50	0.0739	0.41	QV	|	|	|	|
2+55	0.0767	0.41	QV	|	|	|	|
3+ 0	0.0795	0.41	QV	|	|	|	|
3+ 5	0.0824	0.42	QV	|	|	|	|
3+10	0.0853	0.42	QV	|	|	|	|
3+15	0.0881	0.42	QV	|	|	|	|
3+20	0.0910	0.42	QV	|	|	|	|
3+25	0.0939	0.42	QV	|	|	|	|
3+30	0.0969	0.42	QV	|	|	|	|
3+35	0.0998	0.42	QV	|	|	|	|
3+40	0.1027	0.43	Q V	|	|	|	|
3+45	0.1057	0.43	Q V	|	|	|	|
3+50	0.1086	0.43	Q V	|	|	|	|
3+55	0.1116	0.43	Q V	|	|	|	|
4+ 0	0.1146	0.43	Q V	|	|	|	|
4+ 5	0.1176	0.43	Q V	|	|	|	|
4+10	0.1206	0.44	Q V	|	|	|	|
4+15	0.1236	0.44	Q V	|	|	|	|
4+20	0.1266	0.44	Q V	|	|	|	|
4+25	0.1297	0.44	Q V	|	|	|	|
4+30	0.1327	0.44	Q V	|	|	|	|
4+35	0.1358	0.45	Q V	|	|	|	|
4+40	0.1389	0.45	Q V	|	|	|	|
4+45	0.1420	0.45	Q V	|	|	|	|
4+50	0.1451	0.45	Q V	|	|	|	|
4+55	0.1482	0.45	Q V	|	|	|	|
5+ 0	0.1513	0.46	Q V	|	|	|	|
5+ 5	0.1545	0.46	Q V	|	|	|	|
5+10	0.1576	0.46	Q V	|	|	|	|
5+15	0.1608	0.46	Q V	|	|	|	|
5+20	0.1640	0.46	Q V	|	|	|	|
5+25	0.1672	0.47	Q V	|	|	|	|
5+30	0.1704	0.47	Q V	|	|	|	|
5+35	0.1737	0.47	Q V	|	|	|	|
5+40	0.1769	0.47	Q V	|	|	|	|
5+45	0.1802	0.47	Q V	|	|	|	|
5+50	0.1834	0.48	Q V	|	|	|	|
5+55	0.1867	0.48	Q V	|	|	|	|
6+ 0	0.1900	0.48	Q V	|	|	|	|
6+ 5	0.1934	0.48	Q V	|	|	|	|
6+10	0.1967	0.48	Q V	|	|	|	|
6+15	0.2001	0.49	Q V	|	|	|	|
6+20	0.2034	0.49	Q V	|	|	|	|
6+25	0.2068	0.49	Q V	|	|	|	|
6+30	0.2102	0.49	Q V	|	|	|	|
6+35	0.2136	0.50	Q V	|	|	|	|
6+40	0.2171	0.50	Q V	|	|	|	|

6+45	0.2205	0.50	|Q V	|	|	|	|
6+50	0.2240	0.50	|Q V	|	|	|	|
6+55	0.2275	0.51	|Q V	|	|	|	|
7+ 0	0.2310	0.51	|Q V	|	|	|	|
7+ 5	0.2345	0.51	|Q V	|	|	|	|
7+10	0.2381	0.52	|Q V	|	|	|	|
7+15	0.2417	0.52	|Q V	|	|	|	|
7+20	0.2452	0.52	|Q V	|	|	|	|
7+25	0.2489	0.52	|Q V	|	|	|	|
7+30	0.2525	0.53	|Q V	|	|	|	|
7+35	0.2561	0.53	|Q V	|	|	|	|
7+40	0.2598	0.53	|Q V	|	|	|	|
7+45	0.2635	0.54	|Q V	|	|	|	|
7+50	0.2672	0.54	|Q V	|	|	|	|
7+55	0.2709	0.54	|Q V	|	|	|	|
8+ 0	0.2747	0.54	|Q V	|	|	|	|
8+ 5	0.2784	0.55	|Q V	|	|	|	|
8+10	0.2822	0.55	|Q V	|	|	|	|
8+15	0.2860	0.55	|Q V	|	|	|	|
8+20	0.2899	0.56	|Q V	|	|	|	|
8+25	0.2937	0.56	|Q V	|	|	|	|
8+30	0.2976	0.56	|Q V	|	|	|	|
8+35	0.3015	0.57	|Q V	|	|	|	|
8+40	0.3055	0.57	|Q V	|	|	|	|
8+45	0.3094	0.58	|Q V	|	|	|	|
8+50	0.3134	0.58	|Q V	|	|	|	|
8+55	0.3174	0.58	|Q V	|	|	|	|
9+ 0	0.3215	0.59	|Q V	|	|	|	|
9+ 5	0.3255	0.59	|Q V	|	|	|	|
9+10	0.3296	0.59	|Q V	|	|	|	|
9+15	0.3338	0.60	|Q V	|	|	|	|
9+20	0.3379	0.60	|Q V	|	|	|	|
9+25	0.3421	0.61	|Q V	|	|	|	|
9+30	0.3463	0.61	|Q V	|	|	|	|
9+35	0.3505	0.62	|Q V	|	|	|	|
9+40	0.3548	0.62	|Q V	|	|	|	|
9+45	0.3591	0.62	|Q V	|	|	|	|
9+50	0.3634	0.63	|Q V	|	|	|	|
9+55	0.3678	0.63	|Q V	|	|	|	|
10+ 0	0.3722	0.64	|Q V	|	|	|	|
10+ 5	0.3766	0.64	|Q V	|	|	|	|
10+10	0.3811	0.65	|Q V	|	|	|	|
10+15	0.3856	0.65	|Q V	|	|	|	|
10+20	0.3901	0.66	|Q V	|	|	|	|
10+25	0.3947	0.66	|Q V	|	|	|	|
10+30	0.3993	0.67	|Q V	|	|	|	|
10+35	0.4040	0.67	|Q V	|	|	|	|
10+40	0.4086	0.68	|Q V	|	|	|	|
10+45	0.4134	0.69	|Q V	|	|	|	|
10+50	0.4181	0.69	|Q V	|	|	|	|
10+55	0.4230	0.70	|Q V	|	|	|	|
11+ 0	0.4278	0.70	|Q V	|	|	|	|
11+ 5	0.4327	0.71	|Q V	|	|	|	|
11+10	0.4376	0.72	|Q V	|	|	|	|
11+15	0.4426	0.72	|Q V	|	|	|	|
11+20	0.4477	0.73	|Q V	|	|	|	|
11+25	0.4528	0.74	|Q V	|	|	|	|
11+30	0.4579	0.75	|Q V	|	|	|	|
11+35	0.4631	0.75	|Q V|		|	|	|
11+40	0.4683	0.76	|Q V|		|	|	|
11+45	0.4736	0.77	|Q V|		|	|	|
11+50	0.4790	0.78	|Q V|		|	|	|
11+55	0.4844	0.78	|Q V|		|	|	|



17+15	1.5971	2.68	| Q |	|	|	|V |
17+20	1.6142	2.48	| Q |	|	|	|V |
17+25	1.6301	2.31	| Q |	|	|	|V |
17+30	1.6450	2.15	| Q |	|	|	| V |
17+35	1.6588	2.00	| Q |	|	|	| V |
17+40	1.6714	1.84	| Q |	|	|	| V |
17+45	1.6835	1.75	| Q |	|	|	| V |
17+50	1.6947	1.62	| Q |	|	|	| V |
17+55	1.7053	1.54	| Q |	|	|	| V |
18+ 0	1.7150	1.42	| Q |	|	|	| V |
18+ 5	1.7242	1.33	| Q |	|	|	| V |
18+10	1.7327	1.24	| Q |	|	|	| V |
18+15	1.7407	1.16	| Q |	|	|	| V |
18+20	1.7486	1.14	| Q |	|	|	| V |
18+25	1.7564	1.14	| Q |	|	|	| V |
18+30	1.7642	1.12	| Q |	|	|	| V |
18+35	1.7717	1.10	| Q |	|	|	| V |
18+40	1.7791	1.07	| Q |	|	|	| V |
18+45	1.7859	1.00	|Q |	|	|	| V |
18+50	1.7924	0.94	|Q |	|	|	| V |
18+55	1.7987	0.91	|Q |	|	|	| V |
19+ 0	1.8045	0.84	|Q |	|	|	| V |
19+ 5	1.8099	0.79	|Q |	|	|	| V |
19+10	1.8152	0.77	|Q |	|	|	| V |
19+15	1.8203	0.75	|Q |	|	|	| V |
19+20	1.8254	0.73	|Q |	|	|	| V |
19+25	1.8303	0.72	|Q |	|	|	| V |
19+30	1.8352	0.71	|Q |	|	|	| V |
19+35	1.8400	0.69	|Q |	|	|	| V |
19+40	1.8447	0.68	|Q |	|	|	| V |
19+45	1.8493	0.67	|Q |	|	|	| V |
19+50	1.8538	0.66	|Q |	|	|	| V |
19+55	1.8583	0.65	|Q |	|	|	| V |
20+ 0	1.8627	0.64	|Q |	|	|	| V |
20+ 5	1.8670	0.63	|Q |	|	|	| V |
20+10	1.8713	0.62	|Q |	|	|	| V |
20+15	1.8755	0.61	|Q |	|	|	| V |
20+20	1.8796	0.60	|Q |	|	|	| V |
20+25	1.8837	0.59	|Q |	|	|	| V |
20+30	1.8877	0.59	|Q |	|	|	| V |
20+35	1.8917	0.58	|Q |	|	|	| V |
20+40	1.8956	0.57	|Q |	|	|	| V |
20+45	1.8995	0.56	|Q |	|	|	| V |
20+50	1.9034	0.56	|Q |	|	|	| V |
20+55	1.9072	0.55	|Q |	|	|	| V |
21+ 0	1.9109	0.54	|Q |	|	|	| V |
21+ 5	1.9146	0.54	|Q |	|	|	| V |
21+10	1.9183	0.53	|Q |	|	|	| V |
21+15	1.9219	0.53	|Q |	|	|	| V |
21+20	1.9255	0.52	|Q |	|	|	| V |
21+25	1.9290	0.51	|Q |	|	|	| V |
21+30	1.9325	0.51	|Q |	|	|	| V |
21+35	1.9360	0.50	|Q |	|	|	| V |
21+40	1.9394	0.50	Q |	|	|	| V |
21+45	1.9428	0.49	Q |	|	|	| V |
21+50	1.9462	0.49	Q |	|	|	| V |
21+55	1.9495	0.48	Q |	|	|	| V |
22+ 0	1.9528	0.48	Q |	|	|	| V |
22+ 5	1.9561	0.47	Q |	|	|	| V |
22+10	1.9593	0.47	Q |	|	|	| V |
22+15	1.9625	0.47	Q |	|	|	| V |
22+20	1.9657	0.46	Q |	|	|	| V |
22+25	1.9689	0.46	Q |	|	|	| V |

22+30	1.9720	0.45	Q	|	|	|	V |
22+35	1.9751	0.45	Q	|	|	|	V |
22+40	1.9782	0.45	Q	|	|	|	V |
22+45	1.9812	0.44	Q	|	|	|	V |
22+50	1.9842	0.44	Q	|	|	|	V |
22+55	1.9872	0.44	Q	|	|	|	V |
23+ 0	1.9902	0.43	Q	|	|	|	V |
23+ 5	1.9932	0.43	Q	|	|	|	V|
23+10	1.9961	0.43	Q	|	|	|	V|
23+15	1.9990	0.42	Q	|	|	|	V|
23+20	2.0019	0.42	Q	|	|	|	V|
23+25	2.0047	0.42	Q	|	|	|	V|
23+30	2.0076	0.41	Q	|	|	|	V|
23+35	2.0104	0.41	Q	|	|	|	V|
23+40	2.0132	0.41	Q	|	|	|	V|
23+45	2.0160	0.40	Q	|	|	|	V|
23+50	2.0188	0.40	Q	|	|	|	V|
23+55	2.0215	0.40	Q	|	|	|	V|
24+ 0	2.0242	0.40	Q	|	|	|	V|
24+ 5	2.0269	0.39	Q	|	|	|	V|
24+10	2.0294	0.37	Q	|	|	|	V|
24+15	2.0318	0.34	Q	|	|	|	V|
24+20	2.0336	0.26	Q	|	|	|	V|
24+25	2.0349	0.20	Q	|	|	|	V|
24+30	2.0360	0.16	Q	|	|	|	V|
24+35	2.0370	0.13	Q	|	|	|	V|
24+40	2.0377	0.11	Q	|	|	|	V|
24+45	2.0384	0.09	Q	|	|	|	V|
24+50	2.0389	0.08	Q	|	|	|	V|
24+55	2.0394	0.07	Q	|	|	|	V|
25+ 0	2.0398	0.06	Q	|	|	|	V|
25+ 5	2.0402	0.05	Q	|	|	|	V|
25+10	2.0405	0.05	Q	|	|	|	V|
25+15	2.0408	0.04	Q	|	|	|	V|
25+20	2.0410	0.03	Q	|	|	|	V|
25+25	2.0412	0.03	Q	|	|	|	V|
25+30	2.0414	0.03	Q	|	|	|	V|
25+35	2.0416	0.02	Q	|	|	|	V|
25+40	2.0417	0.02	Q	|	|	|	V|
25+45	2.0418	0.02	Q	|	|	|	V|
25+50	2.0419	0.01	Q	|	|	|	V|
25+55	2.0420	0.01	Q	|	|	|	V|
26+ 0	2.0421	0.01	Q	|	|	|	V|
26+ 5	2.0421	0.01	Q	|	|	|	V|
26+10	2.0422	0.01	Q	|	|	|	V|
26+15	2.0422	0.01	Q	|	|	|	V|
26+20	2.0423	0.01	Q	|	|	|	V|
26+25	2.0423	0.01	Q	|	|	|	V|
26+30	2.0423	0.00	Q	|	|	|	V|
26+35	2.0424	0.00	Q	|	|	|	V|
26+40	2.0424	0.00	Q	|	|	|	V|
26+45	2.0424	0.00	Q	|	|	|	V|
26+50	2.0424	0.00	Q	|	|	|	V|
26+55	2.0424	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 01/13/23

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6385

Space Center Expansion Project Phase 2 FLag
Developed Condition Area A1 to A4
10 Year 24 Hour Storm Event
Please Refer to Appendix B Developed Condition Hydrology Map

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
10.06	1	0.62
Rainfall data for year 10		
10.06	6	1.27
Rainfall data for year 10		
10.06	24	2.23

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
70.4	70.4	10.06	1.000	0.526	0.176	0.093

Area-averaged adjusted loss rate Fm (In/Hr) = 0.093

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC2)		Yield Fr
1.77	0.176	70.4	70.4	4.20	0.155
8.29	0.824	98.0	98.0	0.20	0.898

Area-averaged catchment yield fraction, Y = 0.767
Area-averaged low loss fraction, Yb = 0.233
User entry of time of concentration = 0.289 (hours)
++
Watershed area = 10.06(Ac.)
Catchment Lag time = 0.231 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 36.0438
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.093(In/Hr)
Average low loss rate fraction (Yb) = 0.233 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.293(In)
Computed peak 30-minute rainfall = 0.502(In)
Specified peak 1-hour rainfall = 0.618(In)
Computed peak 3-hour rainfall = 0.961(In)
Specified peak 6-hour rainfall = 1.270(In)
Specified peak 24-hour rainfall = 2.230(In)

Rainfall depth area reduction factors:
Using a total area of 10.06(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.293(In)
30-minute factor = 1.000 Adjusted rainfall = 0.502(In)
1-hour factor = 1.000 Adjusted rainfall = 0.618(In)
3-hour factor = 1.000 Adjusted rainfall = 0.961(In)
6-hour factor = 1.000 Adjusted rainfall = 1.270(In)
24-hour factor = 1.000 Adjusted rainfall = 2.230(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 121.66 (CFS))		
1	2.336	2.843
2	14.416	14.696
3	42.829	34.568
4	61.310	22.485
5	71.233	12.072
6	77.867	8.071
7	82.576	5.730
8	86.212	4.423
9	89.045	3.446
10	91.163	2.577
11	92.940	2.162
12	94.391	1.765
13	95.580	1.446
14	96.549	1.179
15	97.307	0.923
16	97.877	0.693
17	98.252	0.456
18	98.669	0.508
19	99.102	0.526
20	99.499	0.484
21	99.743	0.296

22	100.000	0.148

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2931	0.2931
2	0.3609	0.0678
3	0.4075	0.0467
4	0.4443	0.0367
5	0.4750	0.0308
6	0.5017	0.0267
7	0.5255	0.0237
8	0.5470	0.0215
9	0.5666	0.0197
10	0.5848	0.0182
11	0.6018	0.0170
12	0.6177	0.0159
13	0.6379	0.0202
14	0.6572	0.0193
15	0.6757	0.0185
16	0.6935	0.0178
17	0.7106	0.0171
18	0.7272	0.0165
19	0.7432	0.0160
20	0.7587	0.0155
21	0.7737	0.0150
22	0.7883	0.0146
23	0.8026	0.0142
24	0.8164	0.0139
25	0.8299	0.0135
26	0.8431	0.0132
27	0.8560	0.0129
28	0.8687	0.0126
29	0.8810	0.0124
30	0.8931	0.0121
31	0.9050	0.0119
32	0.9166	0.0116
33	0.9280	0.0114
34	0.9392	0.0112
35	0.9503	0.0110
36	0.9611	0.0108
37	0.9717	0.0106
38	0.9822	0.0105
39	0.9925	0.0103
40	1.0027	0.0102
41	1.0127	0.0100
42	1.0225	0.0099
43	1.0323	0.0097
44	1.0418	0.0096
45	1.0513	0.0095
46	1.0606	0.0093
47	1.0698	0.0092
48	1.0789	0.0091
49	1.0879	0.0090
50	1.0968	0.0089
51	1.1056	0.0088
52	1.1142	0.0087
53	1.1228	0.0086
54	1.1313	0.0085
55	1.1396	0.0084
56	1.1479	0.0083
57	1.1561	0.0082
58	1.1642	0.0081
59	1.1723	0.0080

60	1.1802	0.0079
61	1.1881	0.0079
62	1.1959	0.0078
63	1.2036	0.0077
64	1.2112	0.0076
65	1.2188	0.0076
66	1.2263	0.0075
67	1.2337	0.0074
68	1.2411	0.0074
69	1.2484	0.0073
70	1.2557	0.0072
71	1.2628	0.0072
72	1.2700	0.0071
73	1.2771	0.0071
74	1.2842	0.0071
75	1.2912	0.0070
76	1.2982	0.0070
77	1.3051	0.0069
78	1.3119	0.0069
79	1.3187	0.0068
80	1.3255	0.0068
81	1.3322	0.0067
82	1.3388	0.0067
83	1.3454	0.0066
84	1.3520	0.0066
85	1.3585	0.0065
86	1.3650	0.0065
87	1.3714	0.0064
88	1.3778	0.0064
89	1.3841	0.0063
90	1.3904	0.0063
91	1.3967	0.0063
92	1.4029	0.0062
93	1.4091	0.0062
94	1.4152	0.0061
95	1.4213	0.0061
96	1.4273	0.0061
97	1.4334	0.0060
98	1.4394	0.0060
99	1.4453	0.0059
100	1.4512	0.0059
101	1.4571	0.0059
102	1.4629	0.0058
103	1.4687	0.0058
104	1.4745	0.0058
105	1.4803	0.0057
106	1.4860	0.0057
107	1.4916	0.0057
108	1.4973	0.0056
109	1.5029	0.0056
110	1.5085	0.0056
111	1.5140	0.0056
112	1.5196	0.0055
113	1.5251	0.0055
114	1.5305	0.0055
115	1.5360	0.0054
116	1.5414	0.0054
117	1.5468	0.0054
118	1.5521	0.0054
119	1.5574	0.0053
120	1.5627	0.0053
121	1.5680	0.0053
122	1.5733	0.0052

123	1.5785	0.0052
124	1.5837	0.0052
125	1.5889	0.0052
126	1.5940	0.0051
127	1.5991	0.0051
128	1.6042	0.0051
129	1.6093	0.0051
130	1.6144	0.0051
131	1.6194	0.0050
132	1.6244	0.0050
133	1.6294	0.0050
134	1.6344	0.0050
135	1.6393	0.0049
136	1.6442	0.0049
137	1.6491	0.0049
138	1.6540	0.0049
139	1.6589	0.0049
140	1.6637	0.0048
141	1.6685	0.0048
142	1.6733	0.0048
143	1.6781	0.0048
144	1.6828	0.0048
145	1.6876	0.0047
146	1.6923	0.0047
147	1.6970	0.0047
148	1.7017	0.0047
149	1.7063	0.0047
150	1.7110	0.0046
151	1.7156	0.0046
152	1.7202	0.0046
153	1.7248	0.0046
154	1.7294	0.0046
155	1.7339	0.0046
156	1.7385	0.0045
157	1.7430	0.0045
158	1.7475	0.0045
159	1.7520	0.0045
160	1.7564	0.0045
161	1.7609	0.0044
162	1.7653	0.0044
163	1.7697	0.0044
164	1.7741	0.0044
165	1.7785	0.0044
166	1.7829	0.0044
167	1.7872	0.0044
168	1.7916	0.0043
169	1.7959	0.0043
170	1.8002	0.0043
171	1.8045	0.0043
172	1.8088	0.0043
173	1.8130	0.0043
174	1.8173	0.0042
175	1.8215	0.0042
176	1.8257	0.0042
177	1.8299	0.0042
178	1.8341	0.0042
179	1.8383	0.0042
180	1.8425	0.0042
181	1.8466	0.0042
182	1.8508	0.0041
183	1.8549	0.0041
184	1.8590	0.0041
185	1.8631	0.0041

186	1.8672	0.0041
187	1.8712	0.0041
188	1.8753	0.0041
189	1.8793	0.0040
190	1.8834	0.0040
191	1.8874	0.0040
192	1.8914	0.0040
193	1.8954	0.0040
194	1.8994	0.0040
195	1.9034	0.0040
196	1.9073	0.0040
197	1.9113	0.0039
198	1.9152	0.0039
199	1.9191	0.0039
200	1.9230	0.0039
201	1.9269	0.0039
202	1.9308	0.0039
203	1.9347	0.0039
204	1.9386	0.0039
205	1.9424	0.0039
206	1.9462	0.0038
207	1.9501	0.0038
208	1.9539	0.0038
209	1.9577	0.0038
210	1.9615	0.0038
211	1.9653	0.0038
212	1.9691	0.0038
213	1.9728	0.0038
214	1.9766	0.0038
215	1.9803	0.0037
216	1.9841	0.0037
217	1.9878	0.0037
218	1.9915	0.0037
219	1.9952	0.0037
220	1.9989	0.0037
221	2.0026	0.0037
222	2.0063	0.0037
223	2.0099	0.0037
224	2.0136	0.0037
225	2.0172	0.0036
226	2.0209	0.0036
227	2.0245	0.0036
228	2.0281	0.0036
229	2.0317	0.0036
230	2.0353	0.0036
231	2.0389	0.0036
232	2.0425	0.0036
233	2.0461	0.0036
234	2.0496	0.0036
235	2.0532	0.0036
236	2.0567	0.0035
237	2.0603	0.0035
238	2.0638	0.0035
239	2.0673	0.0035
240	2.0708	0.0035
241	2.0743	0.0035
242	2.0778	0.0035
243	2.0813	0.0035
244	2.0848	0.0035
245	2.0882	0.0035
246	2.0917	0.0035
247	2.0951	0.0034
248	2.0986	0.0034

249	2.1020	0.0034
250	2.1054	0.0034
251	2.1089	0.0034
252	2.1123	0.0034
253	2.1157	0.0034
254	2.1191	0.0034
255	2.1224	0.0034
256	2.1258	0.0034
257	2.1292	0.0034
258	2.1325	0.0034
259	2.1359	0.0034
260	2.1392	0.0033
261	2.1426	0.0033
262	2.1459	0.0033
263	2.1492	0.0033
264	2.1525	0.0033
265	2.1559	0.0033
266	2.1592	0.0033
267	2.1624	0.0033
268	2.1657	0.0033
269	2.1690	0.0033
270	2.1723	0.0033
271	2.1755	0.0033
272	2.1788	0.0033
273	2.1821	0.0032
274	2.1853	0.0032
275	2.1885	0.0032
276	2.1918	0.0032
277	2.1950	0.0032
278	2.1982	0.0032
279	2.2014	0.0032
280	2.2046	0.0032
281	2.2078	0.0032
282	2.2110	0.0032
283	2.2142	0.0032
284	2.2173	0.0032
285	2.2205	0.0032
286	2.2237	0.0032
287	2.2268	0.0032
288	2.2300	0.0031

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0031	0.0007	0.0024
2	0.0032	0.0007	0.0024
3	0.0032	0.0007	0.0024
4	0.0032	0.0007	0.0024
5	0.0032	0.0007	0.0024
6	0.0032	0.0007	0.0025
7	0.0032	0.0007	0.0025
8	0.0032	0.0007	0.0025
9	0.0032	0.0008	0.0025
10	0.0032	0.0008	0.0025
11	0.0032	0.0008	0.0025
12	0.0033	0.0008	0.0025
13	0.0033	0.0008	0.0025
14	0.0033	0.0008	0.0025
15	0.0033	0.0008	0.0025
16	0.0033	0.0008	0.0025
17	0.0033	0.0008	0.0025
18	0.0033	0.0008	0.0025

19	0.0033	0.0008	0.0026
20	0.0033	0.0008	0.0026
21	0.0034	0.0008	0.0026
22	0.0034	0.0008	0.0026
23	0.0034	0.0008	0.0026
24	0.0034	0.0008	0.0026
25	0.0034	0.0008	0.0026
26	0.0034	0.0008	0.0026
27	0.0034	0.0008	0.0026
28	0.0034	0.0008	0.0026
29	0.0035	0.0008	0.0027
30	0.0035	0.0008	0.0027
31	0.0035	0.0008	0.0027
32	0.0035	0.0008	0.0027
33	0.0035	0.0008	0.0027
34	0.0035	0.0008	0.0027
35	0.0035	0.0008	0.0027
36	0.0035	0.0008	0.0027
37	0.0036	0.0008	0.0027
38	0.0036	0.0008	0.0027
39	0.0036	0.0008	0.0028
40	0.0036	0.0008	0.0028
41	0.0036	0.0008	0.0028
42	0.0036	0.0008	0.0028
43	0.0036	0.0008	0.0028
44	0.0037	0.0009	0.0028
45	0.0037	0.0009	0.0028
46	0.0037	0.0009	0.0028
47	0.0037	0.0009	0.0028
48	0.0037	0.0009	0.0029
49	0.0037	0.0009	0.0029
50	0.0037	0.0009	0.0029
51	0.0038	0.0009	0.0029
52	0.0038	0.0009	0.0029
53	0.0038	0.0009	0.0029
54	0.0038	0.0009	0.0029
55	0.0038	0.0009	0.0029
56	0.0038	0.0009	0.0029
57	0.0039	0.0009	0.0030
58	0.0039	0.0009	0.0030
59	0.0039	0.0009	0.0030
60	0.0039	0.0009	0.0030
61	0.0039	0.0009	0.0030
62	0.0039	0.0009	0.0030
63	0.0040	0.0009	0.0030
64	0.0040	0.0009	0.0031
65	0.0040	0.0009	0.0031
66	0.0040	0.0009	0.0031
67	0.0040	0.0009	0.0031
68	0.0041	0.0009	0.0031
69	0.0041	0.0010	0.0031
70	0.0041	0.0010	0.0031
71	0.0041	0.0010	0.0032
72	0.0041	0.0010	0.0032
73	0.0042	0.0010	0.0032
74	0.0042	0.0010	0.0032
75	0.0042	0.0010	0.0032
76	0.0042	0.0010	0.0032
77	0.0042	0.0010	0.0033
78	0.0043	0.0010	0.0033
79	0.0043	0.0010	0.0033
80	0.0043	0.0010	0.0033
81	0.0043	0.0010	0.0033

82	0.0044	0.0010	0.0033
83	0.0044	0.0010	0.0034
84	0.0044	0.0010	0.0034
85	0.0044	0.0010	0.0034
86	0.0044	0.0010	0.0034
87	0.0045	0.0010	0.0034
88	0.0045	0.0010	0.0035
89	0.0045	0.0011	0.0035
90	0.0046	0.0011	0.0035
91	0.0046	0.0011	0.0035
92	0.0046	0.0011	0.0035
93	0.0046	0.0011	0.0036
94	0.0047	0.0011	0.0036
95	0.0047	0.0011	0.0036
96	0.0047	0.0011	0.0036
97	0.0048	0.0011	0.0036
98	0.0048	0.0011	0.0037
99	0.0048	0.0011	0.0037
100	0.0048	0.0011	0.0037
101	0.0049	0.0011	0.0037
102	0.0049	0.0011	0.0038
103	0.0049	0.0012	0.0038
104	0.0050	0.0012	0.0038
105	0.0050	0.0012	0.0038
106	0.0050	0.0012	0.0039
107	0.0051	0.0012	0.0039
108	0.0051	0.0012	0.0039
109	0.0051	0.0012	0.0040
110	0.0052	0.0012	0.0040
111	0.0052	0.0012	0.0040
112	0.0052	0.0012	0.0040
113	0.0053	0.0012	0.0041
114	0.0053	0.0012	0.0041
115	0.0054	0.0013	0.0041
116	0.0054	0.0013	0.0042
117	0.0055	0.0013	0.0042
118	0.0055	0.0013	0.0042
119	0.0056	0.0013	0.0043
120	0.0056	0.0013	0.0043
121	0.0056	0.0013	0.0043
122	0.0057	0.0013	0.0044
123	0.0057	0.0013	0.0044
124	0.0058	0.0013	0.0044
125	0.0058	0.0014	0.0045
126	0.0059	0.0014	0.0045
127	0.0059	0.0014	0.0046
128	0.0060	0.0014	0.0046
129	0.0061	0.0014	0.0046
130	0.0061	0.0014	0.0047
131	0.0062	0.0014	0.0047
132	0.0062	0.0014	0.0048
133	0.0063	0.0015	0.0048
134	0.0063	0.0015	0.0049
135	0.0064	0.0015	0.0049
136	0.0065	0.0015	0.0050
137	0.0066	0.0015	0.0050
138	0.0066	0.0015	0.0051
139	0.0067	0.0016	0.0051
140	0.0068	0.0016	0.0052
141	0.0069	0.0016	0.0053
142	0.0069	0.0016	0.0053
143	0.0070	0.0016	0.0054
144	0.0071	0.0016	0.0054

145	0.0071	0.0017	0.0055
146	0.0072	0.0017	0.0055
147	0.0073	0.0017	0.0056
148	0.0074	0.0017	0.0057
149	0.0075	0.0017	0.0058
150	0.0076	0.0018	0.0058
151	0.0077	0.0018	0.0059
152	0.0078	0.0018	0.0060
153	0.0079	0.0019	0.0061
154	0.0080	0.0019	0.0062
155	0.0082	0.0019	0.0063
156	0.0083	0.0019	0.0064
157	0.0085	0.0020	0.0065
158	0.0086	0.0020	0.0066
159	0.0088	0.0020	0.0067
160	0.0089	0.0021	0.0068
161	0.0091	0.0021	0.0070
162	0.0092	0.0021	0.0071
163	0.0095	0.0022	0.0073
164	0.0096	0.0022	0.0074
165	0.0099	0.0023	0.0076
166	0.0100	0.0023	0.0077
167	0.0103	0.0024	0.0079
168	0.0105	0.0024	0.0080
169	0.0108	0.0025	0.0083
170	0.0110	0.0026	0.0085
171	0.0114	0.0027	0.0088
172	0.0116	0.0027	0.0089
173	0.0121	0.0028	0.0093
174	0.0124	0.0029	0.0095
175	0.0129	0.0030	0.0099
176	0.0132	0.0031	0.0101
177	0.0139	0.0032	0.0106
178	0.0142	0.0033	0.0109
179	0.0150	0.0035	0.0115
180	0.0155	0.0036	0.0119
181	0.0165	0.0038	0.0127
182	0.0171	0.0040	0.0131
183	0.0185	0.0043	0.0142
184	0.0193	0.0045	0.0148
185	0.0159	0.0037	0.0122
186	0.0170	0.0039	0.0130
187	0.0197	0.0046	0.0151
188	0.0215	0.0050	0.0165
189	0.0267	0.0062	0.0205
190	0.0308	0.0072	0.0236
191	0.0467	0.0077	0.0390
192	0.0678	0.0077	0.0600
193	0.2931	0.0077	0.2854
194	0.0367	0.0077	0.0290
195	0.0237	0.0055	0.0182
196	0.0182	0.0042	0.0140
197	0.0202	0.0047	0.0155
198	0.0178	0.0041	0.0136
199	0.0160	0.0037	0.0123
200	0.0146	0.0034	0.0112
201	0.0135	0.0031	0.0104
202	0.0126	0.0029	0.0097
203	0.0119	0.0028	0.0091
204	0.0112	0.0026	0.0086
205	0.0106	0.0025	0.0082
206	0.0102	0.0024	0.0078
207	0.0097	0.0023	0.0075

208	0.0093	0.0022	0.0072
209	0.0090	0.0021	0.0069
210	0.0087	0.0020	0.0066
211	0.0084	0.0020	0.0064
212	0.0081	0.0019	0.0062
213	0.0079	0.0018	0.0060
214	0.0076	0.0018	0.0059
215	0.0074	0.0017	0.0057
216	0.0072	0.0017	0.0056
217	0.0071	0.0017	0.0055
218	0.0070	0.0016	0.0053
219	0.0068	0.0016	0.0052
220	0.0067	0.0015	0.0051
221	0.0065	0.0015	0.0050
222	0.0064	0.0015	0.0049
223	0.0063	0.0015	0.0048
224	0.0061	0.0014	0.0047
225	0.0060	0.0014	0.0046
226	0.0059	0.0014	0.0045
227	0.0058	0.0014	0.0045
228	0.0057	0.0013	0.0044
229	0.0056	0.0013	0.0043
230	0.0055	0.0013	0.0042
231	0.0054	0.0013	0.0042
232	0.0054	0.0012	0.0041
233	0.0053	0.0012	0.0040
234	0.0052	0.0012	0.0040
235	0.0051	0.0012	0.0039
236	0.0051	0.0012	0.0039
237	0.0050	0.0012	0.0038
238	0.0049	0.0011	0.0038
239	0.0049	0.0011	0.0037
240	0.0048	0.0011	0.0037
241	0.0047	0.0011	0.0036
242	0.0047	0.0011	0.0036
243	0.0046	0.0011	0.0035
244	0.0046	0.0011	0.0035
245	0.0045	0.0011	0.0035
246	0.0045	0.0010	0.0034
247	0.0044	0.0010	0.0034
248	0.0044	0.0010	0.0034
249	0.0043	0.0010	0.0033
250	0.0043	0.0010	0.0033
251	0.0042	0.0010	0.0032
252	0.0042	0.0010	0.0032
253	0.0042	0.0010	0.0032
254	0.0041	0.0010	0.0032
255	0.0041	0.0009	0.0031
256	0.0040	0.0009	0.0031
257	0.0040	0.0009	0.0031
258	0.0040	0.0009	0.0030
259	0.0039	0.0009	0.0030
260	0.0039	0.0009	0.0030
261	0.0039	0.0009	0.0030
262	0.0038	0.0009	0.0029
263	0.0038	0.0009	0.0029
264	0.0038	0.0009	0.0029
265	0.0037	0.0009	0.0029
266	0.0037	0.0009	0.0028
267	0.0037	0.0009	0.0028
268	0.0036	0.0008	0.0028
269	0.0036	0.0008	0.0028
270	0.0036	0.0008	0.0027

271	0.0036	0.0008	0.0027
272	0.0035	0.0008	0.0027
273	0.0035	0.0008	0.0027
274	0.0035	0.0008	0.0027
275	0.0034	0.0008	0.0026
276	0.0034	0.0008	0.0026
277	0.0034	0.0008	0.0026
278	0.0034	0.0008	0.0026
279	0.0034	0.0008	0.0026
280	0.0033	0.0008	0.0026
281	0.0033	0.0008	0.0025
282	0.0033	0.0008	0.0025
283	0.0033	0.0008	0.0025
284	0.0032	0.0008	0.0025
285	0.0032	0.0008	0.0025
286	0.0032	0.0007	0.0025
287	0.0032	0.0007	0.0024
288	0.0032	0.0007	0.0024

Total soil rain loss = 0.45(In)
Total effective rainfall = 1.78(In)
Peak flow rate in flood hydrograph = 12.76(CFS)

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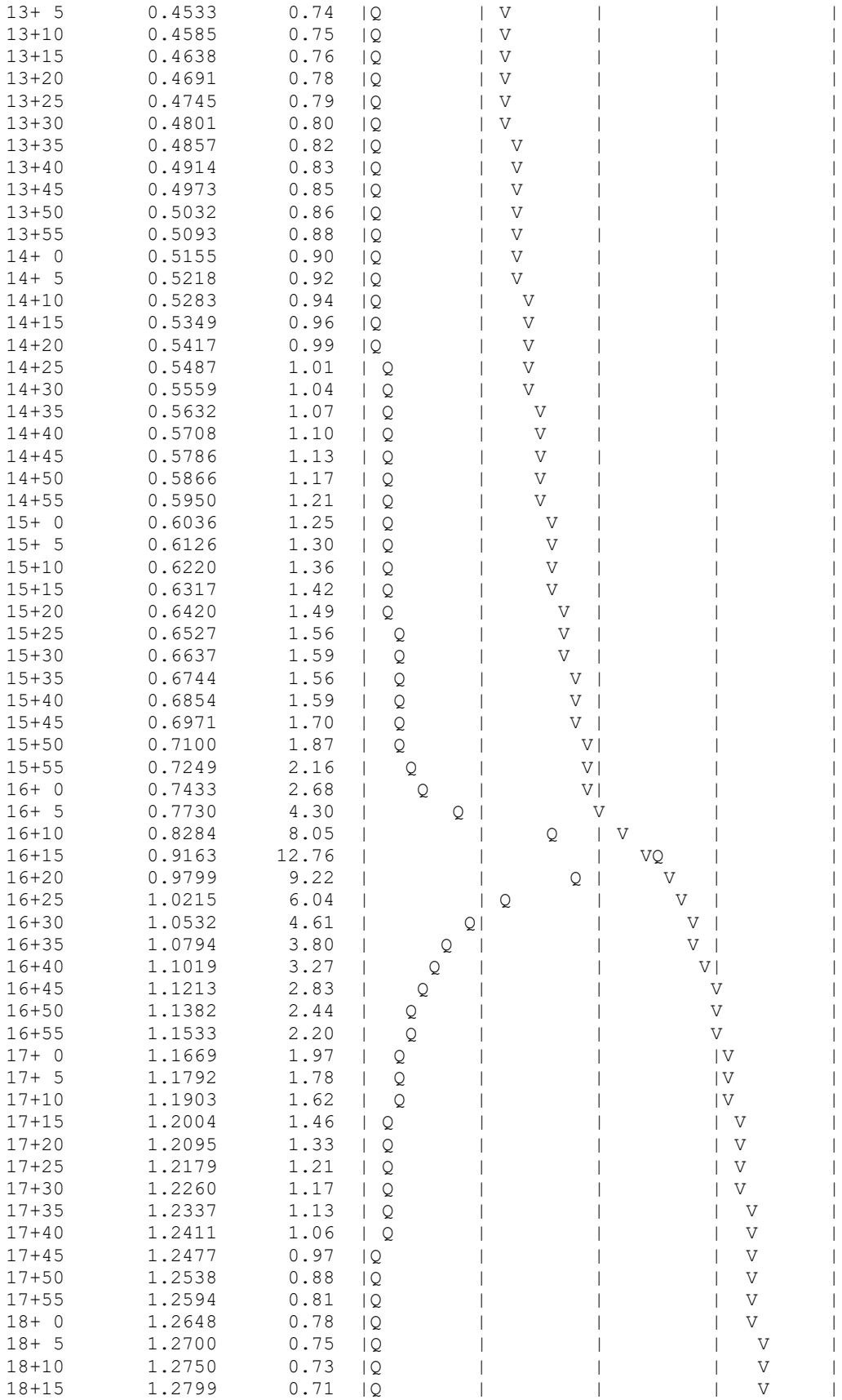
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.01	Q				
0+10	0.0003	0.04	Q				
0+15	0.0012	0.13	Q				
0+20	0.0025	0.18	Q				
0+25	0.0039	0.21	Q				
0+30	0.0055	0.23	Q				
0+35	0.0072	0.24	Q				
0+40	0.0089	0.26	Q				
0+45	0.0108	0.27	Q				
0+50	0.0126	0.27	Q				
0+55	0.0146	0.28	Q				
1+ 0	0.0165	0.28	Q				
1+ 5	0.0185	0.29	Q				
1+10	0.0205	0.29	Q				
1+15	0.0226	0.30	Q				
1+20	0.0246	0.30	Q				
1+25	0.0267	0.30	Q				
1+30	0.0287	0.30	Q				
1+35	0.0308	0.30	Q				
1+40	0.0330	0.31	Q				
1+45	0.0351	0.31	Q				
1+50	0.0372	0.31	Q				
1+55	0.0394	0.31	QV				
2+ 0	0.0415	0.31	QV				
2+ 5	0.0437	0.31	QV				
2+10	0.0458	0.31	QV				
2+15	0.0480	0.32	QV				
2+20	0.0502	0.32	QV				
2+25	0.0524	0.32	QV				
2+30	0.0546	0.32	QV				

2+35	0.0568	0.32	QV	|	|	|	|
2+40	0.0590	0.32	QV	|	|	|	|
2+45	0.0612	0.32	QV	|	|	|	|
2+50	0.0634	0.32	QV	|	|	|	|
2+55	0.0656	0.32	QV	|	|	|	|
3+ 0	0.0679	0.33	QV	|	|	|	|
3+ 5	0.0701	0.33	QV	|	|	|	|
3+10	0.0724	0.33	QV	|	|	|	|
3+15	0.0747	0.33	Q V	|	|	|	|
3+20	0.0769	0.33	Q V	|	|	|	|
3+25	0.0792	0.33	Q V	|	|	|	|
3+30	0.0815	0.33	Q V	|	|	|	|
3+35	0.0838	0.33	Q V	|	|	|	|
3+40	0.0861	0.34	Q V	|	|	|	|
3+45	0.0885	0.34	Q V	|	|	|	|
3+50	0.0908	0.34	Q V	|	|	|	|
3+55	0.0931	0.34	Q V	|	|	|	|
4+ 0	0.0955	0.34	Q V	|	|	|	|
4+ 5	0.0978	0.34	Q V	|	|	|	|
4+10	0.1002	0.34	Q V	|	|	|	|
4+15	0.1026	0.35	Q V	|	|	|	|
4+20	0.1050	0.35	Q V	|	|	|	|
4+25	0.1074	0.35	Q V	|	|	|	|
4+30	0.1098	0.35	Q V	|	|	|	|
4+35	0.1122	0.35	Q V	|	|	|	|
4+40	0.1146	0.35	Q V	|	|	|	|
4+45	0.1170	0.35	Q V	|	|	|	|
4+50	0.1195	0.36	Q V	|	|	|	|
4+55	0.1219	0.36	Q V	|	|	|	|
5+ 0	0.1244	0.36	Q V	|	|	|	|
5+ 5	0.1269	0.36	Q V	|	|	|	|
5+10	0.1294	0.36	Q V	|	|	|	|
5+15	0.1319	0.36	Q V	|	|	|	|
5+20	0.1344	0.36	Q V	|	|	|	|
5+25	0.1369	0.37	Q V	|	|	|	|
5+30	0.1395	0.37	Q V	|	|	|	|
5+35	0.1420	0.37	Q V	|	|	|	|
5+40	0.1446	0.37	Q V	|	|	|	|
5+45	0.1471	0.37	Q V	|	|	|	|
5+50	0.1497	0.37	Q V	|	|	|	|
5+55	0.1523	0.38	Q V	|	|	|	|
6+ 0	0.1549	0.38	Q V	|	|	|	|
6+ 5	0.1575	0.38	Q V	|	|	|	|
6+10	0.1602	0.38	Q V	|	|	|	|
6+15	0.1628	0.38	Q V	|	|	|	|
6+20	0.1655	0.39	Q V	|	|	|	|
6+25	0.1681	0.39	Q V	|	|	|	|
6+30	0.1708	0.39	Q V	|	|	|	|
6+35	0.1735	0.39	Q V	|	|	|	|
6+40	0.1762	0.39	Q V	|	|	|	|
6+45	0.1790	0.40	Q V	|	|	|	|
6+50	0.1817	0.40	Q V	|	|	|	|
6+55	0.1844	0.40	Q V	|	|	|	|
7+ 0	0.1872	0.40	Q V	|	|	|	|
7+ 5	0.1900	0.40	Q V	|	|	|	|
7+10	0.1928	0.41	Q V	|	|	|	|
7+15	0.1956	0.41	Q V	|	|	|	|
7+20	0.1984	0.41	Q V	|	|	|	|
7+25	0.2013	0.41	Q V	|	|	|	|
7+30	0.2041	0.42	Q V	|	|	|	|
7+35	0.2070	0.42	Q V	|	|	|	|
7+40	0.2099	0.42	Q V	|	|	|	|
7+45	0.2128	0.42	Q V	|	|	|	|

7+50	0.2157	0.42	Q	V	|	|	|	|
7+55	0.2187	0.43	Q	V	|	|	|	|
8+ 0	0.2216	0.43	Q	V	|	|	|	|
8+ 5	0.2246	0.43	Q	V	|	|	|	|
8+10	0.2276	0.43	Q	V	|	|	|	|
8+15	0.2306	0.44	Q	V	|	|	|	|
8+20	0.2337	0.44	Q	V	|	|	|	|
8+25	0.2367	0.44	Q	V	|	|	|	|
8+30	0.2398	0.45	Q	V	|	|	|	|
8+35	0.2429	0.45	Q	V	|	|	|	|
8+40	0.2460	0.45	Q	V	|	|	|	|
8+45	0.2491	0.45	Q	V	|	|	|	|
8+50	0.2522	0.46	Q	V	|	|	|	|
8+55	0.2554	0.46	Q	V	|	|	|	|
9+ 0	0.2586	0.46	Q	V	|	|	|	|
9+ 5	0.2618	0.47	Q	V	|	|	|	|
9+10	0.2651	0.47	Q	V	|	|	|	|
9+15	0.2683	0.47	Q	V	|	|	|	|
9+20	0.2716	0.48	Q	V	|	|	|	|
9+25	0.2749	0.48	Q	V	|	|	|	|
9+30	0.2782	0.48	Q	V	|	|	|	|
9+35	0.2816	0.49	Q	V	|	|	|	|
9+40	0.2849	0.49	Q	V	|	|	|	|
9+45	0.2883	0.49	Q	V	|	|	|	|
9+50	0.2918	0.50	Q	V	|	|	|	|
9+55	0.2952	0.50	|Q	V	|	|	|	|
10+ 0	0.2987	0.51	|Q	V	|	|	|	|
10+ 5	0.3022	0.51	|Q	V	|	|	|	|
10+10	0.3057	0.51	|Q	V	|	|	|	|
10+15	0.3093	0.52	|Q	V	|	|	|	|
10+20	0.3129	0.52	|Q	V	|	|	|	|
10+25	0.3165	0.53	|Q	V	|	|	|	|
10+30	0.3202	0.53	|Q	V	|	|	|	|
10+35	0.3238	0.53	|Q	V	|	|	|	|
10+40	0.3276	0.54	|Q	V	|	|	|	|
10+45	0.3313	0.54	|Q	V	|	|	|	|
10+50	0.3351	0.55	|Q	V	|	|	|	|
10+55	0.3389	0.55	|Q	V|		|	|	|
11+ 0	0.3427	0.56	|Q	V|		|	|	|
11+ 5	0.3466	0.56	|Q	V|		|	|	|
11+10	0.3506	0.57	|Q	V|		|	|	|
11+15	0.3545	0.57	|Q	V|		|	|	|
11+20	0.3585	0.58	|Q	V|		|	|	|
11+25	0.3625	0.59	|Q	V|		|	|	|
11+30	0.3666	0.59	|Q	V|		|	|	|
11+35	0.3707	0.60	|Q	V|		|	|	|
11+40	0.3749	0.60	|Q	V		|	|	|
11+45	0.3791	0.61	|Q	V		|	|	|
11+50	0.3834	0.62	|Q	V		|	|	|
11+55	0.3877	0.62	|Q	V		|	|	|
12+ 0	0.3920	0.63	|Q	V		|	|	|
12+ 5	0.3964	0.64	|Q	V		|	|	|
12+10	0.4008	0.64	|Q	V		|	|	|
12+15	0.4053	0.65	|Q	V		|	|	|
12+20	0.4099	0.66	|Q	V		|	|	|
12+25	0.4144	0.67	|Q	|V		|	|	|
12+30	0.4191	0.67	|Q	|V		|	|	|
12+35	0.4238	0.68	|Q	|V		|	|	|
12+40	0.4285	0.69	|Q	|V		|	|	|
12+45	0.4333	0.70	|Q	|V		|	|	|
12+50	0.4382	0.71	|Q	|V		|	|	|
12+55	0.4432	0.72	|Q	|V		|	|	|
13+ 0	0.4482	0.73	|Q	| V		|	|	|



18+20	1.2847	0.69	|Q	|	|	| V	|
18+25	1.2893	0.67	|Q	|	|	| V	|
18+30	1.2938	0.66	|Q	|	|	| V	|
18+35	1.2983	0.64	|Q	|	|	| V	|
18+40	1.3026	0.63	|Q	|	|	| V	|
18+45	1.3068	0.61	|Q	|	|	| V	|
18+50	1.3110	0.60	|Q	|	|	| V	|
18+55	1.3150	0.59	|Q	|	|	| V	|
19+ 0	1.3190	0.58	|Q	|	|	| V	|
19+ 5	1.3229	0.57	|Q	|	|	| V	|
19+10	1.3267	0.56	|Q	|	|	| V	|
19+15	1.3305	0.55	|Q	|	|	| V	|
19+20	1.3342	0.54	|Q	|	|	| V	|
19+25	1.3378	0.53	|Q	|	|	| V	|
19+30	1.3414	0.52	|Q	|	|	| V	|
19+35	1.3449	0.51	|Q	|	|	| V	|
19+40	1.3483	0.50	|Q	|	|	| V	|
19+45	1.3517	0.49	Q	|	|	| V	|
19+50	1.3551	0.49	Q	|	|	| V	|
19+55	1.3584	0.48	Q	|	|	| V	|
20+ 0	1.3617	0.47	Q	|	|	| V	|
20+ 5	1.3649	0.47	Q	|	|	| V	|
20+10	1.3681	0.46	Q	|	|	| V	|
20+15	1.3712	0.45	Q	|	|	| V	|
20+20	1.3743	0.45	Q	|	|	| V	|
20+25	1.3773	0.44	Q	|	|	| V	|
20+30	1.3803	0.44	Q	|	|	| V	|
20+35	1.3833	0.43	Q	|	|	| V	|
20+40	1.3863	0.43	Q	|	|	| V	|
20+45	1.3892	0.42	Q	|	|	| V	|
20+50	1.3921	0.42	Q	|	|	| V	|
20+55	1.3949	0.41	Q	|	|	| V	|
21+ 0	1.3977	0.41	Q	|	|	| V	|
21+ 5	1.4005	0.40	Q	|	|	| V	|
21+10	1.4033	0.40	Q	|	|	| V	|
21+15	1.4060	0.40	Q	|	|	| V	|
21+20	1.4087	0.39	Q	|	|	| V	|
21+25	1.4113	0.39	Q	|	|	| V	|
21+30	1.4140	0.38	Q	|	|	| V	|
21+35	1.4166	0.38	Q	|	|	| V	|
21+40	1.4192	0.38	Q	|	|	| V	|
21+45	1.4218	0.37	Q	|	|	| V	|
21+50	1.4243	0.37	Q	|	|	| V	|
21+55	1.4269	0.37	Q	|	|	| V	|
22+ 0	1.4294	0.36	Q	|	|	| V	|
22+ 5	1.4318	0.36	Q	|	|	| V	|
22+10	1.4343	0.36	Q	|	|	| V	|
22+15	1.4367	0.35	Q	|	|	| V	|
22+20	1.4391	0.35	Q	|	|	| V	|
22+25	1.4415	0.35	Q	|	|	| V	|
22+30	1.4439	0.35	Q	|	|	| V	|
22+35	1.4463	0.34	Q	|	|	| V	|
22+40	1.4486	0.34	Q	|	|	| V	|
22+45	1.4509	0.34	Q	|	|	| V	|
22+50	1.4532	0.33	Q	|	|	| V	|
22+55	1.4555	0.33	Q	|	|	| V	|
23+ 0	1.4578	0.33	Q	|	|	| V	|
23+ 5	1.4600	0.33	Q	|	|	| V	|
23+10	1.4623	0.32	Q	|	|	| V	|
23+15	1.4645	0.32	Q	|	|	| V	|
23+20	1.4667	0.32	Q	|	|	| V	|
23+25	1.4689	0.32	Q	|	|	| V	|
23+30	1.4710	0.32	Q	|	|	| V	|

23+35	1.4732	0.31	Q	|	|	|	V|
23+40	1.4753	0.31	Q	|	|	|	V|
23+45	1.4775	0.31	Q	|	|	|	V|
23+50	1.4796	0.31	Q	|	|	|	V|
23+55	1.4817	0.30	Q	|	|	|	V|
24+ 0	1.4838	0.30	Q	|	|	|	V|
24+ 5	1.4858	0.29	Q	|	|	|	V|
24+10	1.4876	0.26	Q	|	|	|	V|
24+15	1.4887	0.17	Q	|	|	|	V|
24+20	1.4895	0.12	Q	|	|	|	V|
24+25	1.4901	0.09	Q	|	|	|	V|
24+30	1.4906	0.07	Q	|	|	|	V|
24+35	1.4909	0.05	Q	|	|	|	V|
24+40	1.4912	0.04	Q	|	|	|	V|
24+45	1.4915	0.03	Q	|	|	|	V|
24+50	1.4916	0.03	Q	|	|	|	V|
24+55	1.4918	0.02	Q	|	|	|	V|
25+ 0	1.4919	0.02	Q	|	|	|	V|
25+ 5	1.4920	0.01	Q	|	|	|	V|
25+10	1.4921	0.01	Q	|	|	|	V|
25+15	1.4921	0.01	Q	|	|	|	V|
25+20	1.4921	0.01	Q	|	|	|	V|
25+25	1.4922	0.00	Q	|	|	|	V|
25+30	1.4922	0.00	Q	|	|	|	V|
25+35	1.4922	0.00	Q	|	|	|	V|
25+40	1.4922	0.00	Q	|	|	|	V|
25+45	1.4922	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 01/13/23

