

DS #: 4774-1

APN: 137.33.801-002

PROJECT: Summerlin Village 24-Parcel Cos. 2 Wash Update

SUBMITTAL: 3rd Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: December 22, 2016
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for: Summerlin Village 24 – Parcel COS-2 Wash - Update		COPIES TO: GCW Engineers & Surveyors
Cross Streets:	Open Space between Parcel C and Parcel D	Howard Hughes Company, LLC
File Number:	F:\Depot\DSMemos\DS4774C.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-33-801-002	
Zoning Action:	FMP-62680	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/30/2015	1/21/2016	Not Approved	\$400.00	427966: \$400
2 nd Submittal	3/10/2016	4/6/2016	Approved	\$400.00	436538: \$400
3 rd Submittal	12/5/2016	12/22/2016	See Comments Below	\$100.00	467659: \$100
TOTAL FEES (LDDRS):				\$900.00	----

REMARKS:

3rd Submittal: Update to revise the side slope of channel at various locations from 2:1 to 3:1, 4:1 or 5:1

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

- The subject "COS-2" parcel is a common lot and public drainage easement to be privately maintained by the developer and future *Homeowners Association*. Record as such in the final map.

NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

END OF REMARKS

ays

T/R/S: T20S/R59E/33
AREA K-33

 *** FAX TX REPORT ***

TRANSMISSION OK

JOB NO. 2737
 DESTINATION ADDRESS 7028042299
 PSWD/SUBADDRESS
 DESTINATION ID
 ST. TIME 12/22 16:45
 USAGE T 00' 29
 PGS. 1
 RESULT OK

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LETTER OF TRANSMITTAL



Project No.: 62024-232
Date: December 5, 2016

To: City of Las Vegas
333 N. Rancho Drive
Las Vegas, NV 89106
Attention: Albert Sung, PE

Subject: Technical Drainage Study for Summerlin Village 24 - Parcel COS-2 Wash

Sent Via: Hand Delivery

Items being sent:

One (1) Copy – Update to the Subject Study
One (1) Copy – Improvement Plans (rolled)
One (1) Copy – Stamped and Signed Standard Form 1 (bound)

These items are submitted:

- | | |
|--|---|
| ☐ At your request | ☒ For your action |
| ☐ For your approval | ☐ For your files |
| ☒ For your review and comments | ☐ For your information |

Acknowledgment of receipt:

☒ **Required**

Received by: _____
Date: _____
Time: _____

Remarks:

Cordially,

GCW, INC.

Rachael R. Dennis, PE
Project Manager
Flood Control Division

Copies to: Ryan Belsick, GCW
Josh Johnson, GCW
Vicki Marjerrison, GCW
Jennifer Veras, GCW
Nelson Baggs, GCW

**UPDATE TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
PARCEL COS-2**

62024-232

December 2016

Prepared for:

**The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4450**

GCV
ENGINEERS \ SURVEYORS

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Summerlin Village 24 Parcel COS-2 Wash Date: December 2016

Location of Development a) Descriptive (Cross Streets) North/South: Sky Vista Drive

East/West: Crossbridge Drive

b) Section: 33 Township: 20S Range: 59E

c) APN: 137-33-801-002

Name of Owner: The Howard Hughes Company, LLC.

Telephone No.: 791-4300 Fax No. 791-4450 E-Mail Address: Not available

Address: 10801 W. Charleston Blvd. 3rd Floor, Las Vegas, Nevada 89135

Contact Person-Name: Rachael R. Dennis, P.E.

Telephone No.: (702) 804-2000

* E-Mail Address: Rdennis@gcwengineering.com

Fax No.: (702) 804-2299

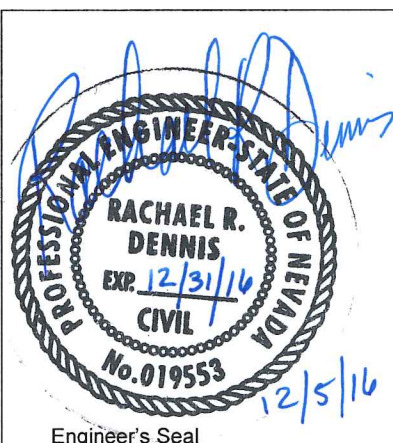
Firm: GCW, INC.

Address: 1555 S. Rainbow Blvd, Las Vegas, NV 89146

Type of Land Development/Land Disturbance

☐	Rezoning	☐	Subdivision Map	☐	Clearing and Grading Only
☐	Parcel Map	☐	Planned Unit Development	☒	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit		Storm Drain and Channel Improvements

- Total Owned Land Area: At Site: 396.57 ± acres Being Developed/Disturbed: 3.1 ± acres
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No
- Proposed type of development (Residential, Commercial, Etc.): Storm Drain and Channel Improvements
- Approximate upstream land area which drains to the subject site: 530.6 ± acres
- Has the site drainage been evaluated in the past? ☒ Yes ☐ No If yes, please identify documentation: Conceptual Drainage Study for Summerlin Village 24, GCW; Technical Drainage Study for Summerlin Village 24 Unit 2 Improvements, GCW; Technical Drainage Study for Summerlin Village 24 Unit 1 Improvements including Parcels "A" & "B" Mass Grading, GCW.
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing Unit 1 7'x7' RCB storm drain in Crossbridge Drive and existing Unit 1 48-inch RCP in Crossbridge Drive.
- Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

**Review and concurrence of the Clark County Regional Flood Control District is required.

Local Entity File No.	Revision	Date

REFERENCE:

STANDARD FORM 1

**UPDATE TO THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
PARCEL COS-2**

62024-232

December 2016

Prepared for:

**The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4450**

Prepared by:

**GCW, Inc.
1555 S. Rainbow Blvd.
Las Vegas, Nevada 89146
Phone: (702) 804-2000
Fax: (702) 804-2299**

62024-232

December 5, 2016

Albert Y. Sung, PE
Flood Control Project Manager
City of Las Vegas - Land Development Services
Department of Public Works
333 N. Rancho Drive
Las Vegas, Nevada 89106

Re: Update to the Technical Drainage Study for Summerlin Village 24 Parcel COS-2

Dear Mr. Sung:

The purpose of this letter is to serve as an update to the subject project. The *Technical Drainage Study for Summerlin Village 24 Parcel COS-2* (hereinafter referred to as the COS-2 Study) was approved by the City of Las Vegas Public Works Department (CLV) on April 7, 2016. Pertinent reference material from the COS-2 Study has been included in Appendix B. The methodologies and calculations presented in this report are in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Manual).

Since approval of the COS-2 Study, the side slopes in certain sections along the channel have been revised from 2:1 to 5:1, 4:1 or 3:1 with placed sacrificial fill. A meeting was held on April 7, 2016, with CLV and GCW, Inc. (GCW), to discuss the proposed revisions. It was agreed at the meeting that GCW would prepare an update to the COS-2 Study with normal depth calculations for typical engineered and sacrificial fill sections for minimum and maximum slopes. It was also determined that no update to the HEC-RAS model would be required unless the normal depth sections indicated significant differences in depths and velocities. Normal depth calculations for the typical engineered and sacrificial fill sections for representative sections within the longitudinal minimum slope, longitudinal maximum slope, and revised side slopes have been performed at Cross Sections 1800 (Station 36+06), 1510 (Station 38+02), 1450 (Station 39+29), 1200 (Station 41+96), 1000 (Station 43+65), 900 (Station 44+33), 775 (Station 45+89) and 700 (46+65). See Referenced Figure 6R in Appendix B for locations of the abovementioned cross sections. The revised cross sections have been compared with the velocities and normal depths from the original COS-2 Study in the Revised Side Slope (SS) Comparison Table. Please note that the revised side slopes do not cause significant changes in normal depths or velocities within the channel. Copies of the normal depth calculations have been included in Appendix A.

REVISED SIDE SLOPE (SS) COMPARISON TABLE							
Original HECRAS Sta.*	Plan Sta.	ULT Q (cfs)	Slope (%)	2:1 SS Depth (ft)	NEW Depth (ft)	2:1 SS Velocity (ft/s)	NEW Velocity (ft/s)
1800	36+06.88	554	5.84	2.49	2.35	10.01	10.67
1510	38+02.07	554	5.83	1.68	1.70	11.66	11.32
1450	39+29.84	554	5.71	2.08	2.02	10.79	11.25
1200	41+96.94	554	5.53	1.81	1.79	10.49	9.80
1000	43+65.35	554	5.03	1.98	1.88	11.04	11.34
900	44+33.05	554	4.74	1.72	1.83	12.19	10.72
775	45+89.12	554	4.75	2.14	2.09	10.17	9.49
700	46+65.77	554	5.16	1.71	1.69	10.37	10.58

*See Referenced Figure 7R.



In general, the normal depths and velocities are consistent with the previously approved studies and do not significantly alter the character of flows downstream and do not pose any negative impacts on downstream facilities.

Flows impacting the southern boundary of Parcel COS-2 were previously directed to the existing Village 24 Unit 1 48-inch RCP stub located in Crossbridge Drive approximately 100 feet west of Parcel COS-2. The proposed extension of the existing 48-inch RCP has been revised to better serve the future development of Parcel D. Copies of the revised interim and ultimate conditions hydraulic models for the 48-inch RCP have been included in Appendix B. Since the proposed 48-inch RCP has been extended an additional 50 feet to the west, a small area (1 cfs) will drain to the proposed unlined ditch north of Crossbridge Drive directing flows into the proposed NDOT Type 2 drop inlet. A normal depth calculation for the proposed ditch has been included in Appendix B. The proposed ditch will have a minimal freeboard above the calculated water surface elevation since the ditch serves to direct offsite flows for interim conditions only. The proposed discharge points are consistent with the previously approved referenced drainage studies. Hydraulic Calculations have been included in Appendix B.