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6385

Space Center Expansion Project Phase 2 Flag
Developed Condition Area A1 to A4
100 Year 24 Hour Storm Event
Please Refer to Appendix B Developed Condition Hydrology Map

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
10.06	1	1.09
Rainfall data for year 100		
10.06	6	2.09
Rainfall data for year 100		
10.06	24	3.64

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******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 2)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
70.4	70.4	10.06	1.000	0.526	0.176	0.093

Area-averaged adjusted loss rate Fm (In/Hr) = 0.093

********* Area-Averaged low loss rate fraction, Yb **********

Area	Area	SCS CN	SCS CN	S	Pervious

(Ac.)	Fract	(AMC2)	(AMC2)		Yield Fr
1.77	0.176	70.4	70.4	4.20	0.307
8.29	0.824	98.0	98.0	0.20	0.936

Area-averaged catchment yield fraction, Y = 0.825
Area-averaged low loss fraction, Yb = 0.175
User entry of time of concentration = 0.267 (hours)
++
Watershed area = 10.06(Ac.)
Catchment Lag time = 0.214 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 39.0137
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.093(In/Hr)
Average low loss rate fraction (Yb) = 0.175 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall = 0.517(In)
Computed peak 30-minute rainfall = 0.885(In)
Specified peak 1-hour rainfall = 1.090(In)
Computed peak 3-hour rainfall = 1.625(In)
Specified peak 6-hour rainfall = 2.090(In)
Specified peak 24-hour rainfall = 3.640(In)

Rainfall depth area reduction factors:
Using a total area of 10.06(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.517(In)
30-minute factor = 1.000 Adjusted rainfall = 0.885(In)
1-hour factor = 1.000 Adjusted rainfall = 1.089(In)
3-hour factor = 1.000 Adjusted rainfall = 1.625(In)
6-hour factor = 1.000 Adjusted rainfall = 2.090(In)
24-hour factor = 1.000 Adjusted rainfall = 3.640(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
(K = 121.66 (CFS))		
1	2.641	3.213
2	17.590	18.187
3	47.691	36.622
4	64.621	20.598
5	73.961	11.363
6	80.187	7.575
7	84.606	5.375
8	88.070	4.215
9	90.562	3.032
10	92.579	2.453
11	94.215	1.992
12	95.521	1.588
13	96.574	1.282
14	97.380	0.981
15	97.956	0.700
16	98.362	0.495
17	98.825	0.563
18	99.293	0.569
19	99.636	0.418
20	100.000	0.209

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.5170	0.5170
2	0.6365	0.1195
3	0.7188	0.0823
4	0.7836	0.0648
5	0.8378	0.0543
6	0.8849	0.0471
7	0.9268	0.0419
8	0.9647	0.0379
9	0.9994	0.0347
10	1.0315	0.0321
11	1.0614	0.0299
12	1.0895	0.0281
13	1.1217	0.0322
14	1.1523	0.0306
15	1.1816	0.0293
16	1.2097	0.0281
17	1.2366	0.0270
18	1.2626	0.0260
19	1.2877	0.0251
20	1.3119	0.0242
21	1.3354	0.0235
22	1.3582	0.0228
23	1.3803	0.0221
24	1.4019	0.0215
25	1.4228	0.0210
26	1.4433	0.0204
27	1.4632	0.0199
28	1.4827	0.0195
29	1.5017	0.0190
30	1.5204	0.0186
31	1.5386	0.0182
32	1.5565	0.0179
33	1.5740	0.0175
34	1.5912	0.0172
35	1.6081	0.0169
36	1.6246	0.0166
37	1.6409	0.0163
38	1.6568	0.0160
39	1.6726	0.0157
40	1.6880	0.0155
41	1.7032	0.0152
42	1.7182	0.0150
43	1.7330	0.0148
44	1.7475	0.0145
45	1.7618	0.0143
46	1.7760	0.0141
47	1.7899	0.0139
48	1.8036	0.0137
49	1.8172	0.0136
50	1.8306	0.0134
51	1.8438	0.0132
52	1.8569	0.0131
53	1.8698	0.0129
54	1.8825	0.0127
55	1.8951	0.0126
56	1.9075	0.0124
57	1.9198	0.0123
58	1.9320	0.0122
59	1.9441	0.0120
60	1.9560	0.0119
61	1.9677	0.0118

62	1.9794	0.0117
63	1.9910	0.0115
64	2.0024	0.0114
65	2.0137	0.0113
66	2.0249	0.0112
67	2.0360	0.0111
68	2.0470	0.0110
69	2.0579	0.0109
70	2.0687	0.0108
71	2.0793	0.0107
72	2.0899	0.0106
73	2.1015	0.0116
74	2.1130	0.0115
75	2.1244	0.0114
76	2.1357	0.0113
77	2.1469	0.0112
78	2.1580	0.0111
79	2.1690	0.0110
80	2.1799	0.0109
81	2.1908	0.0109
82	2.2016	0.0108
83	2.2123	0.0107
84	2.2229	0.0106
85	2.2335	0.0106
86	2.2440	0.0105
87	2.2544	0.0104
88	2.2647	0.0103
89	2.2750	0.0103
90	2.2852	0.0102
91	2.2953	0.0101
92	2.3054	0.0101
93	2.3154	0.0100
94	2.3253	0.0099
95	2.3352	0.0099
96	2.3450	0.0098
97	2.3547	0.0097
98	2.3644	0.0097
99	2.3740	0.0096
100	2.3836	0.0096
101	2.3931	0.0095
102	2.4026	0.0095
103	2.4120	0.0094
104	2.4213	0.0093
105	2.4306	0.0093
106	2.4398	0.0092
107	2.4490	0.0092
108	2.4582	0.0091
109	2.4672	0.0091
110	2.4763	0.0090
111	2.4853	0.0090
112	2.4942	0.0089
113	2.5031	0.0089
114	2.5119	0.0088
115	2.5207	0.0088
116	2.5295	0.0088
117	2.5382	0.0087
118	2.5468	0.0087
119	2.5555	0.0086
120	2.5640	0.0086
121	2.5726	0.0085
122	2.5811	0.0085
123	2.5895	0.0084
124	2.5979	0.0084

125	2.6063	0.0084
126	2.6146	0.0083
127	2.6229	0.0083
128	2.6311	0.0082
129	2.6393	0.0082
130	2.6475	0.0082
131	2.6556	0.0081
132	2.6637	0.0081
133	2.6718	0.0081
134	2.6798	0.0080
135	2.6878	0.0080
136	2.6957	0.0080
137	2.7037	0.0079
138	2.7115	0.0079
139	2.7194	0.0078
140	2.7272	0.0078
141	2.7350	0.0078
142	2.7427	0.0077
143	2.7504	0.0077
144	2.7581	0.0077
145	2.7658	0.0076
146	2.7734	0.0076
147	2.7810	0.0076
148	2.7885	0.0076
149	2.7961	0.0075
150	2.8036	0.0075
151	2.8110	0.0075
152	2.8185	0.0074
153	2.8259	0.0074
154	2.8332	0.0074
155	2.8406	0.0073
156	2.8479	0.0073
157	2.8552	0.0073
158	2.8625	0.0073
159	2.8697	0.0072
160	2.8769	0.0072
161	2.8841	0.0072
162	2.8913	0.0072
163	2.8984	0.0071
164	2.9055	0.0071
165	2.9126	0.0071
166	2.9196	0.0071
167	2.9266	0.0070
168	2.9337	0.0070
169	2.9406	0.0070
170	2.9476	0.0070
171	2.9545	0.0069
172	2.9614	0.0069
173	2.9683	0.0069
174	2.9751	0.0069
175	2.9820	0.0068
176	2.9888	0.0068
177	2.9956	0.0068
178	3.0023	0.0068
179	3.0091	0.0067
180	3.0158	0.0067
181	3.0225	0.0067
182	3.0292	0.0067
183	3.0358	0.0067
184	3.0424	0.0066
185	3.0490	0.0066
186	3.0556	0.0066
187	3.0622	0.0066

188	3.0687	0.0065
189	3.0753	0.0065
190	3.0818	0.0065
191	3.0882	0.0065
192	3.0947	0.0065
193	3.1011	0.0064
194	3.1076	0.0064
195	3.1140	0.0064
196	3.1203	0.0064
197	3.1267	0.0064
198	3.1331	0.0063
199	3.1394	0.0063
200	3.1457	0.0063
201	3.1520	0.0063
202	3.1582	0.0063
203	3.1645	0.0062
204	3.1707	0.0062
205	3.1769	0.0062
206	3.1831	0.0062
207	3.1893	0.0062
208	3.1954	0.0062
209	3.2016	0.0061
210	3.2077	0.0061
211	3.2138	0.0061
212	3.2199	0.0061
213	3.2260	0.0061
214	3.2320	0.0061
215	3.2381	0.0060
216	3.2441	0.0060
217	3.2501	0.0060
218	3.2561	0.0060
219	3.2620	0.0060
220	3.2680	0.0060
221	3.2739	0.0059
222	3.2798	0.0059
223	3.2858	0.0059
224	3.2916	0.0059
225	3.2975	0.0059
226	3.3034	0.0059
227	3.3092	0.0058
228	3.3150	0.0058
229	3.3209	0.0058
230	3.3267	0.0058
231	3.3324	0.0058
232	3.3382	0.0058
233	3.3440	0.0058
234	3.3497	0.0057
235	3.3554	0.0057
236	3.3611	0.0057
237	3.3668	0.0057
238	3.3725	0.0057
239	3.3782	0.0057
240	3.3838	0.0057
241	3.3894	0.0056
242	3.3951	0.0056
243	3.4007	0.0056
244	3.4063	0.0056
245	3.4118	0.0056
246	3.4174	0.0056
247	3.4230	0.0056
248	3.4285	0.0055
249	3.4340	0.0055
250	3.4395	0.0055

251	3.4450	0.0055
252	3.4505	0.0055
253	3.4560	0.0055
254	3.4615	0.0055
255	3.4669	0.0054
256	3.4723	0.0054
257	3.4778	0.0054
258	3.4832	0.0054
259	3.4886	0.0054
260	3.4940	0.0054
261	3.4993	0.0054
262	3.5047	0.0054
263	3.5100	0.0053
264	3.5154	0.0053
265	3.5207	0.0053
266	3.5260	0.0053
267	3.5313	0.0053
268	3.5366	0.0053
269	3.5419	0.0053
270	3.5471	0.0053
271	3.5524	0.0053
272	3.5576	0.0052
273	3.5629	0.0052
274	3.5681	0.0052
275	3.5733	0.0052
276	3.5785	0.0052
277	3.5837	0.0052
278	3.5888	0.0052
279	3.5940	0.0052
280	3.5991	0.0052
281	3.6043	0.0051
282	3.6094	0.0051
283	3.6145	0.0051
284	3.6196	0.0051
285	3.6247	0.0051
286	3.6298	0.0051
287	3.6349	0.0051
288	3.6400	0.0051

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0051	0.0009	0.0042
2	0.0051	0.0009	0.0042
3	0.0051	0.0009	0.0042
4	0.0051	0.0009	0.0042
5	0.0051	0.0009	0.0042
6	0.0051	0.0009	0.0042
7	0.0052	0.0009	0.0043
8	0.0052	0.0009	0.0043
9	0.0052	0.0009	0.0043
10	0.0052	0.0009	0.0043
11	0.0052	0.0009	0.0043
12	0.0052	0.0009	0.0043
13	0.0053	0.0009	0.0043
14	0.0053	0.0009	0.0044
15	0.0053	0.0009	0.0044
16	0.0053	0.0009	0.0044
17	0.0053	0.0009	0.0044
18	0.0053	0.0009	0.0044
19	0.0054	0.0009	0.0044
20	0.0054	0.0009	0.0044

21	0.0054	0.0009	0.0045
22	0.0054	0.0009	0.0045
23	0.0054	0.0010	0.0045
24	0.0055	0.0010	0.0045
25	0.0055	0.0010	0.0045
26	0.0055	0.0010	0.0045
27	0.0055	0.0010	0.0046
28	0.0055	0.0010	0.0046
29	0.0056	0.0010	0.0046
30	0.0056	0.0010	0.0046
31	0.0056	0.0010	0.0046
32	0.0056	0.0010	0.0046
33	0.0057	0.0010	0.0047
34	0.0057	0.0010	0.0047
35	0.0057	0.0010	0.0047
36	0.0057	0.0010	0.0047
37	0.0057	0.0010	0.0047
38	0.0058	0.0010	0.0047
39	0.0058	0.0010	0.0048
40	0.0058	0.0010	0.0048
41	0.0058	0.0010	0.0048
42	0.0058	0.0010	0.0048
43	0.0059	0.0010	0.0048
44	0.0059	0.0010	0.0049
45	0.0059	0.0010	0.0049
46	0.0059	0.0010	0.0049
47	0.0060	0.0010	0.0049
48	0.0060	0.0010	0.0049
49	0.0060	0.0011	0.0050
50	0.0060	0.0011	0.0050
51	0.0061	0.0011	0.0050
52	0.0061	0.0011	0.0050
53	0.0061	0.0011	0.0051
54	0.0061	0.0011	0.0051
55	0.0062	0.0011	0.0051
56	0.0062	0.0011	0.0051
57	0.0062	0.0011	0.0051
58	0.0062	0.0011	0.0052
59	0.0063	0.0011	0.0052
60	0.0063	0.0011	0.0052
61	0.0063	0.0011	0.0052
62	0.0064	0.0011	0.0052
63	0.0064	0.0011	0.0053
64	0.0064	0.0011	0.0053
65	0.0065	0.0011	0.0053
66	0.0065	0.0011	0.0053
67	0.0065	0.0011	0.0054
68	0.0065	0.0011	0.0054
69	0.0066	0.0012	0.0054
70	0.0066	0.0012	0.0055
71	0.0067	0.0012	0.0055
72	0.0067	0.0012	0.0055
73	0.0067	0.0012	0.0055
74	0.0067	0.0012	0.0056
75	0.0068	0.0012	0.0056
76	0.0068	0.0012	0.0056
77	0.0069	0.0012	0.0057
78	0.0069	0.0012	0.0057
79	0.0069	0.0012	0.0057
80	0.0070	0.0012	0.0057
81	0.0070	0.0012	0.0058
82	0.0070	0.0012	0.0058
83	0.0071	0.0012	0.0058

84	0.0071	0.0012	0.0059
85	0.0072	0.0013	0.0059
86	0.0072	0.0013	0.0059
87	0.0072	0.0013	0.0060
88	0.0073	0.0013	0.0060
89	0.0073	0.0013	0.0060
90	0.0073	0.0013	0.0061
91	0.0074	0.0013	0.0061
92	0.0074	0.0013	0.0061
93	0.0075	0.0013	0.0062
94	0.0075	0.0013	0.0062
95	0.0076	0.0013	0.0063
96	0.0076	0.0013	0.0063
97	0.0077	0.0013	0.0063
98	0.0077	0.0013	0.0064
99	0.0078	0.0014	0.0064
100	0.0078	0.0014	0.0064
101	0.0079	0.0014	0.0065
102	0.0079	0.0014	0.0065
103	0.0080	0.0014	0.0066
104	0.0080	0.0014	0.0066
105	0.0081	0.0014	0.0067
106	0.0081	0.0014	0.0067
107	0.0082	0.0014	0.0068
108	0.0082	0.0014	0.0068
109	0.0083	0.0015	0.0069
110	0.0084	0.0015	0.0069
111	0.0084	0.0015	0.0070
112	0.0085	0.0015	0.0070
113	0.0086	0.0015	0.0071
114	0.0086	0.0015	0.0071
115	0.0087	0.0015	0.0072
116	0.0088	0.0015	0.0072
117	0.0088	0.0015	0.0073
118	0.0089	0.0016	0.0073
119	0.0090	0.0016	0.0074
120	0.0090	0.0016	0.0075
121	0.0091	0.0016	0.0075
122	0.0092	0.0016	0.0076
123	0.0093	0.0016	0.0077
124	0.0093	0.0016	0.0077
125	0.0095	0.0017	0.0078
126	0.0095	0.0017	0.0078
127	0.0096	0.0017	0.0079
128	0.0097	0.0017	0.0080
129	0.0098	0.0017	0.0081
130	0.0099	0.0017	0.0081
131	0.0100	0.0017	0.0082
132	0.0101	0.0018	0.0083
133	0.0102	0.0018	0.0084
134	0.0103	0.0018	0.0085
135	0.0104	0.0018	0.0086
136	0.0105	0.0018	0.0086
137	0.0106	0.0019	0.0088
138	0.0107	0.0019	0.0088
139	0.0109	0.0019	0.0090
140	0.0109	0.0019	0.0090
141	0.0111	0.0019	0.0092
142	0.0112	0.0020	0.0092
143	0.0114	0.0020	0.0094
144	0.0115	0.0020	0.0095
145	0.0106	0.0019	0.0087
146	0.0107	0.0019	0.0088

147	0.0109	0.0019	0.0090
148	0.0110	0.0019	0.0091
149	0.0112	0.0020	0.0092
150	0.0113	0.0020	0.0093
151	0.0115	0.0020	0.0095
152	0.0117	0.0020	0.0096
153	0.0119	0.0021	0.0098
154	0.0120	0.0021	0.0099
155	0.0123	0.0022	0.0102
156	0.0124	0.0022	0.0103
157	0.0127	0.0022	0.0105
158	0.0129	0.0023	0.0106
159	0.0132	0.0023	0.0109
160	0.0134	0.0023	0.0110
161	0.0137	0.0024	0.0113
162	0.0139	0.0024	0.0115
163	0.0143	0.0025	0.0118
164	0.0145	0.0025	0.0120
165	0.0150	0.0026	0.0124
166	0.0152	0.0027	0.0126
167	0.0157	0.0027	0.0130
168	0.0160	0.0028	0.0132
169	0.0166	0.0029	0.0137
170	0.0169	0.0029	0.0139
171	0.0175	0.0031	0.0145
172	0.0179	0.0031	0.0147
173	0.0186	0.0033	0.0154
174	0.0190	0.0033	0.0157
175	0.0199	0.0035	0.0165
176	0.0204	0.0036	0.0169
177	0.0215	0.0038	0.0178
178	0.0221	0.0039	0.0183
179	0.0235	0.0041	0.0194
180	0.0242	0.0042	0.0200
181	0.0260	0.0045	0.0214
182	0.0270	0.0047	0.0223
183	0.0293	0.0051	0.0242
184	0.0306	0.0054	0.0253
185	0.0281	0.0049	0.0232
186	0.0299	0.0052	0.0247
187	0.0347	0.0061	0.0286
188	0.0379	0.0066	0.0313
189	0.0471	0.0077	0.0394
190	0.0543	0.0077	0.0465
191	0.0823	0.0077	0.0746
192	0.1195	0.0077	0.1118
193	0.5170	0.0077	0.5093
194	0.0648	0.0077	0.0571
195	0.0419	0.0073	0.0346
196	0.0321	0.0056	0.0265
197	0.0322	0.0056	0.0266
198	0.0281	0.0049	0.0232
199	0.0251	0.0044	0.0207
200	0.0228	0.0040	0.0188
201	0.0210	0.0037	0.0173
202	0.0195	0.0034	0.0161
203	0.0182	0.0032	0.0151
204	0.0172	0.0030	0.0142
205	0.0163	0.0028	0.0134
206	0.0155	0.0027	0.0128
207	0.0148	0.0026	0.0122
208	0.0141	0.0025	0.0117
209	0.0136	0.0024	0.0112

210	0.0131	0.0023	0.0108
211	0.0126	0.0022	0.0104
212	0.0122	0.0021	0.0100
213	0.0118	0.0021	0.0097
214	0.0114	0.0020	0.0094
215	0.0111	0.0019	0.0092
216	0.0108	0.0019	0.0089
217	0.0116	0.0020	0.0095
218	0.0113	0.0020	0.0093
219	0.0110	0.0019	0.0091
220	0.0108	0.0019	0.0089
221	0.0106	0.0018	0.0087
222	0.0103	0.0018	0.0085
223	0.0101	0.0018	0.0084
224	0.0099	0.0017	0.0082
225	0.0097	0.0017	0.0080
226	0.0096	0.0017	0.0079
227	0.0094	0.0016	0.0078
228	0.0092	0.0016	0.0076
229	0.0091	0.0016	0.0075
230	0.0089	0.0016	0.0074
231	0.0088	0.0015	0.0073
232	0.0087	0.0015	0.0071
233	0.0085	0.0015	0.0070
234	0.0084	0.0015	0.0069
235	0.0083	0.0014	0.0068
236	0.0082	0.0014	0.0067
237	0.0081	0.0014	0.0066
238	0.0080	0.0014	0.0066
239	0.0078	0.0014	0.0065
240	0.0077	0.0014	0.0064
241	0.0076	0.0013	0.0063
242	0.0076	0.0013	0.0062
243	0.0075	0.0013	0.0062
244	0.0074	0.0013	0.0061
245	0.0073	0.0013	0.0060
246	0.0072	0.0013	0.0059
247	0.0071	0.0012	0.0059
248	0.0071	0.0012	0.0058
249	0.0070	0.0012	0.0058
250	0.0069	0.0012	0.0057
251	0.0068	0.0012	0.0056
252	0.0068	0.0012	0.0056
253	0.0067	0.0012	0.0055
254	0.0066	0.0012	0.0055
255	0.0066	0.0011	0.0054
256	0.0065	0.0011	0.0054
257	0.0064	0.0011	0.0053
258	0.0064	0.0011	0.0053
259	0.0063	0.0011	0.0052
260	0.0063	0.0011	0.0052
261	0.0062	0.0011	0.0051
262	0.0062	0.0011	0.0051
263	0.0061	0.0011	0.0050
264	0.0061	0.0011	0.0050
265	0.0060	0.0010	0.0050
266	0.0060	0.0010	0.0049
267	0.0059	0.0010	0.0049
268	0.0059	0.0010	0.0048
269	0.0058	0.0010	0.0048
270	0.0058	0.0010	0.0048
271	0.0057	0.0010	0.0047
272	0.0057	0.0010	0.0047

273	0.0056	0.0010	0.0047
274	0.0056	0.0010	0.0046
275	0.0056	0.0010	0.0046
276	0.0055	0.0010	0.0045
277	0.0055	0.0010	0.0045
278	0.0054	0.0010	0.0045
279	0.0054	0.0009	0.0045
280	0.0054	0.0009	0.0044
281	0.0053	0.0009	0.0044
282	0.0053	0.0009	0.0044
283	0.0053	0.0009	0.0043
284	0.0052	0.0009	0.0043
285	0.0052	0.0009	0.0043
286	0.0052	0.0009	0.0042
287	0.0051	0.0009	0.0042
288	0.0051	0.0009	0.0042

Total soil rain loss = 0.53(In)
Total effective rainfall = 3.11(In)
Peak flow rate in flood hydrograph = 23.99(CFS)

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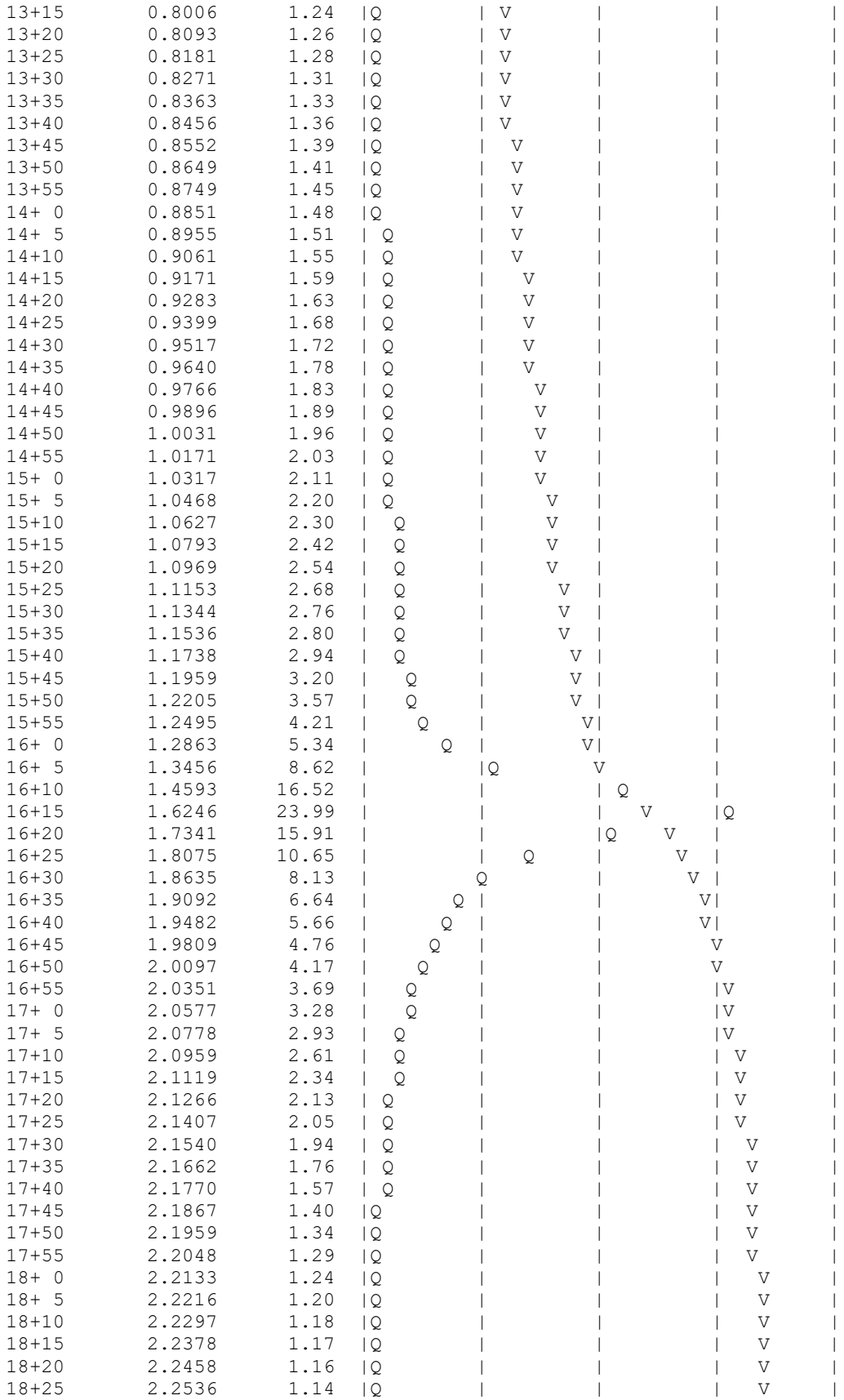
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	7.5	15.0	22.5	30.0
0+ 5	0.0001	0.01	Q				
0+10	0.0007	0.09	Q				
0+15	0.0024	0.24	Q				
0+20	0.0046	0.33	Q				
0+25	0.0073	0.38	Q				
0+30	0.0101	0.41	Q				
0+35	0.0131	0.43	Q				
0+40	0.0162	0.45	Q				
0+45	0.0194	0.47	Q				
0+50	0.0227	0.48	Q				
0+55	0.0261	0.49	Q				
1+ 0	0.0295	0.50	Q				
1+ 5	0.0330	0.50	Q				
1+10	0.0365	0.51	Q				
1+15	0.0400	0.51	Q				
1+20	0.0436	0.52	Q				
1+25	0.0472	0.52	Q				
1+30	0.0508	0.53	Q				
1+35	0.0545	0.53	Q				
1+40	0.0582	0.53	Q				
1+45	0.0619	0.53	Q				
1+50	0.0655	0.54	QV				
1+55	0.0693	0.54	QV				
2+ 0	0.0730	0.54	QV				
2+ 5	0.0767	0.54	QV				
2+10	0.0805	0.54	QV				
2+15	0.0842	0.55	QV				
2+20	0.0880	0.55	QV				
2+25	0.0918	0.55	QV				
2+30	0.0956	0.55	QV				
2+35	0.0994	0.55	QV				
2+40	0.1032	0.56	QV				

2+45	0.1071	0.56	QV	|	|	|	|
2+50	0.1109	0.56	QV	|	|	|	|
2+55	0.1148	0.56	QV	|	|	|	|
3+ 0	0.1187	0.56	QV	|	|	|	|
3+ 5	0.1226	0.57	QV	|	|	|	|
3+10	0.1265	0.57	QV	|	|	|	|
3+15	0.1304	0.57	Q V	|	|	|	|
3+20	0.1344	0.57	Q V	|	|	|	|
3+25	0.1383	0.58	Q V	|	|	|	|
3+30	0.1423	0.58	Q V	|	|	|	|
3+35	0.1463	0.58	Q V	|	|	|	|
3+40	0.1503	0.58	Q V	|	|	|	|
3+45	0.1543	0.58	Q V	|	|	|	|
3+50	0.1584	0.59	Q V	|	|	|	|
3+55	0.1624	0.59	Q V	|	|	|	|
4+ 0	0.1665	0.59	Q V	|	|	|	|
4+ 5	0.1706	0.59	Q V	|	|	|	|
4+10	0.1747	0.60	Q V	|	|	|	|
4+15	0.1788	0.60	Q V	|	|	|	|
4+20	0.1829	0.60	Q V	|	|	|	|
4+25	0.1871	0.60	Q V	|	|	|	|
4+30	0.1913	0.61	Q V	|	|	|	|
4+35	0.1955	0.61	Q V	|	|	|	|
4+40	0.1997	0.61	Q V	|	|	|	|
4+45	0.2039	0.61	Q V	|	|	|	|
4+50	0.2081	0.62	Q V	|	|	|	|
4+55	0.2124	0.62	Q V	|	|	|	|
5+ 0	0.2167	0.62	Q V	|	|	|	|
5+ 5	0.2210	0.62	Q V	|	|	|	|
5+10	0.2253	0.63	Q V	|	|	|	|
5+15	0.2297	0.63	Q V	|	|	|	|
5+20	0.2340	0.63	Q V	|	|	|	|
5+25	0.2384	0.64	Q V	|	|	|	|
5+30	0.2428	0.64	Q V	|	|	|	|
5+35	0.2472	0.64	Q V	|	|	|	|
5+40	0.2517	0.64	Q V	|	|	|	|
5+45	0.2561	0.65	Q V	|	|	|	|
5+50	0.2606	0.65	Q V	|	|	|	|
5+55	0.2651	0.65	Q V	|	|	|	|
6+ 0	0.2696	0.66	Q V	|	|	|	|
6+ 5	0.2742	0.66	Q V	|	|	|	|
6+10	0.2787	0.66	Q V	|	|	|	|
6+15	0.2833	0.67	Q V	|	|	|	|
6+20	0.2880	0.67	Q V	|	|	|	|
6+25	0.2926	0.67	Q V	|	|	|	|
6+30	0.2973	0.68	Q V	|	|	|	|
6+35	0.3019	0.68	Q V	|	|	|	|
6+40	0.3066	0.68	Q V	|	|	|	|
6+45	0.3114	0.69	Q V	|	|	|	|
6+50	0.3161	0.69	Q V	|	|	|	|
6+55	0.3209	0.69	Q V	|	|	|	|
7+ 0	0.3257	0.70	Q V	|	|	|	|
7+ 5	0.3306	0.70	Q V	|	|	|	|
7+10	0.3354	0.71	Q V	|	|	|	|
7+15	0.3403	0.71	Q V	|	|	|	|
7+20	0.3452	0.71	Q V	|	|	|	|
7+25	0.3502	0.72	Q V	|	|	|	|
7+30	0.3551	0.72	Q V	|	|	|	|
7+35	0.3601	0.73	Q V	|	|	|	|
7+40	0.3652	0.73	Q V	|	|	|	|
7+45	0.3702	0.73	Q V	|	|	|	|
7+50	0.3753	0.74	Q V	|	|	|	|
7+55	0.3804	0.74	Q V	|	|	|	|

8+ 0	0.3856	0.75	Q	V	|	|	|
8+ 5	0.3907	0.75	|Q	V	|	|	|
8+10	0.3960	0.76	|Q	V	|	|	|
8+15	0.4012	0.76	|Q	V	|	|	|
8+20	0.4065	0.77	|Q	V	|	|	|
8+25	0.4118	0.77	|Q	V	|	|	|
8+30	0.4171	0.78	|Q	V	|	|	|
8+35	0.4225	0.78	|Q	V	|	|	|
8+40	0.4279	0.79	|Q	V	|	|	|
8+45	0.4333	0.79	|Q	V	|	|	|
8+50	0.4388	0.80	|Q	V	|	|	|
8+55	0.4443	0.80	|Q	V	|	|	|
9+ 0	0.4499	0.81	|Q	V	|	|	|
9+ 5	0.4555	0.81	|Q	V	|	|	|
9+10	0.4611	0.82	|Q	V	|	|	|
9+15	0.4668	0.82	|Q	V	|	|	|
9+20	0.4725	0.83	|Q	V	|	|	|
9+25	0.4782	0.84	|Q	V	|	|	|
9+30	0.4840	0.84	|Q	V	|	|	|
9+35	0.4899	0.85	|Q	V	|	|	|
9+40	0.4958	0.85	|Q	V	|	|	|
9+45	0.5017	0.86	|Q	V	|	|	|
9+50	0.5076	0.87	|Q	V	|	|	|
9+55	0.5137	0.87	|Q	V	|	|	|
10+ 0	0.5197	0.88	|Q	V	|	|	|
10+ 5	0.5258	0.89	|Q	V	|	|	|
10+10	0.5320	0.89	|Q	V	|	|	|
10+15	0.5382	0.90	|Q	V	|	|	|
10+20	0.5445	0.91	|Q	V	|	|	|
10+25	0.5508	0.92	|Q	V	|	|	|
10+30	0.5571	0.92	|Q	V	|	|	|
10+35	0.5636	0.93	|Q	V	|	|	|
10+40	0.5700	0.94	|Q	V	|	|	|
10+45	0.5766	0.95	|Q	V	|	|	|
10+50	0.5832	0.96	|Q	V	|	|	|
10+55	0.5898	0.97	|Q	V	|	|	|
11+ 0	0.5965	0.98	|Q	V	|	|	|
11+ 5	0.6033	0.98	|Q	V	|	|	|
11+10	0.6102	0.99	|Q	V	|	|	|
11+15	0.6171	1.00	|Q	V	|	|	|
11+20	0.6241	1.01	|Q	V	|	|	|
11+25	0.6311	1.02	|Q	V	|	|	|
11+30	0.6382	1.03	|Q	V	|	|	|
11+35	0.6454	1.05	|Q	V	|	|	|
11+40	0.6527	1.06	|Q	V	|	|	|
11+45	0.6600	1.07	|Q	V	|	|	|
11+50	0.6675	1.08	|Q	V	|	|	|
11+55	0.6750	1.09	|Q	V	|	|	|
12+ 0	0.6826	1.10	|Q	V	|	|	|
12+ 5	0.6903	1.11	|Q	V	|	|	|
12+10	0.6979	1.11	|Q	V	|	|	|
12+15	0.7054	1.09	|Q	V	|	|	|
12+20	0.7129	1.09	|Q	V	|	|	|
12+25	0.7204	1.09	|Q	|V	|	|	|
12+30	0.7280	1.10	|Q	|V	|	|	|
12+35	0.7357	1.11	|Q	|V	|	|	|
12+40	0.7434	1.12	|Q	|V	|	|	|
12+45	0.7512	1.14	|Q	|V	|	|	|
12+50	0.7592	1.15	|Q	|V	|	|	|
12+55	0.7672	1.17	|Q	|V	|	|	|
13+ 0	0.7753	1.18	|Q	|V	|	|	|
13+ 5	0.7836	1.20	|Q	| V	|	|	|
13+10	0.7920	1.22	|Q	| V	|	|	|



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18+30       2.2613      1.12  |Q        |         |         |   V     |
18+35       2.2688      1.09  |Q        |         |         |   V     |
18+40       2.2762      1.07  |Q        |         |         |   V     |
18+45       2.2835      1.05  |Q        |         |         |    V    |
18+50       2.2905      1.03  |Q        |         |         |    V    |
18+55       2.2975      1.01  |Q        |         |         |    V    |
19+ 0       2.3043      0.99  |Q        |         |         |    V    |
19+ 5       2.3111      0.97  |Q        |         |         |    V    |
19+10       2.3177      0.96  |Q        |         |         |    V    |
19+15       2.3241      0.94  |Q        |         |         |    V    |
19+20       2.3305      0.93  |Q        |         |         |    V    |
19+25       2.3368      0.91  |Q        |         |         |    V    |
19+30       2.3429      0.90  |Q        |         |         |     V   |
19+35       2.3490      0.88  |Q        |         |         |     V   |
19+40       2.3550      0.87  |Q        |         |         |     V   |
19+45       2.3609      0.85  |Q        |         |         |     V   |
19+50       2.3667      0.84  |Q        |         |         |     V   |
19+55       2.3724      0.83  |Q        |         |         |     V   |
20+ 0       2.3780      0.82  |Q        |         |         |     V   |
20+ 5       2.3836      0.81  |Q        |         |         |     V   |
20+10       2.3891      0.80  |Q        |         |         |     V   |
20+15       2.3945      0.79  |Q        |         |         |     V   |
20+20       2.3998      0.78  |Q        |         |         |     V   |
20+25       2.4051      0.77  |Q        |         |         |     V   |
20+30       2.4103      0.76  |Q        |         |         |      V  |
20+35       2.4155      0.75  Q         |         |         |      V  |
20+40       2.4206      0.74  Q         |         |         |      V  |
20+45       2.4256      0.73  Q         |         |         |      V  |
20+50       2.4306      0.72  Q         |         |         |      V  |
20+55       2.4355      0.71  Q         |         |         |      V  |
21+ 0       2.4403      0.71  Q         |         |         |      V  |
21+ 5       2.4452      0.70  Q         |         |         |      V  |
21+10       2.4499      0.69  Q         |         |         |      V  |
21+15       2.4546      0.68  Q         |         |         |      V  |
21+20       2.4593      0.68  Q         |         |         |      V  |
21+25       2.4639      0.67  Q         |         |         |      V  |
21+30       2.4685      0.66  Q         |         |         |      V  |
21+35       2.4730      0.66  Q         |         |         |       V |
21+40       2.4775      0.65  Q         |         |         |       V |
21+45       2.4819      0.64  Q         |         |         |       V |
21+50       2.4863      0.64  Q         |         |         |       V |
21+55       2.4907      0.63  Q         |         |         |       V |
22+ 0       2.4950      0.63  Q         |         |         |       V |
22+ 5       2.4993      0.62  Q         |         |         |       V |
22+10       2.5035      0.62  Q         |         |         |       V |
22+15       2.5077      0.61  Q         |         |         |       V |
22+20       2.5119      0.61  Q         |         |         |       V |
22+25       2.5161      0.60  Q         |         |         |       V |
22+30       2.5202      0.60  Q         |         |         |       V |
22+35       2.5242      0.59  Q         |         |         |       V |
22+40       2.5283      0.59  Q         |         |         |       V |
22+45       2.5323      0.58  Q         |         |         |       V |
22+50       2.5363      0.58  Q         |         |         |       V |
22+55       2.5402      0.57  Q         |         |         |        V|
23+ 0       2.5441      0.57  Q         |         |         |        V|
23+ 5       2.5480      0.56  Q         |         |         |        V|
23+10       2.5519      0.56  Q         |         |         |        V|
23+15       2.5557      0.56  Q         |         |         |        V|
23+20       2.5595      0.55  Q         |         |         |        V|
23+25       2.5633      0.55  Q         |         |         |        V|
23+30       2.5670      0.54  Q         |         |         |        V|
23+35       2.5707      0.54  Q         |         |         |        V|
23+40       2.5744      0.54  Q         |         |         |        V|
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23+45	2.5781	0.53	Q	|	|	|	V|
23+50	2.5817	0.53	Q	|	|	|	V|
23+55	2.5854	0.53	Q	|	|	|	V|
24+ 0	2.5890	0.52	Q	|	|	|	V|
24+ 5	2.5924	0.51	Q	|	|	|	V|
24+10	2.5954	0.43	Q	|	|	|	V|
24+15	2.5972	0.27	Q	|	|	|	V|
24+20	2.5985	0.18	Q	|	|	|	V|
24+25	2.5994	0.13	Q	|	|	|	V|
24+30	2.6001	0.10	Q	|	|	|	V|
24+35	2.6007	0.08	Q	|	|	|	V|
24+40	2.6011	0.06	Q	|	|	|	V|
24+45	2.6014	0.05	Q	|	|	|	V|
24+50	2.6017	0.04	Q	|	|	|	V|
24+55	2.6019	0.03	Q	|	|	|	V|
25+ 0	2.6021	0.02	Q	|	|	|	V|
25+ 5	2.6022	0.02	Q	|	|	|	V|
25+10	2.6023	0.01	Q	|	|	|	V|
25+15	2.6023	0.01	Q	|	|	|	V|
25+20	2.6024	0.01	Q	|	|	|	V|
25+25	2.6024	0.01	Q	|	|	|	V|
25+30	2.6024	0.00	Q	|	|	|	V|
25+35	2.6024	0.00	Q	|	|	|	V

APPENDIX E – BASIN ROUTING ANALYSIS

- Stage-Storage-Discharge Table for Basin A
- Basin A – Composite Outlet Rating Table
- 10-Year 24-Hour Basin Routing Analysis
- 100-Year 24-Hour Basin Routing Analysis

Stage-Storage-Discharge Table

DAVID EVANS AND ASSOCIATES INC.
18484 Outer Hwy 18N, Suite 225
Apple Valley, CA 92307

Basin A							
Interval	Elevation (Ft)	Depth (Ft)	Contour Area (Sqft)	Incremental Volume (Cuft)	Cummulative Volume (Cuft)	Cummulative Volume (Acft)	*Q_{Tot} (cfs)
1.0	2,890.00	-	17,433.44	N/A	-	-	-
2.0	2,890.50	0.50	18,572.21	9,001.41	9,001.41	0.21	-
3.0	2,891.00	1.00	19,731.51	9,575.93	18,577.34	0.43	-
4.0	2,891.50	1.50	20,911.34	10,160.71	28,738.06	0.66	-
5.0	2,892.00	2.00	22,111.71	10,755.76	39,493.82	0.91	5.10
7.0	2,892.50	2.50	23,332.61	4,666.52	50,854.90	1.17	7.23
8.0	2,893.00	3.00	24,574.03	11,976.66	62,831.56	1.44	8.85
9.0	2,893.50	3.50	25,836.00	12,602.51	75,434.06	1.73	15.30
10.0	2,894.00	4.00	27,118.49	13,238.62	88,672.69	2.04	20.43

Notes:

*Refer to Outlet Structure Stage-Discharge Table in Appendix E

Revised Infiltration Basin A - Composite Rating Table

DAVID EVANS AND ASSOCIATES INC.
18484 Outer Hwy 18N, Suite 225
Apple Valley, CA 92307

Elevation (ft)	Depth (ft)	3 Rectangular Orfice 3-6"x12" Flow (cfs)	3 Rectangular Orfice 3-6"x12" Flow (cfs)	Rectangular Weir Box (1.5'X1.5') Flow (cfs)	Total Flows (cfs)
2890.00	0.00	0.000	0.000	0.000	0.000
2890.50	0.50	0.000	0.000	0.000	0.000
2891.00	1.00	0.000	0.000	0.000	0.000
2891.50	1.50	0.000	0.000	0.000	0.000
2892.00	2.00	5.100	0.000	0.000	5.100
2892.50	2.50	7.230	0.000	0.000	7.230
2893.00	3.00	8.850	0.000	0.000	8.850
2893.50	3.50	10.200	5.100	0.000	15.300
2894.00	4.00	11.430	7.230	1.770	20.430

*Refer to Improvement Plans in Appendix G

FLOOD HYDROGRAPH ROUTING PROGRAM

Study date: 01/16/23

Space Center Expansion Project Phase 2 Flag
10 Year 24 Hour
Basin A
Please Refer to Appendix B Developed Condition Hydrology map

Program License Serial Number 6385

********** HYDROGRAPH INFORMATION **********

From study/file name: UHDEV10YRPHASE2FLAG.rte
**********HYDROGRAPH DATA**********
Number of intervals = 309
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 12.764 (CFS)
Total volume = 1.492 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

++
Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 309
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.210	0.001	0.210	0.210
1.000	0.430	0.001	0.430	0.430
1.500	0.660	0.001	0.660	0.660
2.000	0.910	5.100	0.892	0.928
2.500	1.170	7.230	1.145	1.195
3.000	1.440	8.850	1.410	1.470

3.500	1.730	15.300	1.677	1.783
4.000	2.040	20.430	1.970	2.110

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.2	6.38	9.57	12.76	Depth (Ft.)
0.083	0.01	0.00	0.000	O	|	|	|	|	0.00
0.167	0.04	0.00	0.000	O	|	|	|	|	0.00
0.250	0.13	0.00	0.001	O	|	|	|	|	0.00
0.333	0.18	0.00	0.002	O	|	|	|	|	0.00
0.417	0.21	0.00	0.003	O	|	|	|	|	0.01
0.500	0.23	0.00	0.005	O	|	|	|	|	0.01
0.583	0.24	0.00	0.006	O	|	|	|	|	0.02
0.667	0.26	0.00	0.008	O	|	|	|	|	0.02
0.750	0.27	0.00	0.010	O	|	|	|	|	0.02
0.833	0.27	0.00	0.012	O	|	|	|	|	0.03
0.917	0.28	0.00	0.014	O	|	|	|	|	0.03
1.000	0.28	0.00	0.016	O	|	|	|	|	0.04
1.083	0.29	0.00	0.018	O	|	|	|	|	0.04
1.167	0.29	0.00	0.020	O	|	|	|	|	0.05
1.250	0.30	0.00	0.022	O	|	|	|	|	0.05
1.333	0.30	0.00	0.024	O	|	|	|	|	0.06
1.417	0.30	0.00	0.026	O	|	|	|	|	0.06
1.500	0.30	0.00	0.028	O	|	|	|	|	0.07
1.583	0.30	0.00	0.030	O	|	|	|	|	0.07
1.667	0.31	0.00	0.032	O	|	|	|	|	0.08
1.750	0.31	0.00	0.034	O	|	|	|	|	0.08
1.833	0.31	0.00	0.036	O	|	|	|	|	0.09
1.917	0.31	0.00	0.038	O	|	|	|	|	0.09
2.000	0.31	0.00	0.040	O	|	|	|	|	0.10
2.083	0.31	0.00	0.043	O	|	|	|	|	0.10
2.167	0.31	0.00	0.045	O	|	|	|	|	0.11
2.250	0.32	0.00	0.047	O	|	|	|	|	0.11
2.333	0.32	0.00	0.049	O	|	|	|	|	0.12
2.417	0.32	0.00	0.051	O	|	|	|	|	0.12
2.500	0.32	0.00	0.053	O	|	|	|	|	0.13
2.583	0.32	0.00	0.056	O	|	|	|	|	0.13
2.667	0.32	0.00	0.058	O	|	|	|	|	0.14
2.750	0.32	0.00	0.060	O	|	|	|	|	0.14
2.833	0.32	0.00	0.062	O	|	|	|	|	0.15
2.917	0.32	0.00	0.064	O	|	|	|	|	0.15
3.000	0.33	0.00	0.067	O	|	|	|	|	0.16
3.083	0.33	0.00	0.069	O	|	|	|	|	0.16
3.167	0.33	0.00	0.071	O	|	|	|	|	0.17
3.250	0.33	0.00	0.073	O	|	|	|	|	0.17
3.333	0.33	0.00	0.076	O	|	|	|	|	0.18
3.417	0.33	0.00	0.078	O	|	|	|	|	0.19
3.500	0.33	0.00	0.080	O	|	|	|	|	0.19
3.583	0.33	0.00	0.083	O	|	|	|	|	0.20
3.667	0.34	0.00	0.085	O	|	|	|	|	0.20
3.750	0.34	0.00	0.087	O	|	|	|	|	0.21
3.833	0.34	0.00	0.090	O	|	|	|	|	0.21
3.917	0.34	0.00	0.092	O	|	|	|	|	0.22
4.000	0.34	0.00	0.094	O	|	|	|	|	0.22
4.083	0.34	0.00	0.097	O	|	|	|	|	0.23
4.167	0.34	0.00	0.099	O	|	|	|	|	0.24
4.250	0.35	0.00	0.101	O	|	|	|	|	0.24
4.333	0.35	0.00	0.104	O	|	|	|	|	0.25
4.417	0.35	0.00	0.106	O	|	|	|	|	0.25

4.500	0.35	0.00	0.108	O	|	|	|	|	0.26
4.583	0.35	0.00	0.111	O	|	|	|	|	0.26
4.667	0.35	0.00	0.113	O	|	|	|	|	0.27
4.750	0.35	0.00	0.116	O	|	|	|	|	0.28
4.833	0.36	0.00	0.118	O	|	|	|	|	0.28
4.917	0.36	0.00	0.121	O	|	|	|	|	0.29
5.000	0.36	0.00	0.123	O	|	|	|	|	0.29
5.083	0.36	0.00	0.126	O	|	|	|	|	0.30
5.167	0.36	0.00	0.128	O	|	|	|	|	0.30
5.250	0.36	0.00	0.131	O	|	|	|	|	0.31
5.333	0.36	0.00	0.133	O	|	|	|	|	0.32
5.417	0.37	0.00	0.136	O	|	|	|	|	0.32
5.500	0.37	0.00	0.138	O	|	|	|	|	0.33
5.583	0.37	0.00	0.141	O	|	|	|	|	0.33
5.667	0.37	0.00	0.143	O	|	|	|	|	0.34
5.750	0.37	0.00	0.146	O	|	|	|	|	0.35
5.833	0.37	0.00	0.148	O	|	|	|	|	0.35
5.917	0.38	0.00	0.151	O	|	|	|	|	0.36
6.000	0.38	0.00	0.153	O	|	|	|	|	0.37
6.083	0.38	0.00	0.156	O	|	|	|	|	0.37
6.167	0.38	0.00	0.159	O	|	|	|	|	0.38
6.250	0.38	0.00	0.161	O	|	|	|	|	0.38
6.333	0.39	0.00	0.164	O	|	|	|	|	0.39
6.417	0.39	0.00	0.167	O	|	|	|	|	0.40
6.500	0.39	0.00	0.169	O	|	|	|	|	0.40
6.583	0.39	0.00	0.172	O	|	|	|	|	0.41
6.667	0.39	0.00	0.175	O	|	|	|	|	0.42
6.750	0.40	0.00	0.177	O	|	|	|	|	0.42
6.833	0.40	0.00	0.180	O	|	|	|	|	0.43
6.917	0.40	0.00	0.183	OI	|	|	|	|	0.44
7.000	0.40	0.00	0.186	OI	|	|	|	|	0.44
7.083	0.40	0.00	0.188	OI	|	|	|	|	0.45
7.167	0.41	0.00	0.191	OI	|	|	|	|	0.46
7.250	0.41	0.00	0.194	OI	|	|	|	|	0.46
7.333	0.41	0.00	0.197	OI	|	|	|	|	0.47
7.417	0.41	0.00	0.200	OI	|	|	|	|	0.48
7.500	0.42	0.00	0.202	OI	|	|	|	|	0.48
7.583	0.42	0.00	0.205	OI	|	|	|	|	0.49
7.667	0.42	0.00	0.208	OI	|	|	|	|	0.50
7.750	0.42	0.00	0.211	OI	|	|	|	|	0.50
7.833	0.42	0.00	0.214	OI	|	|	|	|	0.51
7.917	0.43	0.00	0.217	OI	|	|	|	|	0.52
8.000	0.43	0.00	0.220	OI	|	|	|	|	0.52
8.083	0.43	0.00	0.223	OI	|	|	|	|	0.53
8.167	0.43	0.00	0.226	OI	|	|	|	|	0.54
8.250	0.44	0.00	0.229	OI	|	|	|	|	0.54
8.333	0.44	0.00	0.232	OI	|	|	|	|	0.55
8.417	0.44	0.00	0.235	OI	|	|	|	|	0.56
8.500	0.45	0.00	0.238	OI	|	|	|	|	0.56
8.583	0.45	0.00	0.241	OI	|	|	|	|	0.57
8.667	0.45	0.00	0.244	OI	|	|	|	|	0.58
8.750	0.45	0.00	0.247	OI	|	|	|	|	0.58
8.833	0.46	0.00	0.250	OI	|	|	|	|	0.59
8.917	0.46	0.00	0.253	OI	|	|	|	|	0.60
9.000	0.46	0.00	0.257	OI	|	|	|	|	0.61
9.083	0.47	0.00	0.260	OI	|	|	|	|	0.61
9.167	0.47	0.00	0.263	OI	|	|	|	|	0.62
9.250	0.47	0.00	0.266	OI	|	|	|	|	0.63
9.333	0.48	0.00	0.270	OI	|	|	|	|	0.64
9.417	0.48	0.00	0.273	OI	|	|	|	|	0.64
9.500	0.48	0.00	0.276	OI	|	|	|	|	0.65
9.583	0.49	0.00	0.279	OI	|	|	|	|	0.66
9.667	0.49	0.00	0.283	OI	|	|	|	|	0.67