If you have any questions or require additional information, please contact our office at (702) 804-2000.

Cordially,

GCW, INC.



Rachael R. Dennis, PE
Project Manager
Flood Control Division

rrd/vlr

c: Ryan Belsick, GCW
Josh Johnson, GCW
Vicki Marjerrison, GCW
Nelson Baggs, GCW

**UPDATE TO TECHNICAL DRAINAGE STUDY FOR
SUMMERLIN V24 PARCEL COS-2
APPENDIX LAYOUT**

Appendix A. Hydraulic Calculations

1. Normal Depth Calculations
2. Standard Form 6 Models
3. Interim Ditch Calculation
4. Drop Inlet Calculation

Appendix B. Referenced Materials

1. Technical Drainage Study for Summerlin Village 24 – Parcel COS-2 Wash
 - a) CLV Approval
 - b) Figure 5 – Interim Conditions Drainage Map
 - c) Figure 6R – Proposed Conditions HEC-RAS Exhibit
 - d) COS1-2 HEC-RAS Ultimate Condition Model
 - e) Standard Form 6 Model
 - f) Improvement Plans

APPENDIX A

Hydraulic Calculations

Worksheet for Section 1800

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.84 %
Discharge 554.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+55.67	3415.63
0+56.08	3415.66
0+58.01	3415.75
0+60.31	3415.70
0+60.75	3415.68
0+60.83	3415.67
0+69.71	3415.29
0+76.12	3415.00
0+79.22	3414.78
0+81.76	3414.60
0+82.14	3414.57
0+83.30	3414.00
0+84.68	3413.32
0+85.33	3413.00
0+86.83	3412.27
0+87.24	3412.06
0+87.36	3412.00
0+88.18	3411.62
0+89.17	3411.11
0+89.22	3411.09
0+89.40	3411.00
0+89.86	3411.00
0+90.00	3411.00
0+90.02	3411.00
0+90.06	3410.99
0+90.64	3411.00
0+92.38	3411.00

Worksheet for Section 1800

Input Data

Station (ft)	Elevation (ft)
0+93.73	3410.95
0+95.85	3410.82
0+97.03	3410.80
0+97.53	3410.75
0+98.15	3410.69
1+00.16	3410.49
1+04.92	3410.00
1+05.50	3409.79
1+06.14	3409.41
1+06.58	3409.31
1+07.19	3409.34
1+08.11	3409.35
1+08.45	3409.38
1+09.14	3409.51
1+11.56	3409.85
1+11.63	3409.86
1+12.49	3410.00
1+12.50	3410.00
1+13.73	3410.13
1+14.37	3410.06
1+14.68	3410.03
1+15.50	3410.03
1+17.38	3410.01
1+18.42	3410.00
1+18.58	3410.00
1+21.03	3409.80
1+21.49	3409.82
1+21.67	3409.81
1+22.03	3409.80
1+22.20	3409.79
1+22.67	3409.72
1+23.30	3409.60
1+26.07	3409.00
1+26.12	3408.98
1+26.73	3408.79
1+27.82	3408.58
1+28.46	3408.38

Worksheet for Section 1800

Input Data

Station (ft)	Elevation (ft)
1+29.16	3408.29
1+29.47	3408.25
1+29.75	3408.24
1+30.00	3408.24
1+30.25	3408.26
1+30.48	3408.28
1+30.77	3408.33
1+31.70	3408.42
1+32.13	3408.42
1+33.14	3408.40
1+36.15	3408.51
1+37.14	3408.52
1+54.42	3412.84

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+55.67, 3415.63)	(0+89.40, 3411.00)	0.040
(0+89.40, 3411.00)	(1+37.14, 3408.52)	0.035
(1+37.14, 3408.52)	(1+54.42, 3412.84)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.35 ft
Elevation Range	3408.24 to 3415.75 ft
Flow Area	51.92 ft ²

Worksheet for Section 1800

Results

Wetted Perimeter	46.98	ft
Hydraulic Radius	1.11	ft
Top Width	46.28	ft
Normal Depth	2.35	ft
Critical Depth	2.93	ft
Critical Slope	0.01714	ft/ft
Velocity	10.67	ft/s
Velocity Head	1.77	ft
Specific Energy	4.12	ft
Froude Number	1.78	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.35	ft
Critical Depth	2.93	ft
Channel Slope	5.84	%
Critical Slope	0.01714	ft/ft