9.750	0.49	0.00	0.286	OI	|	|	|	0.67
9.833	0.50	0.00	0.290	OI	|	|	|	0.68
9.917	0.50	0.00	0.293	OI	|	|	|	0.69
10.000	0.51	0.00	0.296	OI	|	|	|	0.70
10.083	0.51	0.00	0.300	OI	|	|	|	0.70
10.167	0.51	0.00	0.303	OI	|	|	|	0.71
10.250	0.52	0.00	0.307	OI	|	|	|	0.72
10.333	0.52	0.00	0.311	OI	|	|	|	0.73
10.417	0.53	0.00	0.314	OI	|	|	|	0.74
10.500	0.53	0.00	0.318	OI	|	|	|	0.75
10.583	0.53	0.00	0.321	OI	|	|	|	0.75
10.667	0.54	0.00	0.325	OI	|	|	|	0.76
10.750	0.54	0.00	0.329	OI	|	|	|	0.77
10.833	0.55	0.00	0.333	OI	|	|	|	0.78
10.917	0.55	0.00	0.336	OI	|	|	|	0.79
11.000	0.56	0.00	0.340	OI	|	|	|	0.80
11.083	0.56	0.00	0.344	OI	|	|	|	0.80
11.167	0.57	0.00	0.348	OI	|	|	|	0.81
11.250	0.57	0.00	0.352	OI	|	|	|	0.82
11.333	0.58	0.00	0.356	OI	|	|	|	0.83
11.417	0.59	0.00	0.360	OI	|	|	|	0.84
11.500	0.59	0.00	0.364	OI	|	|	|	0.85
11.583	0.60	0.00	0.368	OI	|	|	|	0.86
11.667	0.60	0.00	0.372	OI	|	|	|	0.87
11.750	0.61	0.00	0.376	OI	|	|	|	0.88
11.833	0.62	0.00	0.381	OI	|	|	|	0.89
11.917	0.62	0.00	0.385	OI	|	|	|	0.90
12.000	0.63	0.00	0.389	OI	|	|	|	0.91
12.083	0.64	0.00	0.394	OI	|	|	|	0.92
12.167	0.64	0.00	0.398	OI	|	|	|	0.93
12.250	0.65	0.00	0.402	OI	|	|	|	0.94
12.333	0.66	0.00	0.407	OI	|	|	|	0.95
12.417	0.67	0.00	0.411	OI	|	|	|	0.96
12.500	0.67	0.00	0.416	OI	|	|	|	0.97
12.583	0.68	0.00	0.421	OI	|	|	|	0.98
12.667	0.69	0.00	0.425	OI	|	|	|	0.99
12.750	0.70	0.00	0.430	OI	|	|	|	1.00
12.833	0.71	0.00	0.435	OI	|	|	|	1.01
12.917	0.72	0.00	0.440	OI	|	|	|	1.02
13.000	0.73	0.00	0.445	OI	|	|	|	1.03
13.083	0.74	0.00	0.450	OI	|	|	|	1.04
13.167	0.75	0.00	0.455	OI	|	|	|	1.05
13.250	0.76	0.00	0.460	OI	|	|	|	1.07
13.333	0.78	0.00	0.466	OI	|	|	|	1.08
13.417	0.79	0.00	0.471	OI	|	|	|	1.09
13.500	0.80	0.00	0.477	O I	|	|	|	1.10
13.583	0.82	0.00	0.482	O I	|	|	|	1.11
13.667	0.83	0.00	0.488	O I	|	|	|	1.13
13.750	0.85	0.00	0.494	O I	|	|	|	1.14
13.833	0.86	0.00	0.499	O I	|	|	|	1.15
13.917	0.88	0.00	0.505	O I	|	|	|	1.16
14.000	0.90	0.00	0.512	O I	|	|	|	1.18
14.083	0.92	0.00	0.518	O I	|	|	|	1.19
14.167	0.94	0.00	0.524	O I	|	|	|	1.20
14.250	0.96	0.00	0.531	O I	|	|	|	1.22
14.333	0.99	0.00	0.538	O I	|	|	|	1.23
14.417	1.01	0.00	0.544	O I	|	|	|	1.25
14.500	1.04	0.00	0.551	O I	|	|	|	1.26
14.583	1.07	0.00	0.559	O I	|	|	|	1.28
14.667	1.10	0.00	0.566	O I	|	|	|	1.30
14.750	1.13	0.00	0.574	O I	|	|	|	1.31
14.833	1.17	0.00	0.582	O I	|	|	|	1.33
14.917	1.21	0.00	0.590	O I	|	|	|	1.35

15.000	1.25	0.00	0.598	O I |	|	|	|	1.37
15.083	1.30	0.00	0.607	O I |	|	|	|	1.39
15.167	1.36	0.00	0.616	O I |	|	|	|	1.41
15.250	1.42	0.00	0.626	O I |	|	|	|	1.43
15.333	1.49	0.00	0.636	O I |	|	|	|	1.45
15.417	1.56	0.00	0.646	O I |	|	|	|	1.47
15.500	1.59	0.00	0.657	O I |	|	|	|	1.49
15.583	1.56	0.16	0.668	O I |	|	|	|	1.52
15.667	1.59	0.34	0.677	O I |	|	|	|	1.53
15.750	1.70	0.51	0.685	|O I |	|	|	|	1.55
15.833	1.87	0.68	0.693	|O I |	|	|	|	1.57
15.917	2.16	0.86	0.702	| O I |	|	|	|	1.58
16.000	2.68	1.06	0.712	| O I |	|	|	|	1.60
16.083	4.30	1.38	0.728	| O | I	|	|	|	1.64
16.167	8.05	2.01	0.758	| O |	| I	|	|	1.70
16.250	12.76	3.11	0.813	| O|	|	|	I	1.81
16.333	9.22	4.15	0.863	| | O	|	I|	|	1.91
16.417	6.04	4.60	0.886	| | O I|	|	|	|	1.95
16.500	4.61	4.70	0.890	| | O |	|	|	|	1.96
16.583	3.80	4.63	0.887	| |I O |	|	|	|	1.95
16.667	3.27	4.49	0.880	| I O |	|	|	|	1.94
16.750	2.83	4.30	0.871	| I| O |	|	|	|	1.92
16.833	2.44	4.08	0.860	| I | O |	|	|	|	1.90
16.917	2.20	3.85	0.849	| I |O |	|	|	|	1.88
17.000	1.97	3.62	0.837	| I |O |	|	|	|	1.85
17.083	1.78	3.39	0.826	| I O |	|	|	|	1.83
17.167	1.62	3.17	0.815	| I O|	|	|	|	1.81
17.250	1.46	2.95	0.805	| I O|	|	|	|	1.79
17.333	1.33	2.75	0.795	| I O |	|	|	|	1.77
17.417	1.21	2.56	0.785	| I O |	|	|	|	1.75
17.500	1.17	2.38	0.777	| I O |	|	|	|	1.73
17.583	1.13	2.22	0.769	| I O |	|	|	|	1.72
17.667	1.06	2.07	0.761	| I O |	|	|	|	1.70
17.750	0.97	1.93	0.755	| I O |	|	|	|	1.69
17.833	0.88	1.80	0.748	| I O |	|	|	|	1.68
17.917	0.81	1.67	0.742	| I O |	|	|	|	1.66
18.000	0.78	1.56	0.736	|I O |	|	|	|	1.65
18.083	0.75	1.45	0.731	|I O |	|	|	|	1.64
18.167	0.73	1.36	0.727	|I O |	|	|	|	1.63
18.250	0.71	1.28	0.723	|I O |	|	|	|	1.63
18.333	0.69	1.20	0.719	|I O |	|	|	|	1.62
18.417	0.67	1.13	0.716	|IO |	|	|	|	1.61
18.500	0.66	1.07	0.713	|IO |	|	|	|	1.61
18.583	0.64	1.02	0.710	|IO |	|	|	|	1.60
18.667	0.63	0.97	0.707	|IO |	|	|	|	1.59
18.750	0.61	0.92	0.705	|IO |	|	|	|	1.59
18.833	0.60	0.88	0.703	|IO |	|	|	|	1.59
18.917	0.59	0.84	0.701	|IO |	|	|	|	1.58
19.000	0.58	0.81	0.700	|IO |	|	|	|	1.58
19.083	0.57	0.78	0.698	|O |	|	|	|	1.58
19.167	0.56	0.75	0.697	|O |	|	|	|	1.57
19.250	0.55	0.72	0.695	|O |	|	|	|	1.57
19.333	0.54	0.70	0.694	|O |	|	|	|	1.57
19.417	0.53	0.68	0.693	|O |	|	|	|	1.57
19.500	0.52	0.66	0.692	|O |	|	|	|	1.56
19.583	0.51	0.64	0.691	|O |	|	|	|	1.56
19.667	0.50	0.62	0.690	|O |	|	|	|	1.56
19.750	0.49	0.60	0.690	|O |	|	|	|	1.56
19.833	0.49	0.59	0.689	|O |	|	|	|	1.56
19.917	0.48	0.58	0.688	|O |	|	|	|	1.56
20.000	0.47	0.56	0.688	|O |	|	|	|	1.56
20.083	0.47	0.55	0.687	|O |	|	|	|	1.55
20.167	0.46	0.54	0.686	|O |	|	|	|	1.55

20.250	0.45	0.53	0.686	|O	|	|	|	1.55
20.333	0.45	0.52	0.685	|O	|	|	|	1.55
20.417	0.44	0.51	0.685	|O	|	|	|	1.55
20.500	0.44	0.50	0.684	|O	|	|	|	1.55
20.583	0.43	0.49	0.684	|O	|	|	|	1.55
20.667	0.43	0.48	0.684	|O	|	|	|	1.55
20.750	0.42	0.48	0.683	|O	|	|	|	1.55
20.833	0.42	0.47	0.683	|O	|	|	|	1.55
20.917	0.41	0.46	0.683	|O	|	|	|	1.55
21.000	0.41	0.45	0.682	|O	|	|	|	1.54
21.083	0.40	0.45	0.682	|O	|	|	|	1.54
21.167	0.40	0.44	0.682	|O	|	|	|	1.54
21.250	0.40	0.44	0.681	IO	|	|	|	1.54
21.333	0.39	0.43	0.681	IO	|	|	|	1.54
21.417	0.39	0.43	0.681	IO	|	|	|	1.54
21.500	0.38	0.42	0.681	IO	|	|	|	1.54
21.583	0.38	0.42	0.680	IO	|	|	|	1.54
21.667	0.38	0.41	0.680	IO	|	|	|	1.54
21.750	0.37	0.41	0.680	IO	|	|	|	1.54
21.833	0.37	0.40	0.680	IO	|	|	|	1.54
21.917	0.37	0.40	0.679	O	|	|	|	1.54
22.000	0.36	0.39	0.679	O	|	|	|	1.54
22.083	0.36	0.39	0.679	O	|	|	|	1.54
22.167	0.36	0.38	0.679	O	|	|	|	1.54
22.250	0.35	0.38	0.679	O	|	|	|	1.54
22.333	0.35	0.38	0.678	O	|	|	|	1.54
22.417	0.35	0.37	0.678	O	|	|	|	1.54
22.500	0.35	0.37	0.678	O	|	|	|	1.54
22.583	0.34	0.37	0.678	O	|	|	|	1.54
22.667	0.34	0.36	0.678	O	|	|	|	1.54
22.750	0.34	0.36	0.678	O	|	|	|	1.54
22.833	0.33	0.36	0.677	O	|	|	|	1.53
22.917	0.33	0.35	0.677	O	|	|	|	1.53
23.000	0.33	0.35	0.677	O	|	|	|	1.53
23.083	0.33	0.35	0.677	O	|	|	|	1.53
23.167	0.32	0.34	0.677	O	|	|	|	1.53
23.250	0.32	0.34	0.677	O	|	|	|	1.53
23.333	0.32	0.34	0.677	O	|	|	|	1.53
23.417	0.32	0.34	0.676	O	|	|	|	1.53
23.500	0.32	0.33	0.676	O	|	|	|	1.53
23.583	0.31	0.33	0.676	O	|	|	|	1.53
23.667	0.31	0.33	0.676	O	|	|	|	1.53
23.750	0.31	0.33	0.676	O	|	|	|	1.53
23.833	0.31	0.32	0.676	O	|	|	|	1.53
23.917	0.30	0.32	0.676	O	|	|	|	1.53
24.000	0.30	0.32	0.676	O	|	|	|	1.53
24.083	0.29	0.32	0.675	O	|	|	|	1.53
24.167	0.26	0.31	0.675	O	|	|	|	1.53
24.250	0.17	0.30	0.675	O	|	|	|	1.53
24.333	0.12	0.28	0.674	O	|	|	|	1.53
24.417	0.09	0.25	0.672	O	|	|	|	1.52
24.500	0.07	0.23	0.671	O	|	|	|	1.52
24.583	0.05	0.21	0.670	O	|	|	|	1.52
24.667	0.04	0.19	0.669	O	|	|	|	1.52
24.750	0.03	0.17	0.668	O	|	|	|	1.52
24.833	0.03	0.15	0.667	O	|	|	|	1.51
24.917	0.02	0.13	0.666	O	|	|	|	1.51
25.000	0.02	0.12	0.666	O	|	|	|	1.51
25.083	0.01	0.10	0.665	O	|	|	|	1.51
25.167	0.01	0.09	0.664	O	|	|	|	1.51
25.250	0.01	0.08	0.664	O	|	|	|	1.51
25.333	0.01	0.07	0.663	O	|	|	|	1.51
25.417	0.00	0.06	0.663	O	|	|	|	1.51

25.500	0.00	0.06	0.663	O	|	|	|	|	1.51
25.583	0.00	0.05	0.662	O	|	|	|	|	1.50
25.667	0.00	0.04	0.662	O	|	|	|	|	1.50
25.750	0.00	0.04	0.662	O	|	|	|	|	1.50
25.833	0.00	0.03	0.662	O	|	|	|	|	1.50
25.917	0.00	0.03	0.661	O	|	|	|	|	1.50
26.000	0.00	0.02	0.661	O	|	|	|	|	1.50
26.083	0.00	0.02	0.661	O	|	|	|	|	1.50
26.167	0.00	0.02	0.661	O	|	|	|	|	1.50
26.250	0.00	0.02	0.661	O	|	|	|	|	1.50
26.333	0.00	0.01	0.661	O	|	|	|	|	1.50
26.417	0.00	0.01	0.661	O	|	|	|	|	1.50
26.500	0.00	0.01	0.660	O	|	|	|	|	1.50
26.583	0.00	0.01	0.660	O	|	|	|	|	1.50
26.667	0.00	0.01	0.660	O	|	|	|	|	1.50
26.750	0.00	0.01	0.660	O	|	|	|	|	1.50
26.833	0.00	0.01	0.660	O	|	|	|	|	1.50
26.917	0.00	0.01	0.660	O	|	|	|	|	1.50
27.000	0.00	0.00	0.660	O	|	|	|	|	1.50
27.083	0.00	0.00	0.660	O	|	|	|	|	1.50
27.167	0.00	0.00	0.660	O	|	|	|	|	1.50
27.250	0.00	0.00	0.660	O	|	|	|	|	1.50
27.333	0.00	0.00	0.660	O	|	|	|	|	1.50
27.417	0.00	0.00	0.660	O	|	|	|	|	1.50
27.500	0.00	0.00	0.660	O	|	|	|	|	1.50
27.583	0.00	0.00	0.660	O	|	|	|	|	1.50
27.667	0.00	0.00	0.660	O	|	|	|	|	1.50
27.750	0.00	0.00	0.660	O	|	|	|	|	1.50
27.833	0.00	0.00	0.660	O	|	|	|	|	1.50
27.917	0.00	0.00	0.660	O	|	|	|	|	1.50

Remaining water in basin = 0.66 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 335
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 4.699 (CFS)
Total volume = 0.832 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

FLOOD HYDROGRAPH ROUTING PROGRAM

Study date: 01/16/23

Space Center Expansion Project Phase 2 Flag
100 Year 24 Hour
Basin A
Please Refer to Appendix B Developed Condition Hydrology map

Program License Serial Number 6385

********** HYDROGRAPH INFORMATION **********

From study/file name: UHDEV100YRPHASE2FLAG.rte
**********HYDROGRAPH DATA**********
Number of intervals = 307
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 23.988 (CFS)
Total volume = 2.602 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

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Process from Point/Station 100.000 to Point/Station 101.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data

Total number of inflow hydrograph intervals = 307
Hydrograph time unit = 5.000 (Min.)
Initial depth in storage basin = 0.00(Ft.)

Initial basin depth = 0.00 (Ft.)
Initial basin storage = 0.00 (Ac.Ft)
Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.210	0.001	0.210	0.210
1.000	0.430	0.001	0.430	0.430
1.500	0.660	0.001	0.660	0.660
2.000	0.910	5.100	0.892	0.928
2.500	1.170	7.230	1.145	1.195
3.000	1.440	8.850	1.410	1.470

3.500	1.730	15.300	1.677	1.783
4.000	2.040	20.430	1.970	2.110

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	6.0	11.99	17.99	23.99	Depth (Ft.)
0.083	0.01	0.00	0.000	O	|	|	|	|	0.00
0.167	0.09	0.00	0.000	O	|	|	|	|	0.00
0.250	0.24	0.00	0.002	O	|	|	|	|	0.00
0.333	0.33	0.00	0.004	O	|	|	|	|	0.01
0.417	0.38	0.00	0.006	O	|	|	|	|	0.01
0.500	0.41	0.00	0.009	O	|	|	|	|	0.02
0.583	0.43	0.00	0.012	O	|	|	|	|	0.03
0.667	0.45	0.00	0.015	O	|	|	|	|	0.03
0.750	0.47	0.00	0.018	O	|	|	|	|	0.04
0.833	0.48	0.00	0.021	O	|	|	|	|	0.05
0.917	0.49	0.00	0.024	O	|	|	|	|	0.06
1.000	0.50	0.00	0.028	O	|	|	|	|	0.07
1.083	0.50	0.00	0.031	O	|	|	|	|	0.07
1.167	0.51	0.00	0.035	O	|	|	|	|	0.08
1.250	0.51	0.00	0.038	O	|	|	|	|	0.09
1.333	0.52	0.00	0.042	O	|	|	|	|	0.10
1.417	0.52	0.00	0.045	O	|	|	|	|	0.11
1.500	0.53	0.00	0.049	O	|	|	|	|	0.12
1.583	0.53	0.00	0.053	O	|	|	|	|	0.13
1.667	0.53	0.00	0.056	O	|	|	|	|	0.13
1.750	0.53	0.00	0.060	O	|	|	|	|	0.14
1.833	0.54	0.00	0.064	O	|	|	|	|	0.15
1.917	0.54	0.00	0.067	O	|	|	|	|	0.16
2.000	0.54	0.00	0.071	O	|	|	|	|	0.17
2.083	0.54	0.00	0.075	O	|	|	|	|	0.18
2.167	0.54	0.00	0.079	O	|	|	|	|	0.19
2.250	0.55	0.00	0.082	O	|	|	|	|	0.20
2.333	0.55	0.00	0.086	O	|	|	|	|	0.20
2.417	0.55	0.00	0.090	O	|	|	|	|	0.21
2.500	0.55	0.00	0.094	O	|	|	|	|	0.22
2.583	0.55	0.00	0.097	O	|	|	|	|	0.23
2.667	0.56	0.00	0.101	O	|	|	|	|	0.24
2.750	0.56	0.00	0.105	O	|	|	|	|	0.25
2.833	0.56	0.00	0.109	O	|	|	|	|	0.26
2.917	0.56	0.00	0.113	O	|	|	|	|	0.27
3.000	0.56	0.00	0.117	O	|	|	|	|	0.28
3.083	0.57	0.00	0.121	O	|	|	|	|	0.29
3.167	0.57	0.00	0.124	O	|	|	|	|	0.30
3.250	0.57	0.00	0.128	O	|	|	|	|	0.31
3.333	0.57	0.00	0.132	O	|	|	|	|	0.32
3.417	0.58	0.00	0.136	O	|	|	|	|	0.32
3.500	0.58	0.00	0.140	O	|	|	|	|	0.33
3.583	0.58	0.00	0.144	O	|	|	|	|	0.34
3.667	0.58	0.00	0.148	O	|	|	|	|	0.35
3.750	0.58	0.00	0.152	O	|	|	|	|	0.36
3.833	0.59	0.00	0.156	O	|	|	|	|	0.37
3.917	0.59	0.00	0.160	O	|	|	|	|	0.38
4.000	0.59	0.00	0.164	O	|	|	|	|	0.39
4.083	0.59	0.00	0.168	O	|	|	|	|	0.40
4.167	0.60	0.00	0.173	O	|	|	|	|	0.41
4.250	0.60	0.00	0.177	O	|	|	|	|	0.42
4.333	0.60	0.00	0.181	O	|	|	|	|	0.43
4.417	0.60	0.00	0.185	O	|	|	|	|	0.44

4.500	0.61	0.00	0.189	O	|	|	|	0.45
4.583	0.61	0.00	0.193	O	|	|	|	0.46
4.667	0.61	0.00	0.197	O	|	|	|	0.47
4.750	0.61	0.00	0.202	O	|	|	|	0.48
4.833	0.62	0.00	0.206	O	|	|	|	0.49
4.917	0.62	0.00	0.210	O	|	|	|	0.50
5.000	0.62	0.00	0.214	O	|	|	|	0.51
5.083	0.62	0.00	0.219	O	|	|	|	0.52
5.167	0.63	0.00	0.223	O	|	|	|	0.53
5.250	0.63	0.00	0.227	O	|	|	|	0.54
5.333	0.63	0.00	0.232	O	|	|	|	0.55
5.417	0.64	0.00	0.236	O	|	|	|	0.56
5.500	0.64	0.00	0.240	O	|	|	|	0.57
5.583	0.64	0.00	0.245	O	|	|	|	0.58
5.667	0.64	0.00	0.249	O	|	|	|	0.59
5.750	0.65	0.00	0.254	O	|	|	|	0.60
5.833	0.65	0.00	0.258	O	|	|	|	0.61
5.917	0.65	0.00	0.263	O	|	|	|	0.62
6.000	0.66	0.00	0.267	O	|	|	|	0.63
6.083	0.66	0.00	0.272	O	|	|	|	0.64
6.167	0.66	0.00	0.276	O	|	|	|	0.65
6.250	0.67	0.00	0.281	O	|	|	|	0.66
6.333	0.67	0.00	0.285	O	|	|	|	0.67
6.417	0.67	0.00	0.290	O	|	|	|	0.68
6.500	0.68	0.00	0.295	O	|	|	|	0.69
6.583	0.68	0.00	0.299	O	|	|	|	0.70
6.667	0.68	0.00	0.304	O	|	|	|	0.71
6.750	0.69	0.00	0.309	O	|	|	|	0.72
6.833	0.69	0.00	0.313	O	|	|	|	0.74
6.917	0.69	0.00	0.318	O	|	|	|	0.75
7.000	0.70	0.00	0.323	O	|	|	|	0.76
7.083	0.70	0.00	0.328	O	|	|	|	0.77
7.167	0.71	0.00	0.333	O	|	|	|	0.78
7.250	0.71	0.00	0.337	O	|	|	|	0.79
7.333	0.71	0.00	0.342	O	|	|	|	0.80
7.417	0.72	0.00	0.347	O	|	|	|	0.81
7.500	0.72	0.00	0.352	O	|	|	|	0.82
7.583	0.73	0.00	0.357	O	|	|	|	0.83
7.667	0.73	0.00	0.362	O	|	|	|	0.85
7.750	0.73	0.00	0.367	O	|	|	|	0.86
7.833	0.74	0.00	0.372	O	|	|	|	0.87
7.917	0.74	0.00	0.377	O	|	|	|	0.88
8.000	0.75	0.00	0.383	O	|	|	|	0.89
8.083	0.75	0.00	0.388	OI	|	|	|	0.90
8.167	0.76	0.00	0.393	OI	|	|	|	0.92
8.250	0.76	0.00	0.398	OI	|	|	|	0.93
8.333	0.77	0.00	0.403	OI	|	|	|	0.94
8.417	0.77	0.00	0.409	OI	|	|	|	0.95
8.500	0.78	0.00	0.414	OI	|	|	|	0.96
8.583	0.78	0.00	0.419	OI	|	|	|	0.98
8.667	0.79	0.00	0.425	OI	|	|	|	0.99
8.750	0.79	0.00	0.430	OI	|	|	|	1.00
8.833	0.80	0.00	0.436	OI	|	|	|	1.01
8.917	0.80	0.00	0.441	OI	|	|	|	1.02
9.000	0.81	0.00	0.447	OI	|	|	|	1.04
9.083	0.81	0.00	0.452	OI	|	|	|	1.05
9.167	0.82	0.00	0.458	OI	|	|	|	1.06
9.250	0.82	0.00	0.463	OI	|	|	|	1.07
9.333	0.83	0.00	0.469	OI	|	|	|	1.08
9.417	0.84	0.00	0.475	OI	|	|	|	1.10
9.500	0.84	0.00	0.481	OI	|	|	|	1.11
9.583	0.85	0.00	0.486	OI	|	|	|	1.12
9.667	0.85	0.00	0.492	OI	|	|	|	1.14

9.750	0.86	0.00	0.498	OI	|	|	|	1.15
9.833	0.87	0.00	0.504	OI	|	|	|	1.16
9.917	0.87	0.00	0.510	OI	|	|	|	1.17
10.000	0.88	0.00	0.516	OI	|	|	|	1.19
10.083	0.89	0.00	0.522	OI	|	|	|	1.20
10.167	0.89	0.00	0.528	OI	|	|	|	1.21
10.250	0.90	0.00	0.534	OI	|	|	|	1.23
10.333	0.91	0.00	0.541	OI	|	|	|	1.24
10.417	0.92	0.00	0.547	OI	|	|	|	1.25
10.500	0.92	0.00	0.553	OI	|	|	|	1.27
10.583	0.93	0.00	0.560	OI	|	|	|	1.28
10.667	0.94	0.00	0.566	OI	|	|	|	1.30
10.750	0.95	0.00	0.573	OI	|	|	|	1.31
10.833	0.96	0.00	0.579	OI	|	|	|	1.32
10.917	0.97	0.00	0.586	OI	|	|	|	1.34
11.000	0.98	0.00	0.592	OI	|	|	|	1.35
11.083	0.98	0.00	0.599	OI	|	|	|	1.37
11.167	0.99	0.00	0.606	OI	|	|	|	1.38
11.250	1.00	0.00	0.613	OI	|	|	|	1.40
11.333	1.01	0.00	0.620	OI	|	|	|	1.41
11.417	1.02	0.00	0.627	OI	|	|	|	1.43
11.500	1.03	0.00	0.634	OI	|	|	|	1.44
11.583	1.05	0.00	0.641	OI	|	|	|	1.46
11.667	1.06	0.00	0.648	OI	|	|	|	1.47
11.750	1.07	0.00	0.656	OI	|	|	|	1.49
11.833	1.08	0.06	0.663	OI	|	|	|	1.51
11.917	1.09	0.19	0.669	OI	|	|	|	1.52
12.000	1.10	0.31	0.675	OI	|	|	|	1.53
12.083	1.11	0.42	0.680	OI	|	|	|	1.54
12.167	1.11	0.51	0.685	OI	|	|	|	1.55
12.250	1.09	0.59	0.689	OI	|	|	|	1.56
12.333	1.09	0.65	0.692	OI	|	|	|	1.56
12.417	1.09	0.71	0.695	OI	|	|	|	1.57
12.500	1.10	0.76	0.697	|O	|	|	|	1.57
12.583	1.11	0.81	0.699	|O	|	|	|	1.58
12.667	1.12	0.85	0.701	|O	|	|	|	1.58
12.750	1.14	0.88	0.703	|O	|	|	|	1.59
12.833	1.15	0.92	0.705	|O	|	|	|	1.59
12.917	1.17	0.95	0.706	|O	|	|	|	1.59
13.000	1.18	0.98	0.708	|O	|	|	|	1.60
13.083	1.20	1.01	0.709	|O	|	|	|	1.60
13.167	1.22	1.03	0.711	|O	|	|	|	1.60
13.250	1.24	1.06	0.712	|O	|	|	|	1.60
13.333	1.26	1.08	0.713	|O	|	|	|	1.61
13.417	1.28	1.11	0.714	|O	|	|	|	1.61
13.500	1.31	1.13	0.716	|O	|	|	|	1.61
13.583	1.33	1.16	0.717	|O	|	|	|	1.61
13.667	1.36	1.18	0.718	|O	|	|	|	1.62
13.750	1.39	1.21	0.719	|O	|	|	|	1.62
13.833	1.41	1.23	0.720	|O	|	|	|	1.62
13.917	1.45	1.26	0.722	|O	|	|	|	1.62
14.000	1.48	1.29	0.723	|O	|	|	|	1.63
14.083	1.51	1.31	0.724	|OI	|	|	|	1.63
14.167	1.55	1.34	0.726	|OI	|	|	|	1.63
14.250	1.59	1.37	0.727	|OI	|	|	|	1.63
14.333	1.63	1.40	0.729	|OI	|	|	|	1.64
14.417	1.68	1.44	0.730	|OI	|	|	|	1.64
14.500	1.72	1.47	0.732	|OI	|	|	|	1.64
14.583	1.78	1.51	0.734	| O	|	|	|	1.65
14.667	1.83	1.55	0.736	| O	|	|	|	1.65
14.750	1.89	1.59	0.738	| O	|	|	|	1.66
14.833	1.96	1.63	0.740	| O	|	|	|	1.66
14.917	2.03	1.68	0.742	| O	|	|	|	1.66

15.000	2.11	1.73	0.745	O				1.67
15.083	2.20	1.79	0.748	O				1.68
15.167	2.30	1.85	0.751	OI				1.68
15.250	2.42	1.92	0.754	OI				1.69
15.333	2.54	1.99	0.757	OI				1.69
15.417	2.68	2.07	0.762	OI				1.70
15.500	2.76	2.16	0.766	OI				1.71
15.583	2.80	2.24	0.770	OI				1.72
15.667	2.94	2.32	0.774	O				1.73
15.750	3.20	2.42	0.779	OI				1.74
15.833	3.57	2.55	0.785	OI				1.75
15.917	4.21	2.72	0.793	O I				1.77
16.000	5.34	2.99	0.807	O I				1.79
16.083	8.62	3.52	0.832	O	I			1.84
16.167	16.52	4.70	0.891	O		I		1.96
16.250	23.99	5.79	0.994	O			I	2.16
16.333	15.91	6.56	1.089	O		I		2.34
16.417	10.65	6.93	1.134	O	I			2.43
16.500	8.13	7.07	1.150	OI				2.46
16.583	6.64	7.08	1.152	IO				2.47
16.667	5.66	7.03	1.146	I O				2.45
16.750	4.76	6.93	1.134	I O				2.43
16.833	4.17	6.80	1.117	I O				2.40
16.917	3.69	6.64	1.098	I O				2.36
17.000	3.28	6.47	1.077	I O				2.32
17.083	2.93	6.28	1.054	I O				2.28
17.167	2.61	6.09	1.031	I O				2.23
17.250	2.34	5.89	1.007	I O				2.19
17.333	2.13	5.69	0.982	I O				2.14
17.417	2.05	5.49	0.958	I O				2.09
17.500	1.94	5.30	0.935	I O				2.05
17.583	1.76	5.11	0.911	I O				2.00
17.667	1.57	4.68	0.889	I O				1.96
17.750	1.40	4.26	0.869	I O				1.92
17.833	1.34	3.88	0.850	I O				1.88
17.917	1.29	3.54	0.834	I O				1.85
18.000	1.24	3.24	0.819	I O				1.82
18.083	1.20	2.98	0.806	I O				1.79
18.167	1.18	2.74	0.794	I O				1.77
18.250	1.17	2.54	0.784	I O				1.75
18.333	1.16	2.36	0.776	I O				1.73
18.417	1.14	2.20	0.768	IO				1.72
18.500	1.12	2.06	0.761	IO				1.70
18.583	1.09	1.93	0.755	IO				1.69
18.667	1.07	1.82	0.749	IO				1.68
18.750	1.05	1.72	0.744	IO				1.67
18.833	1.03	1.63	0.740	IO				1.66
18.917	1.01	1.55	0.736	IO				1.65
19.000	0.99	1.48	0.733	O				1.65
19.083	0.97	1.41	0.729	O				1.64
19.167	0.96	1.36	0.726	O				1.63
19.250	0.94	1.30	0.724	O				1.63
19.333	0.93	1.25	0.721	O				1.62
19.417	0.91	1.21	0.719	O				1.62
19.500	0.90	1.17	0.717	O				1.61
19.583	0.88	1.13	0.715	O				1.61
19.667	0.87	1.10	0.714	O				1.61
19.750	0.85	1.07	0.712	O				1.60
19.833	0.84	1.04	0.711	O				1.60
19.917	0.83	1.01	0.710	O				1.60
20.000	0.82	0.99	0.708	O				1.60
20.083	0.81	0.96	0.707	O				1.59
20.167	0.80	0.94	0.706	O				1.59

20.250	0.79	0.92	0.705	|O	|	|	|	|	1.59
20.333	0.78	0.90	0.704	|O	|	|	|	|	1.59
20.417	0.77	0.89	0.703	|O	|	|	|	|	1.59
20.500	0.76	0.87	0.703	|O	|	|	|	|	1.59
20.583	0.75	0.86	0.702	IO	|	|	|	|	1.58
20.667	0.74	0.84	0.701	IO	|	|	|	|	1.58
20.750	0.73	0.83	0.700	IO	|	|	|	|	1.58
20.833	0.72	0.81	0.700	IO	|	|	|	|	1.58
20.917	0.71	0.80	0.699	IO	|	|	|	|	1.58
21.000	0.71	0.79	0.699	IO	|	|	|	|	1.58
21.083	0.70	0.78	0.698	IO	|	|	|	|	1.58
21.167	0.69	0.77	0.698	IO	|	|	|	|	1.58
21.250	0.68	0.76	0.697	IO	|	|	|	|	1.57
21.333	0.68	0.75	0.697	O	|	|	|	|	1.57
21.417	0.67	0.74	0.696	O	|	|	|	|	1.57
21.500	0.66	0.73	0.696	O	|	|	|	|	1.57
21.583	0.66	0.72	0.695	O	|	|	|	|	1.57
21.667	0.65	0.71	0.695	O	|	|	|	|	1.57
21.750	0.64	0.70	0.694	O	|	|	|	|	1.57
21.833	0.64	0.69	0.694	O	|	|	|	|	1.57
21.917	0.63	0.69	0.694	O	|	|	|	|	1.57
22.000	0.63	0.68	0.693	O	|	|	|	|	1.57
22.083	0.62	0.67	0.693	O	|	|	|	|	1.57
22.167	0.62	0.67	0.693	O	|	|	|	|	1.57
22.250	0.61	0.66	0.692	O	|	|	|	|	1.56
22.333	0.61	0.65	0.692	O	|	|	|	|	1.56
22.417	0.60	0.65	0.692	O	|	|	|	|	1.56
22.500	0.60	0.64	0.691	O	|	|	|	|	1.56
22.583	0.59	0.63	0.691	O	|	|	|	|	1.56
22.667	0.59	0.63	0.691	O	|	|	|	|	1.56
22.750	0.58	0.62	0.690	O	|	|	|	|	1.56
22.833	0.58	0.62	0.690	O	|	|	|	|	1.56
22.917	0.57	0.61	0.690	O	|	|	|	|	1.56
23.000	0.57	0.61	0.690	O	|	|	|	|	1.56
23.083	0.56	0.60	0.689	O	|	|	|	|	1.56
23.167	0.56	0.60	0.689	O	|	|	|	|	1.56
23.250	0.56	0.59	0.689	O	|	|	|	|	1.56
23.333	0.55	0.59	0.689	O	|	|	|	|	1.56
23.417	0.55	0.58	0.688	O	|	|	|	|	1.56
23.500	0.54	0.58	0.688	O	|	|	|	|	1.56
23.583	0.54	0.57	0.688	O	|	|	|	|	1.56
23.667	0.54	0.57	0.688	O	|	|	|	|	1.56
23.750	0.53	0.56	0.688	O	|	|	|	|	1.56
23.833	0.53	0.56	0.687	O	|	|	|	|	1.55
23.917	0.53	0.55	0.687	O	|	|	|	|	1.55
24.000	0.52	0.55	0.687	O	|	|	|	|	1.55
24.083	0.51	0.55	0.687	O	|	|	|	|	1.55
24.167	0.43	0.54	0.686	O	|	|	|	|	1.55
24.250	0.27	0.51	0.685	O	|	|	|	|	1.55
24.333	0.18	0.47	0.683	O	|	|	|	|	1.55
24.417	0.13	0.43	0.681	O	|	|	|	|	1.54
24.500	0.10	0.39	0.679	O	|	|	|	|	1.54
24.583	0.08	0.35	0.677	O	|	|	|	|	1.53
24.667	0.06	0.31	0.675	O	|	|	|	|	1.53
24.750	0.05	0.28	0.674	O	|	|	|	|	1.53
24.833	0.04	0.25	0.672	O	|	|	|	|	1.52
24.917	0.03	0.22	0.671	O	|	|	|	|	1.52
25.000	0.02	0.20	0.670	O	|	|	|	|	1.52
25.083	0.02	0.17	0.668	O	|	|	|	|	1.52
25.167	0.01	0.15	0.667	O	|	|	|	|	1.51
25.250	0.01	0.13	0.666	O	|	|	|	|	1.51
25.333	0.01	0.12	0.666	O	|	|	|	|	1.51
25.417	0.01	0.10	0.665	O	|	|	|	|	1.51

25.500	0.00	0.09	0.664	O	|	|	|	|	1.51
25.583	0.00	0.08	0.664	O	|	|	|	|	1.51
25.667	0.00	0.07	0.663	O	|	|	|	|	1.51
25.750	0.00	0.06	0.663	O	|	|	|	|	1.51
25.833	0.00	0.05	0.662	O	|	|	|	|	1.50
25.917	0.00	0.04	0.662	O	|	|	|	|	1.50
26.000	0.00	0.04	0.662	O	|	|	|	|	1.50
26.083	0.00	0.03	0.662	O	|	|	|	|	1.50
26.167	0.00	0.03	0.661	O	|	|	|	|	1.50
26.250	0.00	0.03	0.661	O	|	|	|	|	1.50
26.333	0.00	0.02	0.661	O	|	|	|	|	1.50
26.417	0.00	0.02	0.661	O	|	|	|	|	1.50
26.500	0.00	0.02	0.661	O	|	|	|	|	1.50
26.583	0.00	0.01	0.661	O	|	|	|	|	1.50
26.667	0.00	0.01	0.661	O	|	|	|	|	1.50
26.750	0.00	0.01	0.660	O	|	|	|	|	1.50
26.833	0.00	0.01	0.660	O	|	|	|	|	1.50
26.917	0.00	0.01	0.660	O	|	|	|	|	1.50
27.000	0.00	0.01	0.660	O	|	|	|	|	1.50
27.083	0.00	0.01	0.660	O	|	|	|	|	1.50
27.167	0.00	0.01	0.660	O	|	|	|	|	1.50
27.250	0.00	0.00	0.660	O	|	|	|	|	1.50
27.333	0.00	0.00	0.660	O	|	|	|	|	1.50
27.417	0.00	0.00	0.660	O	|	|	|	|	1.50
27.500	0.00	0.00	0.660	O	|	|	|	|	1.50
27.583	0.00	0.00	0.660	O	|	|	|	|	1.50
27.667	0.00	0.00	0.660	O	|	|	|	|	1.50
27.750	0.00	0.00	0.660	O	|	|	|	|	1.50
27.833	0.00	0.00	0.660	O	|	|	|	|	1.50
27.917	0.00	0.00	0.660	O	|	|	|	|	1.50
28.000	0.00	0.00	0.660	O	|	|	|	|	1.50
28.083	0.00	0.00	0.660	O	|	|	|	|	1.50
28.167	0.00	0.00	0.660	O	|	|	|	|	1.50

Remaining water in basin = 0.66 (Ac.Ft)

**********HYDROGRAPH DATA**********

Number of intervals = 338
Time interval = 5.0 (Min.)
Maximum/Peak flow rate = 7.085 (CFS)
Total volume = 1.942 (Ac.Ft)

Status of hydrographs being held in storage

	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5
Peak (CFS)	0.000	0.000	0.000	0.000	0.000
Vol (Ac.Ft)	0.000	0.000	0.000	0.000	0.000

****

APPENDIX F – HYDRAULIC ANALYSIS

- Rectangular Orifice Analysis
- Rectangular Weir Analysis
- Curb Inlet Analysis for Inlet A1
- Storm Drain Line A WSPG Analysis

Rectangular Orifice 6"x12"

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	0.50 ft
Centroid Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Discharge Coefficient	0.600
Opening Width	1.00 ft
Opening Height	0.5 ft

Results	
Discharge	1.70 cfs
Headwater Height Above Centroid	0.50 ft
Tailwater Height Above Centroid	0.00 ft
Flow Area	0.5 ft²
Velocity	3.40 ft/s

Rating Table for Rectangular Orifice 6"x12"

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	0.50 ft
Centroid Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Discharge Coefficient	0.600
Opening Width	1.00 ft
Opening Height	0.5 ft

Headwater Elevation (ft)	Discharge (cfs)	Velocity (ft/s)
0.00		(N/A)
0.50	1.70	3.40
1.00	2.41	4.81
1.50	2.95	5.89
2.00	3.40	6.81
2.50	3.81	7.61
3.00	4.17	8.34
3.50	4.50	9.00
4.00	4.81	9.63
4.50	5.10	10.21
5.00	5.38	10.76

Rectangular Weir

Project Description	
Solve For	Discharge

Input Data	
Headwater Elevation	0.50 ft
Crest Elevation	0.00 ft
Tailwater Elevation	0.00 ft
Weir Coefficient	3.33 ft^(1/2)/s
Crest Length	1.5 ft
Number Of Contractions	0

Results	
Discharge	1.77 cfs
Headwater Height Above Crest	0.50 ft
Tailwater Height Above Crest	0.00 ft
Flow Area	0.8 ft²
Velocity	2.35 ft/s
Wetted Perimeter	2.5 ft
Top Width	1.50 ft

Curb Inlet In Sag - 1

Project Description	
Solve For	Spread

Input Data	
Discharge	5.39 cfs
Gutter Width	0.00 ft
Gutter Cross Slope	0.000 ft/ft
Road Cross Slope	0.007 ft/ft
Curb Opening Length	7.0 ft
Opening Height	0.5 ft
Curb Throat Type	Horizontal
Local Depression	0.0 in
Local Depression Width	0.0 in
Throat Incline Angle	90.00 degrees

Results	
Spread	57.7 ft
Depth	4.8 in
Gutter Depression	0.0 in
Total Depression	0.0 in

Program Package Serial Number: 7159

WATER SURFACE PROFILE LISTING Date: 5-10-2023 Time: 1:29:57

Space Center Flag Lot
Storm Drain Line A-1
100-Year Storm Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2890.000	1.500	2891.500	5.39	3.05	.14	2891.64	.00	.89	.00	1.500	.000	.00	1 .0
.000	.0387					.0026	.00	1.50	.00	.52	.013	.00	.00	PIPE
1000.000	2890.000	1.500	2891.500	5.39	3.05	.14	2891.64	.00	.89	.00	1.500	.000	.00	1 .0
3.413	.0387					.0024	.01	1.50	.00	.52	.013	.00	.00	PIPE
1003.413	2890.132	1.361	2891.493	5.39	3.20	.16	2891.65	.00	.89	.87	1.500	.000	.00	1 .0
1.789	.0387					.0024	.00	1.36	.41	.52	.013	.00	.00	PIPE
1005.201	2890.201	1.280	2891.481	5.39	3.36	.17	2891.66	.00	.89	1.06	1.500	.000	.00	1 .0
1.361	.0387					.0026	.00	1.28	.48	.52	.013	.00	.00	PIPE
1006.562	2890.254	1.214	2891.468	5.39	3.52	.19	2891.66	.00	.89	1.18	1.500	.000	.00	1 .0
.208	.0387					.0028	.00	1.21	.54	.52	.013	.00	.00	PIPE
1006.771	2890.262	1.155	2891.417	5.39	3.69	.21	2891.63	.00	.89	1.26	1.500	.000	.00	1 .0
HYDRAULIC JUMP														
1006.771	2890.262	.637	2890.899	5.39	7.54	.88	2891.78	.00	.89	1.48	1.500	.000	.00	1 .0
.822	.0387					.0175	.01	.64	1.91	.52	.013	.00	.00	PIPE
1007.593	2890.293	.661	2890.954	5.39	7.19	.80	2891.76	.00	.89	1.49	1.500	.000	.00	1 .0
2.082	.0387					.0154	.03	.66	1.79	.52	.013	.00	.00	PIPE
1009.675	2890.374	.685	2891.059	5.39	6.85	.73	2891.79	.00	.89	1.49	1.500	.000	.00	1 .0
1.616	.0387					.0135	.02	.69	1.67	.52	.013	.00	.00	PIPE

Space Center Flag Lot
Storm Drain Line A-1
100-Year Storm Event

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1011.291	2890.437	.711	2891.147	5.39	6.54	.66	2891.81	.00	.89	1.50	1.500	.000	.00	1 .0
1.252	.0387					.0119	.01	.71	1.55	.52	.013	.00	.00	PIPE
1012.543	2890.485	.738	2891.222	5.39	6.23	.60	2891.83	.00	.89	1.50	1.500	.000	.00	1 .0
.944	.0387					.0105	.01	.74	1.45	.52	.013	.00	.00	PIPE
1013.487	2890.521	.766	2891.287	5.39	5.94	.55	2891.84	.00	.89	1.50	1.500	.000	.00	1 .0
.691	.0387					.0092	.01	.77	1.35	.52	.013	.00	.00	PIPE
1014.178	2890.548	.795	2891.343	5.39	5.67	.50	2891.84	.00	.89	1.50	1.500	.000	.00	1 .0
.465	.0387					.0081	.00	.80	1.25	.52	.013	.00	.00	PIPE
1014.643	2890.566	.826	2891.393	5.39	5.40	.45	2891.85	.00	.89	1.49	1.500	.000	.00	1 .0
.269	.0387					.0072	.00	.83	1.16	.52	.013	.00	.00	PIPE
1014.912	2890.577	.859	2891.436	5.39	5.15	.41	2891.85	.00	.89	1.48	1.500	.000	.00	1 .0
.088	.0387					.0063	.00	.86	1.08	.52	.013	.00	.00	PIPE
WALL	ENTRANCE													
1015.000	2890.580	.896	2891.476	5.39	4.90	.37	2891.85	.00	.89	1.47	1.500	.000	.00	0 .0

WATER SURFACE PROFILE - CHANNEL DEFINITION LISTING

CARD CODE	SECT NO	CHN TYPE	NO OF PIER/PIP	AVE PIER WIDTH	HEIGHT 1 DIAMETER	BASE WIDTH	ZL	ZR	INV DROP	Y(1)	Y(2)	Y(3)	Y(4)	Y(5)	Y(6)	Y(7)	Y(8)	Y(9)	Y(10)
CD	1	4	1		1.500														
CD	2	4	1		1.500														

WATER SURFACE PROFILE - TITLE CARD LISTING

HEADING LINE NO 1 IS -

Space Center Flag Lot

HEADING LINE NO 2 IS -

Storm Drain Line A-1

HEADING LINE NO 3 IS -

100-Year Storm Event

WATER SURFACE PROFILE - ELEMENT CARD LISTING

ELEMENT NO 1 IS A SYSTEM OUTLET * * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1000.000	2890.000	1	2891.500

ELEMENT NO 2 IS A REACH * * *

U/S DATA	STATION	INVERT	SECT	N	RADIUS	ANGLE	ANG PT	MAN H
	1015.000	2890.580	1	.013	.000	.000	.000	0

ELEMENT NO 3 IS A WALL ENTRANCE *

U/S DATA	STATION	INVERT	SECT	FP
	1015.000	2890.580	2	.500

ELEMENT NO 4 IS A SYSTEM HEADWORKS * *

U/S DATA	STATION	INVERT	SECT	W S ELEV
	1015.000	2890.580	2	2890.580

APPENDIX G – REFERENCE DOCUMENTS

- NOAA Point Precipitation
- NRCS Soil Survey
- Addendum to San Bernardin County Hydrology Manual
- Figure ADD-1 Excerpt from San Bernardin County Hydrology Manual
- Approved plans for Space Center Project, PM 16201 (P-602)
- Space Center Flag Lot Improvement Plans

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.489°, Longitude: -117.2836°
Elevation: 2892.87 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	0.090 (0.075-0.111)	0.126 (0.104-0.154)	0.176 (0.144-0.216)	0.218 (0.178-0.270)	0.279 (0.220-0.357)	0.329 (0.255-0.430)	0.383 (0.289-0.512)	0.440 (0.323-0.606)	0.523 (0.369-0.751)	0.592 (0.403-0.878)
10-min	0.130 (0.107-0.159)	0.181 (0.149-0.221)	0.252 (0.207-0.309)	0.313 (0.255-0.387)	0.400 (0.316-0.512)	0.472 (0.365-0.616)	0.548 (0.414-0.734)	0.631 (0.463-0.869)	0.750 (0.528-1.08)	0.848 (0.577-1.26)
15-min	0.157 (0.130-0.192)	0.219 (0.180-0.268)	0.304 (0.250-0.374)	0.378 (0.308-0.468)	0.484 (0.382-0.619)	0.571 (0.441-0.746)	0.663 (0.501-0.888)	0.763 (0.560-1.05)	0.907 (0.639-1.30)	1.03 (0.698-1.52)
30-min	0.213 (0.176-0.260)	0.296 (0.245-0.363)	0.413 (0.340-0.507)	0.513 (0.418-0.635)	0.657 (0.518-0.840)	0.774 (0.599-1.01)	0.900 (0.679-1.20)	1.03 (0.760-1.43)	1.23 (0.867-1.77)	1.39 (0.947-2.07)
60-min	0.257 (0.212-0.314)	0.358 (0.295-0.438)	0.498 (0.410-0.612)	0.618 (0.505-0.766)	0.792 (0.625-1.01)	0.934 (0.722-1.22)	1.09 (0.819-1.45)	1.25 (0.917-1.72)	1.49 (1.05-2.13)	1.68 (1.14-2.49)
2-hr	0.362 (0.299-0.443)	0.488 (0.402-0.597)	0.661 (0.544-0.812)	0.809 (0.660-1.00)	1.02 (0.806-1.31)	1.19 (0.922-1.56)	1.37 (1.04-1.84)	1.57 (1.15-2.16)	1.85 (1.30-2.65)	2.07 (1.41-3.08)
3-hr	0.437 (0.361-0.535)	0.582 (0.480-0.713)	0.781 (0.643-0.959)	0.951 (0.776-1.18)	1.19 (0.941-1.53)	1.39 (1.07-1.81)	1.59 (1.20-2.13)	1.81 (1.33-2.49)	2.12 (1.50-3.05)	2.37 (1.62-3.52)
6-hr	0.596 (0.492-0.729)	0.788 (0.650-0.965)	1.05 (0.863-1.29)	1.27 (1.03-1.57)	1.58 (1.25-2.02)	1.83 (1.41-2.39)	2.09 (1.58-2.80)	2.37 (1.74-3.25)	2.75 (1.94-3.95)	3.07 (2.09-4.55)
12-hr	0.766 (0.632-0.936)	1.02 (0.843-1.25)	1.37 (1.13-1.68)	1.66 (1.35-2.05)	2.06 (1.62-2.63)	2.37 (1.84-3.10)	2.70 (2.04-3.62)	3.05 (2.24-4.20)	3.53 (2.49-5.06)	3.91 (2.66-5.81)
24-hr	1.00 (0.887-1.15)	1.36 (1.20-1.57)	1.84 (1.62-2.12)	2.23 (1.95-2.60)	2.77 (2.35-3.34)	3.20 (2.66-3.93)	3.64 (2.95-4.58)	4.10 (3.23-5.31)	4.73 (3.58-6.38)	5.23 (3.82-7.31)
2-day	1.16 (1.03-1.33)	1.60 (1.41-1.84)	2.18 (1.93-2.52)	2.66 (2.33-3.10)	3.33 (2.82-4.01)	3.85 (3.19-4.73)	4.39 (3.55-5.52)	4.95 (3.90-6.41)	5.72 (4.33-7.72)	6.34 (4.63-8.85)
3-day	1.26 (1.12-1.45)	1.75 (1.55-2.01)	2.40 (2.12-2.78)	2.94 (2.58-3.43)	3.69 (3.13-4.44)	4.27 (3.55-5.25)	4.88 (3.95-6.14)	5.51 (4.34-7.14)	6.38 (4.83-8.62)	7.08 (5.17-9.89)
4-day	1.34 (1.19-1.54)	1.86 (1.65-2.15)	2.57 (2.27-2.96)	3.14 (2.75-3.66)	3.94 (3.34-4.74)	4.56 (3.79-5.61)	5.21 (4.22-6.56)	5.88 (4.63-7.61)	6.81 (5.15-9.19)	7.55 (5.51-10.5)
7-day	1.45 (1.29-1.67)	2.00 (1.77-2.31)	2.74 (2.42-3.17)	3.35 (2.94-3.91)	4.19 (3.55-5.05)	4.85 (4.02-5.96)	5.52 (4.47-6.95)	6.22 (4.90-8.06)	7.19 (5.43-9.70)	7.95 (5.80-11.1)
10-day	1.53 (1.36-1.77)	2.11 (1.87-2.43)	2.88 (2.54-3.33)	3.52 (3.08-4.10)	4.39 (3.72-5.29)	5.08 (4.21-6.24)	5.78 (4.68-7.28)	6.51 (5.13-8.43)	7.51 (5.68-10.1)	8.30 (6.07-11.6)
20-day	1.76 (1.56-2.02)	2.43 (2.16-2.81)	3.34 (2.95-3.86)	4.10 (3.59-4.78)	5.15 (4.37-6.20)	5.98 (4.96-7.35)	6.83 (5.53-8.60)	7.72 (6.08-10.00)	8.95 (6.76-12.1)	9.91 (7.24-13.8)
30-day	1.99 (1.76-2.29)	2.77 (2.45-3.19)	3.83 (3.38-4.43)	4.72 (4.14-5.50)	5.98 (5.07-7.20)	6.98 (5.79-8.58)	8.01 (6.49-10.1)	9.10 (7.17-11.8)	10.6 (8.02-14.3)	11.8 (8.62-16.5)
45-day	2.33 (2.07-2.68)	3.26 (2.88-3.75)	4.54 (4.01-5.24)	5.64 (4.94-6.57)	7.21 (6.11-8.68)	8.47 (7.03-10.4)	9.80 (7.94-12.3)	11.2 (8.84-14.5)	13.2 (9.99-17.8)	14.8 (10.8-20.7)
60-day	2.55 (2.26-2.93)	3.55 (3.15-4.09)	4.97 (4.39-5.75)	6.21 (5.44-7.23)	8.00 (6.78-9.63)	9.47 (7.86-11.6)	11.0 (8.94-13.9)	12.7 (10.0-16.5)	15.1 (11.4-20.4)	17.1 (12.5-23.9)

[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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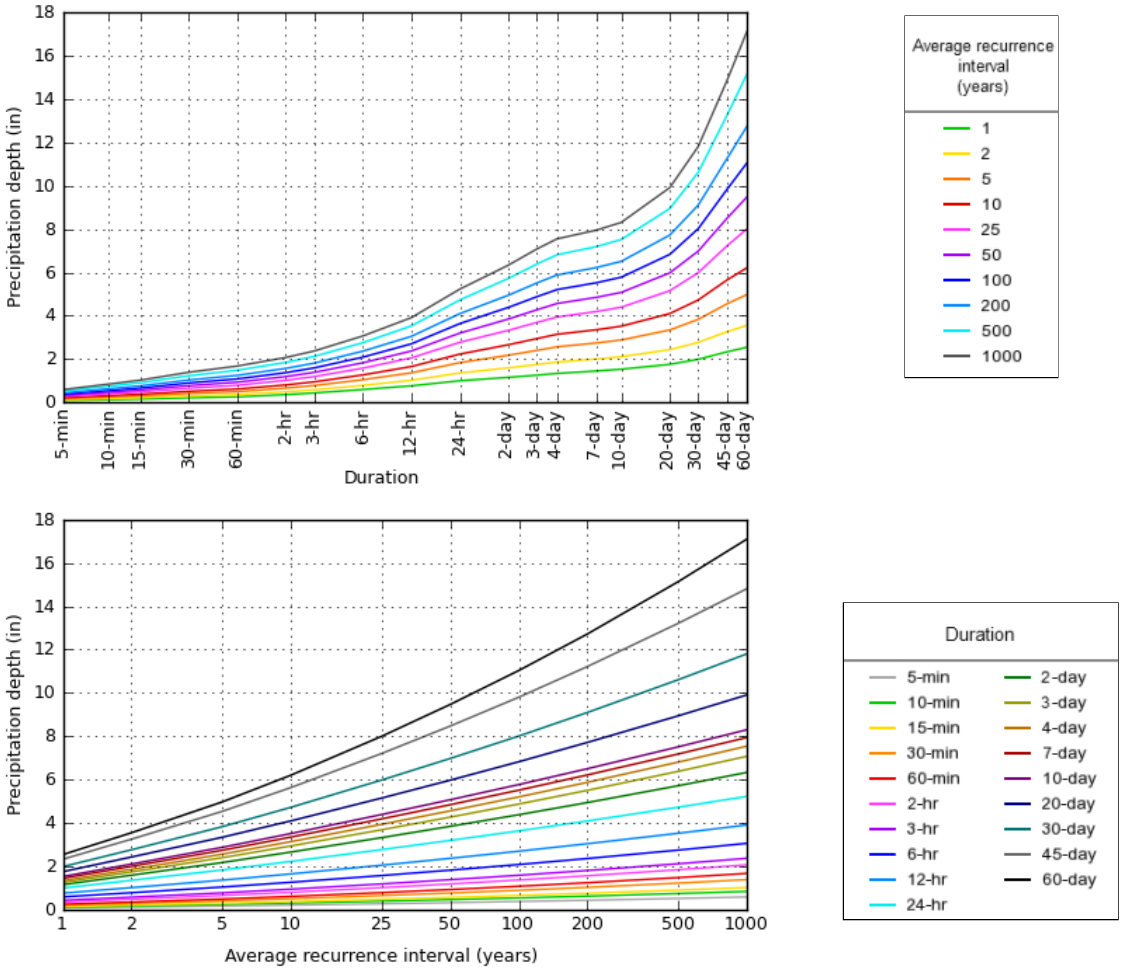
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.4890°, Longitude: -117.2836°



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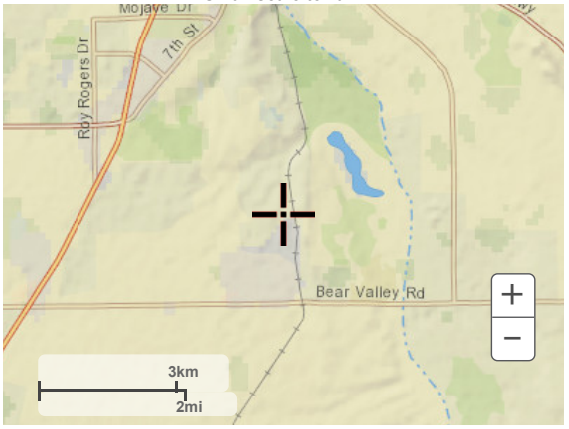
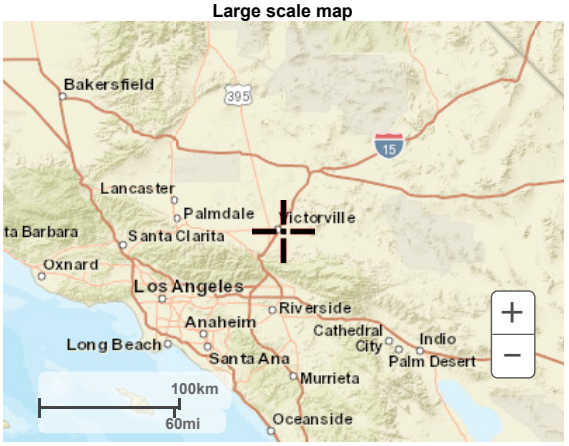
Maps & aerials

Small scale terrain

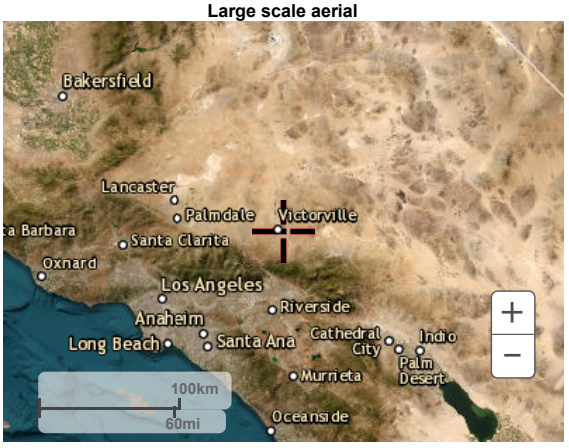


Large scale terrain

Large scale map



Large scale aerial



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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County, California, Mojave River Area

January 11, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,150 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 14, Sep 1, 2022

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
107	BRYMAN LOAMY FINE SAND, 5 TO 9 PERCENT SLOPES	1.5	11.6%
108	BRYMAN LOAMY FINE SAND, 9 TO 15 PERCENT SLOPES	2.1	15.8%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	9.5	72.3%
130	HAPLARGIDS-CALCIORTHIDS COMPLEX, 15 TO 50 PERCENT SLOPES	0.0	0.3%
Totals for Area of Interest		**13.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County, California, Mojave River Area

107—BRYMAN LOAMY FINE SAND, 5 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrc
Elevation: 3,000 to 3,200 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Bryman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bryman

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 39 inches: sandy clay loam
H3 - 39 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 5 percent
Hydric soil rating: No

Helendale
Percent of map unit: 5 percent
Hydric soil rating: No

Bryman, sloping
Percent of map unit: 5 percent
Hydric soil rating: No

108—BRYMAN LOAMY FINE SAND, 9 TO 15 PERCENT SLOPES

Map Unit Setting
National map unit symbol: hkrd
Elevation: 3,000 to 3,200 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition
Bryman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bryman

Setting
Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile
H1 - 0 to 9 inches: loamy fine sand
H2 - 9 to 39 inches: sandy clay loam
H3 - 39 to 60 inches: loamy sand

Properties and qualities
Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 3 percent
Hydric soil rating: No

Bryman, steep

Percent of map unit: 3 percent

Cajon

Percent of map unit: 3 percent
Hydric soil rating: No

Lavic

Percent of map unit: 3 percent
Hydric soil rating: No

Bryman, gravelly surface

Percent of map unit: 3 percent
Hydric soil rating: No

113—CAJON SAND, 2 TO 9 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hkrk
Elevation: 1,800 to 3,500 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 68 degrees F
Frost-free period: 180 to 290 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Cajon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Alluvium derived from mixed sources

Typical profile

A - 0 to 6 inches: sand
C1 - 6 to 25 inches: sand
C2 - 25 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 5 percent
Landform: Alluvial fans
Hydric soil rating: No

Kimberlina

Percent of map unit: 5 percent
Landform: Alluvial fans
Hydric soil rating: No

Cajon, gravelly surface

Percent of map unit: 5 percent
Landform: Alluvial fans

130—HAPLARGIDS-CALCIORTHIDS COMPLEX, 15 TO 50 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hks3
Elevation: 2,600 to 4,100 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days

Farmland classification: Not prime farmland

Map Unit Composition

Haplargids and similar soils: 50 percent
Minor components: 50 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haplargids

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 60 inches: variable

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydric soil rating: No

Minor Components

Calciorthids

Percent of map unit: 25 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Unnamed soils

Percent of map unit: 10 percent
Hydric soil rating: No

Badland

Percent of map unit: 5 percent
Hydric soil rating: No

Cajon

Percent of map unit: 5 percent
Hydric soil rating: No

Bryman

Percent of map unit: 3 percent
Hydric soil rating: No

Mohave varient, s

Percent of map unit: 2 percent
Hydric soil rating: No

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GEOTECHNICAL PROFESSIONALS INC.

GEOTECHNICAL INVESTIGATION
PROPOSED TRAILER LOT EXPANSION
17486 NISQUALLI ROAD
VICTORVILLE, CALIFORNIA

Prepared for:
BRE Space Paxbello, LLC
3401 Etiwanda Avenue
Jurupa Valley, California 91752

Prepared by:
Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, California 90630
(714) 220-2211

Project No. 3149.I

January 4, 2022

GEOTECHNICAL PROFESSIONALS INC.

January 4, 2023

BRE Space Paxbello LLC
3401 Etiwanda Avenue
Jurupa Valley, California 91752

Attention: Taline Agopian
Senior Project Manager, Development

Subject: Report of Geotechnical Investigation
Proposed Trailer Lot Expansion
17486 Nisqualli Road
Victorville, California
GPI Project No. 3149.I

Dear Taline:

Transmitted herewith is our report of geotechnical investigation for the subject project. The report presents the results of our evaluation of the subsurface conditions at the site and recommendations for design and construction.

We appreciate the opportunity of offering our services on this project and look forward to seeing the project through its successful completion. Please contact us if you have questions regarding our report or need further assistance.

Very truly yours,
Geotechnical Professionals Inc.

Patrick McGervey, P.E.
Project Engineer

Paul R. Schade, G.E.
Principal

Distribution: Addressee (PDF)
Tom Cruikshank, Link Logistics

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1.0 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed by Geotechnical Professionals Inc. (GPI) for the proposed trailer lot expansion at the subject site in Victorville, California. The site location is shown on the Site Location Map, Figure 1.

1.2 PROJECT DESCRIPTION

The proposed project will consist of a new paved trailer parking lot and drives across the approximately 8.3-acre site. There will also be a new guard shack building located at the southwest corner of the new parking lot. Floor slabs for the guard shack will be supported on-grade. The project will also include storm water infiltration systems, and landscaping on the remainder of the site.

Proposed finished elevations were not available at the time of preparing this report, however grades are anticipated to be predominately within 2 to 4 feet of existing grades. The finished grades for the proposed guard shack are anticipated to be within 2 to 4 feet of existing grades. Based on similar past projects, we assume that maximum wall loads will be on the order of 2 kips per lineal foot (dead plus live loads).

Our recommendations are based upon the above structural and finish grade information. We should be notified if the actual loads and/or grades differ or change during the project design to either confirm or modify our recommendations. Also, when the project grading and foundation plans become available, we should be provided with copies for review and comment.

1.3 PURPOSE OF INVESTIGATION

The primary purpose of this investigation and report is to provide an evaluation of the existing geotechnical conditions at the site as they relate to the design and construction of the proposed development. More specifically, this investigation was aimed at providing geotechnical recommendations for earthwork, and design of foundations and pavements.

2.0 SCOPE OF WORK

Our scope of work included subsurface exploration, field infiltration testing, laboratory testing, engineering analysis and the preparation of this report.

Our subsurface exploration consisted of six hollow stem auger borings and two infiltration test wells. The borings were performed to depths of approximately 4 to 26 feet below existing grade and the percolation wells were installed at depths of 10 to 12 feet below existing grades. Boring B-6 was refused on concrete prior to reaching its desired depth of 5 feet. A description of field procedures and logs of the borings are presented in the attached Appendix A. The procedures and results of the infiltration tests are discussed in this report. The approximate locations of the subsurface explorations are shown on the Site Plan, Figure 2.

Laboratory testing was performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included determinations of moisture content and dry density, grain size analyses, R-value and maximum density. R-value testing was performed by Geo-Logic under subcontract to GPI. Their test results are presented Appendix B. Corrosivity testing was performed as part of a previous investigation of the adjacent site by others (CHJ, 2016). The results of their testing have been incorporated in this report.

Engineering evaluations were performed to provide earthwork criteria, foundation design parameters, and assessments of seismic hazards. The results of our evaluations are presented in the remainder of the report.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

The site is bound to the north, west, and east by three different industrial/distribution buildings with associated surface trailer parking, and west of local rail spurs adjacent to a drainage channel and rail tracks. The site is predominately vacant with pockets of brush. Stockpiles of soil on the order of 5 feet high are in the southeast corner of the site that are likely associated with the previous cogeneration facility that (based on historical images) appears to have been deconstructed in 2015.

In general, the site slopes gently downward from south to north with a change in ground surface elevation from about Elevation +2902 feet to +2894 feet across the site.

3.2 SUBSURFACE SOIL CONDITIONS

Our field investigation disclosed a subsurface profile consisting of fill soils overlying natural soils. Detailed descriptions of the conditions encountered are shown on the Log of Borings in Appendix A.

We encountered undocumented fills to approximately 2 to 5 feet below existing grade in the explorations. The fill materials encountered consisted of medium dense, dry to slightly moist silty sands and sands with varying amount of gravel. The deeper fill soils were predominately associated with the existing unpaved entrance drive along the southern property line at the site. Limited areas may have deeper undocumented fill soils in the vicinity of the previous cogeneration plant (near boring B-6) in the southeastern corner of the site.

The natural soils consist predominately of silty sand with varying amounts of gravel and possible cobbles to a depth of approximately 13 to 15 feet where we encountered layered clayey sands, silty sands, and gravelly sands. In general, the native soils were dense to very dense and very stiff to hard. The natural soils have moderate to high strength and low compressibility characteristics.

Groundwater was not encountered in our explorations drilled to a maximum depth of 26 feet below ground surface. Published data by the California Department of Water Resources indicates groundwater is deeper than 100 feet below the ground surface.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 OVERVIEW

Based on the results of our investigation, it is our opinion that from a geotechnical viewpoint it is feasible to develop the site as proposed, provided the geotechnical constraints discussed below are mitigated. The most significant geotechnical issues that will affect the design and construction of the proposed building are as follows:

- Undocumented fills were reported to depths of up to 2 to 5 feet below existing grade in the vicinity of the proposed guard shack building. The fill soils are not considered to be suitable for direct support of foundations or floor slabs without remedial earthwork. For the proposed guard shack, we recommend removal and recompaction of the fill and a portion of the upper low-density natural soils to provide uniform support for the planned foundations and floor slab.

- Current moisture contents of the upper soils are generally well below the optimum moisture content so that moisture conditioning (wetting) will be required.

- The upper on-site soils are predominantly dry to slightly moist, medium dense silty sands and sands with silt. As such, the soils are considered to be susceptible to caving in open cuts and excavations. Care should be taken to maintain support of the soils and structures left in-place adjacent to planned excavations.

Our recommendations related to the geotechnical aspects of the development of the site are presented in the subsequent sections of this report.

4.2 SEISMIC DESIGN

4.2.1 General

The site is in a seismically active area of Southern California and is likely to be subjected to strong ground shaking due to earthquakes on nearby faults.

We assume the seismic design of the proposed development will be in accordance with the 2022 California Building Code (CBC) criteria. Based on the results of our investigation, a Site Class D may be used for the seismic design of the proposed building.

4.2.2 Strong Ground Motion Potential

Based on published information (geohazards.usgs.gov), the most significant fault in the proximity of the site is the San Andreas (San Bernardino N.), which is located about 18 miles from the site.

During the life of the project, the site will likely be subject to strong ground motions due to earthquakes on nearby faults. Based on the USGS website (earthquake.usgs.gov), we computed that the site could be subjected to a peak ground acceleration (PGA_M) of 0.55g for a

mean magnitude 7.0 earthquake. This acceleration has been computed using the mapped Maximum Considered Geometric Mean peak ground acceleration from the ASCE 7-16 (for 2022 CBC) and a site coefficient (F_{PGA}) based on Site Class. The predominant earthquake magnitude was determined using a 2-percent probability of exceedance in a 50-year period, or an average return period of 2,475 years. The structural design will need to incorporate measures to mitigate the effects of strong ground motion.

The corresponding seismic design parameters from the CBC are as follows:

2022 CBC:

S_S = 1.20g	$S_{MS} = F_a * S_S$ = 1.22g	$S_{DS} = 2/3 * S_{MS}$ = 0.82g
S_1 = 0.46g	$S_{M1} = F_V * S_1$ = 0.85g	$S_{D1} = 2/3 * S_{M1}$ = 0.56g

The above seismic code values should be confirmed by the Project Structural Engineer using the value above and the pertinent internet website and tables from the building code. The Project Structural Engineer should also evaluate the period of the proposed structure with respect to the T_S value above when reviewing whether a site-specific response analysis will be requested.

4.2.3 Potential for Ground Rupture

There are no known active faults crossing or projecting through the site. The site is not located in an Alquist-Priolo Earthquake Fault Zone. Therefore, ground rupture at this site due to faulting is considered unlikely.

4.2.4 Liquefaction and Seismic Settlement

The site is not located within a zone identified as having a potential for liquefaction by the State, as the quadrangle has not yet been assessed. Additionally, the site is not located in a zone identified as having a potential for liquefaction by the County. Due to the deep historic groundwater levels, we do not anticipate liquefaction induced settlement to negatively impact the site.

Seismic ground subsidence, not related to liquefaction, occurs when loose, granular soils above the groundwater are densified during strong earthquake shaking. Based on our analyses, we estimate a potential dry seismic settlement of less than ¼-inch. The differential seismic settlement is estimated to be less than ¼-inch across a span of 60 feet.

4.3 EARTHWORK

The earthwork for the planned improvements is anticipated to consist of clearing and excavation of undocumented fill and upper natural soils, subgrade preparation, and the placement and compaction of fill.

4.3.1 Clearing

Prior to grading, performing excavations or constructing the proposed improvements, the areas to be developed should be stripped of vegetation and cleared of debris. Buried obstructions, such as abandoned utilities, and tree roots should be removed from areas to be developed. Deleterious material generated during the clearing operation should be removed from the site. Existing vegetation should not be mixed into the soils.

Although not encountered in our explorations, if cesspools or septic systems are encountered, they should be removed in their entirety. The resulting excavation should be backfilled with properly compacted fill soils. As an alternative, cesspools can be backfilled with lean sand-cement slurry. At the conclusion of the clearing operations, a representative of GPI should observe and accept the site prior to further grading.

4.3.2 Excavations

Excavations at this site will include removals of undocumented fill and disturbed and low-density natural soils, footing excavations, and trenching for proposed utility lines.

Building Pad, Pavements and Minor Structures

To provide uniform support for the planned building, prior to placement of fills or construction of the building, the existing fill and a portion of the upper natural soils within the proposed building pad should be removed and replaced as properly compacted fill. For planning purposes, removals for the building pad should extend to a depth of 3 feet below existing grades and at least 2 feet below the base of foundations, whichever is deeper.

Removals below minor structures, such as free-standing walls and trash enclosures, should extend to a depth of 2 feet below existing grade or 1 foot below the base of the foundation, whichever is deeper. For pavement and flatwork subgrade, removals should extend at least 1 foot below existing grades or the proposed subgrade, whichever is deeper.

The actual depths of removals should be determined in the field during grading by GPI. The soils exposed at the base of the overexcavation should be processed in place as described in the “Subgrade Preparation” section of this report.

Excavation of the soils at the site should be readily achieved using conventional methods. The contractor should determine the best method for removal based on the subsurface conditions outlined herein.

Lateral Limits

The Project Surveyor should accurately stake the corners of the areas to be overexcavated in the field. Where space is available, the base of the excavations should extend laterally at least 5 feet beyond the building lines or edge of foundations, or a minimum distance equal to the depth of overexcavation/compaction below finish grade (i.e., a 1:1 projection below the top outside edge of footings), whichever is greater. Building lines include the footprint of the building and other foundation supported improvements, such as canopies and attached site walls.

Existing Utilities

Where not removed by the aforementioned excavations, existing utility trench backfill should be removed and replaced as properly compacted fill within the building pad. The limits of removal should be confirmed in the field. We recommend known utilities be shown on the grading plan.

Caving Potential and Cuts

The sandy soils at the site are expected to have a moderate to severe caving potential when exposed in open cuts. We recommend the following maximum slope inclinations for temporary excavations:

Excavation Height (ft)	Slope (h:v)
<3	Vertical
<8	¾:1
<15	1:1

If cuts greater than 15 feet are planned, we should be contacted to provide further recommendations. The allowable slope inclinations are measured from the toe to the top of the cut. Even at these inclinations, some raveling should be anticipated. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. Surcharge loads should not be permitted within a horizontal distance equal to the height of cut from the top of the excavation or 5 feet from the top of the slopes, whichever is greater, unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of adjacent existing site facilities should be properly shored to maintain support of adjacent elements. Excavations and shoring systems should meet the minimum requirements given in the State of California Occupational Safety and Health Standards.

Slot Cuts

Deeper removals along property lines or adjacent to existing improvements will require shoring or slot cuts. Recommendations for shoring are provided in the “Retaining Structures” section of the report. Removals that will undermine existing adjacent pavements or hardscape may utilize “ABC” slot cuts to depths not greater than 8 feet. Unsurcharged slot cuts up to 8 feet in height should not be wider than 6. Unsurcharged slot cuts up to 6 feet in height should not be wider than 8 feet. The slot cuts should be backfilled to finished grade prior to excavation of the adjacent four slots (two on each side of the excavated slot). We can provide slot widths for other slot heights if required. A test slot should be performed prior to production slots to confirm the stability of the planned cuts.

4.3.3 Subgrade Preparation

After the recommended cuts and removals are performed and prior to placing fills or construction of the proposed improvements, the subgrade soils should be scarified to a depth of 12 inches, moisture conditioned, and compacted to at least 90 percent of the maximum dry density, determined in accordance with ASTM D1557. Moisture conditioning (wetting) of the on-site soils anticipated.

4.3.4 Material for Fill

The upper on-site soils are, in general, suitable for use as compacted fill with some moisture conditioning being required. Although not encountered in our explorations, expansive clayey soils (E.I. greater than 50) were encountered in prior nearby investigations at the site and should not be used as fill within the upper 2 feet below the proposed building pad, or within the upper 1 foot below concrete flatwork subgrade.

Imported fill material should be predominately granular (contain no more than 40 percent fines - portion passing No. 200 sieve) and non-expansive (E.I. of 20 or less). GPI should be provided with a sample (at least 50 pounds) and notified of the location of soils proposed for import at least 72 hours prior to importing. Each proposed import source should be sampled, tested and accepted for use prior to delivery of the soils to the site. Soils imported prior to acceptance by GPI may be rejected if not suitable.

Both imported and existing on-site soils to be used as fill should be free of debris and pieces larger than 8 inches in greatest dimension (3 inches if placed within the depth of the planned footings). If on-site concrete is crushed to be re-used in compacted fill, we recommend the material be crushed to 3-inch minus in size and blended with the on-site soils prior to use.

In backfill areas where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain two sacks of cement per cubic yard and have a maximum slump of 5 inches.

If open-graded rock is used as backfill, the material should be placed in lifts and mechanically densified. Open-graded rock should be separated from the on-site soils by a suitable filter fabric (Mirafi 140N or equivalent).

4.3.5 Placement and Compaction of Fills

Fill soils should be placed in horizontal lifts, moisture-conditioned, and mechanically compacted to densities equal to at least 90 percent of the maximum dry density, determined in accordance with ASTM D1557. Fills within one foot of the subgrade pavement areasggregate base material should be compacted to a relative compaction of at least 95 percent. The optimum lift thickness will depend on the compaction equipment used and can best be determined in the field.

The following uncompacted lift thickness can be used as preliminary guidelines.

Plate compactors	4-6 inches
Small vibratory or static rollers (5-ton±) or track equipment	6-9 inches
Scrapers, Heavy loaders, and large vibratory rollers	9-12 inches

The maximum lift thickness should not be greater than 12 inches and each lift should be thoroughly compacted and accepted prior to subsequent lifts.

In general, on-site soils should be placed at moisture contents of 1 to 3 percent over the optimum moisture content. Current moisture contents of the upper soils are predominately slightly below optimum moisture content. Some moisture conditioning (wetting) will be required. Compacted fills should not be allowed to dry out prior to covering. If the fills are allowed to dry out prior to covering, additional moisture conditioning and processing will be required. A representative of GPI should observe and test the finished subgrade within 24 hours of concrete placement for floor slabs and hardscape.

4.3.6 Shrinkage and Subsidence

Shrinkage is the loss of soil volume caused by compaction of fills to a higher density than before grading. Subsidence is the settlement of in-place subgrade soils caused by loads generated by large earthmoving equipment. For earthwork volume estimating purposes, an average shrinkage value of 2 to 7 percent may be assumed for the surficial soils. Subsidence is expected to be less than 0.1 feet. These values are estimates only and exclude losses due to removal of vegetation or debris. Actual shrinkage and subsidence will depend on the types of earthmoving equipment used and should be determined during grading.

4.3.7 Trench/Wall Backfill

Utility trench backfill consisting of the on-site materials or imported soil, or wall backfill consisting of granular material should be mechanically compacted in lifts. Lift thickness should not exceed those values given in the "Placement and Compaction of Fills" section of this report. Moisture conditioning (wetting) of the on-site soils will be required prior to re-use as backfill. Jetting or flooding of backfill materials should not be permitted. A representative of GPI should observe and test trench and wall backfill as they are placed.

4.4 FOUNDATIONS

4.4.1 Foundation Type

As discussed previously, the proposed structures can be supported on conventional spread footings founded in the properly compacted fill.

4.4.2 Allowable Bearing Pressures

Based on the shear strength and elastic settlement characteristics of the natural and recompacted on-site soils, a static allowable net bearing pressure of up to 2,500 pounds per square foot (psf) may be used for both continuous footings and isolated column footings for the proposed building. These bearing pressures are for dead-plus-live-loads, and may be increased one-third for short-term, transient, wind and seismic loading. The actual bearing pressure used may be less than the value presented above and can be based on economics and structural loads to determine the minimum width for footings as discussed below. The maximum edge pressures induced by eccentric loading or overturning moments should not be allowed to exceed these recommended values.

For minor structures, such as site walls and trash enclosures, we recommend a maximum allowable bearing capacity of 1,500 pounds per square foot be used with minimum footing widths and depths of 18 inches.

4.4.3 Minimum Footing Width and Embedment

The following minimum footing widths and embedments are recommended for the corresponding allowable bearing pressure.

STATIC BEARING PRESSURE (psf)	MINIMUM FOOTING WIDTH (inches)	MINIMUM FOOTING* EMBEDMENT (inches)
2,500	24	24
2,000	24	18
1,500	18	18

* Refers to minimum depth below lowest adjacent grade at the time of foundation construction.

A minimum footing depth of 18 inches should be used even if the actual bearing pressure is less than 1,500 psf.

4.4.4 Estimated Settlements

Total static settlement of continuous wall footings (up to 2 kips per lineal foot) is expected to be on the order of ½ to ¾-inch. Differential static settlement between similarly loaded column footings or along a 60-foot span of a continuous footing is expected to be on the order of ½-inch or less. The majority of the settlement will occur immediately upon load application.

The potential for seismic settlement was addressed in a previous section of this report and should be referred to in evaluating the potential total settlements.

The above estimates are based on the assumption that the recommended earthwork will be performed and that the footings will be sized in accordance with our recommendations.

4.4.5 Lateral Load Resistance

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of footings and underlying soils and by passive soil pressures acting against the embedded sides of the footings. For frictional resistance, a coefficient of friction of 0.35 may be used for design. In addition, an allowable lateral bearing pressure equal to an equivalent fluid weight of 300 pounds per cubic foot may be used, provided the footings are poured tight against compacted fill. These values may be used in combination without reduction.

4.4.6 Foundation Inspection

Prior to placement of concrete and reinforcing steel, a representative of GPI should observe and approve foundation excavations.

4.5 BUILDING FLOOR SLABS

Slab-on-grade floors should be supported on granular, non-expansive (EI $\leq$ 20), compacted soils as discussed in the "Placement and Compaction of Fills" section. There is not a geotechnical requirement for slab reinforcing based on the non-expansive characteristics of the on-site soils.

A vapor/moisture retarder should be placed under slabs that are to be covered with moisture-sensitive floor coverings (parquet, vinyl tile, etc.) or will be storing moisture sensitive supplies. Currently, common practice is to use a 15-mil polyolefin product such as Stego Wrap for this purpose. The need for a sand layer with the vapor barrier is not a geotechnical issue and is a decision for the Project Architect.

It should be noted that the material used as a vapor retarder is only one of several factors affecting the prevention of moisture accumulation under floor coverings. Other factors include maintaining a low water to cement ratio for the concrete used for the floor slab, effective sealing of joints and edges (particularly pipe penetrations), and excess moisture in the concrete. The manufacturer of the floor coverings should be consulted for establishing acceptable criteria for the condition of floor surface prior to placing moisture-sensitive floor coverings.

4.6 RETAINING STRUCTURES

Based on information available to us at this time, retaining walls are not planned at the site, however we have included the following recommendations for walls or shoring less than 6 feet in height. We recommend that walls be backfilled with granular soils (less than 40 percent passing the No. 200 sieve), which are readily available on site.

Active earth pressures can be used for designing cantilevered walls or shoring that can yield laterally at least ½-percent of the wall height under the imposed loads. For level, drained backfill, derived from granular, non-expansive soils, a lateral pressure of an equivalent fluid weighing of 35 pounds per cubic foot may be used. This value can also be used for design of temporary cantilevered shoring.

At-rest pressures should be used for restrained walls that remain rigid enough to be essentially non-yielding. For select, non-expansive, level, drained backfill, a lateral pressure of an equivalent fluid weighing 60 pounds per cubic foot can be used.

The recommended pressures are based on the assumption that the supported earth will be fully drained, preventing the build-up of hydrostatic pressures. For traditional backfilled retaining walls, a drain consisting of perforated pipe and 1 cubic foot of gravel per lineal foot, wrapped in filter fabric should be used. The fabric (non-woven filter fabric, Mirafi 140N or equivalent) should be lapped at the top.

Walls subject to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third and one-half the anticipated surcharge pressure for unrestrained and restrained walls, respectively.

The Structural Engineer should specify the use of select, granular wall backfill on the plans. Wall footings should be designed as discussed in the “Foundations” section.

4.7 PAVEMENTS

A test on the near-surface soils resulted in an R-value of 56. To account for variability of the on-site soils, an R-value of 40 was used for the preliminary design. Based on the subgrade soils anticipated, we recommend the following pavement sections for the various levels of traffic (traffic indices) anticipated:

ASPHALT CONCRETE PAVEMENT

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		ASPHALT CONCRETE	AGGREGATE BASE COURSE
Auto Parking/Drives	4/5	3	4

PORTLAND CEMENT CONCRETE PAVEMENT

PAVEMENT AREA	TRAFFIC INDEX	SECTION THICKNESS (inches)	
		f'c = 3,500 psi PCC	f'c = 4,000 psi PCC
Auto Parking/Drives	4/5	5.5	5.0
Truck Areas	6	6.0	5.5
	7	6.5	6.0
	8	6.5	6.5

The Project Civil Engineer should select the appropriate traffic index for the pavement based on the anticipated traffic usage. For design purposes, the following traffic indices correspond to the following number of heavy (five axle) truck trips per day for a 20-year design life:

Traffic Index	Heavy Truck Trips/Day
4	0
5	1
6	3
7	11
8	35

The concrete used for paving should have a compressive strength at least equivalent to the design compressive strength at the time pavement is subjected to traffic. We do not recommend using concrete with a compressive strength of less than 3,500 psi. Based on the soils encountered in our explorations, reinforcing of the concrete pavements is not required from a geotechnical standpoint. Joint patterns and details should be determined by the Project Civil Engineer. Aggregate base is not considered to be required beneath portland cement concrete.

The pavement subgrade and aggregate base course should be compacted to at least 95 percent of the maximum dry density (ASTM D1557). Aggregate base should conform to the requirements of Section 26 of the California Department of Transportation Standard Specifications for Class II Aggregate Base (three-quarter inch maximum) or Section 200-2 of the Standard Specifications for Public Works Construction (Green Book) for untreated base materials (except Processed Miscellaneous Base).

The above recommendations assume that the base course and compacted subgrade will be properly drained. The design of paved areas should incorporate measures to prevent moisture build-up within the base course, which can otherwise lead to premature pavement failure. For example, curbing adjacent to landscaped areas should be deep enough to act as a barrier to infiltration of irrigation water into the adjacent base course.

4.8 CORROSION

Laboratory testing performed by others (CHJ, 2016) for the adjacent site development indicates that the near surface soils exhibit a soluble sulfate content of 241 mg/kg. For the 2022 CBC, foundation concrete should conform to the requirements outlined in ACI 318, Section 4.3 for Category S0 levels of soluble sulfate exposure from the on-site soils. Chloride levels in the on-site soils are found to be 246 mg/kg. For concrete exposed to soil moisture, such as footings and floor slabs, we recommend a chloride Category C1.

Resistivity testing indicates that they are severely corrosive to buried ferrous metals. Soil corrosion with regards to foundation concrete was addressed in a prior section of this report. GPI does not practice corrosion protection engineering. If corrosion protection recommendations are required, a corrosion engineer such as HDR should be consulted to provide recommendations to protect these elements from corrosion.

4.9 DRAINAGE

Positive surface gradients should be provided adjacent to structures so as to direct surface water run-off and roof drainage away from foundations and slabs toward suitable discharge facilities. Long-term ponding of surface water should not be allowed on pavements or adjacent to buildings.

4.10 INFILTRATION TESTING

Test wells P-1 and P-2 were installed in boreholes drilled using truck-mounted hollow-stem auger drill equipment at preliminary infiltration basin locations provided by the Project Civil Engineer. The locations of the test wells are shown on Figure 2. The wells consisted of 2-inch diameter PVC casing installed in an 8-inch diameter borehole. The casing was perforated in the lower 2 feet of the wells. Packing material around the slotted sections of the well casing consisted of #3 sand. The test wells were constructed to depths of approximately 10 to 12 feet below existing grade in order to test the soils near the bottom of the proposed infiltration basin being considered at the time our field work was conducted. The infiltration testing was performed in general accordance with the San Bernardino County guidelines for borehole infiltration tests.

The measured infiltration rates were calculated using the drop in water level over the test increment time. The final measured rates for each well, corrected as indicated above, are presented in the following table and should be used with an appropriate factor of safety.

Infiltration Test Results Summary

TEST WELL	APPROXIMATE DEPTH OF TEST WELL (feet)	CORRECTED INFILTRATION RATE (in./hr.)
P-1	10	3.0
P-2	12	1.9

The Civil Engineer should evaluate the feasibility of surface infiltration using the rates provided above. Additional factors of safety in computing the design infiltration rate of the proposed infiltration BMP should be determined by the project Civil Engineer.

It should also be noted that the infiltration rates are for clean, clear water and do not include effects of sediment, fines, dissolved solids or other debris, as these materials will significantly reduce the infiltration rates of the subsurface soils. Prior to infiltration, water should be cleaned of sediment or other deleterious materials to help reduce the potential for clogging and reduced percolation rates. Should fines or suspended solids be permitted to enter the basin, reduced infiltration rates will result.

4.11 GEOTECHNICAL OBSERVATION AND TESTING

We recommend that a representative of GPI observe earthwork during construction to confirm that the recommendations provided in our report are applicable during construction. The earthwork activities include grading, compaction of fills, subgrade preparation, pavement construction and foundation excavations. Sufficient in-place field density tests should be performed during fill placement and in-place compaction to evaluate the overall compaction of the soils. Soils that do not meet minimum compaction requirements should be reworked and tested prior to placement of additional fill. If conditions are different than expected, we should be afforded the opportunity to provide an alternate recommendation based on the actual conditions encountered.

5.0 LIMITATIONS

This report, exploration logs, and other materials resulting from GPI's efforts were prepared exclusively for BRE Space Paxbello LLC. and their consultants in designing the proposed development. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on projects other than the currently proposed development, as it may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only. This report cannot be utilized by another entity without the express written permission of GPI.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided by GPI during grading, excavation, and foundation construction. If field conditions during construction appear to be different than is indicated in this report, we should be notified immediately so that we may assess the impact of such conditions on our recommendations. If others perform the construction phase services, they must accept full responsibility for all geotechnical aspects of the project, including this report.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers practicing in this area. No other representation, either express or implied, is included or intended in our report.

Respectfully submitted,
Geotechnical Professionals Inc.

Patrick I.F. McGervey, P.E.
Project Engineer (patrickm@gpi-ca.com)

Paul R. Schade, G.E.
Principal (pauls@gpi-ca.com)

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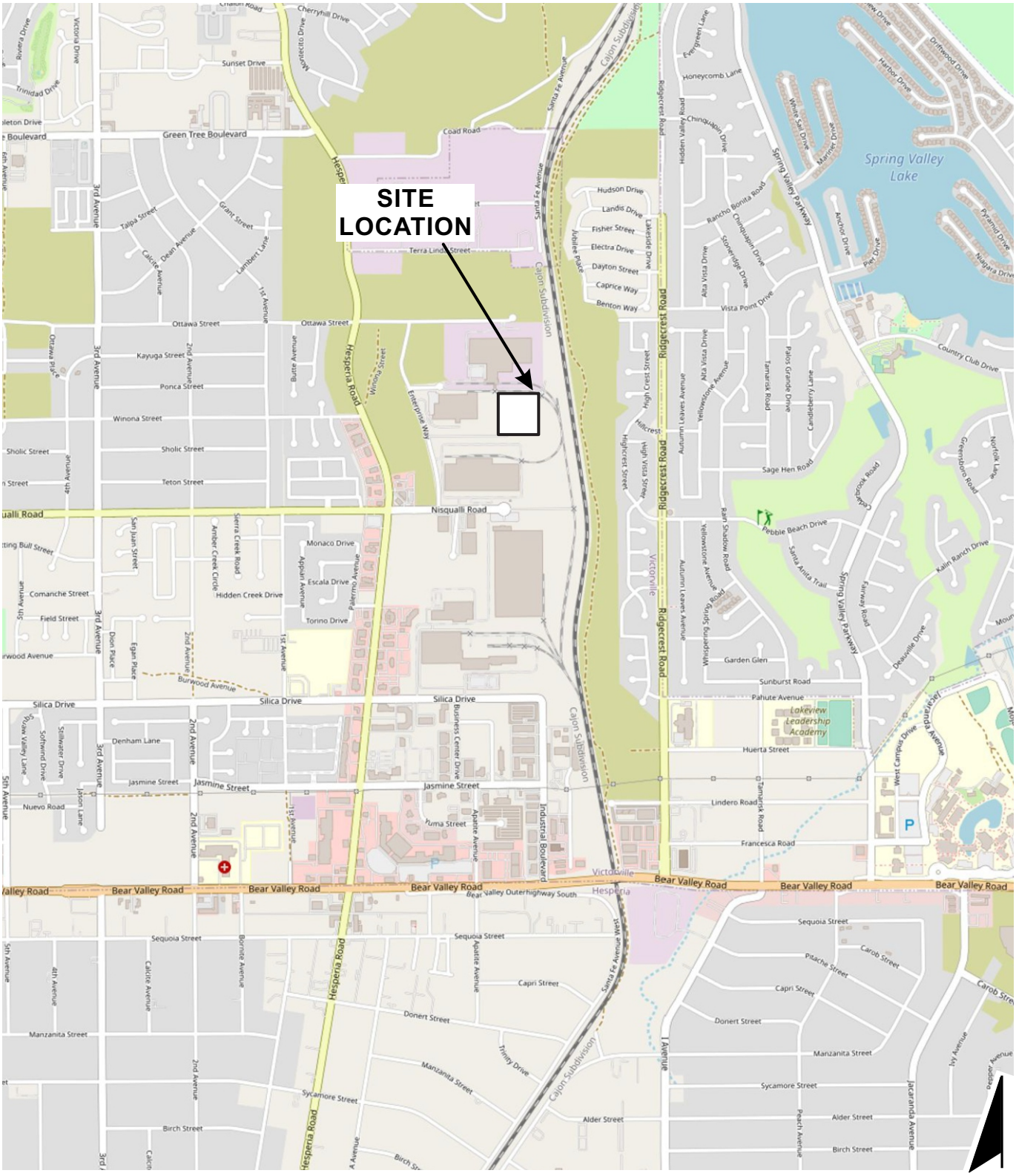


BASE MAP REPRODUCED FROM CALTOPO © 2022

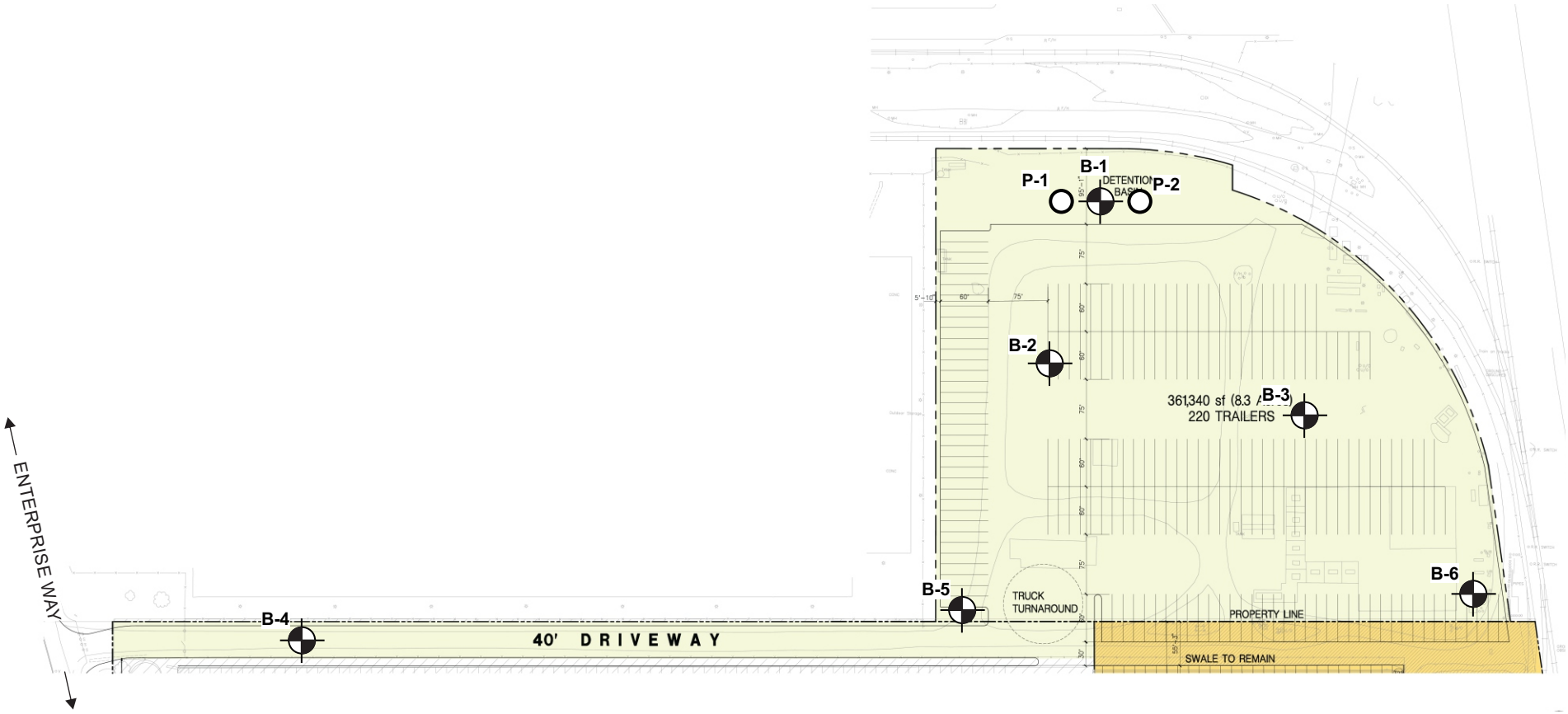
GPI GEOTECHNICAL PROFESSIONALS, INC.

BRE SPACE VICTORVILLE

GPI PROJECT NO.: 3149.I | SCALE: 1" = 2000'

SITE LOCATION MAP

FIGURE 1



EXPLANATION

B-6 APPROXIMATE LOCATION OF EXPLORATORY BORING

P-2 APPROXIMATE LOCATION OF INFILTRATION TEST

N

0 200 400 FEET

BASE MAP REPRODUCED FROM OVERALL SITE PLAN PROVIDED BY HPA ARCHITECTURE : DATED 08-16-2021

GPI GEOTECHNICAL PROFESSIONALS, INC.

BRE SPACE - TRAILER LOT EXPANSION

GPI PROJECT NO.: 3149.I

SCALE: 1" = 200'

SITE PLAN

FIGURE 2

APPENDIX A

EXPLORATORY BORINGS

The subsurface conditions for the site were investigated by drilling and sampling 6 exploratory borings. The borings were advanced to depths of 4 to 26 feet below the existing ground surface. The approximate locations of the explorations are shown on the Site Plan, Figure 2.

The exploratory borings were drilled using truck-mounted hollow-stem auger drill equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the “free-fall” hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blow counts.

The field explorations for the investigation were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures A-1 through A-6 in this appendix. Upon completion of the sampling of hollow-stem auger borings, the holes were backfilled with the excavated soils.

The boring locations were laid out in the field by measuring from existing site features. Ground surface elevations at the exploration locations were estimated from the ALTA Land Title Survey by David Evans and Associates dated December 13, 2022.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
					Fill: **GRAVELY SAND (GP)** brown, moist, trace silt	2900
8.2	112	67	D		Natural: **GRAVELY SAND (GP)** brown, moist, dense, trace silt	
7.1	116	50	D	5		2895
3.6	113	74	D		@ 7 feet, slightly moist	
2.9	117	80	D	10	**SANDY SILT (ML)** brown, dry, hard	2890
7.3		33	S		**SILTY SAND (SM)** brown, slightly moist, dense, with gravel	
6.2	114	72	D	15	**CLAYEY SAND (SC)** brown, moist, dense, with gravel @ 15 feet, trace cobbles	2885
14.0		19	S		@ 17.5 feet, dark brown, very moist, medium dense	
3.4	113	50/3"	D	20	**SILTY SAND (SM)** brown, dry to slightly moist, very dense, with gravel	2880
3.8		49	S		**GRAVELY SAND (GP)** brown, slightly moist, dense, with silt	
10.6	102	60	D	25	**SILTY SAND (SM)** brown, moist, dense	2875
					Total Depth 26 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-1

FIGURE A-1

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** brown, slightly moist, with gravel	
4.6	111	37	D		Natural: **SILTY SAND (SM)** brown, moist, medium dense	2900
2.9	117	77	D	5	@ 5 feet, dry	
					Total depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-2

FIGURE A-2

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SILTY SAND (SM)** brown, moist, with gravel	2910
3.2	114	47	D		Natural: **SILTY SAND (SM)** brown, dry to slightly moist, dense	
6.2	106	65	D	5	@ 5 feet, slightly moist	2905
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-3

FIGURE A-3

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS*	ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
				0	Fill: **SAND (SP)** brown, slightly moist, with gravel	2910
3.6	99	27	D		@ 2 feet, medium dense	
3.0	99	39	D	5	Natural: **SILTY SAND (SM)** brown, dry to slightly moist, medium dense, with gravel	
					Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-4

FIGURE A-4

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **SILTY SAND (SM)** brown, moist, with gravel	
	7.9	118	70	D		Natural: **SILTY SAND (SM)** brown, moist, dense	2900
	2.8	108	50/5"	D	5	@ 5 feet, dry, very dense	
	4.4	117	50/6"	D		@ 7 feet, dry to slightly moist	2895
	6.9	116	79	D	10	@ 10 feet, slightly moist	
							2890
	6.4	96	62	D	15	**CLAYEY SAND (SC)** brown, slightly moist, dense, with gravel	
							2885
	5.8	102	30	D	20	**SILTY SAND (SM)** brown, slightly moist, medium dense	
						CLAYEY SAND (SC) brown, slightly moist, medium dense, with gravel	
						Total Depth 21 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-5

FIGURE A-5

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	ELEVATION (FEET)
			B	0	Fill: **SILTY SAND (SM)** brown, moist, with gravel	2910
					Total Depth 4 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 12-8-22

EQUIPMENT USED: 8 " HOLLOW STEM AUGER

GROUNDWATER LEVEL (ft): NOT ENCOUNTERED

GPI

PROJECT NO.: 3149.I

BRE VICTORVILLE

LOG OF BORING NO. B-6

FIGURE A-6

APPENDIX B

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples from the borings. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix A.

PERCENTAGE PASSING NO. 200 SIEVE

Select soil samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. For select samples, the retained material was then run through a standard set of sieves in accordance with ASTM D6913 to classify the coarse fraction of representative sample. A summary of the percentages passing the No. 200 sieve is presented below. The grain size distribution data obtained from the full sieve analyses are presented in Figure B-1.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	PERCENT PASSING No. 200 SIEVE
B-1	10	Sandy Silt (ML)	59
B-1	15	Clayey Sand (SC)	14
B-3	0-5	Silty Sand (SM)	17

COMPACTION TEST

Maximum dry density/optimum moisture tests were performed in accordance with ASTM D1557 on select representative bulk samples of the site soils. The samples were first screened through the No. 4 sieve and the sample retained was weighed to determine the material retained on the No. 4 sieve. The amount retained was used to determine the rock corrected maximum dry density in accordance with ASTM D 1557 specifications. The test results for the screened (passing No. 4 sieve) and rock-corrected sample are as follows:

		SOIL DESCRIPTION	MAXIMUM	OPTIMUM
BORING NO.	DEPTH (ft)		DRY DENSITY (pcf)	MOISTURE (%)
B-10	0-5	Silty Sand (SM)	132	8.0
		Silty Sand (SM) with rock correction	135	8.0

R-VALUE

Suitability of the near-surface soils for pavement was evaluated by conducting an R-value test. The test was performed in accordance with ASTM D 2844 by GeoLogic Associates (GLA) under subcontract to GPI. The result of the test is as follows:

TEST PIT NO.	DEPTH (ft)	SOIL DESCRIPTION	R-VALUE BY EXUDATION
B-3	0 – 5	Silty Sand (SM)	56

DEPARTMENT OF PUBLIC WORKS

FLOOD CONTROL ● LAND DEVELOPMENT & CONSTRUCTION
SOLID WASTE MANAGEMENT ● SURVEYOR ● TRANSPORTATION

COUNTY OF SAN BERNARDINO

825 East Third Street ● San Bernardino, CA 92415-0835 ● (909) 387-8104
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GRANVILLE M. "BOW" BOWMAN, P.E., P.L.S.
Director of Public Works

April 6, 2010 File: 1(FC)-27.09-01

Hydrology Manual User:

Our San Bernardino County Hydrology Manual was developed in 1983 and revised in 1986 by our consultant Dr. Ted Hromadka. The best available data at the time was the National Oceanic and Atmospheric Administration (NOAA) Atlas II rainfall records and statistics published in 1973; it was the basis of our manual. The County participated with NOAA by providing a portion of the funding to study an additional 30 years of rainfall records. NOAA Atlas XIV was published in 2004 and revised 2006. We asked Dr. Hromadka to review the new rainfall numbers and assess any impacts to our manual. We looked at all areas of the County to see if any changes or revisions were justified. Only the arid desert regions were affected.

We are pleased to announce the new rainfall numbers led to updating our manual with an addendum. Briefly, this addendum addresses the Antecedent Moisture Condition (AMC) for arid regions of the County. The attached map, ADD-1, identifies where AMC I may now be used.

Please use the attached link to our website to access the addendum (March 2010); also included is a list of Frequently Asked Questions (FAQ's) and a map of the affected area. A GIS version of the map is also available.

If you have any questions, please contact Mike Fox, Chief-Water Resources Division at (909) 387-8213.

Sincerely,

KEVIN B. BLAKESLEE, P.E.
Deputy Director-Flood Control

KBB:MJF:bfb

County of San Bernardino Hydrology Manual Addendum for Arid Regions

April 2010

I. INTRODUCTION

After publication of the NOAA Atlas 14 rainfall atlas and the associated data base (NOAA, 2004, revised 2006), the County of San Bernardino Water Resources Division assessed the new publication towards the possibility of updating its Hydrology Manual (1983, revised 1986), particularly in the arid regions of the County. NOAA Atlas 2 (NOAA, 1973) served as the basis for the San Bernardino Hydrology Manual dated 1986. The updated NOAA Atlas 14 publication includes data from several rain gages which were not available at the time of the prior publication of NOAA Atlas 2, as well as 25 years of additional data at several of the rain gages used in NOAA Atlas 2. Consequently, thousands of additional station years of data are included in the updated NOAA Atlas 14. Upon assessing the new NOAA Atlas 14 rainfall statistics and mapping, the County updated their Hydrology Manual criteria to reflect the changes in rainfall statistics and trends developed with NOAA Atlas 14. This Addendum provides a summary of these updated criteria.

It is noted that numerous rain gages found in the NOAA Atlas 14 study area are not included in the NOAA Atlas 14 update and therefore care is needed when applying the updated Hydrology Manual criteria. Hydrology studies need to consider all available rainfall data by identifying rain gages located near or in the vicinity of the study area and need to obtain and review the relevant rainfall data. Such additional rainfall information includes, but is by no means limited to: NOAA (http://www.nws.noaa.gov/), CA-DWR (http://cdec.water.ca.gov/), CIMIS (http://wwwcimis.water.ca.gov/cimis/welcome.jsp), as well as gage data available from San Bernardino County. The results of such a review should be compared with the NOAA Atlas 14 results and a determination made as to the appropriateness in using the NOAA Atlas 14 results or whether a re-assessment of all rainfall data relevant to the study area should be made. Such determinations and reviews must be coordinated with the County in order to conclude the most appropriate rainfall statistics to use, including assessments of station record length and quality, among other factors.

The primary topics considered in the Addendum are:

1. Rainfall quantities for various peak durations of rainfall, and related return periods;
2. Antecedent Moisture Conditions (or "AMC") used in hydrology studies for design and planning;
3. Soil Grouping designations and related maps.

II. RAINFALL STATISTICS

The County of San Bernardino Hydrology Manual (1986) contains isohyetal curves developed for estimating the 2-year return frequency values for the peak 6- and 24-hour durations of rainfall, the 10-year 1-hour rainfalls, and the 100-year 1-hour, 6-hour and 24-hour rainfalls. These isohyetal maps are based upon use of the NOAA Atlas 2 (1973) information. The NOAA Atlas 14 provides information for various peak durations of rainfall depths and for various return periods (return frequencies), including all of the key durations and return periods detailed in the Hydrology Manual.

Access to the NOAA Atlas 14 information is found at http://hdsc.nws.noaa.gov/hdsc/pfds/.

Another resource available for assessing rainfall for hydrology studies is the depth duration frequency studies developed by the California Department of Water Resources (DWR). Some of the gages analyzed by DWR are not included in the NOAA Atlas 14 and should be considered for appropriateness in studies submitted to the county. The depth-duration frequency tables can be obtained as Microsoft Excel files from the DWR website at the following address:

http://www.water.ca.gov/floodmgmt/hafoo/csc/climate_data/.

It is noted that the Hydrology Manual provides interpolation methods for development of rainfall estimates for the 5-minute, 30-minute, 1-, 3-, 6-, and 24-hours of peak rainfall, including recommendations regarding log-log slopes of the relevant mass rainfall plots (for example, see Hydrology Manual Figures E-36 through E-45). The NOAA Atlas 14 provides estimates for these peak durations of rainfall depths directly in tabular form, on a rain gage by rain gage basis (for those gages used in the NOAA Atlas 14 analysis). Hydrology studies prepared using this Addendum should develop the relevant rainfall quantities required for the Hydrology Manual using the newer NOAA Atlas 14 estimates and, if available, the DWR estimates to assess the appropriate rainfall quantities to be used. Additionally, the study should consider all other rain gage information available in the proximity of the study watershed. The submittal should consider these several forms of rainfall information and provide a recommendation as to the appropriate rainfall information to use.

III. ANTECEDENT MOISTURE CONDITIONS (AMC)

The Antecedent Moisture Condition (AMC) concept is a classification of the watershed runoff conditions and is related to the prior five-day precipitation. By examining this prior five-day rainfall, the watershed can be categorized as being wet, average or dry. This classification of the watershed impacts the runoff which can be expected during a particular storm event. Original literature regarding AMC conditions were published by the Soil Conservation Service (SCS) in 1964 in the National Engineering Handbook,

Section 4. (The SCS had since changed to be the Natural Resources Conservation Service (NRSC).) In the 1993 update to the National Engineering handbook, the NRSC revised the AMC concept to that of Antecedent Runoff Condition (ARC), where ARC values correspond to statistical envelopments of the relevant rainfall-runoff information, versus the AMC concept correlating to contemplated prior moisture conditions of the watershed. Similar to many other agencies, the County continues to use the AMC approach in order to determine runoff quantities appropriate for design and planning purposes. The AMC approach should be used in all hydrologic studies prepared for County review or approval as presented in the Hydrology Manual (1986), without modification.

Based on the NOAA Atlas 14 statistical data, updated AMC designations for use in arid region hydrology studies are as shown in Addendum Figures ADD-1. It is noted that the NOAA Atlas 14 did not include all available rain gages, and therefore the hydrology study should examine other relevant rainfall gages to assess the appropriateness of the AMC designations shown in Addendum Figures ADD-1. Regional or Master Plan studies should consider all sources of information. The AMC condition used for these studies must be approved by the County.

IV. SOIL GROUPING DESIGNATIONS

The soil grouping information contained in Section C of the Hydrology Manual (1986) has been updated and can be accessed at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Use of this information follows the directions provided in the Hydrology Manual (1986).

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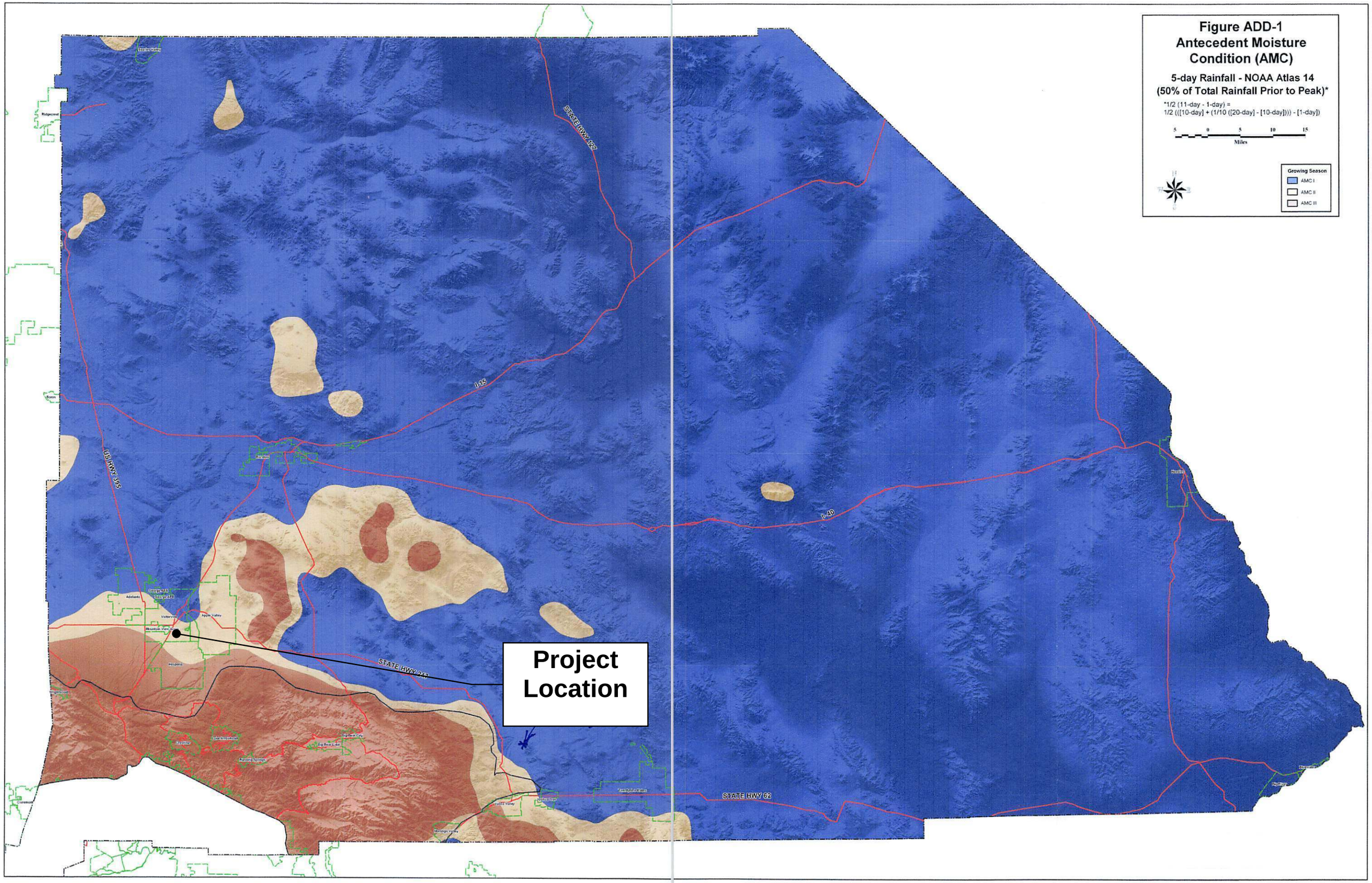
Figure ADD-1
Antecedent Moisture Condition (AMC)

5-day Rainfall - NOAA Atlas 14
(50% of Total Rainfall Prior to Peak)*

*1/2 (11-day - 1-day) =
1/2 (([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])

5 0 5 10 15
Miles

Growing Season
- AMC I
- AMC II
- AMC III



IMPROVEMENT PLANS
PARCEL MAP 16201

GENERAL STREET NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE PLANS AND THE CITY OF VICTORVILLE DEPARTMENT OF PUBLIC WORKS STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS DATED APRIL 19, 1976.
2. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUALLY, AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE CITY HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.
3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ANY PERMITS REQUIRED BY THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT IN ORDER TO DO THE WORK SHOWN ON THESE PLANS.
4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT SURVEYING MONUMENTS IN PLACE, AND THE CONTRACTOR SHALL BE FINANCIALLY RESPONSIBLE FOR RESETTING DAMAGED OR DESTROYED MONUMENTS.
5. JOSHUA TREES SHALL BE PROTECTED IN PLACE OR RELOCATED AS APPROVED BY THE CITY OF VICTORVILLE COMMUNITY SERVICES DEPARTMENT AT CONTRACTOR'S EXPENSE.
6. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE HIMSELF/HERSELF WITH THE JOB SITE AND ANY UNDERGROUND UTILITIES SHOWN OR NOT SHOWN ON THESE PLANS. CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT AT 1-800-422-4133 TO LOCATE UTILITIES AT LEAST TWO WORKING DAYS BEFORE DOING ANY EXCAVATION. ALL PIPELINES, SUBSTRUCTURES, OR UTILITIES OF ANY KIND, WHETHER SHOWN ON THESE PLANS OR NOT, SHALL BE PROTECTED IN PLACE OR, IF REQUIRED, BE REMOVED, RELOCATED, OR REINFORCED TO THE SATISFACTION OF THE CITY ENGINEER OR COMPANY OWNING THE FACILITY AT THE EXPENSE OF THE CONTRACTOR.
7. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY FIELD CHANGES MADE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE ENGINEER AND THE CITY ENGINEER.
8. THE CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT AT LEAST 48 HOURS NOTICE TO SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE INSPECTOR PRIOR TO START OF WORK.
9. THE CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT AT LEAST 24 HOURS NOTICE PRIOR TO ALL INSPECTIONS AT (760) 955-5158. A RE-INSPECTION FEE WILL BE RENDERED ON EACH OCCASION WHEN THE CONTRACTOR IS NOT READY FOR THE INSPECTION AT THE SCHEDULED TIME. NO FURTHER INSPECTIONS WILL BE PERFORMED UNTIL SAID RE-INSPECTION FEE IS PAID.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL SOIL TESTING AND COMPACTION TESTING. A CERTIFICATION OF COMPACTION SIGNED BY A REGISTERED ENGINEER SHALL BE SUBMITTED FOR ALL TRENCH BACKFILLS.
11. WHEN ROUGH GRADING HAS BEEN ACCOMPLISHED, SOILS TESTS SHALL BE TAKEN PER THE STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS OF THE CITY OF VICTORVILLE. IF BASE IS NECESSARY THE THICKNESS SHALL BE DETERMINED BASED ON THE RESULTS OF THE SOIL TESTS. MINIMUM BASE THICKNESS IS 8", MINIMUM R VALUE IS 70 AND MINIMUM SAND EQUIVALENT IS 25. TI VALUES CAN BE OBTAINED FROM THE ENGINEERING DEPARTMENT. ALL STREET PAVEMENT SECTIONS MUST BE APPROVED BY THE CITY ENGINEER PRIOR TO COMMENCEMENT OF CONSTRUCTION. SELECT NATIVE MATERIAL APPROVED BY THE CITY ENGINEER MAY BE USED FOR BASE.
12. CONSTRUCTION TRAFFIC CONTROL AND TEMPORARY STRIPING AND SIGNING PLANS SHALL BE PREPARED BY THE CONTRACTOR'S ENGINEER AND BE APPROVED BY THE CITY ENGINEER. THESE PLANS ARE REQUIRED FOR CONSTRUCTION BY PHASES AND CONSTRUCTION WORK ON EXISTING STREETS.
13. FINAL STRIPING AND TRAFFIC CONTROL SIGN PLANS SHALL BE PREPARED BY THE DEVELOPER'S ENGINEER AND BE APPROVED BY THE CITY ENGINEER. STRIPING AND PAVEMENT MARKINGS SHALL BE FURNISHED BY THE CONTRACTOR PER THE APPROVED PLANS.
14. STREET NAME SIGNS AND TRAFFIC CONTROL SIGNS SHALL BE INSTALLED BY THE CITY OF VICTORVILLE AT THE EXPENSE OF THE CONTRACTOR.
15. THE CONTRACTOR SHALL CLEAN THE STREETS PRIOR TO OCCUPANCY AND SHALL KEEP THE STREETS CLEAN UNTIL THEY ARE ACCEPTED BY THE CITY OF VICTORVILLE.
16. THE APPROVED SET OF PLANS MUST BE KEPT AT THE JOB SITE AT ALL TIMES.
17. GRADE STAKES FOR ALL DRAINAGE STRUCTURES MUST BE SET AND INSPECTION OBTAINED BEFORE POURING.
18. IF ASPHALT CONCRETE IS TO BE PLACED DIRECTLY ON SUBSURFACE OF ROAD OR DRAINAGE FACILITIES, A SOIL STERILANT REGISTERED BY THE EPA FOR USE UNDER AC AND PC SHALL BE UNIFORMLY APPLIED AT THE MANUFACTURER'S RECOMMENDED RATE FOR THE FULL PAVEMENT WIDTH PRIOR TO PAVING.

UTILITY COMPANIES

VERIZON NETWORK SERVICES	(760) 245-0875
CHARTER COMMUNICATIONS	(760) 241-7848
SOUTHERN CALIFORNIA EDISON COMPANY	1-(800) 655-4555
SOUTHWEST GAS COMPANY	(760) 241-9321
VICTOR VALLEY WATER DISTRICT	(760) 245-6424

PRIVATE ENGINEER'S NOTICE TO CONTRACTORS

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

UNDERGROUND UTILITIES & STRUCTURES

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN IN THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND IS RESPONSIBLE FOR THE PROTECTION OF, AND ANY DAMAGE TO THESE LINES OR STRUCTURES.

"CAUTION: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS."

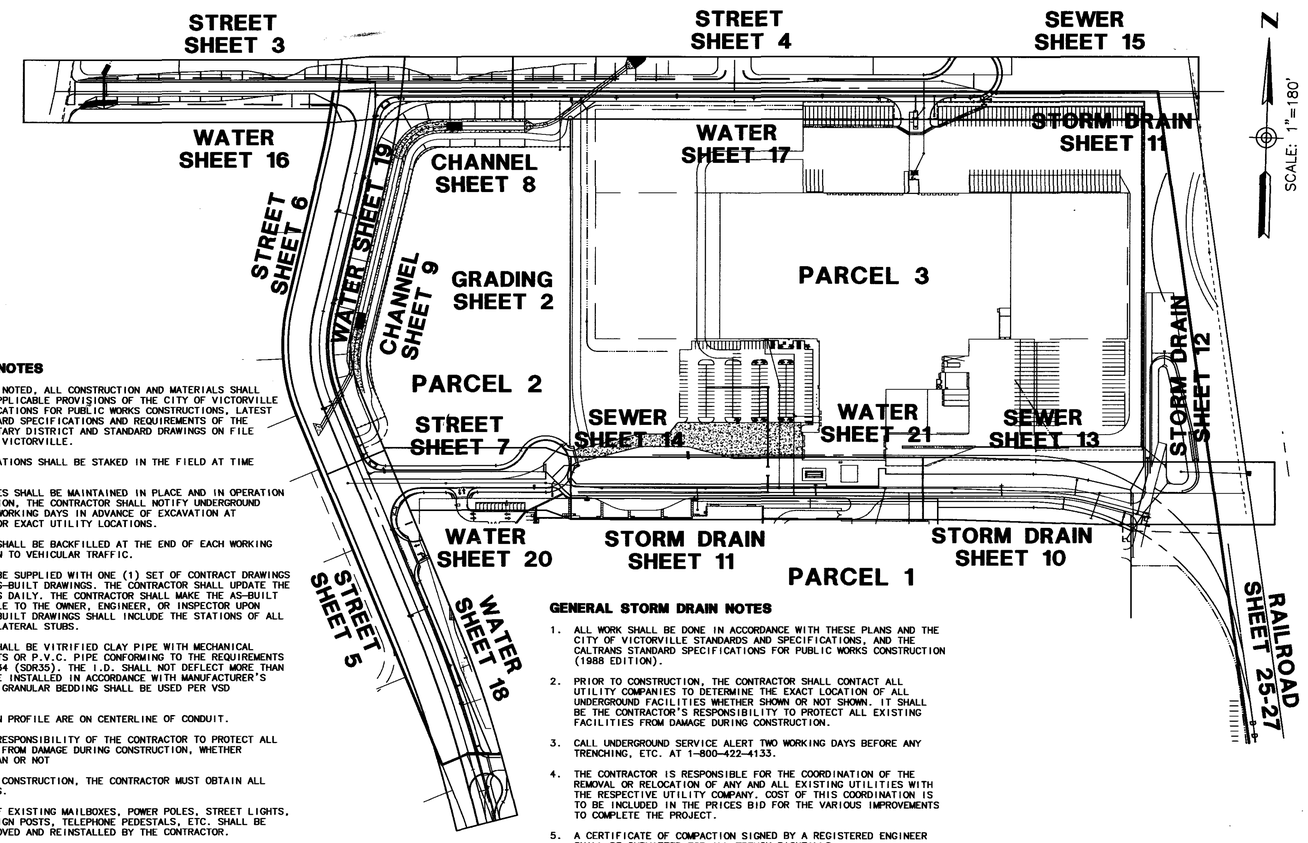
DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940



GENERAL SEWER NOTES

1. UNLESS OTHERWISE NOTED, ALL CONSTRUCTION AND MATERIALS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE CITY OF VICTORVILLE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTIONS, LATEST REVISIONS, STANDARD SPECIFICATIONS AND REQUIREMENTS OF THE VICTORVILLE SANITARY DISTRICT AND STANDARD DRAWINGS ON FILE WITH THE CITY OF VICTORVILLE.
2. MANHOLE RIM ELEVATIONS SHALL BE STAKED IN THE FIELD AT TIME OF CONSTRUCTION.
3. EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE AND IN OPERATION DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT 2 WORKING DAYS IN ADVANCE OF EXCAVATION AT 1-800-422-4133 FOR EXACT UTILITY LOCATIONS.
4. ALL EXCAVATIONS SHALL BE BACKFILLED AT THE END OF EACH WORKING DAY AND ROAD OPEN TO VEHICULAR TRAFFIC.
5. CONTRACTOR WILL BE SUPPLIED WITH ONE (1) SET OF CONTRACT DRAWINGS TO BE USED FOR AS-BUILT DRAWINGS. THE CONTRACTOR SHALL UPDATE THE AS-BUILT DRAWINGS DAILY. THE CONTRACTOR SHALL MAKE THE AS-BUILT DRAWINGS AVAILABLE TO THE OWNER, ENGINEER, OR INSPECTOR UPON REQUEST. THE AS-BUILT DRAWINGS SHALL INCLUDE THE STATIONS OF ALL WYES, TEES, AND LATERAL STUBS.
6. ALL SEWER PIPE SHALL BE VITRIFIED CLAY PIPE WITH MECHANICAL COMPRESSION JOINTS OR P.V.C. PIPE CONFORMING TO THE REQUIREMENTS OF A.S.T.M. D-3034 (SDR35). THE I.D. SHALL NOT DEFLECT MORE THAN 5%. PIPE SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. GRANULAR BEDDING SHALL BE USED PER VSD STANDARD SS-5.
7. STATIONS SHOWN ON PROFILE ARE ON CENTERLINE OF CONDUIT.
8. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING UTILITY FROM DAMAGE DURING CONSTRUCTION, WHETHER SHOWN ON THIS PLAN OR NOT
9. BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR MUST OBTAIN ALL NECESSARY PERMITS.
10. ANY RELOCATION OF EXISTING MAILBOXES, POWER POLES, STREET LIGHTS, FIRE HYDRANTS, SIGN POSTS, TELEPHONE PEDESTALS, ETC. SHALL BE RELOCATED OR REMOVED AND REINSTALLED BY THE CONTRACTOR.
11. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT SURVEY MONUMENTS IN PLACE AND THE CONTRACTOR SHALL BE FINANCIALLY RESPONSIBLE FOR RESETTING DAMAGED OR DESTROYED MONUMENTS.
12. SEWER LINES SHALL BE TESTED PRIOR TO MAKING SERVICE CONNECTIONS.
13. INSTALL HOLD-DOWN BOLTS ON ALL MANHOLE COVERS.
14. THE CONTRACTOR SHALL MARK THE CURB WHERE THE SEWER LATERAL CROSSES THE CURB AND GUTTER.
15. THE CONTRACTOR SHALL NOTIFY THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT AT LEAST 24 HOURS PRIOR TO NECESSARY INSPECTIONS AT (760) 955-5158.
16. ADEQUATE STAKES SHALL BE SET BY THE ENGINEER TO ENABLE THE CONTRACTOR TO CONSTRUCT THE WORK TO PLAN AND GRADE.
17. ADEQUATE STAKES SHALL BE SET BY THE ENGINEER TO ENABLE THE CONTRACTOR TO CONSTRUCT THE WORK TO PLAN AND GRADE.
18. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY FIELD CHANGES MADE WITH OUT PRIOR AUTHORIZATION FROM THE ENGINEER AND THE CITY OF VICTORVILLE.
19. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUALLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, THE ENGINEER, AND THE CITY HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
20. ALL SEWER TO BE INSTALLED PER CITY STANDARD NUMBER S-07.

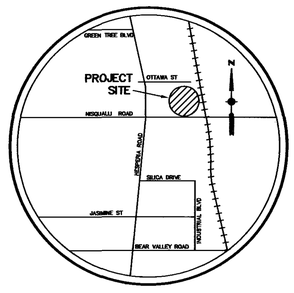
GENERAL STORM DRAIN NOTES

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THESE PLANS AND THE CITY OF VICTORVILLE STANDARDS AND SPECIFICATIONS, AND THE CALTRANS STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1988 EDITION).
2. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES WHETHER SHOWN OR NOT SHOWN. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL EXISTING FACILITIES FROM DAMAGE DURING CONSTRUCTION.
3. CALL UNDERGROUND SERVICE ALERT TWO WORKING DAYS BEFORE ANY TRENCHING, ETC. AT 1-800-422-4133.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF THE REMOVAL OR RELOCATION OF ANY AND ALL EXISTING UTILITIES WITH THE RESPECTIVE UTILITY COMPANY. COST OF THIS COORDINATION IS TO BE INCLUDED IN THE PRICES BID FOR THE VARIOUS IMPROVEMENTS TO COMPLETE THE PROJECT.
5. A CERTIFICATE OF COMPACTION SIGNED BY A REGISTERED ENGINEER SHALL BE SUBMITTED FOR ALL TRENCH BACKFILLS.
6. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY FIELD CHANGES MADE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE UNDERSIGNED ENGINEER AND THE CITY OF VICTORVILLE.
7. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL SURVEY MONUMENTS. ANY SURVEY MONUMENTS DISTURBED DURING THE COURSE OF CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
8. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, ENGINEER AND THE CITY HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE ENGINEER.
9. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ANY PERMITS REQUIRED BY THE CITY OF VICTORVILLE IN ORDER TO DO THE WORK SHOWN ON THESE PLANS.
10. ADEQUATE STAKES SHALL BE SET BY THE ENGINEER TO ENABLE THE CONTRACTOR TO CONSTRUCT THE WORK TO PLAN AND GRADE.
11. STORM DRAIN STATIONING INCREASES UP GRADE. IT DOES NOT FOLLOW CENTERLINE STREET STATIONING.
12. THE CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPT. AT LEAST 48 HRS. NOTICE TO SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE INSPECTOR PRIOR TO START OF WORK.
13. THE CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPT. AT LEAST 24 HRS. NOTICE PRIOR TO ALL INSPECTIONS AT (760) 245-3411.
14. THE CONTRACTOR SHALL REMOVE FROM THE VICINITY OF THE COMPLETED WORK ALL PLANTS, UNUSED MATERIALS, CONCRETE FORMS AND EQUIPMENT BELONGING TO HIM OR USED UNDER HIS DIRECTION DURING CONSTRUCTION UNTIL ACCEPTANCE OF WORK BY THE CITY OF VICTORVILLE.

SHEET INDEX

GENERAL WATER NOTES (VICTOR VALLEY WATER DISTRICT)

1. ALL FEDERAL, STATE OF CALIFORNIA AND LOCAL REGULATIONS RELATING TO PUBLIC WORKS PROJECTS SHALL BE IN EFFECT
2. WATER MAIN SHALL BE HYDRO-TESTED AT 225 P.S.I. FOR A 2 HOUR DURATION, MINIMUM; AT THE LOWEST POINT IN THE PIPING PER VVWD STANDARD SPECIFICATIONS. AFTER COMPLETION OF THE HYDRO-TEST, THE PIPE SHALL BE LEAK-TESTED AT 150 P.S.I. FOR A 2 HOUR DURATION, MINIMUM; AT THE LOWEST POINT IN THE PIPING SYSTEM
3. GATE VALVES TO BE IBBM-RW (IRON BODY, BRASS MOUNTED NON-RISING STEM RESILIENT WEDGE) AS APPROVED BY VVWD
4. CONTRACTOR SHALL NOTIFY VVWD OF INTENTION TO START WORK AT LEAST 48 HOURS PRIOR TO COMMENCING. NO WORK SHALL BE PERFORMED WITHOUT PERMIT
5. MATERIAL AND INSTALLATION SHALL CONFORM TO MANUFACTURER'S INSTRUCTIONS AND LATEST VVWD SPECIFICATIONS, AND/OR AS DIRECTED BY VVWD
6. PROVIDE A MINIMUM OF 10 FEET HORIZONTAL SEPARATION BETWEEN WATER AND SEWER MAINS AND LATERALS
7. ALL VALVES SHALL BE FLANGED DIRECTLY TO THE TEE OR CROSS, AND SHALL HAVE A RESTRAINED JOINT OUTLET. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION COMPLETE WITH VALVE BOX TO FINISH GRADE AFTER CONNECTION TO EXISTING MAIN, AS APPROVED BY THE VVWD. ALL VALVE OPERATORS DEEPER THAN 36" SHALL HAVE OPERATOR EXTENSIONS, MANUFACTURED BY PIPELINE PRODUCTS OR EQUAL
8. EXISTING SCREENED NATIVE MATERIAL FROM TRENCHING OR IMPORTED SAND SHALL BE USED FOR PIPE BEDDING (MINIMUM OF 4-INCHES DEEP) AND BACKFILL TO A DEPTH OF 12-INCHES ABOVE PIPE. IF NATIVE MATERIAL IS UNACCEPTABLE TO THE VVWD INSPECTOR, THEN SAND (SAND EQUIVALENT OF 30) SHALL BE IMPORTED AS REQUIRED FOR BACKFILL. NOTE: END BELL AREAS SHALL BE DUG OUT TO ACHIEVE THE 4-INCHES OF BEDDING
9. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO REQUIREMENTS OF LATEST CITY OR COUNTY PERMIT SPECIFICATIONS
10. 12-GAUGE INSULATED COPPER WIRE SHALL BE TAPED TO THE TOP OF PVC PIPE, 1-INCH WIDE ALARM TAPE SHALL BE INSTALLED 1-FOOT ABOVE PIPE
11. FIRE HYDRANTS SHALL CONFORM TO THE VVWD STANDARDS AND SPECIFICATIONS AND SHALL BE 6-INCH, 3-WAY WITH TWO 2-1/2 INCH AND ONE 4-INCH OUTLETS
12. FIRE HYDRANTS SHALL BE SPACED AT APPROXIMATELY 300 FEET ON LOT LINES AND SET AT 2 FEET FROM FACE OF CURB TO CENTER-LINE OF HYDRANT AND 4 FEET OUTSIDE BOR OR ECR, PER CITY OF VICTORVILLE STANDARD DRAWING S-12
13. CONTRACTOR SHALL COORDINATE WITH VVWD REGARDING THE SERVICE LATERAL LOCATION
14. MATERIAL AND INSTALLATION OF TEMPORARY BLOW-OFFS FOR PIPELINE TESTING TO BE THE RESPONSIBILITY OF CONTRACTOR
15. THE CONTRACTOR SHALL INSTALL PIPE AND FITTINGS WITH RESTRAINED JOINTS (ROMAC GRIP-RING OR APPROVED EQUAL) AT CHANGES OF DIRECTION AND GRADE TO THE LIMITS AS SHOWN ON THE DRAWING. CONCRETE THRUST BLOCKS SHALL BE PROVIDED ONLY AT HYDRANT LOCATIONS IDENTIFIED ON STANDARD DRAWINGS
16. CHANGES IN MAINLINE ELEVATION DUE TO CONFLICT WITH OTHER UTILITIES OR STRUCTURES (SUCH AS SEWERS, STORM DRAINS ETC.) SHALL BE APPROVED BY VVWD INSPECTOR /ENGINEER BEFORE PRO-CEEDING FURTHER WITH WORK
17. ALL REQUIRED TESTING AND ALL CONNECTIONS MADE TO EXISTING WATER SYSTEM SHALL BE COORDINATED WITH AND APPROVED BY THE VVWD INSPECTOR/ENGINEER
18. WATER MAINS SHALL BE 8" DIAMETER MINIMUM OR AS SHOWN ON DRAWINGS. WATER MAIN MATERIAL SHALL BE PVC C900, CLASS 200, DIP, CLASS 350, OR CML/CMC STEEL, 10 GAUGE MINIMUM
19. STANDARD WATER MAIN LOCATION IS FIVE FEET FROM CURB FACE. MINIMUM WATER MAIN DEPTH IS 36-INCHES BELOW PAVEMENT SUBGRADE
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHLORINATION AND DISINFECTION OF NEWLY INSTALLED PIPELINES. THIS RESPONSIBILITY ALSO INCLUDES THE DE-CHLORINATION AND/OR FLUSHING OF THE LINES. THE HYPER-CHLORINATED DISINFECTED WATER SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL EPA REGULATIONS
21. ALL COMMERCIAL/INDUSTRIAL METERS REQUIRE A DEPARTMENT OF HEALTH SERVICES-APPROVED, OWNER-INSTALLED, REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
22. THE CONTRACTOR SHALL MAINTAIN ALL EXISTING UTILITIES IN-PLACE. IF SUBSTANTIAL DIFFERENCES ARE FOUND TO EXIST BETWEEN ACTUAL FIELD CONDITIONS AND THOSE ORIGINALLY ANTICIPATED, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE DISTRICT ENGINEER
23. WHERE SURVEY MONUMENTS EXIST, SUCH MONUMENTS SHALL BE PROTECTED OR SHALL BE REFERENCED AND RESET PURSUANT TO BUSINESS AND PROFESSIONAL CODE. SECTION 8700 TO 8805 (LAND SURVEYOR'S ACT)



VICINITY MAP
NOT TO SCALE

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE DATE
CITY ENGINEER R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	06/11/04	MH	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E.#42386 12/5/03 DATE

IMPROVEMENT PLANS

PARCEL MAP 16201

CITY OF VICTORVILLE

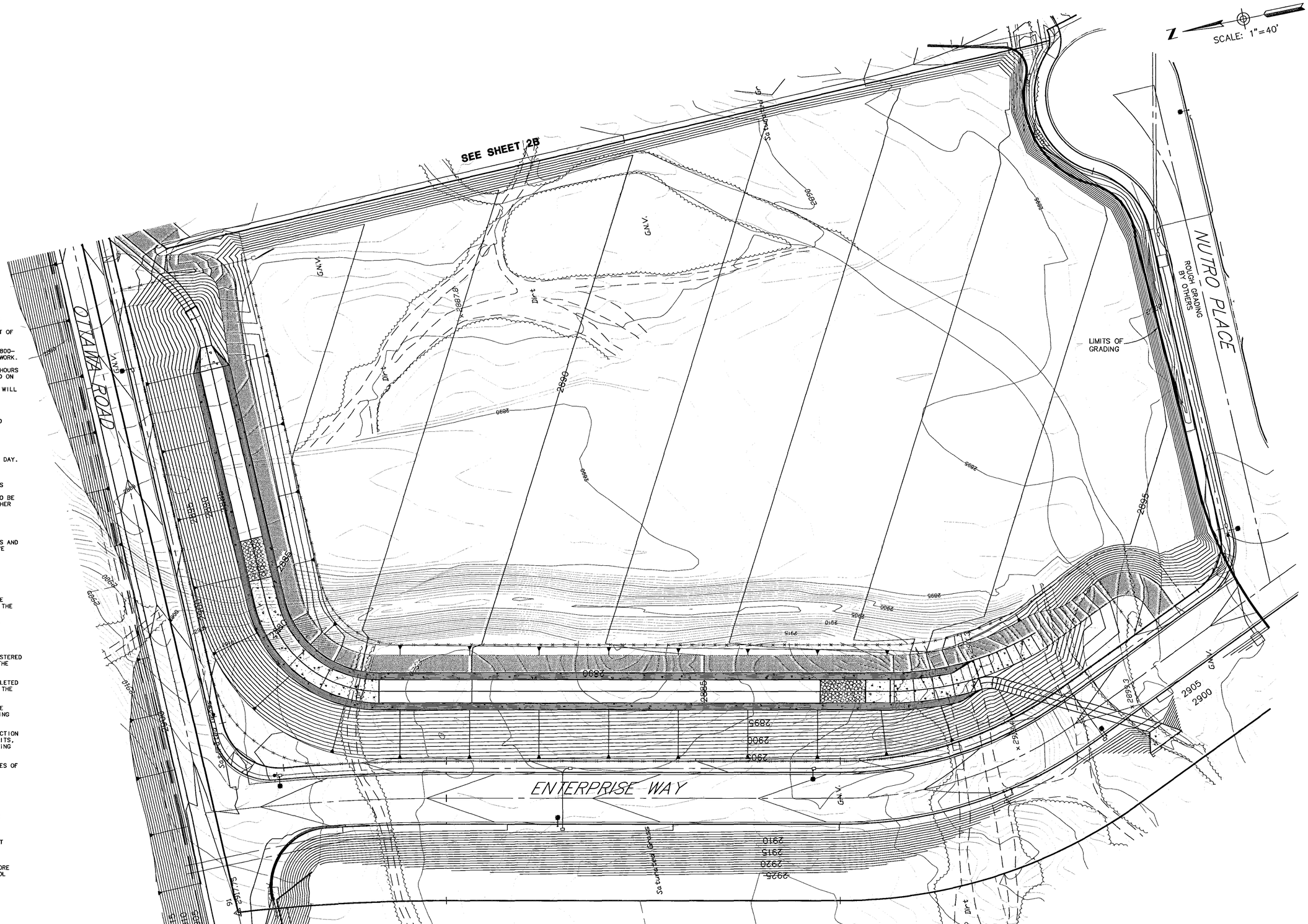
JOB NO.	SHEET
103.0055	1 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 180'	12/10/03	TMH	RK	2627

P-602

ROUGH GRADING NOTES

1. GRADING SHALL CONFORM TO THE CITY GRADING ORDINANCE AND APPENDIX CHAPTER 33 OF THE UNIFORM BUILDING CODE.
2. A GRADING PERMIT SHALL BE OBTAINED FROM THE CITY OF VICTORVILLE BUILDING DEPARTMENT PRIOR TO START OF GRADING WORK.
3. CONTRACTOR SHALL GIVE THE CITY OF VICTORVILLE ENGINEERING DEPT. AT LEAST 2 WORKING DAYS NOTICE TO SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE INSPECTOR PRIOR TO THE START OF WORK.
4. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT (1-800-422-4133) AT LEAST 2 WORKING DAYS IN ADVANCE OF STARTING WORK.
5. NOTIFY THE CITY OF VICTORVILLE ENGINEERING DEPARTMENT 24 HOURS PRIOR TO INSPECTIONS. A REINSPECTION FEE WILL BE RENDERED ON EACH OCCASION WHEN THE CONTRACTOR IS NOT READY FOR THE INSPECTION AT THE SCHEDULED TIME. NO FURTHER INSPECTIONS WILL BE PERFORMED UNTIL SAID REINSPECTION FEE IS PAID.
6. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT SURVEYING MONUMENTS IN PLACE AND THE CONTRACT SHALL BE FINANCIALLY RESPONSIBLE FOR RESETTING DAMAGED OR DESTROYED MONUMENTS.
7. JOSHUA TREES SHALL BE PROTECTED IN PLACE OR RELOCATED AS APPROVED BY DEPARTMENT OF PARKS AND RECREATION.
8. NO GRADING SHALL COMMENCE PRIOR TO 7:00 A.M. EACH WORKING DAY.
9. DUST CONTROL SHALL INCLUDE:
   A) PROVISIONS FOR CONTINUOUS WATERING DURING GRADING OPERATIONS INCLUDING A 24-HOUR ON-CALL OPERATOR OR AS DIRECTED BY CITY STAFF.
   B) UPON COMPLETION OF THE PROJECT, THE ENTIRE SITE IS TO BE STABILIZED BY TREATING WITH MAGNESIUM CHLORIDE OR OTHER APPROVED METHOD AND AS APPROVED BY CITY STAFF.
10. CLEAR ALL CUT AND FILL AREAS OF VEGETATION AND ORGANIC MATERIALS TO A DEPTH OF SIX (6") INCHES OR MORE.
11. FILL SHALL BE PLACED IN LIFTS OF EIGHT (8") INCHES OR LESS AND SUFFICIENT MOISTURE ADDED AND MATERIAL COMPACTED TO ACHIEVE THE REQUIRED PERCENT OF COMPACTION.
12. NO ROCKS GREATER THAN SIX (6") INCHES IN DIAMETER MAY BE PLACED IN FILL.
13. COMPACTION SHALL BE A MINIMUM OF NINETY PERCENT (90%).
14. MAXIMUM SLOPES SHALL BE 2:1. SLOPE STABILIZATION SHALL BE PROVIDED ON ALL SLOPES IN ACCORDANCE WITH SECTION 3316 OF THE UNIFORM BUILDING CODE.
15. ALL OFF-SITE IMPROVEMENTS SHALL BE CONSTRUCTED TO CITY OF VICTORVILLE STANDARDS.
16. ALL FENCES AND WALLS ARE UNDER SEPARATE PERMIT.
17. ALL WALLS AND RETAINING WALLS SHALL BE PREPARED BE A REGISTERED ENGINEER. DETAILS AND CALCULATIONS SHALL BE SUBMITTED TO THE CITY OF VICTORVILLE FOR REVIEW AND APPROVAL.
18. BUILDING PAD AND GRADING PLAN CERTIFICATION SHALL BE COMPLETED BY A LICENSED ENGINEER IN ACCORDANCE WITH SECTION 3317 OF THE UNIFORM BUILDING CODE.
19. THE MAXIMUM ALLOWABLE FOUNDATION BEARING PRESSURE SHALL BE 1500 PSF UNLESS APPROVED BY THE CITY OF VICTORVILLE BUILDING DEPT.
20. THE CONTRACTOR SHALL COMPLY WITH THE GRADING ORDINANCE SECTION 15.08.080 AND SECTION 15.08.090 AS IT RELATES TO BORROW PITS, EXPORT SITES, AND HAUL ROUTES PRIOR TO ISSUANCE OF A GRADING PERMIT.
21. A PALEONTOLOGICAL MONITOR MUST BE PRESENT DURING ALL PHASES OF GRADING WHEN REQUIRED BY CITY STAFF.
22. APPROXIMATE QUANTITIES:
    RAW CUT = ~~35,000~~ 54,000 ~~135,000~~ CU. YD.
    COMPACTED RAW FILL = ~~135,000~~ CU. YD.
    154,000 ~~35,000~~
    EARTHWORK QUANTITIES ARE APPROXIMATE AND ARE INTENDED FOR GRADING PERMIT PURPOSES ONLY. THE GRADING CONTRACTOR IS RESPONSIBLE FOR DETERMINING HIS OWN EARTHWORK QUANTITIES.
23. GRADING SHALL BE COMPACTED IN ACCORDANCE WITH SOILS REPORT PREPARED BY SMITH-EMERY GEOSERVICES DATED MAY 20, 2003.
24. CONSTRUCTION ACTIVITIES OF FIVE (5) ACRES OR MORE SHALL REQUIRE A GENERAL CONSTRUCTION STORM WATER PERMIT. FOR MORE INFORMATION, YOU MAY CALL THE STATE WATER RESOURCES CONTROL BOARD - DIVISION OF WATER QUALITY AT (916) 657-1146.



DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/26/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
4	6/20/04	WG	UPDATE EXISTING TOPO	
3	6/11/04	WG	PLAN CHANGE NO. 1	
2	1/26/04	WG	BID ADDENDUM NO. 3	
1	1/7/04	WG	BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. #42386 — 12/10/03 — DATE

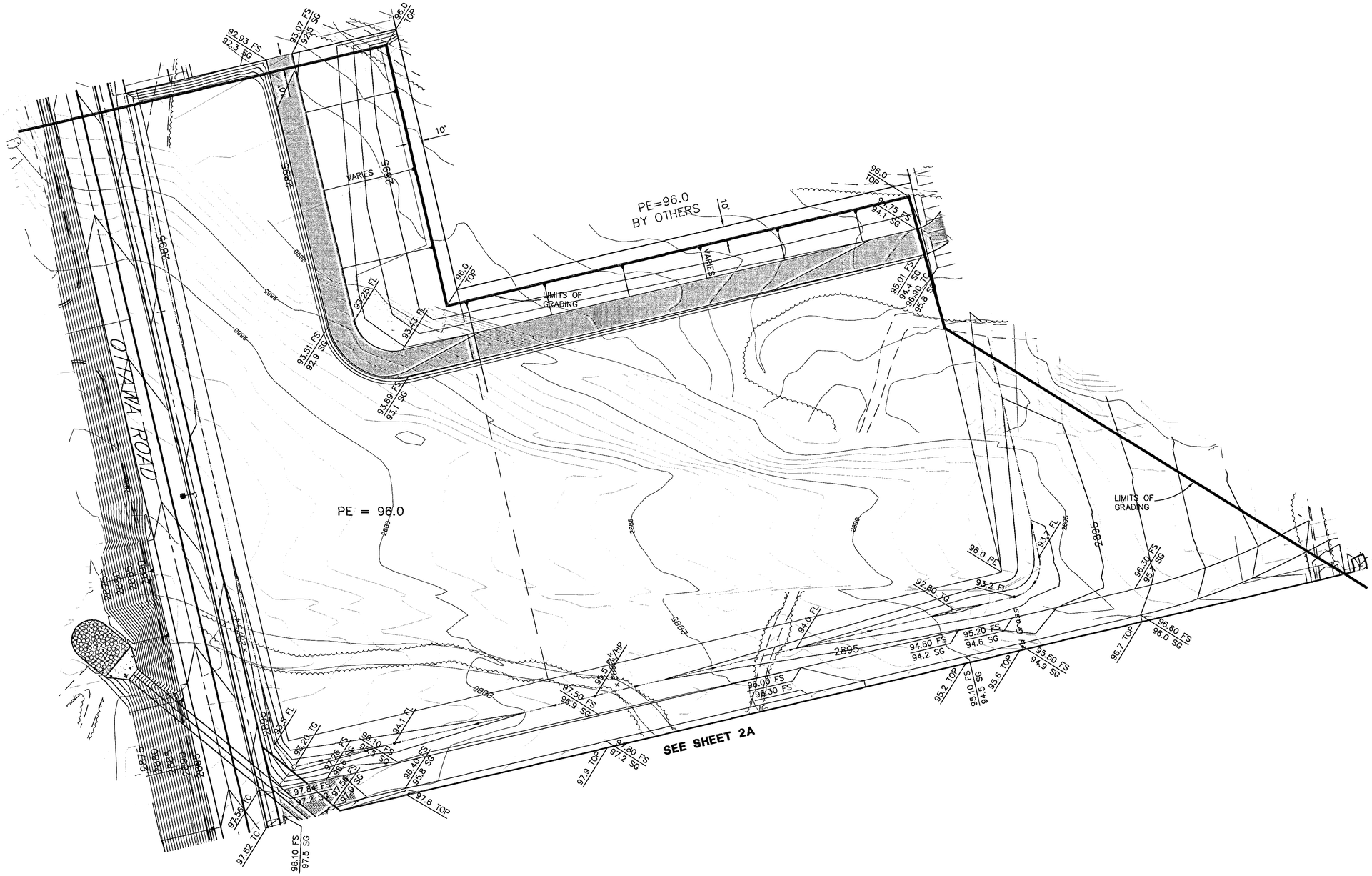
ROUGH GRADING PLAN
PARCEL 2, PARCEL MAP 16201
CITY OF VICTORVILLE

SCALE	DATE	DRAWN BY	DESIGNED BY
1" = 40'	12/10/03	TMH	RK

JOB NO. 103.0055
SHEET 2A OF 27
FILE NO. 2627

P-602

SCALE: 1"=40'



DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/26/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
4	6/20/04	WE	UPDATE EXISTING TOPO	
3	6/11/04	WE	PLAN CHANGE NO. 1	
2	1/26/04	WE	BID ADDENDUM NO. 3	
1	1/7/04	WE	BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. KILPATRICK
EXP. 3/31/06
No.42386
CIVIL
STATE OF CALIFORNIA

VCE, Inc.
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THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E.#42386 DATE 12/10/03

ROUGH GRADING PLAN

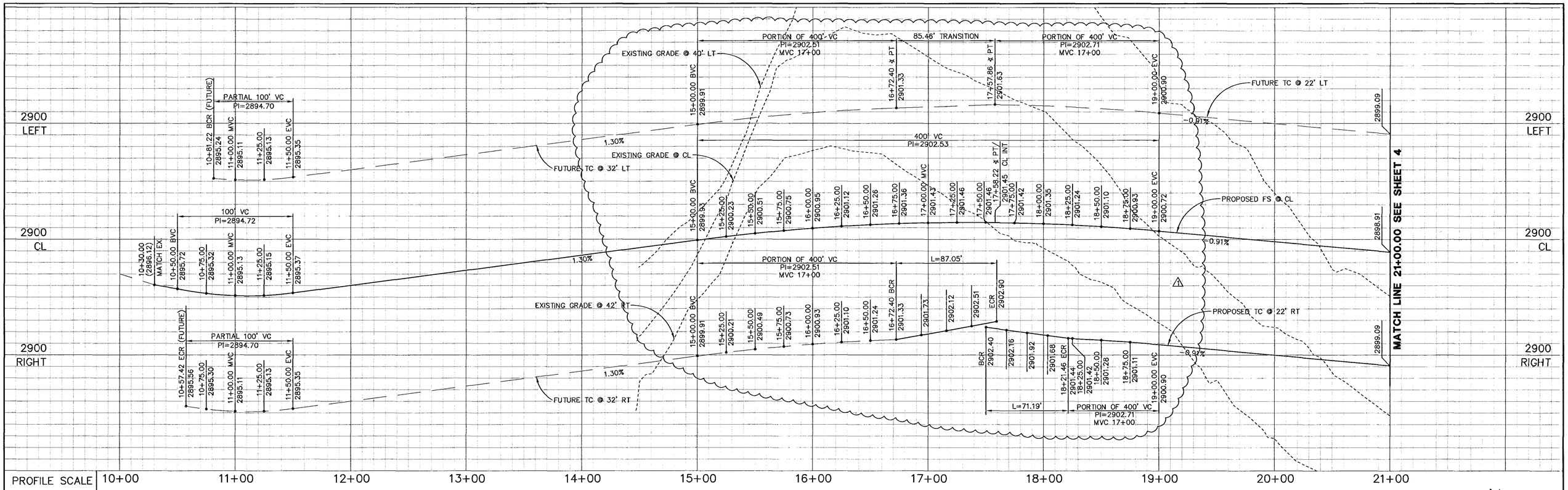
PARCEL 2, PARCEL MAP 16201

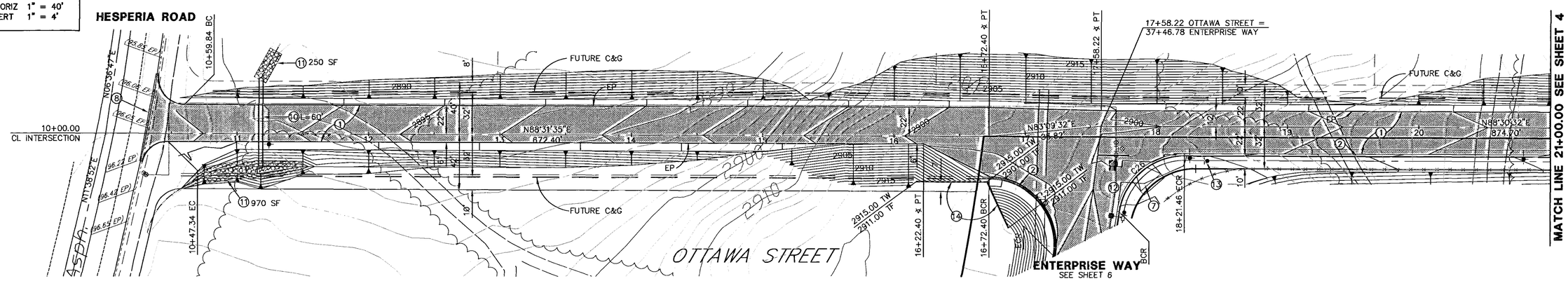
CITY OF VICTORVILLE

JOB NO.	SHEET
103.0055	2B OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	TMH	RK	2627

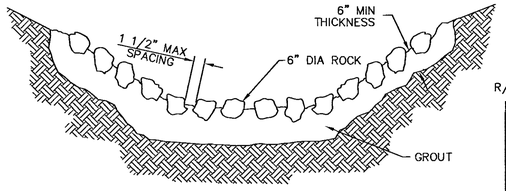
P-602



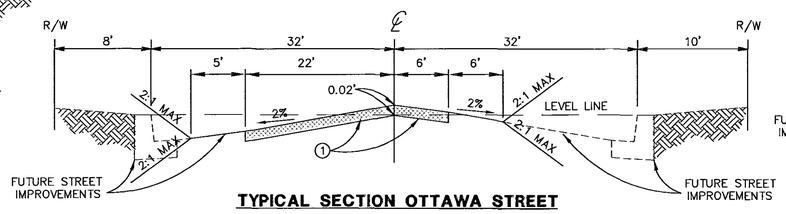


CONSTRUCTION NOTES:

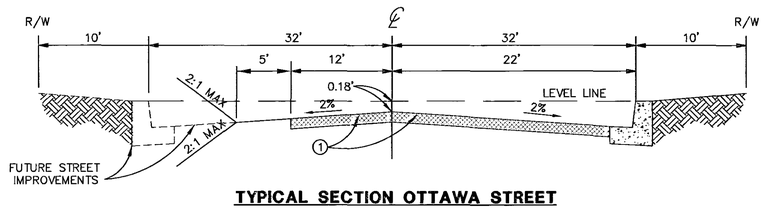
1. CONSTRUCT 4" AC OVER 12" CLASS 2 AGG BASE
2. CONSTRUCT 8" CURB AND GUTTER PER CITY OF VICTORVILLE STD. DWG. S-01
4. CONSTRUCT STANDARD COMMERCIAL DRIVE APPROACH PER CITY OF VICTORVILLE STD. DWG. S-03 (W=20').
7. CONSTRUCT CURB RAMP PER CALTRANS STD. PLAN A88, CASE E.
8. SAWCUT AND REMOVE EXISTING PAVEMENT
10. INSTALL 36" CMP WITH FLARED END SECTIONS PER CALTRANS STD. PLAN D94A, PIPE LENGTH AS NOTED.
11. CONSTRUCT GROUTED 6" DIA. ROCK RIP-RAP EROSION PROTECTION PER DETAIL HEREON, SQUARE FEET AS NOTED.
12. SIGN/STRIPE INTERSECTION PER DETAIL ON SHEET 6
13. INSTALL W53 STREET SIGN (NOT A THROUGH STREET)
⚠ 14. CONSTRUCT VARIABLE HEIGHT TYPE 1 RETAINING WALL PER CALTRANS STD B3-1



GROUTED 6" DIA. ROCK DETAIL
NOT TO SCALE



TYPICAL SECTION OTTAWA STREET
10+59.84 TO 16+22.40
NOT TO SCALE



TYPICAL SECTION OTTAWA STREET
18+21.46 TO 27+50.00
NOT TO SCALE

DIGALERT
1-800-422-4133

CURVE DATA TABLE

NUMBER	D	R	L	T
C25	99°45'17"	50.00	87.05	59.33
C26	81°34'51"	50.00	71.19	43.14

BENCH MARK:
CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
⚠	6/11/04	MC	PLAN CHANGE NO. 1	
⚠	1/26/04		BID ADDENDUM NO. 3	
⚠	1/7/04		BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

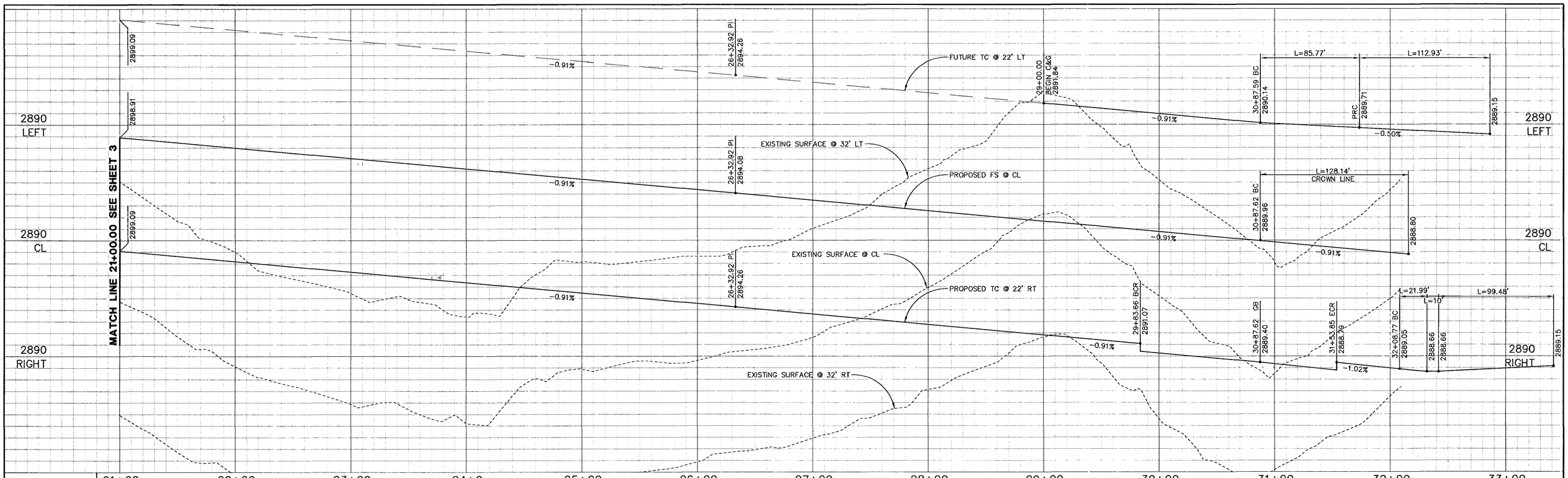
THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E.#42386 — 12/9/03 DATE

STREET IMPROVEMENT PLAN
OTTAWA STREET
10+00.00 - 21+00.00
CITY OF VICTORVILLE

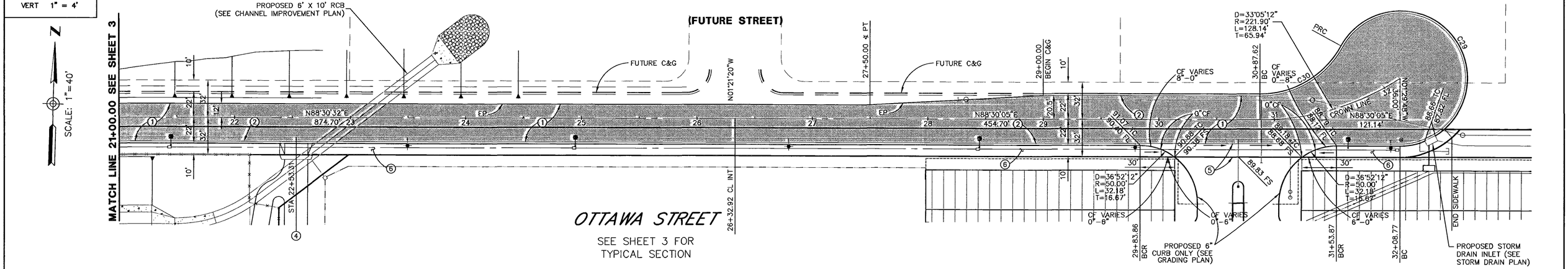
JOB NO.	SHEET
103.0055	3 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



OTTAWA STREET

SEE SHEET 3 FOR TYPICAL SECTION

CONSTRUCTION NOTES:

1. CONSTRUCT 4" AC OVER 12" CLASS 2 AGG BASE
2. CONSTRUCT 8" CURB AND GUTTER PER CITY OF VICTORVILLE STD. DWG. S-01
4. CONSTRUCT STANDARD COMMERCIAL DRIVE APPROACH PER CITY OF VICTORVILLE STD. DWG. S-03 (W=20').
5. CONSTRUCT MODIFIED CURB AND RETURN TYPE COMMERCIAL DRIVE APPROACH PER CITY OF VICTORVILLE STD. DWG. S-03.
6. CONSTRUCT SIDEWALK PER CITY OF VICTORVILLE STD. DWG. S-04.

DIGALERT
1-800-422-4133

CURVE DATA TABLE

NUMBER	D	R	L	T
C29	241°25'53"	58.00	244.40	-97.62
C30	61°25'41"	80.00	85.77	47.53

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE DATE
CITY ENGINEER R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	WGE	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. 42386 12/18/03 DATE

STREET IMPROVEMENT PLAN

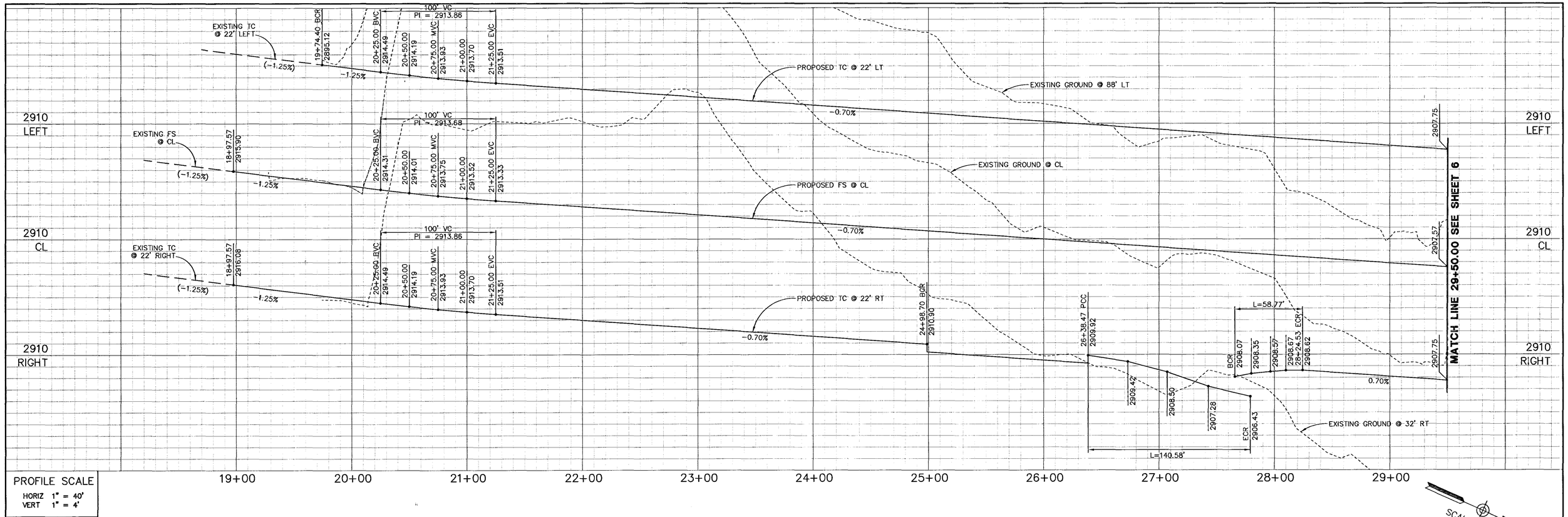
OTTAWA STREET 21+00.00 - 32+17.57

CITY OF VICTORVILLE

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

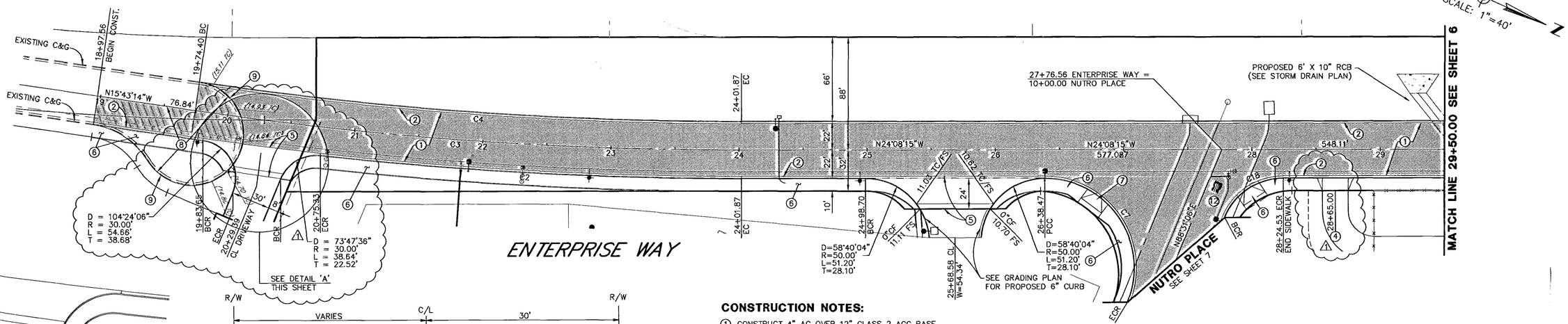
JOB NO. 103.0055
SHEET 4 OF 27

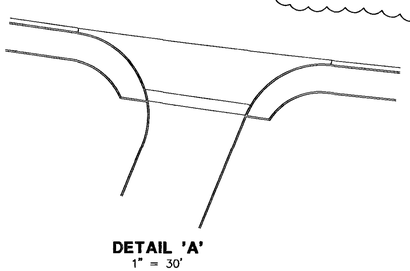
P-602

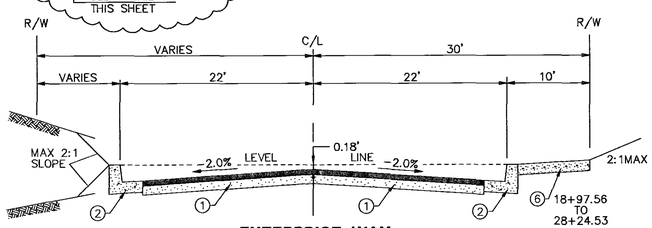


PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'

SCALE: 1"=40'







ENTERPRISE WAY
STA: 18+97.56 TO 29+50.00
NOT TO SCALE

CONSTRUCTION NOTES:

1. CONSTRUCT 4" AC OVER 12" CLASS 2 AGG BASE
2. CONSTRUCT 8" CURB AND GUTTER PER CITY OF VICTORVILLE STD. DWG. S-01
5. CONSTRUCT MODIFIED CURB RETURN TYPE COMMERCIAL DRIVE APPROACH PER CITY OF VICTORVILLE STD. DWG. S-03.
6. CONSTRUCT SIDEWALK PER CITY OF VICTORVILLE STD. DWG. S-04.
7. CONSTRUCT CURB RAMP PER CALTRANS STD. PLAN A88, CASE E.
8. SAWCUT AND REMOVE EXISTING PAVEMENT
9. REMOVE EXISTING CURB AND GUTTER
12. SIGN/STRIPE INTERSECTION PER DETAIL ON SHEET 6

CURVE DATA TABLE

NUMBER	D	R	L	T
C2	06°55'46"	2926.88	353.98	177.21
C3	08°25'01"	2909.88	427.47	214.12
C4	08°25'01"	2887.88	424.24	212.50
C7	112°39'21"	71.50	140.58	107.32
C18	67°20'39"	50.00	58.77	33.31

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	TWE	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. 42386 — DATE 12/10/03

STREET IMPROVEMENT PLAN

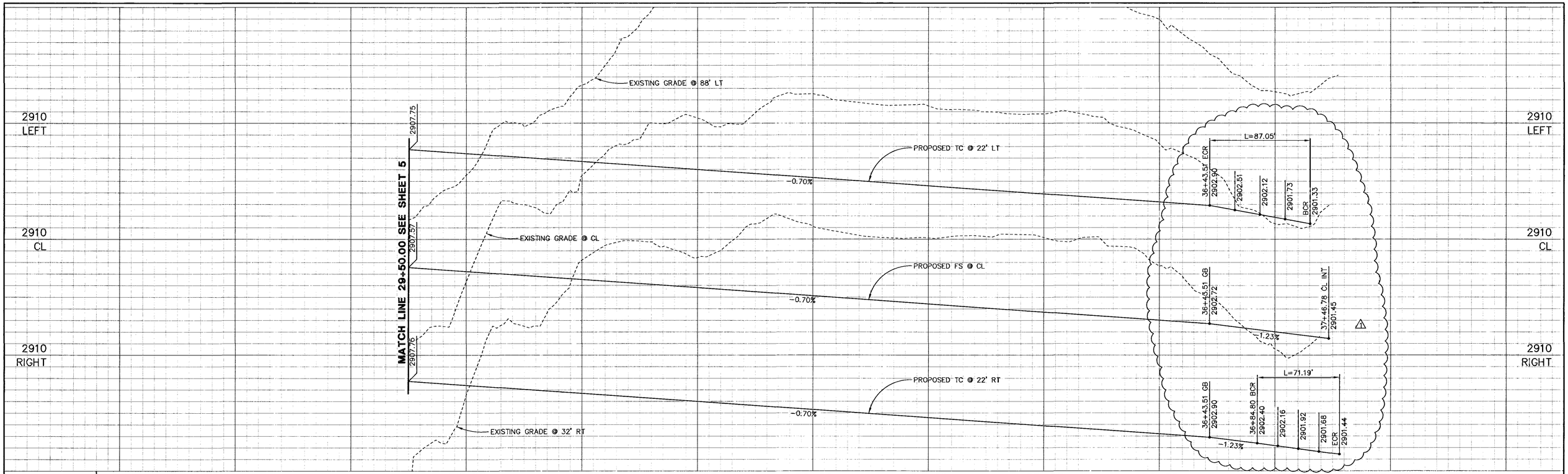
ENTERPRISE WAY
18+97.56 - 29+50.00
CITY OF VICTORVILLE

JOB NO.	SHEET
103.0055	5 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

DIGALERT 1-800-422-4133

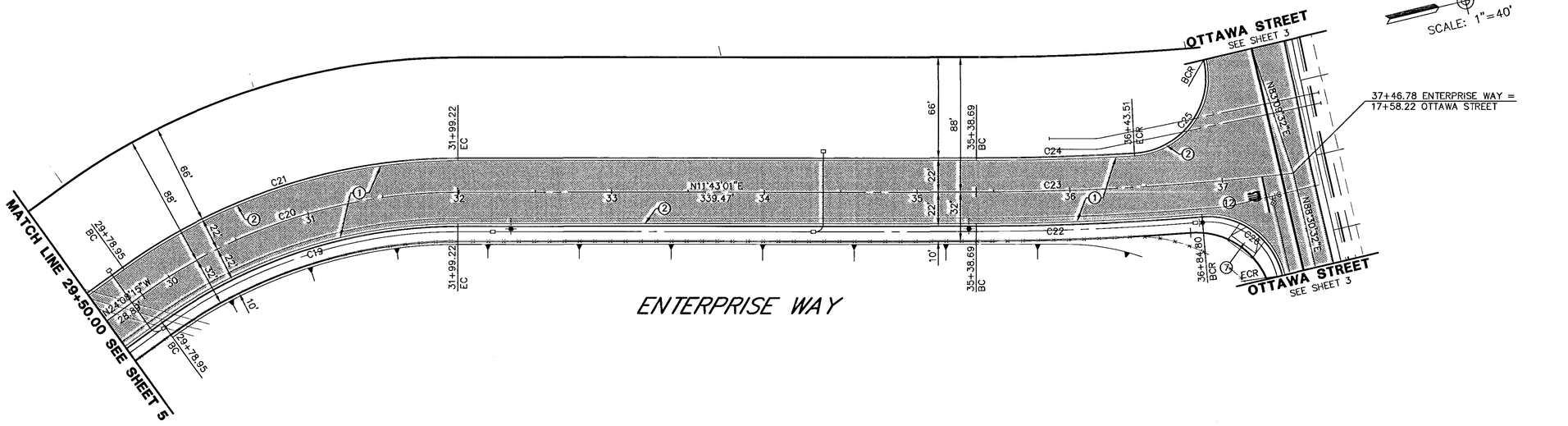
P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'

CONSTRUCTION NOTES:

1. CONSTRUCT 4" AC OVER 12" CLASS 2 AGG BASE
2. CONSTRUCT 8" CURB AND GUTTER PER CITY OF VICTORVILLE STD. DWG. S-01
7. CONSTRUCT CURB RAMP PER CALTRANS STD. PLAN A88, CASE E.
12. SIGN/STRIPE INTERSECTION PER DETAIL ON SHEET 6



CURVE DATA TABLE

NUMBER	D	R	L	T
C19	35°51'17"	330.00	206.51	106.76
C20	35°51'17"	352.00	220.27	113.88
C21	35°51'17"	374.00	234.04	121.00
C22	04°47'20"	1770.00	147.94	74.01
C23	06°49'14"	1748.00	208.08	104.16
C24	03°26'09"	1726.00	103.50	51.77
C25	99°45'17"	50.00	87.05	59.33
C26	81°34'51"	50.00	71.19	43.14

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE DATE
CITY ENGINEER R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	JAM	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. KILPATRICK
EXP. 3/31/06
No.42386
CIVIL
STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
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(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. #42386 12/9/03 DATE

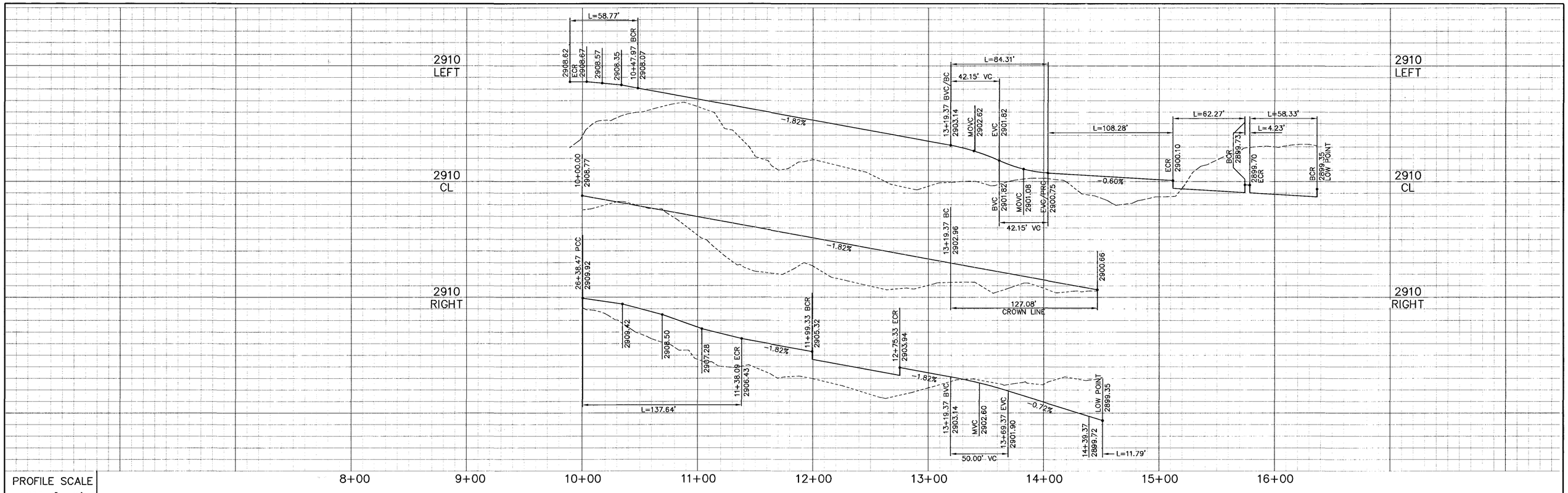
STREET IMPROVEMENT PLAN

ENTERPRISE WAY
29+50.00 - 37+46.78
CITY OF VICTORVILLE

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

JOB NO. 103.0055
SHEET 6 OF 27

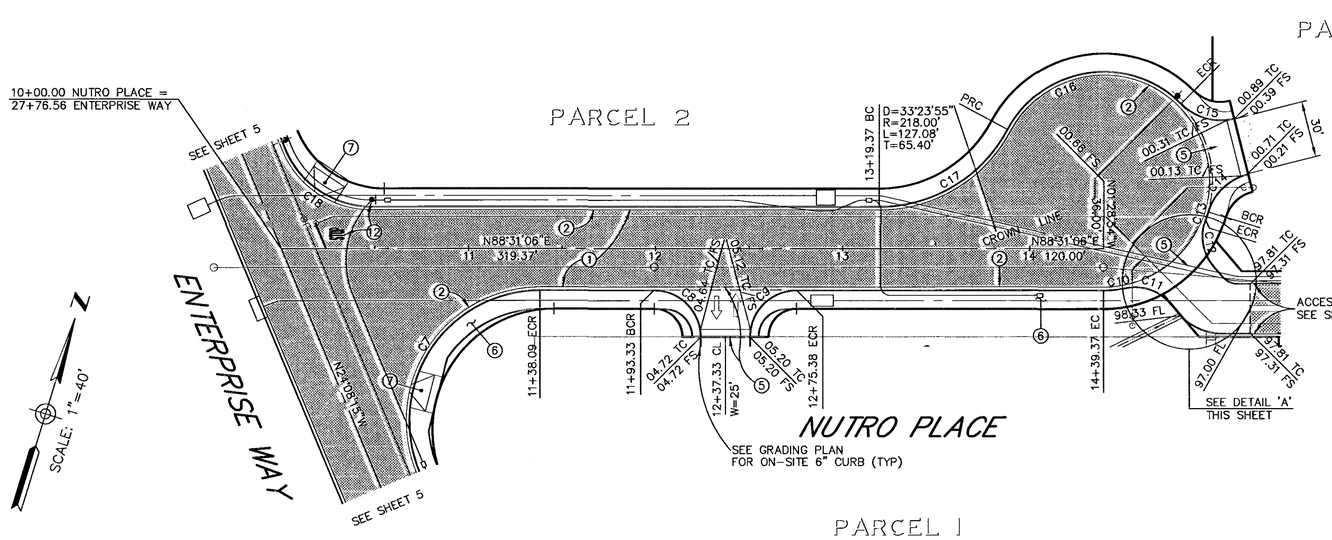
P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'

CONSTRUCTION NOTES:

1. CONSTRUCT 4" AC OVER 12" CLASS 2 AGG BASE
2. CONSTRUCT 8" CURB AND GUTTER PER CITY OF VICTORVILLE STD. DWG. S-01
5. CONSTRUCT MODIFIED CURB RETURN TYPE COMMERCIAL DRIVE APPROACH PER CITY OF VICTORVILLE STD. DWG. S-03.
6. CONSTRUCT SIDEWALK PER CITY OF VICTORVILLE STD. DWG. S-04.
7. CONSTRUCT CURB RAMP PER CALTRANS STD. PLAN A88, CASE E.
12. SIGN/STRIPE INTERSECTION PER DETAIL ON SHEET 6



CURVE DATA TABLE

NUMBER	D	R	L	T
C7	112°39'21"	70.00	137.64	105.07
C8	90°00'00"	25.00	39.27	25.00
C9	90°00'00"	25.00	39.27	25.00
C10	11°38'32"	58.00	11.79	5.91
C11	61°10'48"	25.00	26.69	14.78
C12	61°11'50"	25.00	26.70	14.78
C13	04°10'59"	58.00	4.23	2.12
C14	59°10'27"	30.00	30.98	17.03
C15	59°18'59"	30.00	31.06	17.08
C16	106°58'13"	58.00	108.28	78.34
C17	61°55'39"	78.00	84.31	46.80
C18	67°20'39"	50.00	58.77	33.31

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	WB	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
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Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. 42386 — DATE 12/10/03

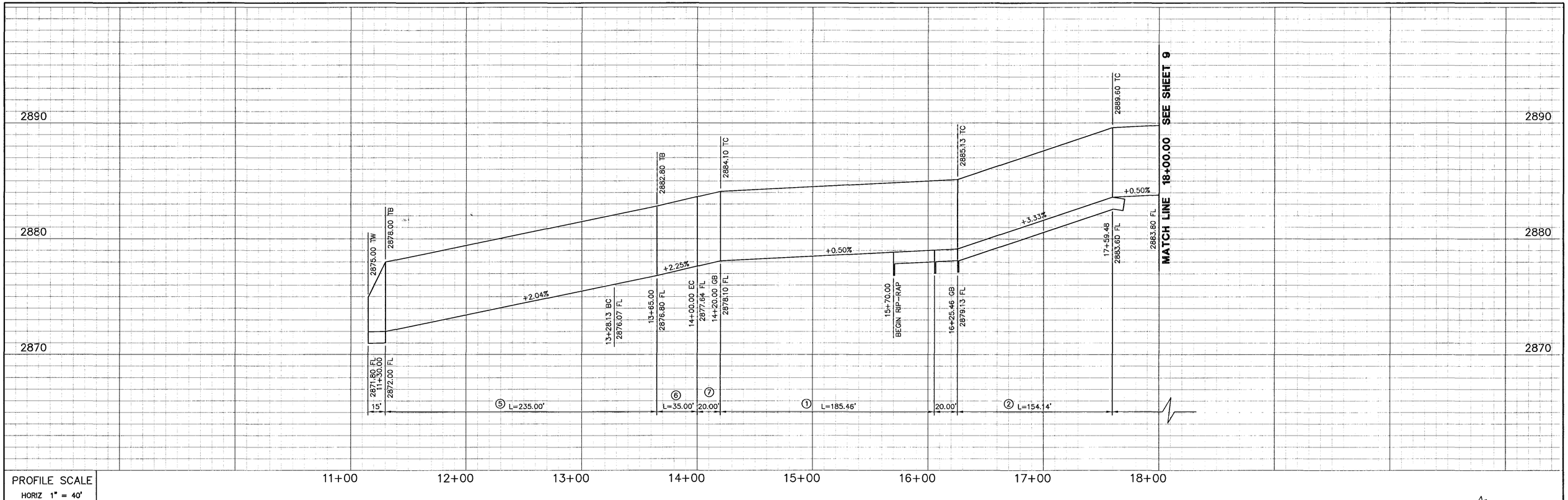
STREET IMPROVEMENT PLAN

NUTRO PLACE
10+00 - 14+46.45
CITY OF VICTORVILLE

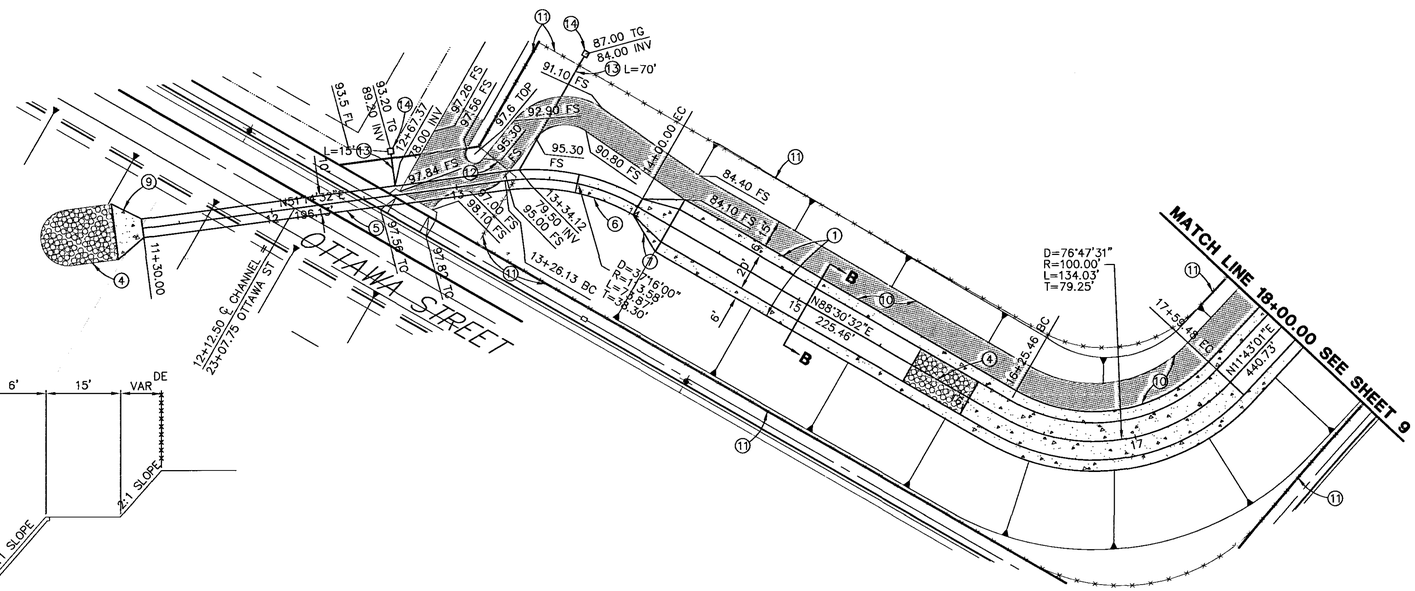
SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

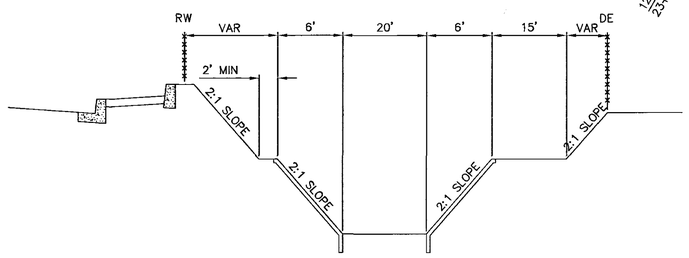
JOB NO. 103.0055
SHEET 7 OF 27

P-602

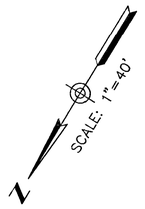


PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'





TYPICAL SECTION



CONSTRUCTION NOTES

1. CONSTRUCT CONCRETE SIDE CHANNEL PER DETAIL ON SHEET 9
4. CONSTRUCT 12" GROUTED RIP-RAP WITH MINIMUM 12" DIA ROCK
5. CONSTRUCT 6'X10' RCB PER CALTRANS STD D-80
6. CONSTRUCT 6'X10' RECTANGULAR CONCRETE CHANNEL PER DETAIL ON SHEET 9
7. CONSTRUCT TRAPEZOIDAL CHANNEL TO RECTANGULAR CHANNEL TRANSITION STRUCTURE PER DETAIL ON SHEET 9
9. CONSTRUCT WING-WALL PER CALTRANS STD D-84
10. CONSTRUCT 3" AC ON COMPACTED NATIVE SOIL
11. CONSTRUCT 6' CHAIN LINK FENCE PER SBC ROAD DEPT STD DWG 300
12. CONSTRUCT 15' WIDE CHAIN LINK GATE PER SBCFCD STD PLAN S.P. 222
13. CONSTRUCT 18" RCP (1500D)
14. ~~CONSTRUCT 2 GRATE GRATING CATCH BASIN (4'-3-1/2") PER APWA STD PLAN 305-2~~ CONSTRUCT ONE GRATE GRATING CATCH BASIN PER APWA 304-2

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
JOHN A. McGLADE 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	JM	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E.#42386 11/6/03 DATE

CHANNEL IMPROVEMENT PLAN

11+46.50 - 18+00.00
CITY OF VICTORVILLE

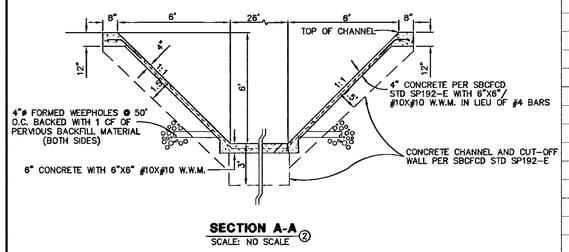
JOB NO.	SHEET
103.0055	8 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	KK	2627

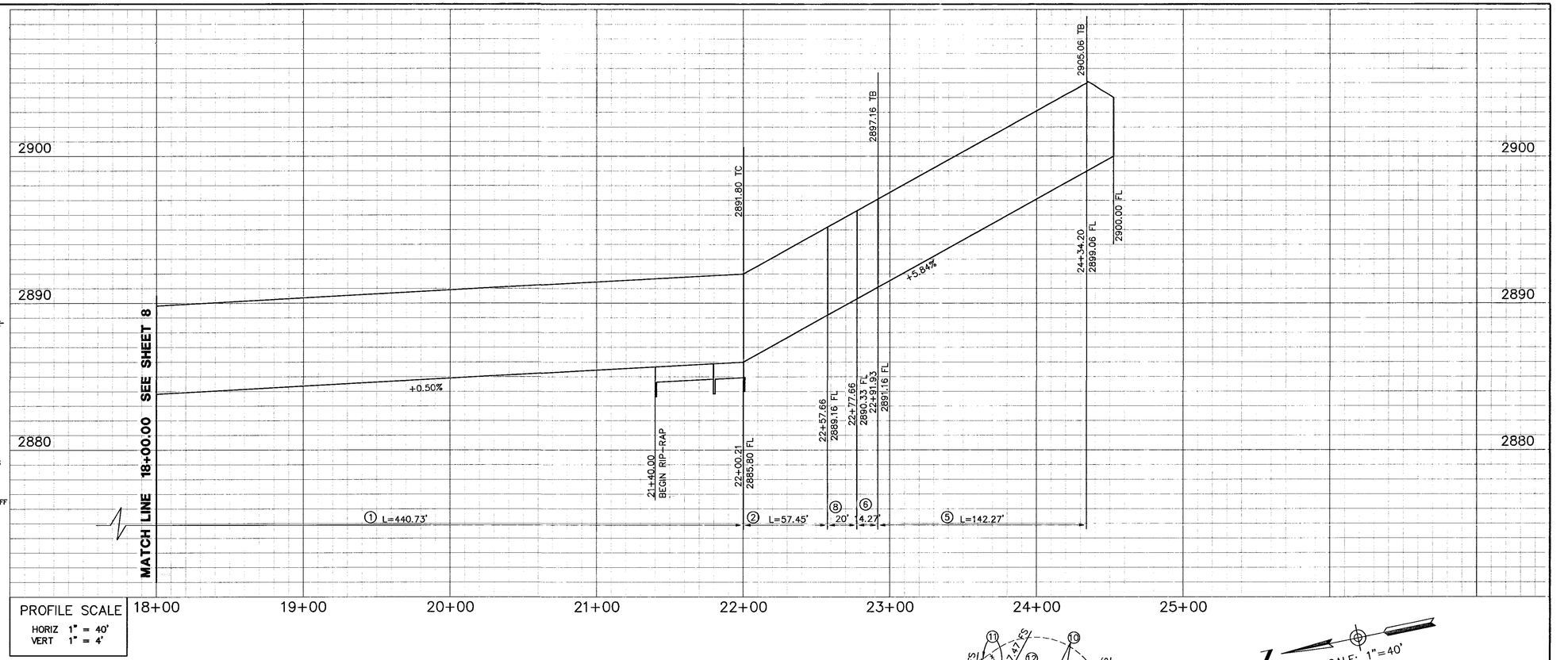
P-602

CONSTRUCTION NOTES

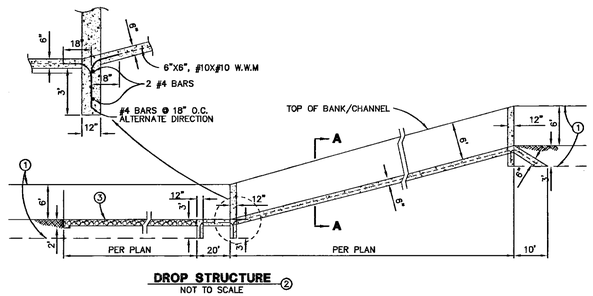
1. CONSTRUCT CONCRETE SIDE CHANNEL PER DETAIL THIS SHEET
2. CONSTRUCT DROP STRUCTURE PER DETAIL THIS SHEET
3. NOT USED
4. CONSTRUCT 12" GROUTED RIP-RAP WITH MINIMUM 12" DIA ROCK
5. CONSTRUCT 6'X10' RCB PER CALTRANS STD D-80
6. CONSTRUCT 6'X10' RECTANGULAR CONCRETE CHANNEL PER DETAIL ON THIS SHEET
7. CONSTRUCT TRAPEZOIDAL CHANNEL TO RECTANGULAR CHANNEL TRANSITION STRUCTURE PER DETAIL ON THIS SHEET
8. CONSTRUCT CHANNEL ACCESS ROAD/TRANSITION STRUCTURE PER DETAIL THIS SHEET
9. CONSTRUCT WING-WALL PER CALTRANS STD D-84
10. CONSTRUCT 3" AC ON COMPACTED NATIVE SOIL
11. CONSTRUCT 6' CHAIN LINK FENCE PER SBC ROAD DEPT STD DWG 300
12. CONSTRUCT 15' WIDE CHAIN LINK GATE PER SBCFCD STD PLAN S.P. 222
13. CONSTRUCT 18" RCP (1500D)
14. ~~CONSTRUCT 2 GRATE GRATING CATCH BASIN (4' 3 1/2") PER APWA STD PLAN 305-2~~ CONSTRUCT ONE GRATE GRATING CATCH BASIN PER APWA 304-2 ⚠1



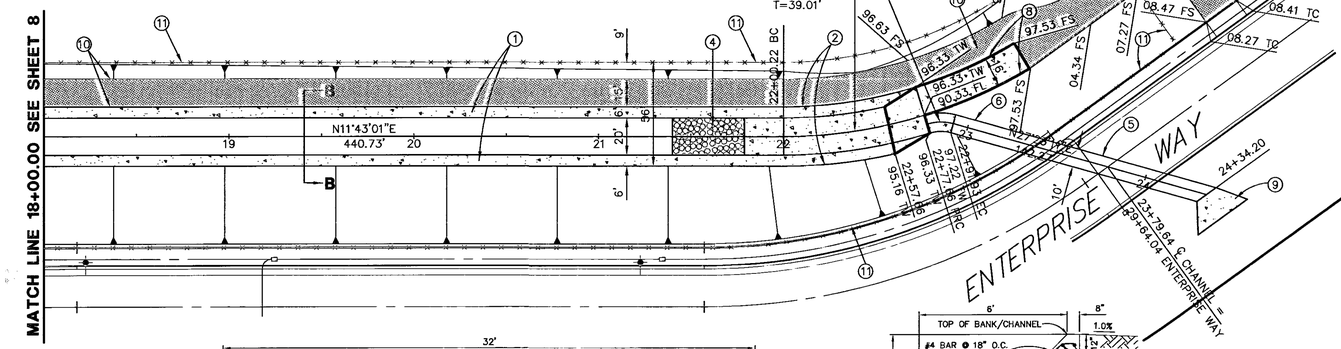
SECTION A-A ②
SCALE: NO SCALE

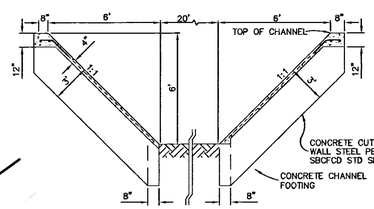


PROFILE SCALE	
HORIZ	1" = 40'
VERT	1" = 4'

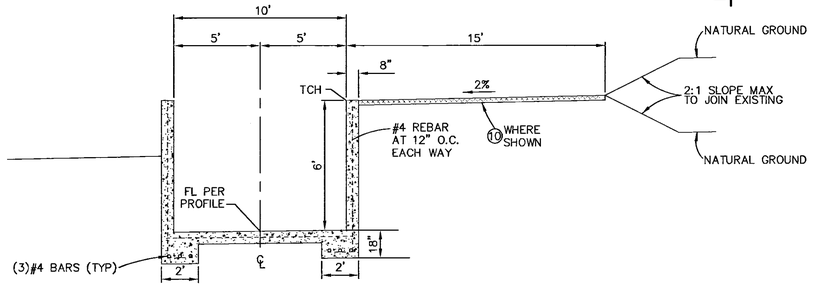


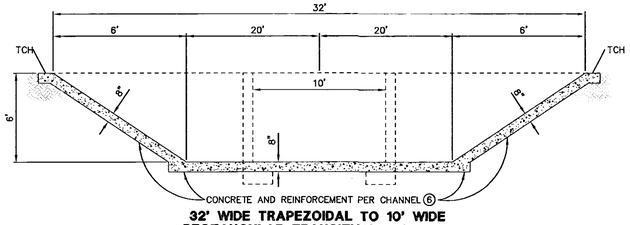
DROP STRUCTURE ②
NOT TO SCALE



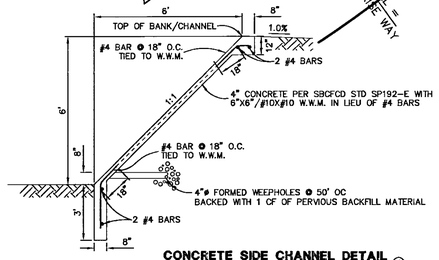


SECTION B-B
NOT TO SCALE

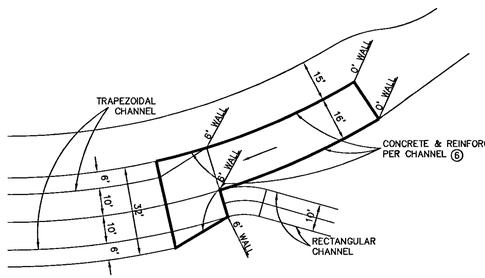




32' WIDE TRAPEZOIDAL TO 10' WIDE RECTANGULAR TRANSITION DETAIL 'D' ⑦
NOT TO SCALE



CONCRETE SIDE CHANNEL DETAIL ①
SCALE: NO SCALE



CHANNEL ACCESS ROAD/TRANSITION STRUCTURE DETAIL ⑧
NOT TO SCALE

DIGALERT
1-800-422-4133

1. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF VICTORVILLE STDS.
2. CONCRETE SHALL BE CLASS 'A' OR 3250 PSI MIN. PER STD. SPECS OF THE STATE OF CALIFORNIA.
3. PROVIDE TRANSVERSE WEAKENED PLANE JOINTS AT 20' O.C..

10' WIDE RECTANGULAR CHANNEL ⑥
NOT TO SCALE

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
⚠1	6/11/04	MB	PLAN CHANGE NO. 1	
⚠2	1/7/04		BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E.#42386 — DATE 12/10/03

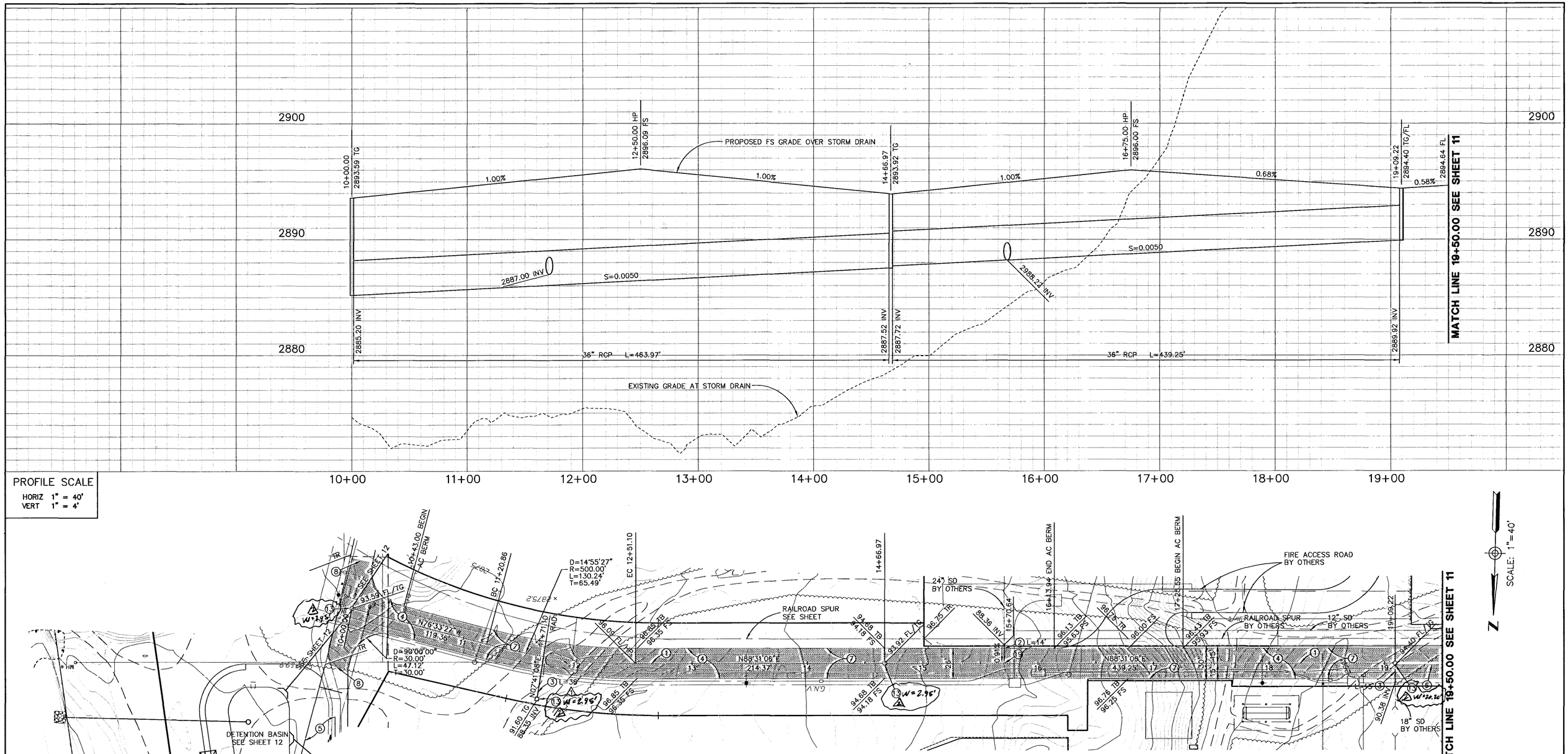
CHANNEL IMPROVEMENT PLAN

18+00.00 - 24+34.20
CITY OF VICTORVILLE

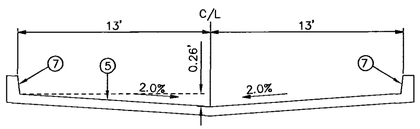
JOB NO.	SHEET
103.0055	9 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

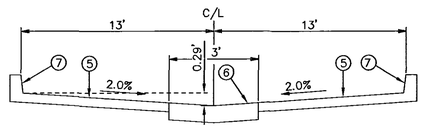
P-602



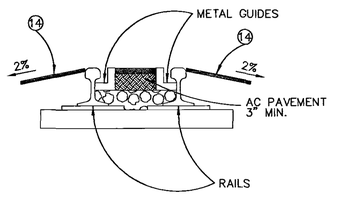
PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



ACCESS ROAD
TYPICAL SECTION
STA:10+00.00 TO 19+09.22



ACCESS ROAD
TYPICAL SECTION
STA:19+09.22 TO 23+60.00



AT-GRADE RAIL CROSSING DETAIL ⑧
NOT TO SCALE

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CONSTRUCTION NOTES:

① CONSTRUCT 36" RCP (D1500)
② CONSTRUCT 24" RCP (D1500)
③ CONSTRUCT 18" RCP (D1500)
④ CONSTRUCT 3" AC ON 4" CLASS II BASE
⑤ CONSTRUCT 3" AC ON NATIVE SOIL
⑥ CONSTRUCT 3' WIDE CONCRETE GUTTER
⑦ CONSTRUCT 6" AC BERM
⑧ CONSTRUCT RAILROAD CROSSING AND SIGNS PER DETAIL THIS SHEET
⑨ CONSTRUCT CONCRETE COLLAR PER SBCFCD STD S.P. 167
⑩ CONSTRUCT GROUTED RIP-RAP WITH 12" DIAMETER ROCK (SIZE AS NOTED)
⑪ CONSTRUCT CONCRETE FLARED END SECTION
⑫ CONSTRUCT END WALL PER SBCFCD STD 209
⚠2 ⑬ CONSTRUCT ONE GRATE GRATING CATCH BASIN PER APWA STD 304-2. W AS SHOWN.
⑭ NOT USED
⑮ CONSTRUCT CATCH BASIN (W=10') AND LOCAL DEPRESSION PER CITY OF VICTORVILLE STD D-02
⑯ CONSTRUCT INLET STRUCTURE PER DETAIL ON SHEET 12
⑰ CONSTRUCT CONCRETE WEIR STRUCTURE PER DETAIL ON SHEET 12
⑱ INSTALL BASIN LINING MATERIAL PER CITY OF VICTORVILLE REQUIREMENTS
⑲ CONSTRUCT JUNCTION STRUCTURE PER APWA STD PLAN 331-2
⑳ CONSTRUCT JUNCTION STRUCTURE PER APWA STD PLAN 332-1

DIGALERT
1-800-422-4133

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
⚠2	6/16/04	WKE	PLAN CHANGE No. 2	
⚠1	6/11/04	WKE	PLAN CHANGE No. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E.#42386 — 12/9/03 DATE

STORM DRAIN IMPROVEMENT PLAN

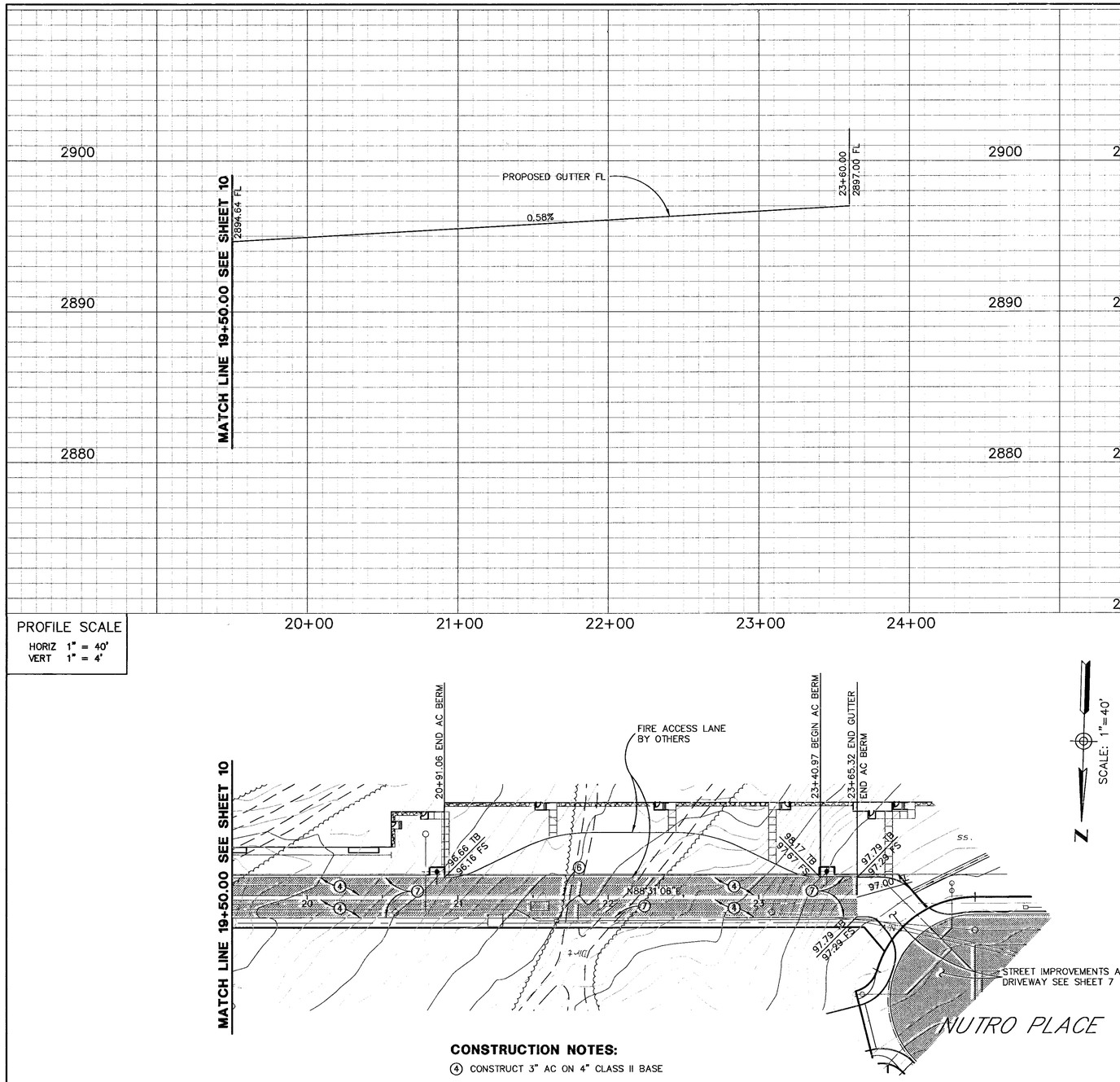
10+00.00 - 19+50.00

CITY OF VICTORVILLE

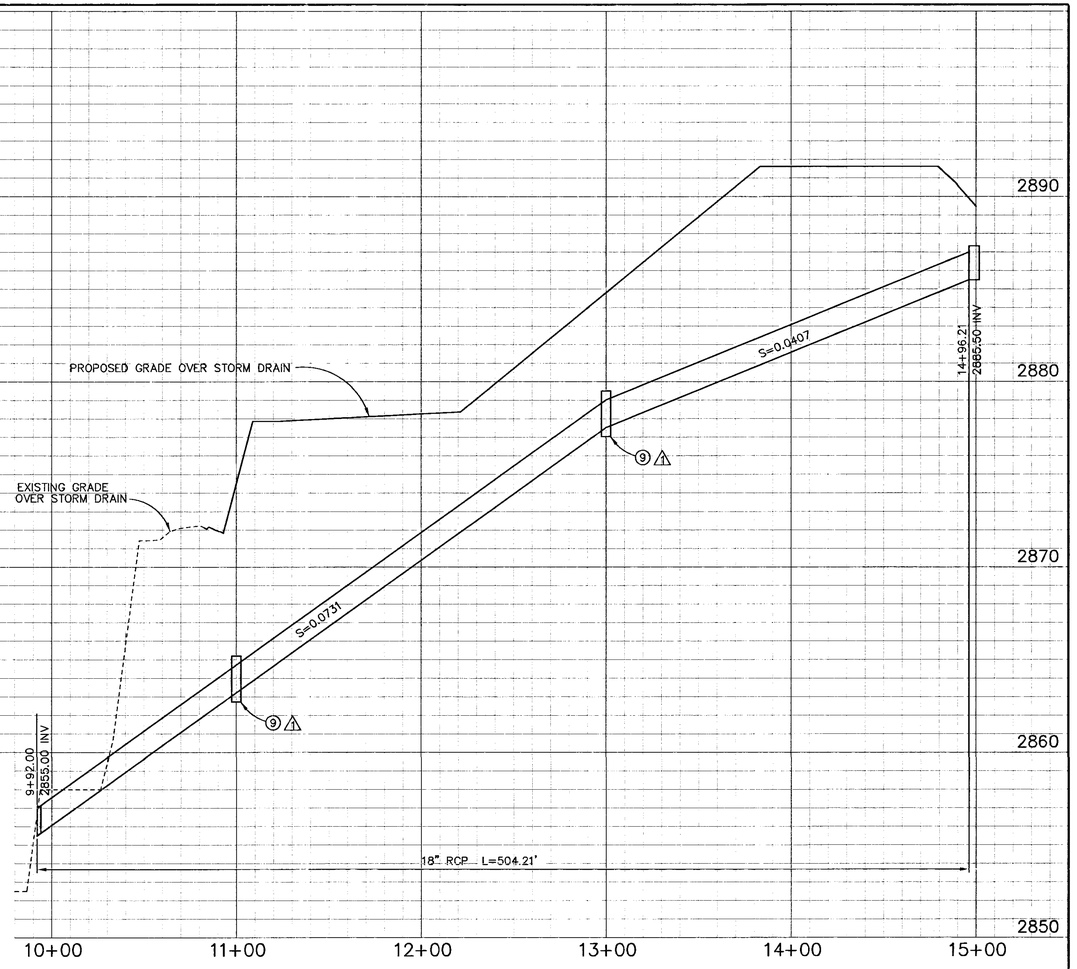
SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

JOB NO. 103.0055
SHEET 10 OF 27

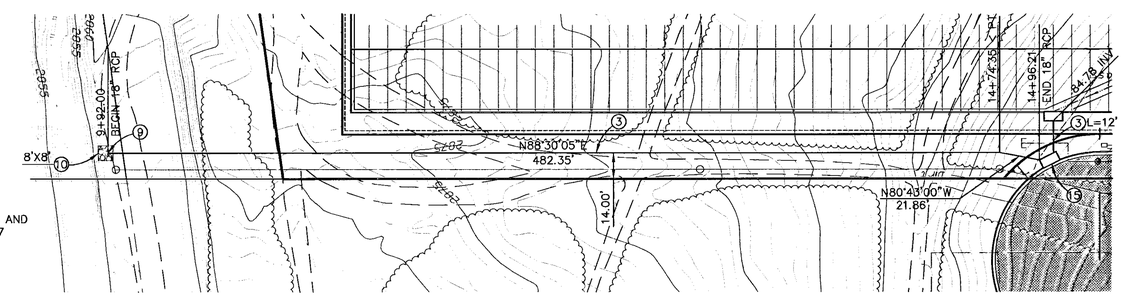
P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



SCALE: 1"=40'



CONSTRUCTION NOTES:

(4) CONSTRUCT 3" AC ON 4" CLASS II BASE
(6) CONSTRUCT 3' WIDE CONCRETE GUTTER
(7) CONSTRUCT 6" AC BERM

CONSTRUCTION NOTES:

(3) CONSTRUCT 18" RCP (D1500)
(4) CONSTRUCT 3" AC ON 4" CLASS II BASE
(6) CONSTRUCT 3' WIDE CONCRETE GUTTER
(7) CONSTRUCT 6" AC BERM
(9) CONSTRUCT CONCRETE COLLAR PER SBCFCD STD S.P. 167
(10) CONSTRUCT GROUTED RIP-RAP WITH 12" DIAMETER ROCK (SIZE AS NOTED)

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	NK	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. #42386 — 7/8/04 — DATE

STORM DRAIN IMPROVEMENT PLAN

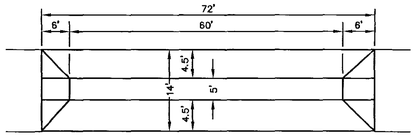
19+50.00 - 23+72.49

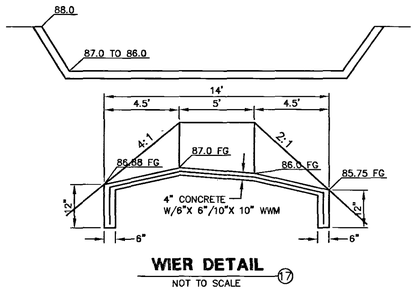
CITY OF VICTORVILLE

JOB NO.	SHEET	OF
103.0055	11	27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	TMH	RK	2627

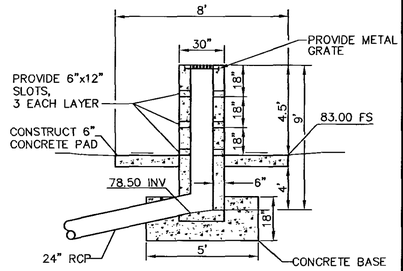
P-602





WIER DETAIL (17)
NOT TO SCALE

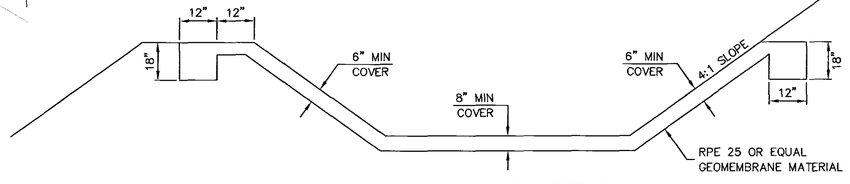
Z
SCALE: 1"=20'



INLET STRUCTURE DETAIL (16)
NOT TO SCALE

CONSTRUCTION NOTES:

1. (1) CONSTRUCT 36" RCP (D1500)
2. (2) CONSTRUCT 24" RCP (D1500)
3. (3) CONSTRUCT 18" RCP (D1500)
5. (5) CONSTRUCT 3" AC ON NATIVE SOIL
9. (9) CONSTRUCT CONCRETE COLLAR PER SBCFCD STD S.P. 167
10. (10) CONSTRUCT GROUTED RIP-RAP WITH 12" DIAMETER ROCK (SIZE AS NOTED)
12. (12) CONSTRUCT END WALL PER SBCFCD STD 209
13. (13) CONSTRUCT ONE GRATE GRATING CATCH BASIN PER APWA STD 304-2
16. (16) CONSTRUCT INLET STRUCTURE PER DETAIL ON SHEET 12
18. (18) INSTALL BASIN LINING MATERIAL PER CITY OF VICTORVILLE REQUIREMENTS



BASIN LINING DETAIL (18) (A)
NOT TO SCALE

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
(A)	6/11/04	JVC	PLAN CHANGE NO. 1	
(B)	1/26/04		BID ADDENDUM NO. 3	
(A)	1/7/04		BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

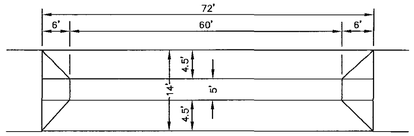
THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. #42386 — 12/8/03 DATE

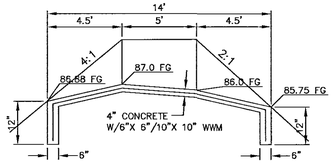
THIS SHEET SUPERCEDED BY SHEET 12 A OF 27

STORM DRAIN IMPROVEMENT PLAN			JOB NO. 103.0055
BASIN			SHEET 12 OF 27
CITY OF VICTORVILLE			
SCALE 1" = 20'	DATE 12/10/03	DRAWN BY CAD	DESIGNED BY RK	FILE NO. 2627

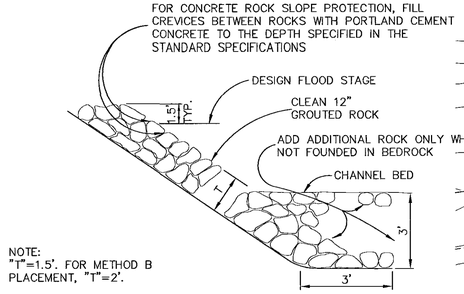
DIGALERT
1-800-422-4133

P-602





WIER DETAIL
NOT TO SCALE (17)



NOTE:
"T"=1.5'. FOR METHOD B PLACEMENT, "T"=2'.

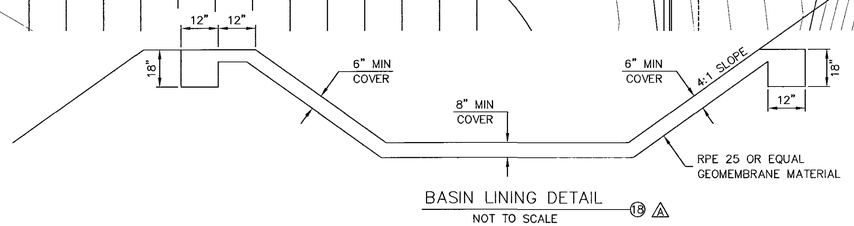
ROCK SLOPE PROTECTION AND CONCRETE-ROCK SLOPE PROTECTION
NOT TO SCALE

Z
SCALE: 1"=20'

INLET STRUCTURE DETAIL
NOT TO SCALE (16)

CONSTRUCTION NOTES:

1. CONSTRUCT 36" RCP (D1500)
2. CONSTRUCT 24" RCP (D1500)
3. CONSTRUCT 18" RCP (D1500)
5. CONSTRUCT 3" AC ON NATIVE SOIL
9. CONSTRUCT CONCRETE COLLAR PER SBCFCD STD S.P. 167
10. CONSTRUCT GROUTED RIP-RAP WITH 12" DIAMETER ROCK (SIZE AS NOTED)
12. CONSTRUCT END WALL PER SBCFCD STD 209
13. CONSTRUCT ONE GRATE GRATING CATCH BASIN PER APWA STD 304-2
16. CONSTRUCT INLET STRUCTURE PER DETAIL ON SHEET 12
18. INSTALL BASIN LINING MATERIAL PER CITY OF VICTORVILLE REQUIREMENTS



BASIN LINING DETAIL
NOT TO SCALE (18) (A)

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
Bruce Brugh for JA McG 3-8-05
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
A	6/11/04		PLAN CHANGE NO. 1	
B	1/26/04		BID ADDENDUM NO. 3	
A	1/7/04		BID ADDENDUM NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

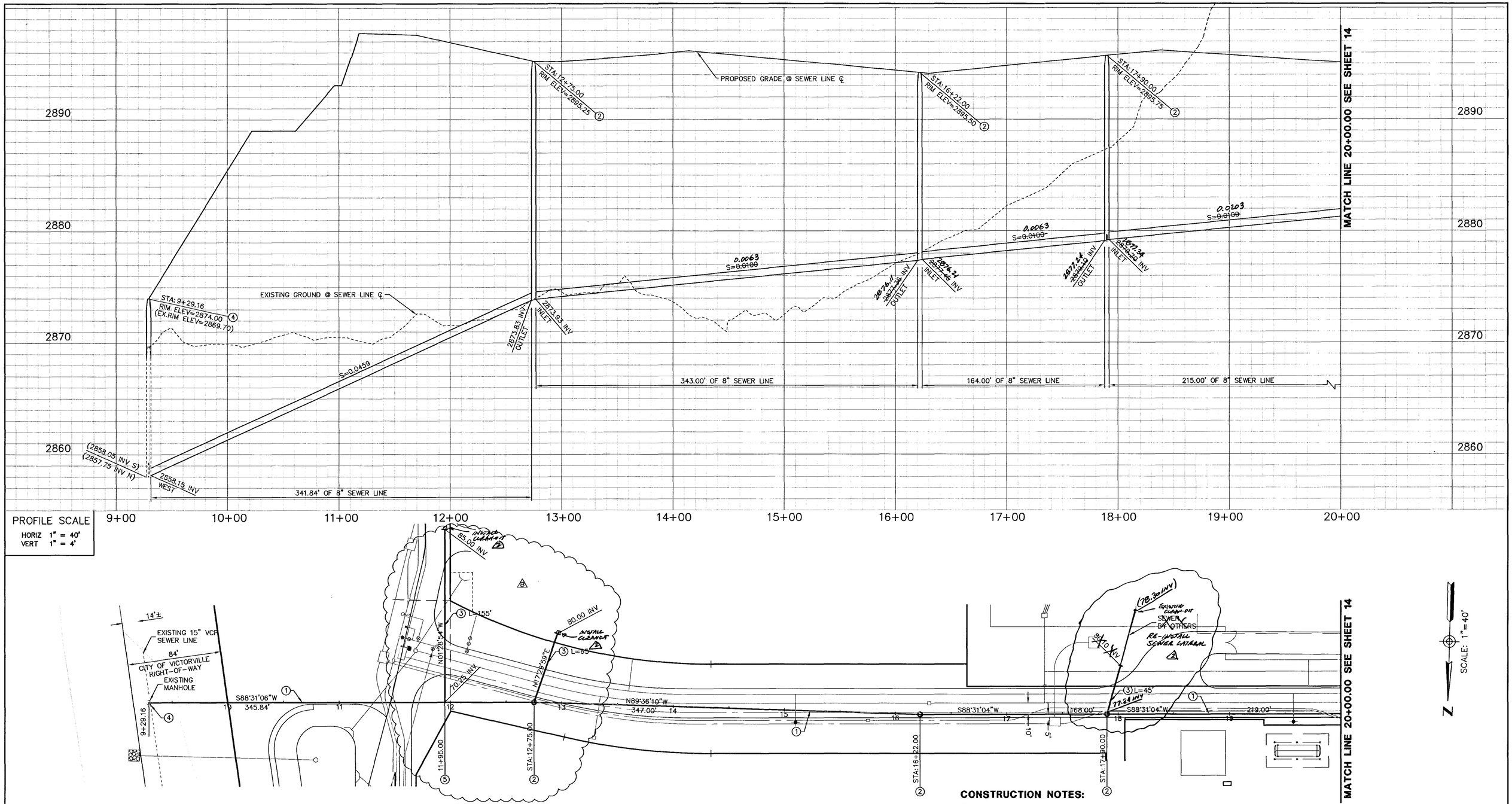
VVCE, inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595
THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. #42386 — DATE

STORM DRAIN IMPROVEMENT PLAN
BASIN
CITY OF VICTORVILLE

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 20'	02/01/05	CAD	RK	2627

JOB NO. 103.0055
SHEET 12A OF 27

DIGALERT
1-800-422-4133



CONSTRUCTION NOTES:

1. CONSTRUCT 8" PVC (SDR35) SEWER PIPE WITH PIPE BEDDING PER CITY OF VICTORVILLE STD. DWG. SS-5.
2. CONSTRUCT SEWER MANHOLE PER CITY OF VICTORVILLE STD. DWG. SS-1 WITH FRAME AND COVER PER VICTORVILLE STD. DWG SS-2.
3. CONSTRUCT 6" PVC (SDR35) SEWER LATERAL (INCLUDING ALL REQUIRED FITTINGS) PER CITY OF VICTORVILLE STD. DWG SS-3.
4. ADJUST SEWER MANHOLE COVER TO GRADE PER CITY OF VICTORVILLE STD. DWG S-07.
5. INSTALL 8"X6" WYE

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
2	8/27/04	VVE	PLAN CHANGE NO.2	
1	6/11/04	VVE	PLAN CHANGE NO. 1	
A	1/26/04		BID ADDENDUM NO. 3	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. #42386 — DATE 12/10/03

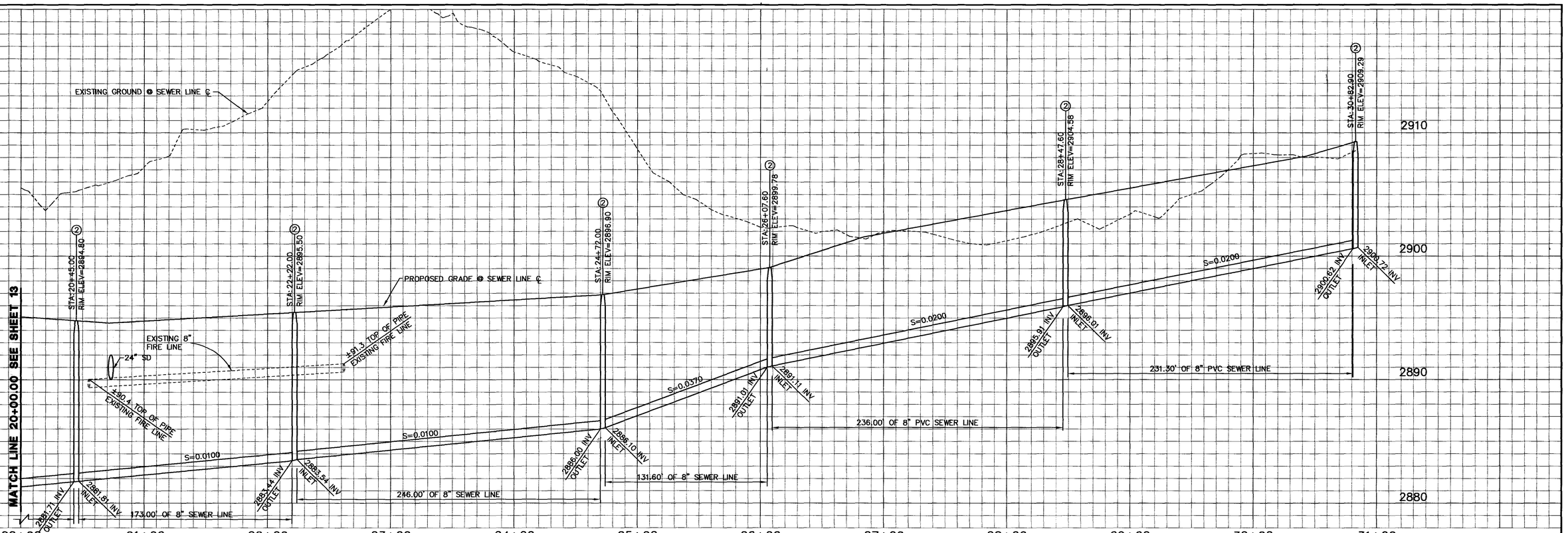
SEWER IMPROVEMENT PLAN

9+29.16 - 20+00.00
CITY OF VICTORVILLE

JOB NO.	SHEET
103.0055	13 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	TMH	RK	2627

P-602



PROFILE SCALE
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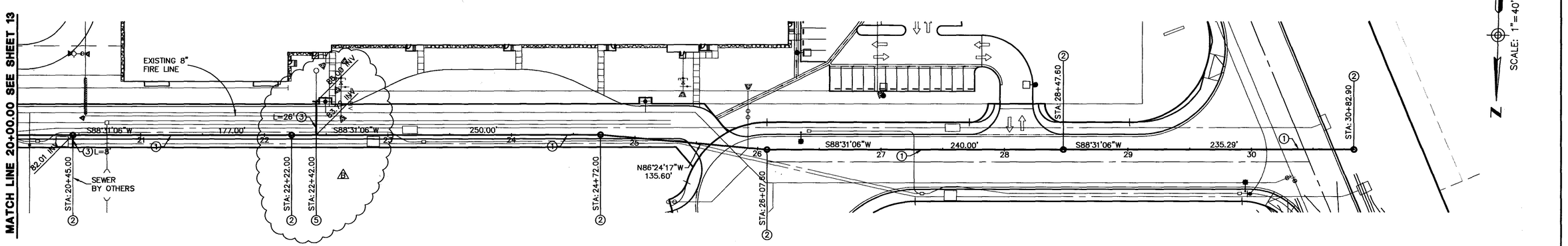
VERT 1" = 4'



CONSTRUCTION NOTES:

1. CONSTRUCT 8" PVC (SDR35) SEWER PIPE WITH PIPE BEDDING PER CITY OF VICTORVILLE STD. DWG. SS-5.
2. CONSTRUCT SEWER MANHOLE PER CITY OF VICTORVILLE STD. DWG. SS-1 WITH FRAME AND COVER PER VICTORVILLE STD. DWG SS-2.
3. CONSTRUCT 6" PVC (SDR35) SEWER LATERAL (INCLUDING ALL REQUIRED FITTINGS) PER CITY OF VICTORVILLE STD. DWG SS-3.

⚠B 5. INSTALL 8"X6" WYE

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
⚠A	6/11/04	JLK	PLAN CHANGE NO. 1	
⚠B	1/26/04		BID ADDENDUM NO. 3	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. 42386 — DATE 12/10/03

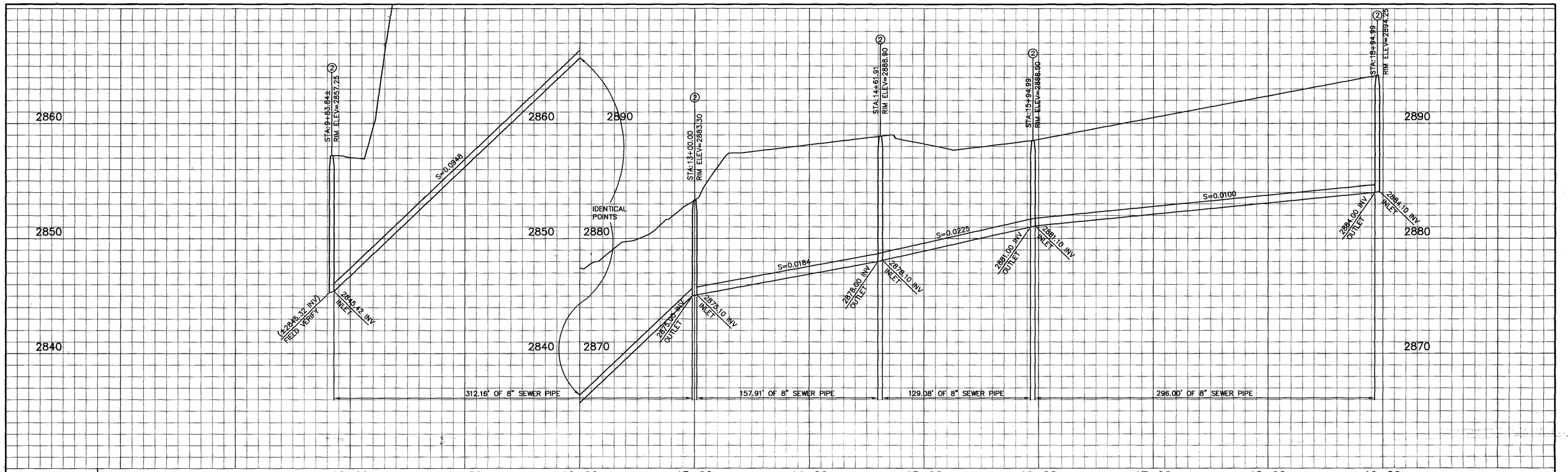
SEWER IMPROVEMENT PLAN

20+00.00 - 30+82.90
CITY OF VICTORVILLE

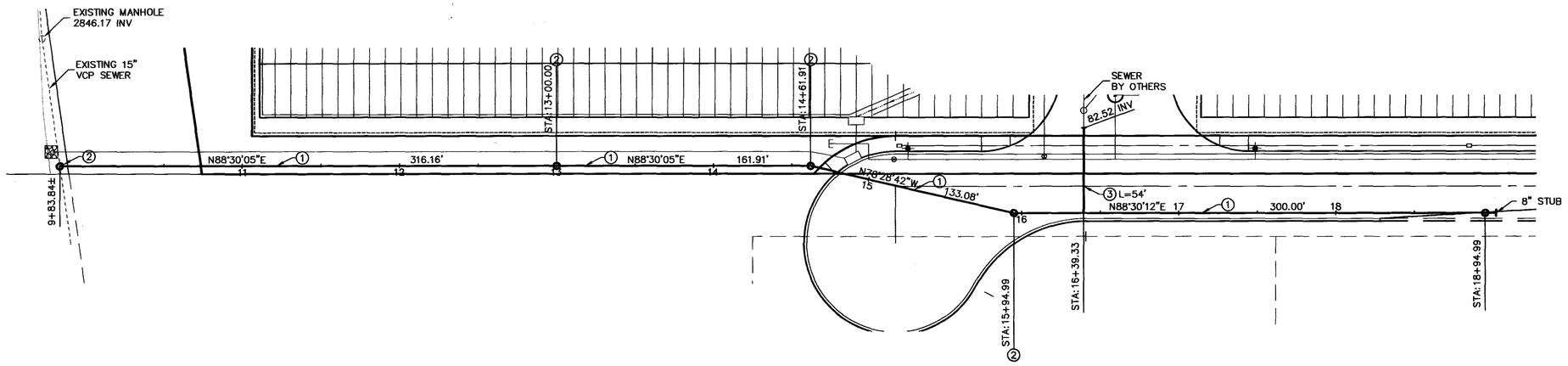
JOB NO.	SHEET
103.0055	14 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	TMH	RK	2627

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



SCALE: 1"=40'

CONSTRUCTION NOTES:

1. CONSTRUCT 8" PVC (SDR35) SEWER PIPE WITH PIPE BEDDING PER CITY OF VICTORVILLE STD. DWG. SS-5.
2. CONSTRUCT SEWER MANHOLE PER CITY OF VICTORVILLE STD. DWG. SS-1 WITH FRAME AND COVER PER VICTORVILLE STD. DWG SS-2.
3. CONSTRUCT 6" PVC (SDR35) SEWER LATERAL (INCLUDING ALL REQUIRED FITTINGS) PER CITY OF VICTORVILLE STD. DWG SS-3.

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
John A. McGlade 7/8/04
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	MWA	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. 42386 — 12/9/03 — DATE

SEWER IMPROVEMENT PLAN

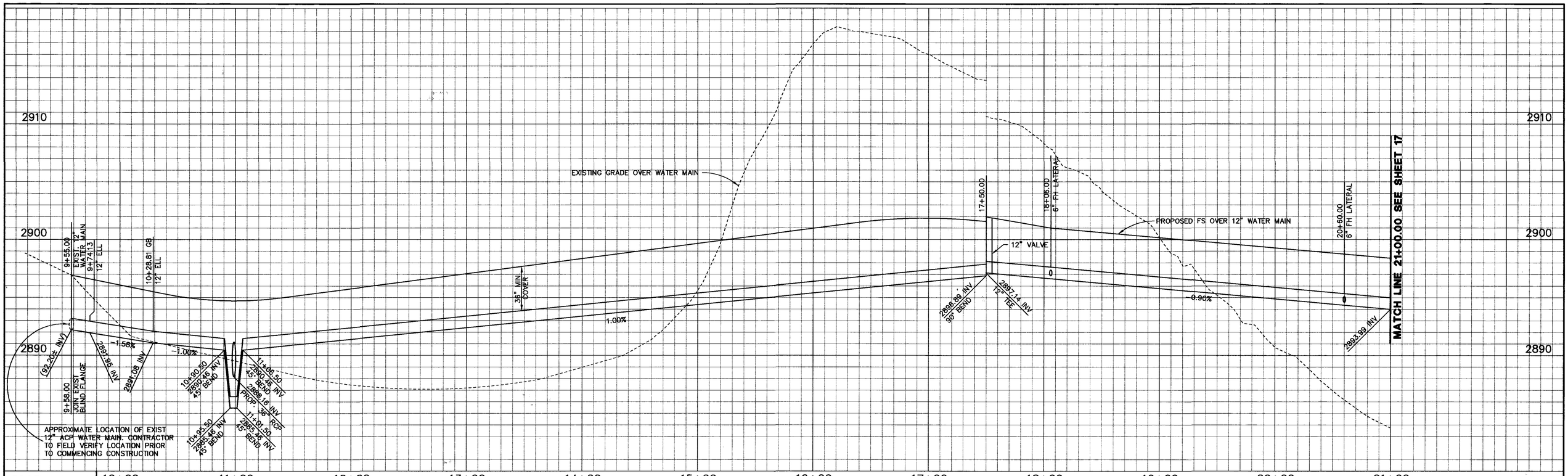
10+00.00 - 17+89.45

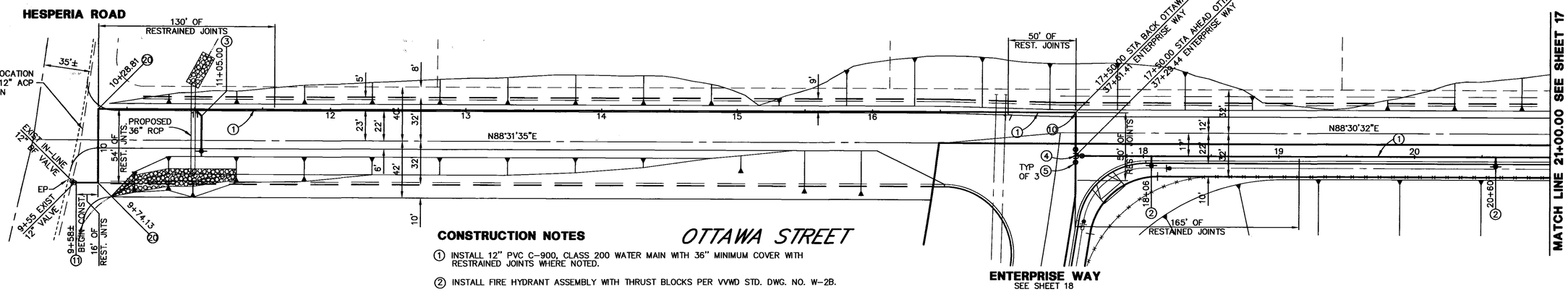
CITY OF VICTORVILLE

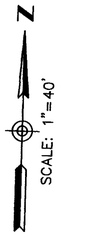
JOB NO.	SHEET
103.0055	15 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

P-602







CONSTRUCTION NOTES

1. INSTALL 12" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
2. INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.
3. INSTALL BLOW-OFF FIRE HYDRANT ASSEMBLY WITH THRUST BLOCK PER VVWD STD. DWG. NO. W-2D.
4. INSTALL 12"X12" TEE.
5. INSTALL 12" BUTTERFLY VALVE PER VVWD STD. DWG. NO. VVWD-1A.
10. INSTALL 12"90° ELL.
11. REMOVE EXISTING BLIND FLANGE AND CONNECT W/ FLANGE COUPLING ADAPTOR AND TEST PLATE. REMOVE TEST PLATE AFTER VVWD HAS APPROVED TESTING.
20. INSTALL 12" 90° BEND W/ THRUST BLOCK

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CITY OF VICTORVILLE FIRE DEPARTMENT	VICTOR VALLEY WATER DISTRICT
RECOMMENDED FOR APPROVAL BY:	ACCEPTED BY: Reginald A. Lamson 7-20-04
DIVISION CHIEF DATE	REGINALD A. LAMSON RCE 43681 DATE DISTRICT ENGINEER

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	WC	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:

ROBERT A. KILPATRICK R.C.E. #42386 12/10/03 DATE

WATER IMPROVEMENT PLAN

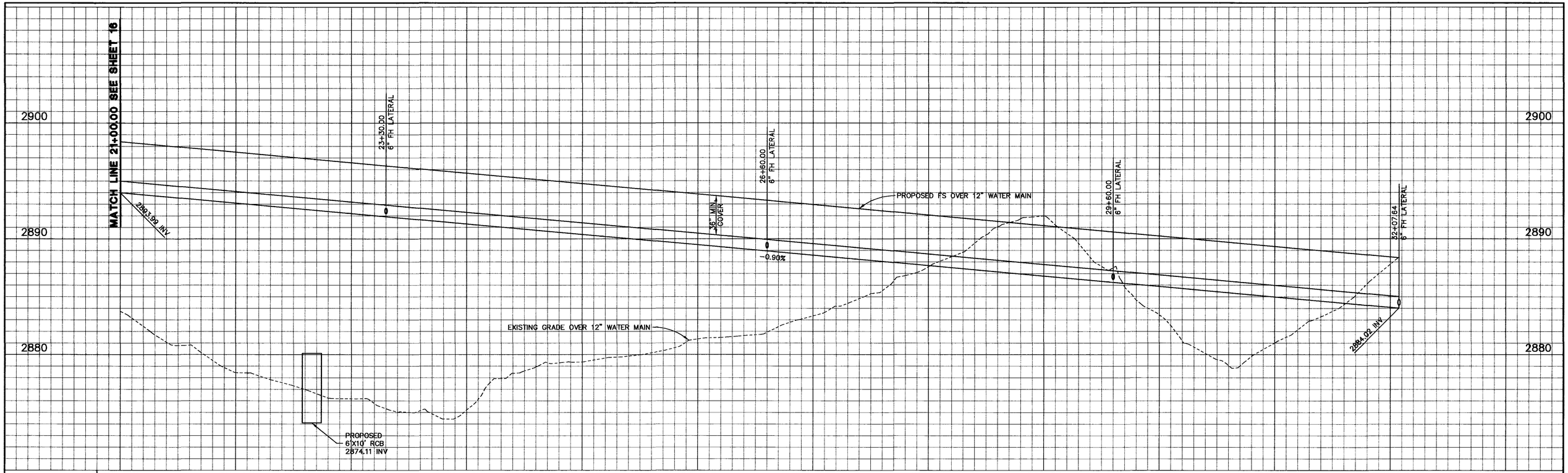
OTTAWA STREET 10+00.00 - 21+00.00

CITY OF VICTORVILLE

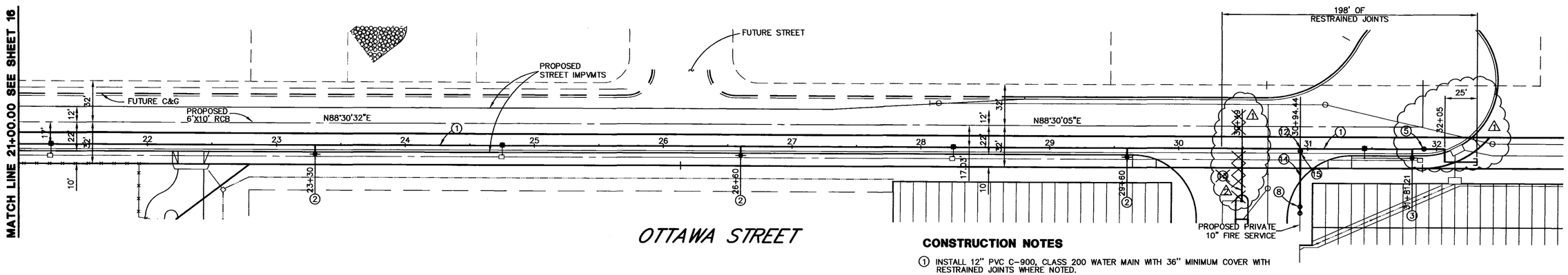
SCALE	DATE	DRAWN BY	DESIGNED BY
1" = 40'	12/10/03	CAD	RK

JOB NO. 103.0055
SHEET 16 OF 27
FILE NO. 2627

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



SCALE: 1" = 40'

CONSTRUCTION NOTES

1. INSTALL 12" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
2. INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.
3. INSTALL BLOW-OFF FIRE HYDRANT ASSEMBLY WITH THRUST BLOCK PER VVWD STD. DWG. NO. W-2D.
8. INSTALL 10" DOUBLE DETECTOR CHECK VALVE ASSEMBLY PER VVWD STD. DWG. VVWD-14.
12. INSTALL 12"X10" TEE.
13. INSTALL 3/4" METERED WATER SERVICE PER VVWD STD. DWG. W-6(WATER METER AND METER BOX TO BE INSTALLED BY VVWD).
14. INSTALL 10" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
15. INSTALL 10" RESILIENT WEDGE GATE VALVE PER VVWD STD DWG VVWD-1A.

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CITY OF VICTORVILLE
FIRE DEPARTMENT
RECOMMENDED FOR APPROVAL BY:
DIVISION CHIEF — DATE 10-24-04

VICTOR VALLEY WATER DISTRICT
ACCEPTED BY: Reginald A. Lawson 7-8-04
REGINALD A. LAWSON RCE 43681
DISTRICT ENGINEER — DATE

REV	DATE	BY	DESCRIPTION	APPR
2	8/27/04	MW	PLAN CHANGE NO. 2	RAL 10-8-04
1	6/11/04	MW	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. KILPATRICK
EXP. 3/31/06
No. 42386
CIVIL
STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. #42386 12/16/03 DATE

WATER IMPROVEMENT PLAN

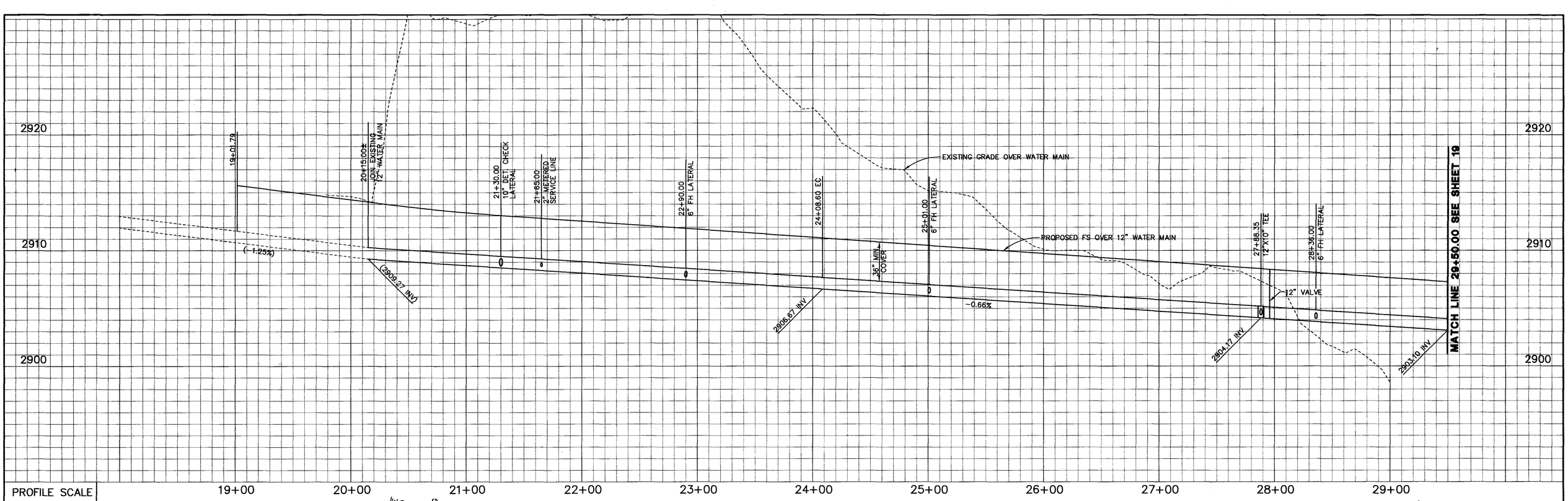
OTTAWA STREET
21+00.00 - 32+17.57

CITY OF VICTORVILLE

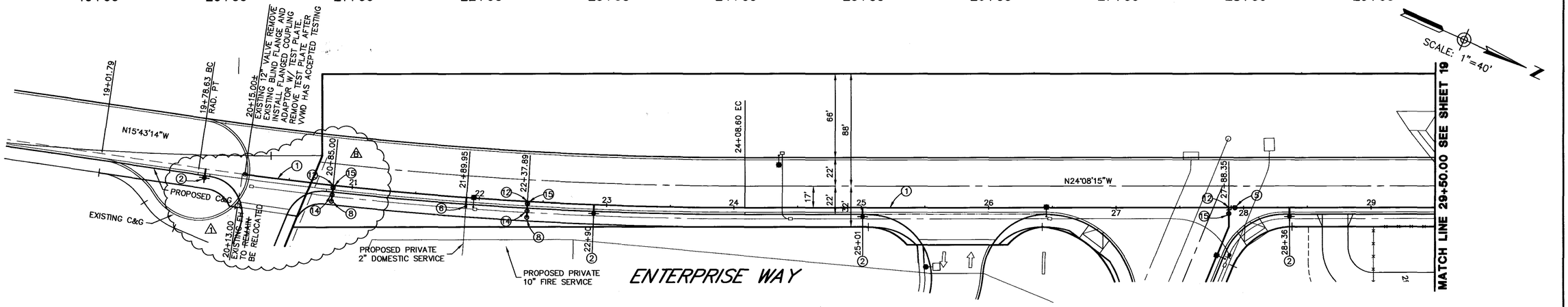
SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

JOB NO. 103.0055
SHEET 17 OF 27

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



CONSTRUCTION NOTES:

1. INSTALL 12" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
2. INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.
5. INSTALL 12" BUTTERFLY VALVE PER VVWD STD. DWG. NO. VVWD-1A.
6. INSTALL 2" METERED WATER SERVICE PER VVWD STD. DWG. NO. W-6A (WATER METER AND METER BOX TO BE INSTALLED BY VVWD).
8. INSTALL 10" DOUBLE DETECTOR CHECK VALVE ASSEMBLY PER VVWD STD. DWG. VVWD-14.
12. INSTALL 12"X10" TEE.
14. INSTALL 10" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
15. INSTALL 10" RESILIENT WEDGE GATE VALVE PER VVWD STD DWG VVWD-1A.

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CITY OF VICTORVILLE
FIRE DEPARTMENT
RECOMMENDED FOR APPROVAL BY:
DIVISION CHIEF DATE

VICTOR VALLEY WATER DISTRICT
ACCEPTED BY: Reginald A. Lawson 7-20-04
REGINALD A. LAWSON RCE 43681 DATE
DISTRICT ENGINEER

REV	DATE	BY	DESCRIPTION	APPR
A	6/11/04	WE	PLAN CHANGE NO. 1	
B	1/26/04		BID ADDENDUM NO. 3	

REGISTERED PROFESSIONAL ENGINEER
ROBERT A. KILPATRICK
EXP. 3/31/06
No. 42386
CIVIL
STATE OF CALIFORNIA

VCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. #42386 12/10/03 DATE

WATER IMPROVEMENT PLAN

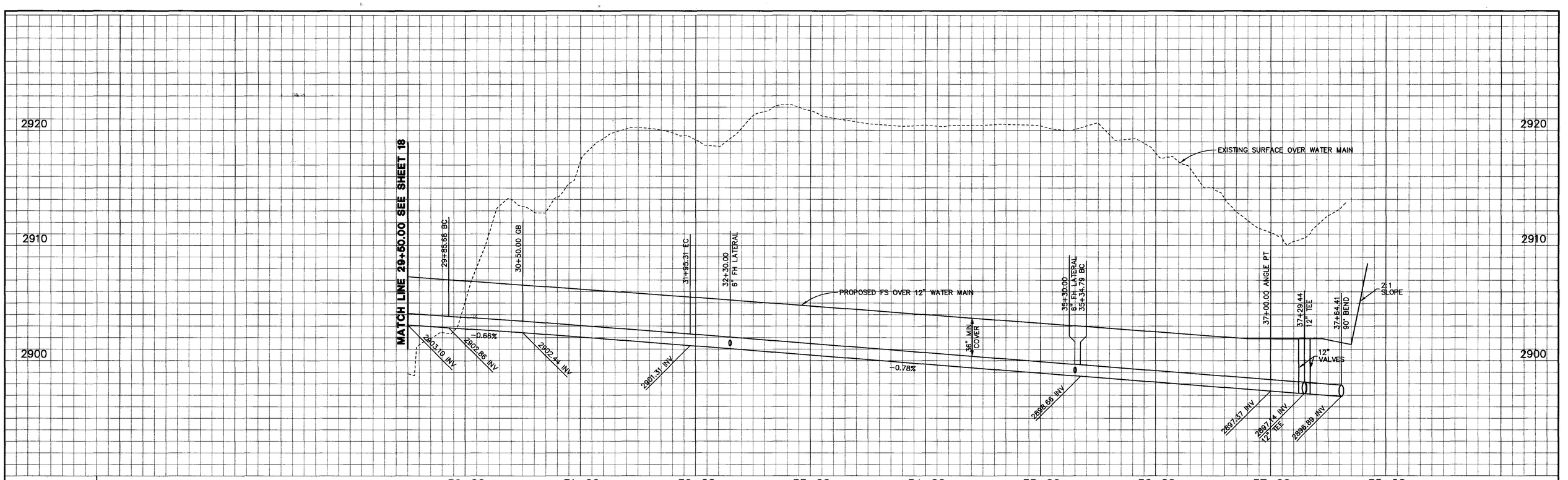
ENTERPRISE WAY
20+15.00 - 29+50.00

CITY OF VICTORVILLE

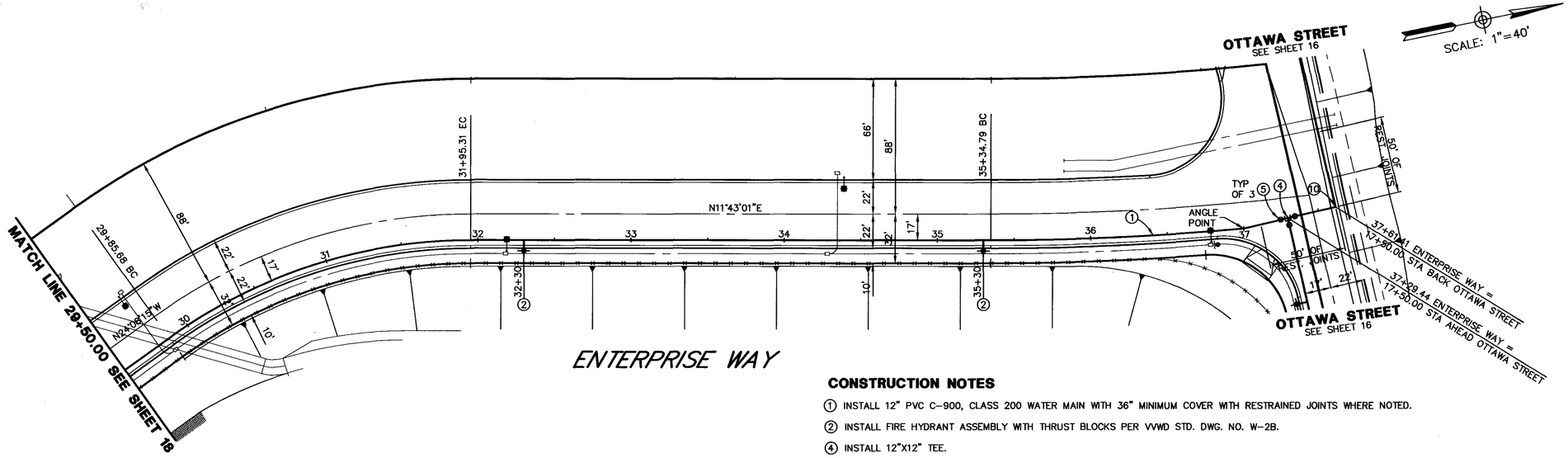
SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

JOB NO. 103.0055
SHEET 18 OF 27

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'



ENTERPRISE WAY

CONSTRUCTION NOTES

1. INSTALL 12" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
2. INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.
4. INSTALL 12"X12" TEE.
5. INSTALL 12" BUTTERFLY VALVE PER VVWD STD. DWG. NO. VVWD-1A.
10. INSTALL 12" 90° ELL.

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CITY OF VICTORVILLE FIRE DEPARTMENT	VICTOR VALLEY WATER DISTRICT
RECOMMENDED FOR APPROVAL BY:	ACCEPTED BY: Reginald A. Lamson 7-20-04
DIVISION CHIEF DATE	REGINALD A. LAMSON RCE 43681 DISTRICT ENGINEER DATE

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	NG	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 03/31/04 No.42386 CIVIL STATE OF CALIFORNIA

VCE, inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK R.C.E. 42386 12/10/03 DATE

WATER IMPROVEMENT PLAN

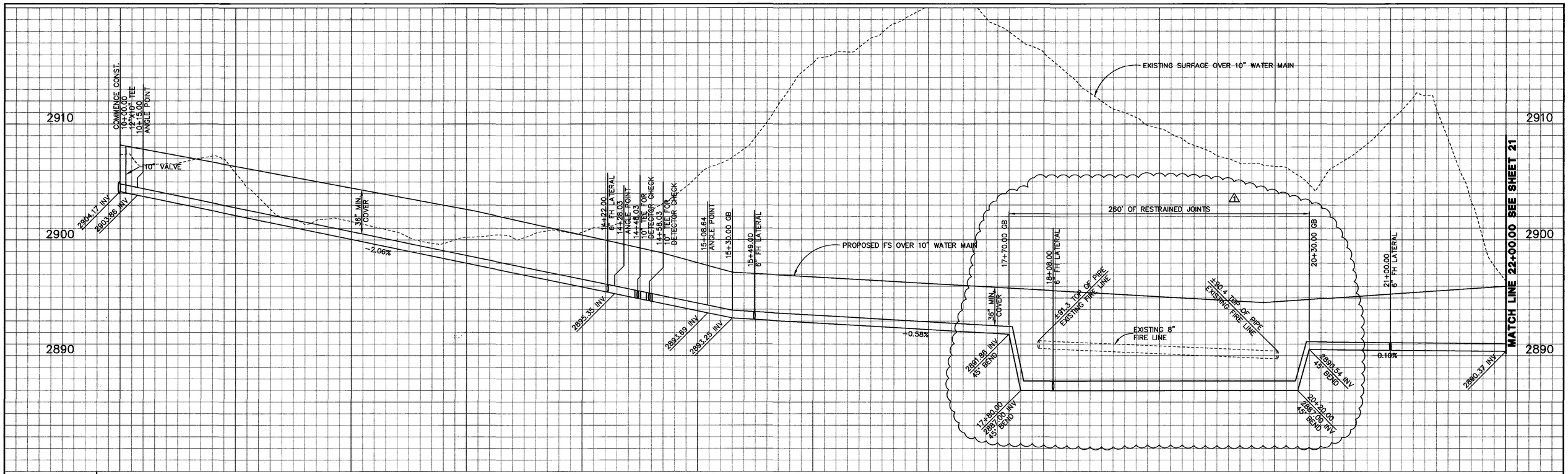
ENTERPRISE WAY
29+50.00 - 37+46.78

CITY OF VICTORVILLE

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2527

JOB NO. 103.0055
SHEET 19 OF 27

P-602



PROFILE SCALE
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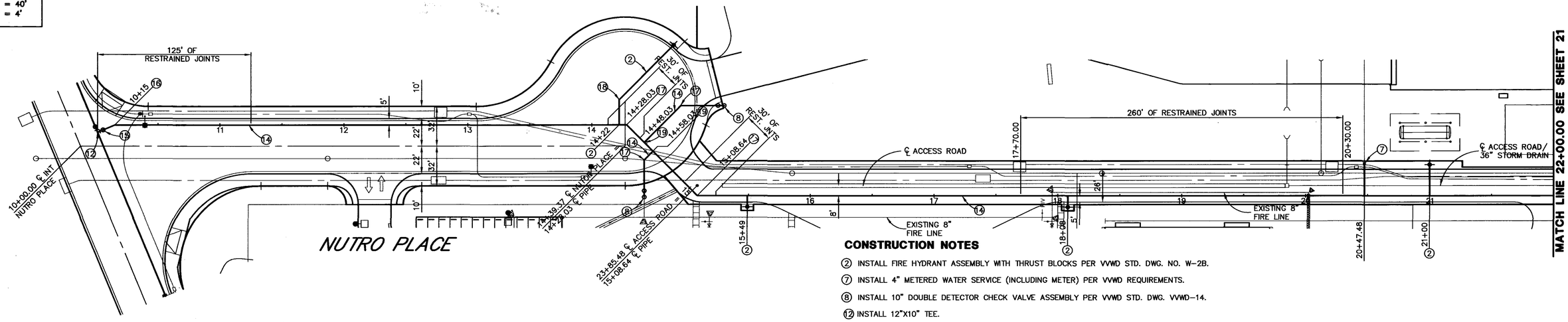
VERT 1" = 4'



CONSTRUCTION NOTES

(2) INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.

(7) INSTALL 4" METERED WATER SERVICE (INCLUDING METER) PER VVWD REQUIREMENTS.

(8) INSTALL 10" DOUBLE DETECTOR CHECK VALVE ASSEMBLY PER VVWD STD. DWG. VVWD-14.

(12) INSTALL 12"X10" TEE.

(14) INSTALL 10" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.

(15) INSTALL 10" RESILIENT WEDGE GATE VALVE.

(16) INSTALL 10" 22-1/2° BEND WITH RESTRAINED JOINTS

(17) INSTALL 10" 45° BEND WITH RESTRAINED JOINTS

(18) INSTALL 6" 45° BEND WITH RESTRAINED JOINTS AS PART OF FIRE HYDRANT ASSEMBLY

(19) INSTALL 10"X10" TEE

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE

JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	MA	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:

ROBERT A. KILPATRICK — R.C.E. #42386 — 12/10/03 — DATE

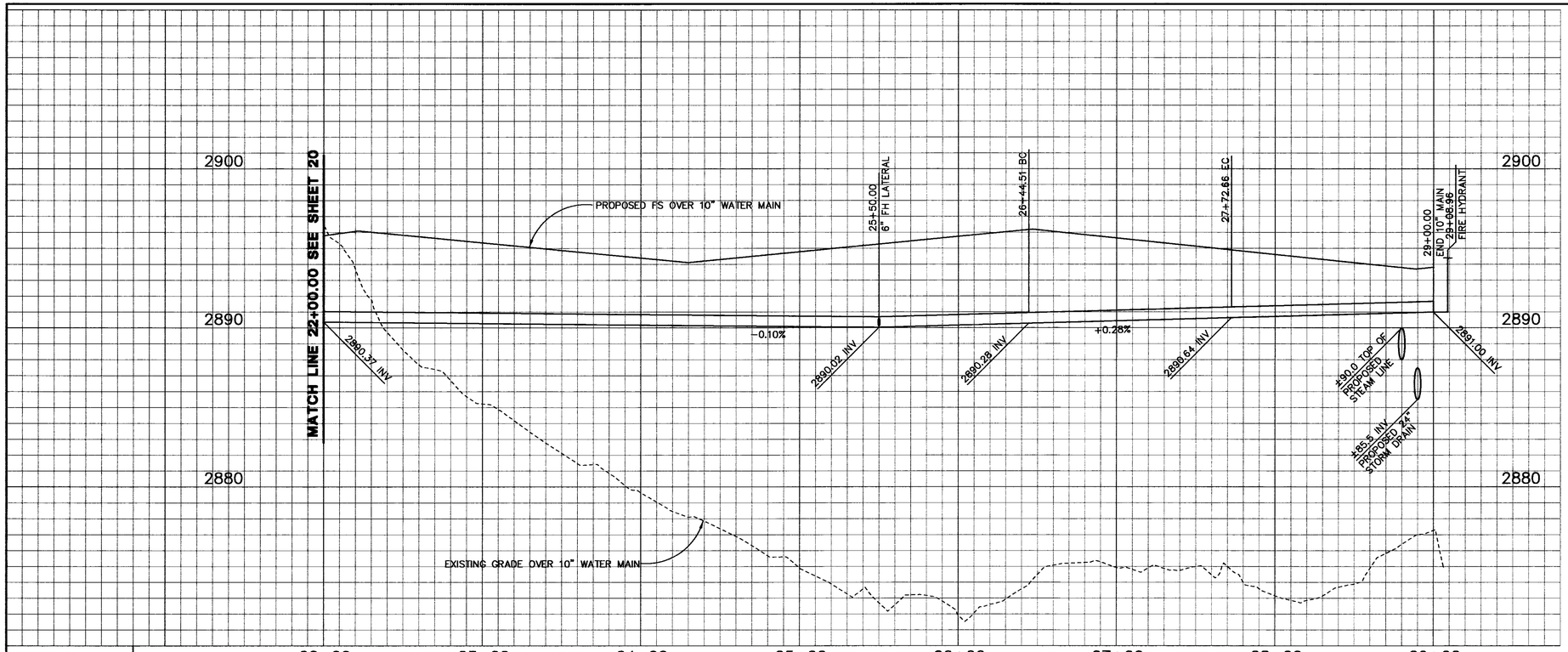
WATER IMPROVEMENT PLAN

NUTRO PLACE & ACCESS ROAD 10+00.00 - 22+00.00 CITY OF VICTORVILLE

JOB NO.	SHEET
103.0055	20 OF 27

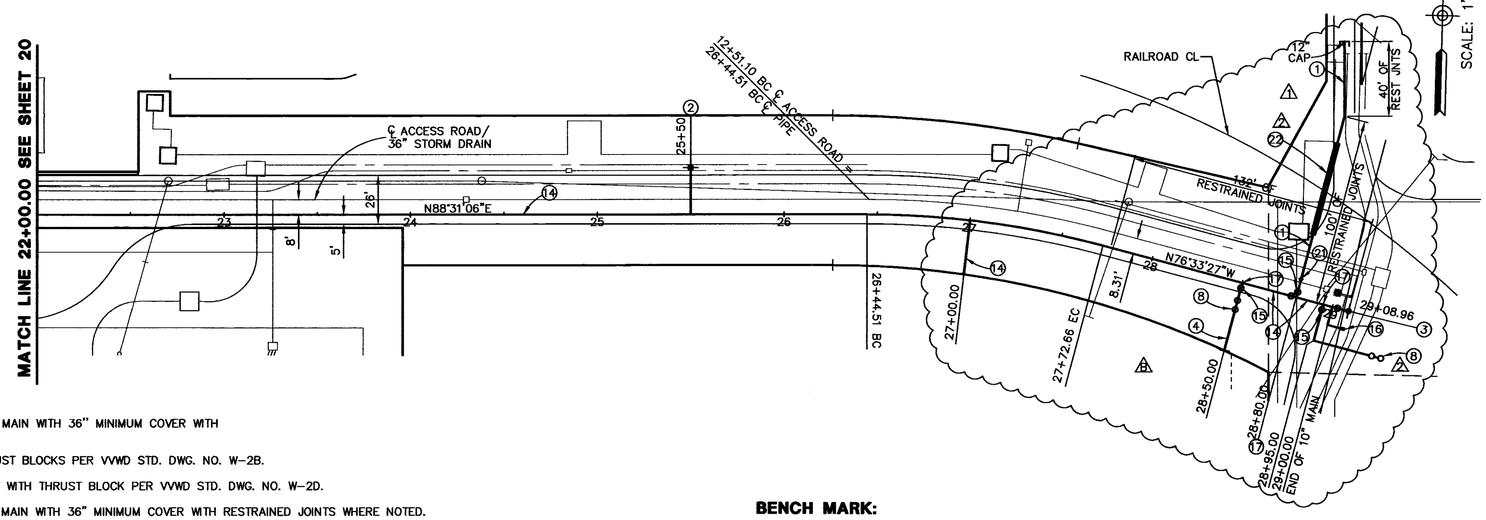
SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

P-602



PROFILE SCALE
HORIZ 1" = 40'
VERT 1" = 4'

DIGALERT
1-800-422-4133



CONSTRUCTION NOTES:

1. INSTALL 12" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
2. INSTALL FIRE HYDRANT ASSEMBLY WITH THRUST BLOCKS PER VVWD STD. DWG. NO. W-2B.
3. INSTALL BLOW-OFF FIRE HYDRANT ASSEMBLY WITH THRUST BLOCK PER VVWD STD. DWG. NO. W-2D.
14. INSTALL 10" PVC C-900, CLASS 200 WATER MAIN WITH 36" MINIMUM COVER WITH RESTRAINED JOINTS WHERE NOTED.
15. INSTALL 10" RESILIENT WEDGE GATE VALVE PER VVWD STD DWG VVWD-1A.
A 16. INSTALL 6" WATER METER SERVICE LINE PER VVWD STDS (WATER METER TO BE INSTALLED BY VVWD)
A 17. INSTALL 10"X10" TEE
1 21. INSTALL 12"X10" REDUCER
2 22. INSTALL 50 LF OF 24" STEEL CASING PER DETAIL THIS SHEET.

BENCH MARK:

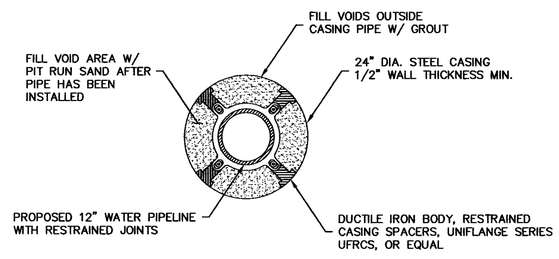
CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

VICTOR VALLEY WATER DISTRICT GENERAL NOTES

1. ALL FEDERAL, STATE OF CALIFORNIA AND LOCAL REGULATIONS RELATING TO PUBLIC WORKS PROJECTS SHALL BE IN EFFECT.
2. WATER MAIN SHALL BE HYDRO-TESTED AT 225 P.S.I. FOR A 2 HOUR DURATION, MINIMUM, AT THE LOWEST POINT IN THE PIPING SYSTEM PER VVWD STANDARD SPECIFICATIONS. AFTER COMPLETION OF THE HYDRO-TEST, THE PIPE SHALL BE LEAK-TESTED AT 150 P.S.I. FOR A 2 HOUR DURATION, MINIMUM, AT THE LOWEST POINT IN THE PIPING SYSTEM.
3. GATE VALVES TO BE IBBM-RW (IRON BODY, BRASS MOUNTED NON-RISING STEM RESILIENT WEDGE) AS APPROVED BY VVWD.
4. CONTRACTOR SHALL NOTIFY VVWD OF INTENTION TO START WORK AT LEAST 48 HOURS PRIOR TO COMMENCING. NO WORK SHALL BE PERFORMED WITHOUT A PERMIT.
5. MATERIAL AND INSTALLATION SHALL CONFORM TO MANUFACTURER'S INSTRUCTIONS AND LATEST VVWD SPECIFICATIONS , AND/OR AS DIRECTED BY VVWD.
6. PROVIDE A MINIMUM OF 10 FEET HORIZONTAL SEPARATION BETWEEN WATER AND SEWER MAINS AND LATERALS.
7. ALL VALVES SHALL BE FLANGED DIRECTLY TO THE TEE OR CROSS, AND SHALL HAVE A RESTRAINED JOINT OUTLET. ALL VALVES INSTALLED BY THE CONTRACTOR SHALL BE ACCESSIBLE FOR OPERATION COMPLETE WITH VALVE BOX TO FINISH GRADE AFTER CONNECTION TO EXISTING MAIN, AS APPROVED BY THE VVWD. ALL VALVE OPERATORS DEEPER THAN 36" SHALL HAVE OPERATOR EXTENSIONS, MANUFACTURED BY PIPELINE PRODUCTS OR DISTRICT-APPROVED EQUAL.
8. EXISTING SCREENED NATIVE MATERIAL FROM TRENCHING OR IMPORTED SAND SHALL BE USED FOR PIPE BEDDING (MINIMUM OF 4-INCHES DEEP) AND BACKFILL TO A DEPTH OF 12-INCHES ABOVE PIPE. IF NATIVE MATERIAL IS UNACCEPTABLE TO THE VVWD INSPECTOR, THEN SAND (SAND EQUIVALENT OF 30) SHALL BE IMPORTED AS REQUIRED FOR BACKFILL. NOTE: END BELL AREAS SHALL BE DUG OUT TO ACHIEVE THE 4-INCHES OF BEDDING.
9. BACKFILL COMPACTION AND RE-SURFACING IN EXISTING STREETS SHALL CONFORM TO REQUIREMENTS OF LATEST CITY OR COUNTY PERMIT SPECIFICATIONS.
10. 12-GAUGE INSULATED COPPER WIRE SHALL BE TAPED TO THE TOP OF PVC PIPE; SPLICED WIRES TO BE CONNECTED WITH A 3M DBR SPLICE KIT (OR APPROVED EQUAL) TO MOISTURE SEAL THE CONNECTION FOR DIRECT BURIAL. 3-INCH WIDE ALARM TAPE SHALL BE INSTALLED 1-FOOT ABOVE PIPE.
11. FIRE HYDRANTS SHALL CONFORM TO THE VVWD STANDARDS AND SPECIFICATIONS AND SHALL BE 6-INCH, 3-WAY WITH TWO 2-1/2 INCH AND ONE 4-INCH OUTLETS.
12. FIRE HYDRANTS SHALL BE SPACED AT APPROXIMATELY 300 FEET ON LOT LINES AND SET AT 2 FEET FROM FACE OF CURB TO CENTER LINE OF HYDRANT AND 4-FEET OUTSIDE BCR OR ECR, PER CITY OF VICTORVILLE STANDARD DRAWINGS S-12.
13. CONTRACTOR SHALL COORDINATE WITH VVWD REGARDING THE SERVICE-LATERAL LOCATION.
14. MATERIAL AND INSTALLATION OF TEMPORARY BLOW-OFFS FOR PIPELINE TESTING TO BE THE RESPONSIBILITY OF CONTRACTOR.
15. THE CONTRACTOR SHALL INSTALL PIPE AND FITTINGS WITH RESTRAINED JOINTS (ROMAC GRIP-RING OR APPROVED EQUAL) AT CHANGES OF DIRECTION AND GRADE TO THE LIMITS AS SHOWN ON THE DRAWING. CONCRETE THRUST BLOCKS SHALL BE PROVIDED ONLY AT HYDRANT LOCATIONS IDENTIFIED ON STANDARD DRAWING.
16. CHANGES IN MAINLINE ELEVATION DUE TO CONFLICT WITH OTHER UTILITIES OR STRUCTURES (SUCH AS SEWERS, STORM DRAINS, ETC.) SHALL BE APPROVED BY VVWD INSPECTOR / ENGINEER BEFORE PROCEEDING WITH WORK.
17. ALL REQUIRED TESTING AND ALL CONNECTIONS MADE TO EXISTING WATER SYSTEM SHALL BE COORDINATED WITH AND APPROVED BY THE VVWD INSPECTOR/ENGINEER.
18. WATER MAINS SHALL BE 8" DIAMETER MINIMUM OR AS SHOWN ON DRAWINGS. WATER MAIN MATERIAL SHALL BE PVC C900, CLASS 200 OR DIP, CLASS 350.
19. STANDARD WATER MAIN LOCATION IS FIVE FEET FROM CURB FACE. MINIMUM WATER MAIN DEPTH IS 36-INCHES BELOW GROUND SURFACE.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHLORINATIONATION AND DISINFECTION OF NEWLY INSTALLED PIPELINES. THIS RESPONSIBILITY ALSO INCLUDES THE DE-CHLORINATION AND/OR FLUSHING OF THE LINES. THE HYPER-CHLORINATED DISINFECTION WATER SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL EPA REGULATIONS.
21. ALL COMMERCIAL/INDUSTRIAL METERS REQUIRE A DEPARTMENT OF HEALTH SERVICES-APPROVED, OWNER INSTALLED REDUCED PRESSURE BACKFLOW PREVENTION DEVICE.



STEEL CASING DETAIL 2 A
NOT TO SCALE

CITY OF VICTORVILLE FIRE DEPARTMENT	VICTOR VALLEY WATER DISTRICT
RECOMMENDED FOR APPROVAL: DIVISION CHIEF 10-20-04 DATE	ACCEPTED BY: 7-8-04 REGINALD A. LAWSON RCE 43681 DISTRICT ENGINEER DATE

REV	DATE	BY	DESCRIPTION	APPR
A	8/27/04	WLB	PLAN CHANGE NO. 2	RAL 10-15-04
1	6/11/04	WLB	PLAN CHANGE NO. 1	
A	1/26/04		BID ADDENDUM NO. 3	

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 3/31/06 No.42386 CIVIL STATE OF CALIFORNIA

VVCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION: 12/10/03
ROBERT A. KILPATRICK R.C.E. #42386 DATE

WATER IMPROVEMENT PLAN

ACCESS ROAD 22+00.00 - 29+15.45

CITY OF VICTORVILLE

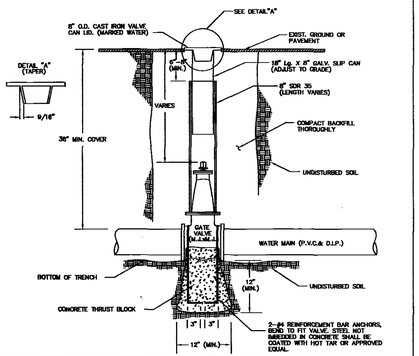
JOB NO.	SHEET
103.0055	21 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 40'	12/10/03	CAD	RK	2627

P-602

NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RAISING VALVE CANS AFTER PROJECT COMPLETION AND/OR STREET PAVING.
2. GATE VALVES ARE NOT TO BE INSTALLED UNLESS APPROVED BY VICTOR VALLEY WATER DISTRICT.
3. 14 GA. COPPER WIRE TO BE TAPED TO TOP OF PIPE AND WRAPPED SECURELY AROUND GATE VALVE.
4. THRUST BLOCK AND ANCHOR BARS SHALL ALWAYS BE INSTALLED ON VALVES 12" AND LARGER; ON 10" AND SMALLER VALVES ONLY WHEN SPECIFIED ON THE PROJECT DRAWINGS.



	VALVE DETAILS FOR D.I.P. OR P.V.C. WITH STANDARD VALVE CAN ASSEMBLY	APPROVED BY DISTRICT ENGINEER: REGINALD A. LAMSON; STANDARD DRAWING No. VVWD-1A; REVISED DATE: 12-03

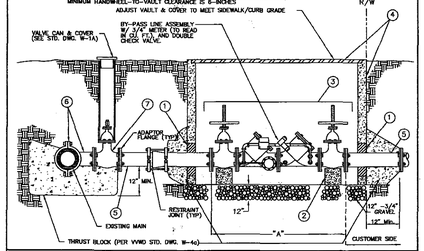
MATERIALS:

1. "DRY PACK" @ PIPE OPENINGS (TYP).
2. CONCRETE BLOCKS TO SUPPORT DETECTOR CHECK ASSEMBLY (AS REQUIRED).
3. DOUBLE CHECK DETECTOR ASSEMBLY, (PER VVWD. SEE LIST OF APPROVED ASSEMBLIES BELOW.
4. BROOKS, UTILITY OR ARMORCAST (SEE STD. DWG. W-5A) NO SECTIONAL VAULTS (OR DISTRICT APPROVED EQUAL).
5. STD. STEEL, C.M.L. & COATED, OR D.I.P. PIPE (LENGTH VARIES) W/ ADAPTOR FLANGES AND RESTRAINT COUPLINGS (EBBA ADAPTORS & RESTRAINT COUPLINGS OR DISTRICT APPROVED EQUAL).
6. TAPPING SLEEVE (ROMAC OR APPROVED EQUAL).
7. RESILIENT WEDGE GATE VALVE (SEE "B"). Min. 6"

TYPICAL DIMENSIONS			
SIZE	"A"	"B"	VAULT (PER STD. DWG. W-5)
4"	52"	4" FLG'D	4' x 6'- 6" x 48"
6"	63"	6" FLG'D	4' x 6'- 6" x 48"
8"	76"	8" FLG'D	4'- 6" x 8'- 6" x 48"
10"	90"	10" FLG'D	4'- 6" x 8'- 6" x 48"

APPROVED ASSEMBLIES: MUST BE AWWA APPROVED WITH 3/4" BY-PASS METER

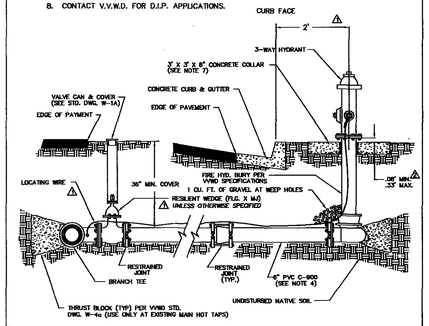
NOTE: IF VAULT IS LOCATED BEHIND R/W, AN EASEMENT AND DEDICATION ARE REQUIRED.



	DOUBLE DETECTOR CHECK VALVE INSTALLATION	APPROVED BY DISTRICT ENGINEER: REGINALD LAMSON, PE; STANDARD DRAWING No. VVWD-14; REVISED DATE: 06-03

NOTES:

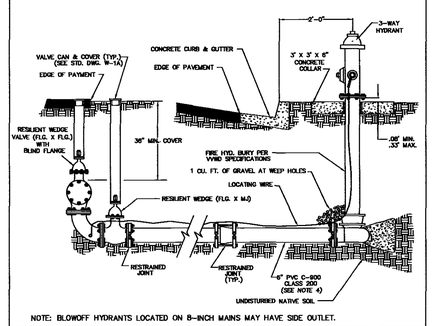
1. WRAP 8 MIL POLYETHYLENE AROUND PARTS REQUIRING THRUST BLOCKS OR PIERS.
2. WEEP HOLE ON HYDRANT BARREL MUST BE CLEAR OF OBSTRUCTIONS.
3. C.L. OF HYDRANT SHALL BE PLACED 2' FROM PROPERTY LINE, IF NO CURB EXIST.
4. 6" PVC HYDRANT LATERAL LENGTH IS VARIABLE – TO BE SPECIFIED ON PLAN DRAWINGS.
5. ALL PVC HYDRANT LATERALS SHALL INCLUDE FLANGE X MECHANICAL JOINT RESILIENT WEDGE VALVES AND MECHANICAL JOINT FIRE HYDRANT SHOES.
6. LOCATING WIRE TO RUN FROM MAIN, ALONG HYDRANT LATERAL, UP TO, AND CONNECTED WITH, HYDRANT CAP CHAIN.
7. ELEVATION OF FIRE HYDRANT "CONCRETE COLLAR" SHALL BE DETERMINED BY PROPOSED CONSTRUCTION PLANS OR EXISTING GROUND ELEVATIONS IN PREVIOUSLY DEVELOPED AREAS.
8. CONTACT V.V.W.D. FOR D.I.P. APPLICATIONS.



	STANDARD FIRE HYDRANT WITH VALVE CAN ASSEMBLY	APPROVED BY DISTRICT ENGINEER: REGINALD A. LAMSON; STANDARD DRAWING NO. W-2B; REVISED DATE: 12-03

NOTES:

1. WRAP 8 MIL POLYETHYLENE AROUND PARTS REQUIRING THRUST BLOCKS OR PIERS. ALL FASTENERS ARE TO BE GREASE COATED STAINLESS STEEL.
2. WEEP HOLE ON HYDRANT BARREL MUST BE CLEAR OF OBSTRUCTIONS.
3. CENTER OF HYDRANT IS TO BE PLACED 2' WITHIN THE PHASE BOUNDARY.
4. SEE VVWD STANDARDS FOR GENERAL HYDRANT LOCATION DETAILS.
5. ALL PVC HYDRANT LATERALS SHALL INCLUDE FLG X MJ JOINT RESILIENT WEDGE VALVES AND MECHANICAL JOINT FIRE HYDRANT SHOES.
6. LOCATING WIRE TO RUN FROM MAIN, ALONG HYDRANT LATERAL, UP TO AND CONNECTED WITH, HYDRANT CAP CHAIN.
7. CALCULATIONS FOR THE RESTRAINED JOINTS AT WATER MAIN END ARE REQUIRED. A BLIND FLANGE IS REQUIRED TO COVER THE END OF THE RESILIENT WEDGE VALVE. AN "AIR/VAC" VALVE MAY BE REQUIRED PER PLANS OR VVWD INSPECTOR.
8. CONTACT V.V.W.D. FOR D.I.P. APPLICATIONS.
9. 2-INCH BLOW-OFFS ARE NOT ALLOWED.

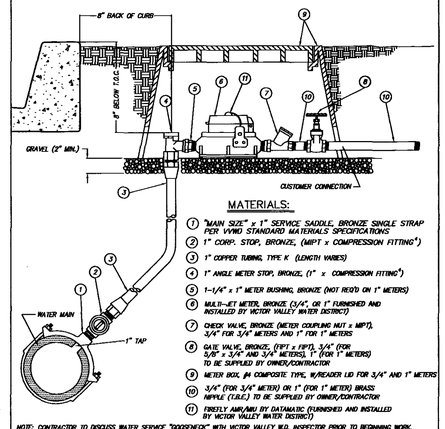


NOTE: BLOWOFF HYDRANTS LOCATED ON 8-INCH MAINS MAY HAVE SIDE OUTLET.

	END CAP BLOW-OFF FIRE HYDRANT WITH VALVE CAN ASSEMBLY	APPROVED BY DISTRICT ENGINEER: REGINALD A. LAMSON, PE; STANDARD DRAWING NO. W-2D; REVISED DATE: 12-03

GENERAL NOTES:

1. ALL SERVICE LINES SHALL HAVE A MINIMUM DEPTH OF 24".
2. ITEMS 5, 6, 7 & 9 TO BE SUPPLIED AND INSTALLED BY VVWD UNLESS OTHERWISE NOTED.
3. ITEMS 1, 2, 3, AND 4 TO BE SUPPLIED AND INSTALLED BY TRACT CONTRACTOR IF NEW SERVICE IN SUBDIVISION.
4. MUELLER C110 FITTING or VVWD-APPROVED EQUAL.
5. ALL COMMERCIAL/INDUSTRIAL METERS REQUIRE A DEPARTMENT OF HEALTH SERVICES-APPROVED, OWNER-INSTALLED REDUCED PRESSURE BACKFLOW PREVENTION DEVICE.



MATERIALS:

1. "MAIN SIZE" x 1" SERVICE SADDLE, BRONZE SINGLE STRAP PER VVWD STANDARD MATERIALS SPECIFICATIONS
2. 1" CORP. STOP, BRONZE, (MIPT x COMPRESSION FITTING*)
3. 1" COPPER TUBING, TYPE K (LENGTH VARIES)
4. 1" ANGLE METER STOP, BRONZE, (1" x COMPRESSION FITTING*)
5. 1-1/4" x 1" METER BUSHING, BRONZE (NOT REQ'D ON 1" METERS)
6. MULTI-JET METER, BRONZE (3/4", OR 1" FURNISHED AND INSTALLED BY VICTOR VALLEY WATER DISTRICT)
7. CHECK VALVE, BRONZE (METER COUPLING NUT x MIPT), 3/4" FOR 3/4" METERS AND 1" FOR 1" METERS
8. GATE VALVE, BRONZE, (FPT x FPT), 3/4" (FOR 5/8" x 3/4" AND 3/4" METERS), 1" (FOR 1" METERS) TO BE SUPPLIED BY OWNER/CONTRACTOR
9. METER BOX, #4 COMPOSITE TYPE, W/READER LID FOR 3/4" AND 1" METERS
10. 3/4" (FOR 3/4" METER) OR 1" (FOR 1" METER) BRASS NIPPLE (T.B.E.) TO BE SUPPLIED BY OWNER/CONTRACTOR
11. FIREFLY AMR/MIU BY DATAMATIC (FURNISHED AND INSTALLED BY VICTOR VALLEY WATER DISTRICT)

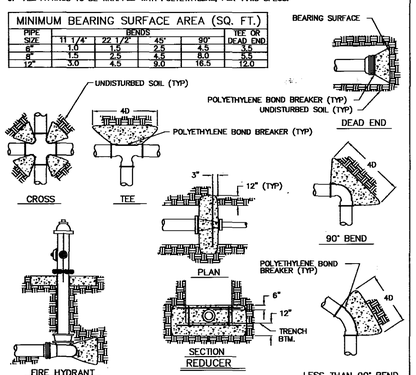
NOTE: CONTRACTOR TO DISCUSS WATER SERVICE "GOOSENECK" WITH VICTOR VALLEY W.D. INSPECTOR PRIOR TO BEGINNING WORK.

	TYPICAL SERVICE INSTALLATION FOR 3/4", AND 1" METERS	APPROVED BY DISTRICT ENGINEER: REGINALD A. LAMSON; STANDARD DRAWING No. W-6; REVISED DATE: 09-03

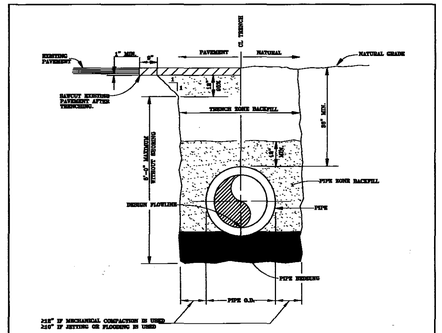
NOTES:

1. PIPE INSTALLED UNDER CONDITIONS DIFFERENT FROM THOSE NORMALLY ENCOUNTERED SHALL REQUIRE THRUST BLOCKS DESIGNED FOR THOSE PARTICULAR CONDITIONS.
2. ALL THRUST BLOCKS SHALL BE CLASS "A" CONCRETE AND PLACED AGAINST UNDISTURBED SOIL. INSPECTOR WILL DETERMINE SIZES NOT SHOWN.
3. THRUST BLOCKS ON CROSSES SHALL BE USED WHENEVER PIPE SIZES DIFFER OR WHEN ONE OR MORE OPENINGS ARE PLUGGED.
4. AT ALL FITTINGS THRU 10", A 3'-3" MEE (6'-6" MEE ON FITTINGS 12" AND OVER) SHALL BE INSTALLED ON EACH SIDE OF FITTING (WITH AC USE ONLY).
5. REINFORCING STEEL SHALL CONFORM TO A.S.T.M. SPECIFICATIONS A15 AND A305 INTERMEDIATE GRADE.
6. ALL FITTINGS TO BE WRAPPED WITH POLYETHYLENE, PER VVWD SPECS.

MINIMUM BEARING SURFACE AREA (SQ. FT.)					
PIPE SIZE	BENDS 11 1/4°	22 1/2°	45°	90°	TEE OR DEAD END
6"	1.0	1.5	2.5	4.5	4.5
8"	1.5	2.5	4.5	8.0	8.5
12"	3.0	4.5	9.0	16.5	12.0



DRAWN BY: WLZ	Victor Valley Water District	REV. DATE	STD. DRWG. NO.
APPROVED BY:	CONCRETE THRUST BLOCKS		W-4a
DATE: 08/27/97	FOR HYD. BURY OR AS CALLED OUT ON DWG.		



95% IF MECHANICAL COMPACTION IS USED
95% IF JETTING OR FLOODING IS USED

Trench Zone Backfill Material:

COMPACTED TO 90% OF ASTM D-1557-91 SELECT MATERIAL OR APPROVED IMPORT.

IF MECHANICAL COMPACTION IS USED, MATERIAL MAY NOT BE GREATER THAN 3 INCHES IN ANY DIMENSION.

IF FLOODING OR JETTING IS USED, MATERIAL MUST MEET THE FOLLOWING:

1/2" 100% PASSING
#200 0% - 10% PASSING
(SE ≥ 20)

Pipe Bedding and Pipe Zone Backfill Material:

COMPACTED TO 95% OF ASTM D-1557-91 RECOMMENDED GRADATION - SEE SPEC.

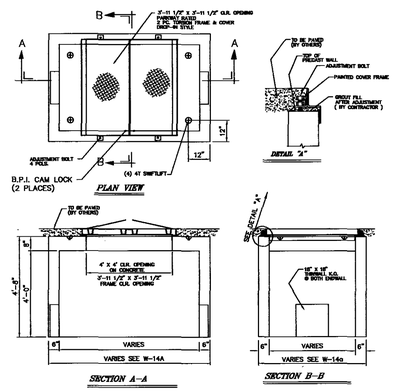
1/2" 100% PASSING
#200 0% - 10% PASSING

(SE ≥ 20 IF FLOODING OR JETTING IS USED)

	TYPICAL EXCAVATION BACKFILL SCHEMATIC	APPROVED BY DISTRICT ENGINEER: REGINALD LAMSON, PE; STANDARD DRAWING No. VVWD-4; REVISED DATE: 12-03

NOTES:

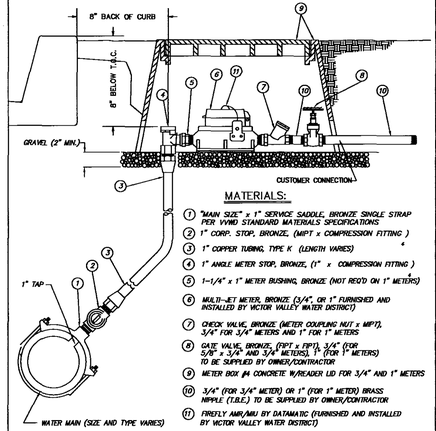
1. VAULT COVER TO BE BROOKS OR UTILITY, NO SECTIONAL VAULTS ALLOWED OR VVWD APPROVED EQUAL.
2. FOR VAULT AND PIPING LAYOUT, SEE VVWD STD. DWG. W-14a.
3. A JOINT SEALING COMPOUND SHALL BE USED AT ALL JOINTS.
4. MAX. LIFT ON HINGED DOORS 30 LBS. ALL JOINTS.



DRAWN BY: WLZ	Victor Valley Water District	REV. DATE	STD. DRWG. NO.
APPROVED BY:	TRAFFIC VAULT FOR 4'-10' FIRE SERVICE	10/97 WLZ; 04/98 WLZ; 12/03 JK	W-5A
DATE: 08/27/97			

GENERAL NOTES:

1. ALL SERVICE LINES SHALL HAVE A MINIMUM DEPTH OF 24".
2. ITEMS 5, 6, 7 & 9 TO BE SUPPLIED AND INSTALLED BY VVWD UNLESS OTHERWISE NOTED.
3. ITEMS 1, 2, 3, AND 4 TO BE SUPPLIED AND INSTALLED BY TRACT CONTRACTOR IF NEW SERVICE IN SUBDIVISION.
4. MUELLER C110 FITTING or VVWD-APPROVED EQUAL.
5. ALL COMMERCIAL/INDUSTRIAL METERS REQUIRE A DEPARTMENT OF HEALTH SERVICES-APPROVED, BACKFLOW PREVENTION DEVICE.
6. TWO-INCH METER SERVICE IS SIMILAR. DISCUSS PLATE DETAILS WITH THE VVWD INSPECTOR.



MATERIALS:

1. "MAIN SIZE" x 1" SERVICE SADDLE, BRONZE SINGLE STRAP PER VVWD STANDARD MATERIALS SPECIFICATIONS
2. 1" CORP. STOP, BRONZE, (MIPT x COMPRESSION FITTING*)
3. 1" COPPER TUBING, TYPE K (LENGTH VARIES)
4. 1" ANGLE METER STOP, BRONZE, (1" x COMPRESSION FITTING*)
5. 1-1/4" x 1" METER BUSHING, BRONZE (NOT REQ'D ON 1" METERS)
6. MULTI-JET METER, BRONZE (3/4", OR 1" FURNISHED AND INSTALLED BY VICTOR VALLEY WATER DISTRICT)
7. CHECK VALVE, BRONZE (METER COUPLING NUT x MIPT), 3/4" FOR 3/4" METERS AND 1" FOR 1" METERS
8. GATE VALVE, BRONZE, (FPT x FPT), 3/4" (FOR 5/8" x 3/4" AND 3/4" METERS), 1" (FOR 1" METERS) TO BE SUPPLIED BY OWNER/CONTRACTOR
9. METER BOX #4 CONCRETE W/READER LID FOR 3/4" AND 1" METERS
10. 3/4" (FOR 3/4" METER) OR 1" (FOR 1" METER) BRASS NIPPLE (T.B.E.) TO BE SUPPLIED BY OWNER/CONTRACTOR
11. FIREFLY AMR/MIU BY DATAMATIC (FURNISHED AND INSTALLED BY VICTOR VALLEY WATER DISTRICT)

NOTE: CONTRACTOR TO DISCUSS WATER SERVICE "GOOSENECK" WITH VICTOR VALLEY W.D. INSPECTOR PRIOR TO BEGINNING WORK.

	VICTOR VALLEY WATER DISTRICT: TYPICAL SERVICE INSTALLATION FOR 3/4", AND 1" METERS	REV. DATE: A 05/22/98; 03/22/02	STD. DRWG. NO. W-6

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

CITY OF VICTORVILLE FIRE DEPARTMENT	VICTOR VALLEY WATER DISTRICT
RECOMMENDED FOR APPROVAL BY:	ACCEPTED BY: 7-20-04
DIVISION CHIEF DATE	REGINALD A. LAMSON RCE 43681 DISTRICT ENGINEER DATE

REV	DATE	BY	DESCRIPTION	APPR
1	6/11/04	MW	PLAN CHANGE NO. 1	

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 3/31/06 — No.42386 — CIVIL — STATE OF CALIFORNIA

VCE, Inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:

ROBERT A. KILPATRICK R.C.E. #42386 DATE 12/10/03

WATER IMPROVEMENT PLAN

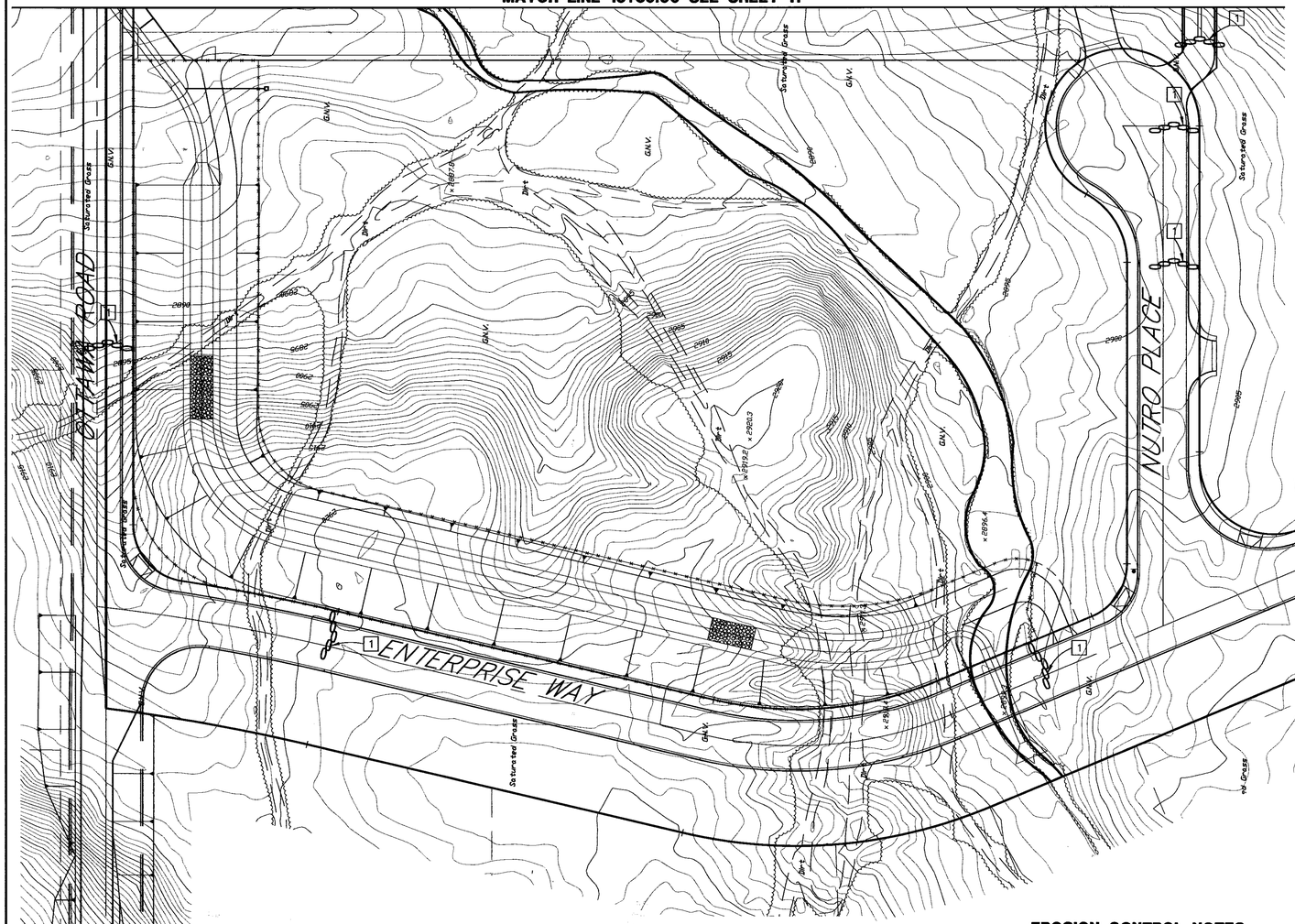
STANDARD DRAWINGS

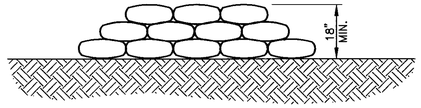
CITY OF VICTORVILLE

JOB NO.	SHEET	SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
103.0055	22 OF 27	NOT TO SCALE	12/10/03	CAD	RK	2627

P-602

MATCH LINE 19+50.00 SEE SHEET 11



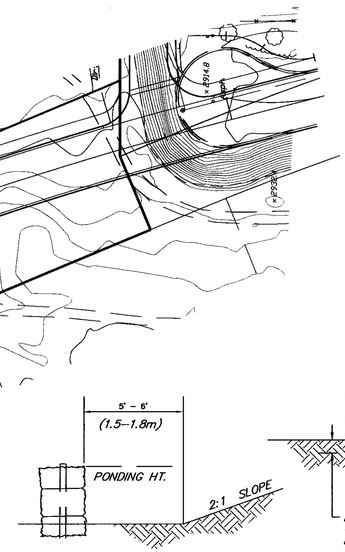


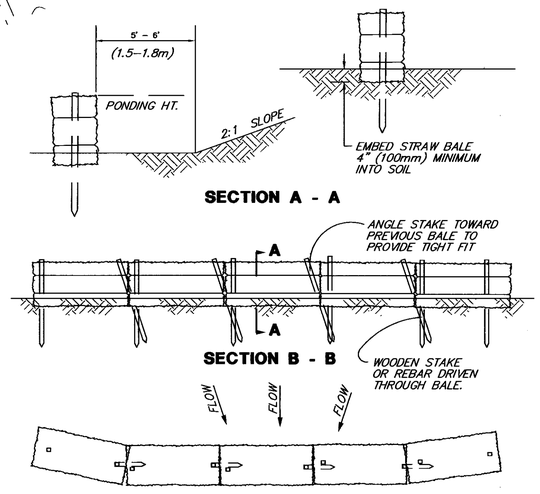
1 **SANDBAG BARRIER DETAIL**

NOT TO SCALE

Z

SCALE: 1"=60'





NOTES:

1. *THE STRAW BALES SHALL BE PLACED ON SLOPE CONTOUR.*
2. *BALES TO BE PLACED IN A ROW WITH THE ENDS TIGHTLY ABUTTING.*
3. *KEY IN BALES TO PREVENT EROSION OR FLOW UNDER BALES.*

2 **STRAW BALE DIKE**

EROSION CONTROL NOTES

1. A STANDBY CREW FOR EMERGENCY WORK SHALL BE AVAILABLE AT ALL TIMES DURING THE RAINY SEASON. NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE RAPID CONSTRUCTION OF TEMPORARY DEVICES WHEN RAIN IS IMMINENT.
2. DEVICES SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE INSPECTOR.
3. ALL REMOVABLE PROTECTIVE DEVICES SHOWN SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE 5-DAY RAIN PROBABILITY FORECAST EXCEEDS 40%.
4. AFTER A RAINSTORM, ALL SILT AND DEBRIS SHALL BE REMOVED FROM CHECK BERMS AND DESILTING BASINS AND THE BASINS PUMPED DRY.
5. FILL SLOPES AT THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE TOP OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
6. A GUARD WILL BE POSTED ON THE SITE WHENEVER THE DEPTH OF WATER IN ANY DEVICE EXCEEDS TWO FEET.
7. EROSION CONTROL SHALL BE INSTALLED WITHIN OR ADJACENT TO ANY GRADED AREAS AS SHOWN ON THE PLANS.
8. ALL 2:1 SLOPES SHALL BE TREATED WITH SOILS STABILIZER OR PLANTED WITH NATIVE GRASS PER LANDSCAPE PLAN.
9. THIS PLAN TO BE MADE A PART OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REPORT DATED MAY 19, 2003.

CONSTRUCTION NOTES

1 INSTALL SANDBAGS PER DETAIL THIS SHEET

2 INSTALL STRAW BALE DIKE PER DETAIL THIS SHEET

PRIVATE ENGINEER'S NOTICE TO CONTRACTORS

THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY: THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY, AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

DIGALERT

1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED

CITY OF VICTORVILLE

JOHN A. McGLADE 12/22/03

JOHN A. McGLADE DATE

CITY ENGINEER R.C.E. 40935

EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR

REGISTERED PROFESSIONAL ENGINEER ROBERT A. KILPATRICK EXP. 03/31/04 No.42386 CIVIL STATE OF CALIFORNIA

VCE, inc.
14297 Cajon St., Suite 101
Victorville, CA 92392
(760)241-0595

THESE PLANS WERE PREPARED UNDER MY SUPERVISION:

ROBERT A. KILPATRICK R.C.E. 42386 12/10/03 DATE

EROSION CONTROL PLAN

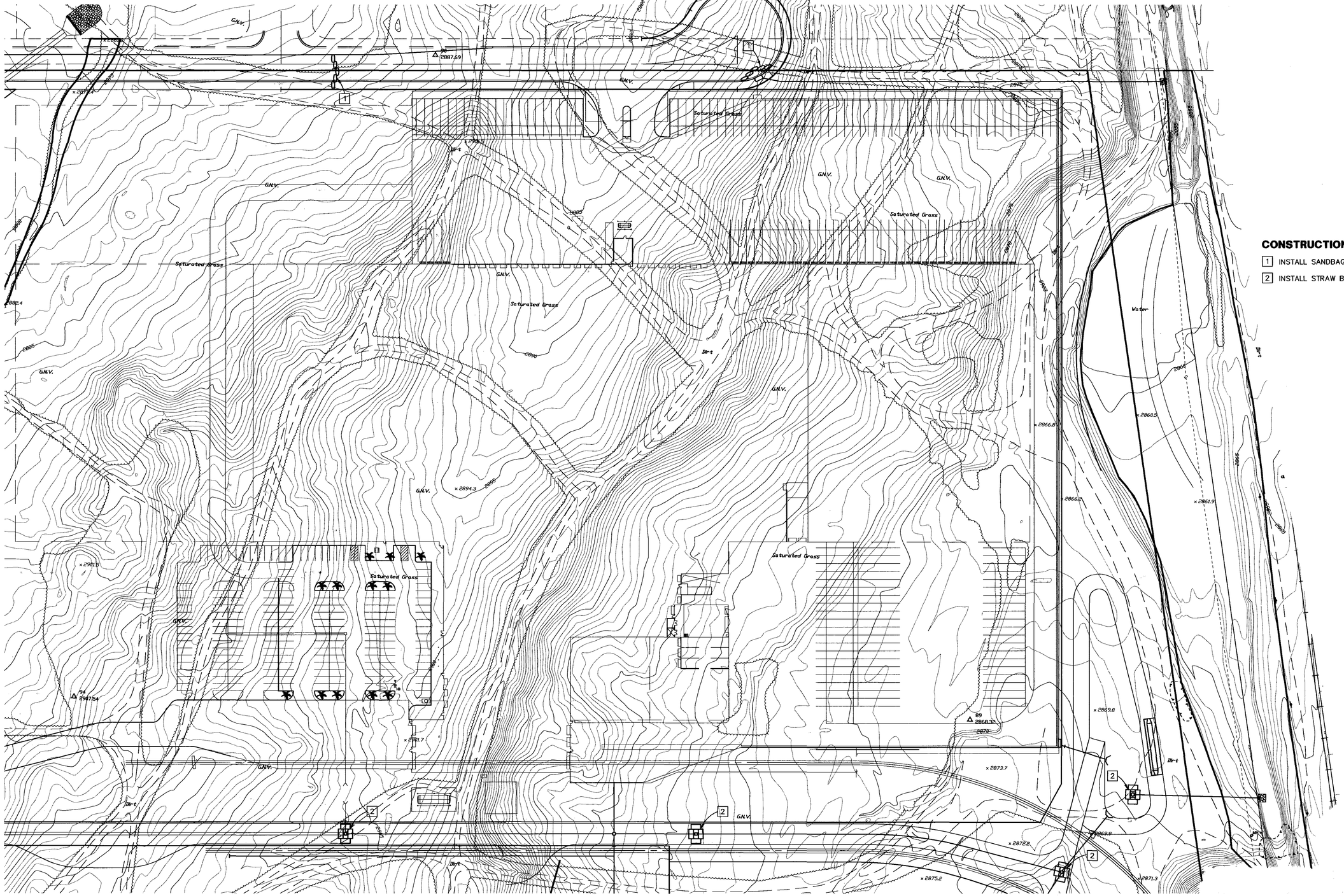
PARCEL 3, PARCEL MAP 16201

CITY OF VICTORVILLE

JOB NO.	SHEET	OF
103.0055	23	27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 60'	12/10/03	CAD	RK	2627

SHT. 23 OF 27



CONSTRUCTION NOTES

1. INSTALL SANDBAGS PER DETAIL ON SHEET 23
2. INSTALL STRAW BALE DIKE PER DETAIL ON SHEET 23

DIGALERT
1-800-422-4133

BENCH MARK:

CITY OF VICTORVILLE BENCH MARK V-209

LOCATED AT THE SOUTHWEST ECR OF HESPERIA ROAD AND NISQUALLI ROAD.

ELEVATION = 2949.940

APPROVED
CITY OF VICTORVILLE
JOHN A. McGLADE — DATE
CITY ENGINEER — R.C.E. 40935
EXPIRES: 03-31-07

REV	DATE	BY	DESCRIPTION	APPR

REGISTERED PROFESSIONAL ENGINEER — ROBERT A. KILPATRICK — EXP. 03/31/04 — No.42386 — CIVIL — STATE OF CALIFORNIA

VVCE, Inc.
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(760)241-0595
THESE PLANS WERE PREPARED UNDER MY SUPERVISION:
ROBERT A. KILPATRICK — R.C.E. 42386 — DATE 12/10/03

EROSION CONTROL PLAN

PARCEL 3, PARCEL MAP 16201

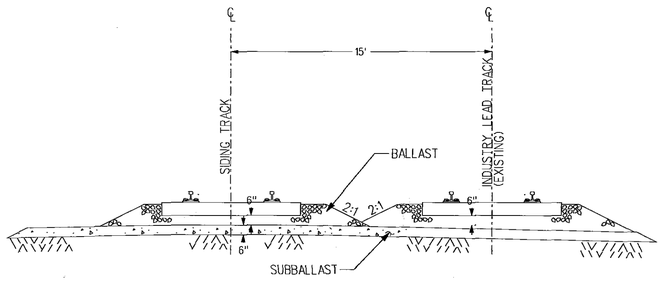
CITY OF VICTORVILLE

JOB NO.	SHEET
103.0055	24 OF 27

SCALE	DATE	DRAWN BY	DESIGNED BY	FILE NO.
1" = 60'	12/10/03	CAD	RK	2627

SHT. 24 OF 27

CITY SIDING			
DESCRIPTION	STATIONING	NORTHING	EASTING
PS #11	400+00.00	740.51	3608.43
PITO	400+31.25	771.75	3607.66
PC	401+55.76	895.44	3593.32
PT	404+45.29	1184.18	3596.46
PC	412+26.84	1958.39	3703.33
PT	413+30.97	2060.75	3722.23
PITO	414+44.22	2171.07	3747.83
PS #11	415+06.72	2232.98	3756.38



TYPICAL SECTION I
NTS

CITY ALIGNMENT #1			
DESCRIPTION	STATIONING	NORTHING	EASTING
POB/PS #9	27+40	3988.86	3534.52
PITO	27+70.17	4018.61	3529.53
PC	28+55.90	4101.05	3505.99
POE/POT	32+69.60	4415.73	3254.31
PT	35+43.76	4479.34	2990.87
POE	46+24.89	4451.38	1910.11

DONE BY OTHERS

CITY ALIGNMENT #2				
DESCRIPTION	STATIONING	INDUSTRY LEAD STATIONING	NORTHING	EASTING
POB/PS #9	500+00.00	25+74.90	3870.53	3554.47
PITO	500+30.17		3900.28	3549.46
PC	501+14.58		3981.45	3526.29
PT	508+18.43		4368.51	2999.19
POE/POT	510+48.68		4362.54	2769.01
POE	517+6[illegible]		4343.96	2052.46

DONE BY OTHERS

P-602

REVISIONS			
NO.	DESCRIPTION	DATE	BY

APPROVED
CITY OF VICTORVILLE
John A. McGlade 12/22/03
JOHN A. McGLADE DATE
CITY ENGINEER RCE 40935
EXPIRES 3-31-07

HANSON WILSON INCORPORATED
275 W. HOSPITALITY LANE STE. 300
SAN BERNARDINO, CALIFORNIA 92408
PHONE: 909-806-8808
FAX: 909-806-8899

APPROVED DATE

FILE: g-02rev.dgn
DESIGNED GAM
CHECKED DGD
DRAWN NRJ
CHECKED GAM

THE CITY OF VICTORVILLE RAIL PROJECT
FOXBOROUGH INDUSTRIAL PARK
JOB# 103.0055

SHEET 25 OF 27
FILE NO. X3-510-136
DATE 07-21-03

SHT. 25 OF 27

MATCH LINE STA 18+00
SEE DRAWING PP1

EXISTING SPUR TRACK

EXISTING INDUSTRY LEAD

BNSF MAINLINE

TO BE DONE BY OTHERS

CURVE 2
R= 533.77'
D= 10°45'00"
L= 703.85'
DELTA= 75°33'09"

CURVE 1
R= 521.67'
D= 11°00'00"
L= 687.86'
DELTA= 75°32'56"

PT
Sta 35+43.76
PT
Sta 508+18.43

BEGIN SPUR/END CITY LIMITS
Sta 32+69.60

CITY OWNED TRACK

PS #9
Sta 500+00.00

PITO
Sta 500+30.17

PC
Sta 501+14.58

PS #9
Sta 27+40.00

PITO
Sta 27+70.17

PC
Sta 28+55.90

L 300.00
R 0.19
e 0.05'

L 300.00
R 0.21
e 0.24'

PLAN

PVC 22+62.38
Elev 2904.34

PVI 23+37.18
Elev 2902.72

PVT 24+32.38
Elev 2902.85

PS #9

PVC 31+17.67
Elev 2897.94

PVI 32+67.67
Elev 2897.00

PVI 34+17.67
Elev 2897.00

Grade = -0.92%

Grade = -0.63%

Grade = 0.00%

2935 2930 2920 2910 2900 2890 2885

2906.93 2906.07 2905.09 2904.11 2903.25 2902.46 2901.82 2901.19 2900.57 2900.20 2899.94 2899.37 2898.68 2898.05 2897.42 2896.80 2896.17 2895.54 2895.37 2895.01

19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00

PROFILE

P-602

VERTICAL SCALE 1"= 5'

HORIZONTAL SCALE 1"= 60'

REVISIONS			
NO.	DESCRIPTION	DATE	BY

APPROVED
CITY OF VICTORVILLE
John A. McGlade 12/22/03
JOHN A. McGLADE DATE
CITY ENGINEER RCE 40935
EXPIRES 8-31-07

HANSON WILSON INCORPORATED
275 W. HOSPITALITY LANE, STE. 300
SAN BERNARDINO, CALIFORNIA 92408
PHONE: 909-806-0800
FAX: 909-806-0899

APPROVED DATE

FILE:$FILEABBREV$
DESIGNED GAM
CHECKED DGD
DRAWN NRJ
CHECKED GAM

THE CITY OF VICTORVILLE RAIL PROJECT
FOXBOROUGH INDUSTRIAL PARK
ALIGNMENT #1
STA. 18+00 TO STA. 32+69.60

SHEET 26 OF 27
FILE NO. X3-510-136
DATE 07-21-03

SHT. 26 OF 27

File: $FILE$ Date: $DATE$ Time: $TIME$ By: $USERNAME$

P-602

REVISIONS			
NO.	DESCRIPTION	DATE	BY

APPROVED
CITY OF VICTORVILLE
John A. McGlade 12/22/03
JOHN A. McGLADE
CITY ENGINEER
EXPIRES 3-31-07

HANSON WILSON INCORPORATED
275 W. HOSPITALITY LANE STE. 300
SAN BERNARDINO, CALIFORNIA 92408
PHONE: 909-806-8000
FAX: 909-806-8099

APPROVED DATE

FILE: pp2_NEW.dgn
DESIGNED GAM
CHECKED DGD
DRAWN NRJ
CHECKED GAM

THE CITY OF VICTORVILLE RAIL PROJECT
FOXBOROUGH INDUSTRIAL PARK
ALIGNMENT #2

STA. 500+00 TO STA. 510+48.68

SHEET 27 OF 27
FILE NO. X3-510-136
DATE 07-21-03

SHT. 27 OF 27

File: X:\Projects\X3510136\CADD\pp2_NEW.dgn Date: 12/05/2003 Time: 03:26:50 PM By: gamontoya