Cross Section for Section 1800

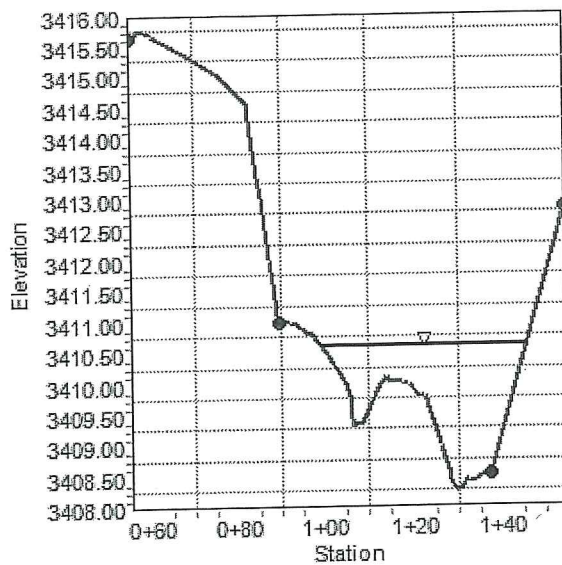
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	5.84	%
Normal Depth	2.35	ft
Discharge	554.00	ft ³ /s

Cross Section Image



Project Description

Manning Formula

Normal Depth

5.83 %

554.00 ft³/s

Elevation (ft)

0+25.86	3403.04
0+25.96	3403.03
0+26.06	3403.03
0+27.03	3403.00
0+32.70	3402.00
0+42.34	3399.59
0+42.79	3399.50
0+43.91	3399.43
0+49.19	3399.00
0+49.37	3398.99
0+49.43	3398.99
0+49.93	3398.95
0+50.13	3398.94
0+52.47	3398.79
0+52.97	3398.75
0+54.35	3398.61
0+54.46	3398.60
0+54.77	3398.57
0+54.78	3398.57
0+54.98	3398.54
0+56.27	3398.40
0+56.95	3398.32
0+57.46	3398.26
0+58.80	3398.10
0+59.61	3398.00
0+61.23	3397.36
0+61.28	3397.34

Worksheet for Section 1510

Input Data

Station (ft)	Elevation (ft)
0+61.73	3397.14
0+62.36	3397.00
0+62.50	3396.97
0+62.90	3396.92
0+62.97	3396.91
0+63.41	3396.88
0+64.99	3396.85
0+66.04	3396.84
0+66.08	3396.84
0+66.48	3396.84
0+67.16	3396.83
0+67.63	3396.83
0+68.18	3396.84
0+68.38	3396.84
0+68.58	3396.84
0+69.78	3396.86
0+70.29	3396.88
0+70.42	3396.89
0+70.99	3396.92
0+72.40	3397.00
0+72.76	3397.02
0+74.56	3397.08
0+75.27	3397.07
0+76.62	3397.06
0+77.79	3397.07
0+78.48	3397.03
0+79.05	3397.00
0+79.92	3396.95
0+80.16	3396.94
0+80.29	3396.94
0+80.47	3396.93
0+80.58	3396.92
0+80.81	3396.91
0+80.93	3396.90
0+81.25	3396.88
0+81.38	3396.88
0+81.43	3396.88

Worksheet for Section 1510

Input Data

Station (ft)	Elevation (ft)
0+81.63	3396.87
0+81.78	3396.86
0+81.86	3396.86
0+81.92	3396.86
0+82.12	3396.85
0+82.47	3396.84
0+82.83	3396.83
0+83.32	3396.83
0+83.56	3396.83
0+84.16	3396.85
0+84.51	3396.86
0+85.08	3396.92
0+87.33	3397.34
0+88.99	3397.62
0+89.69	3397.76
0+89.83	3397.78
0+90.00	3397.82
0+90.33	3397.88
0+90.96	3398.00
0+93.51	3398.00
1+13.51	3402.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+25.86, 3403.04)	(0+42.34, 3399.59)	0.040
(0+42.34, 3399.59)	(0+93.51, 3398.00)	0.035
(0+93.51, 3398.00)	(1+13.51, 3402.00)	0.040

Worksheet for Section 1510

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.70	ft
Elevation Range	3396.83 to 3403.04 ft	
Flow Area	48.92	ft ²
Wetted Perimeter	41.52	ft
Hydraulic Radius	1.18	ft
Top Width	41.13	ft
Normal Depth	1.70	ft
Critical Depth	2.36	ft
Critical Slope	0.01606	ft/ft
Velocity	11.32	ft/s
Velocity Head	1.99	ft
Specific Energy	3.70	ft
Froude Number	1.83	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.70	ft
Critical Depth	2.36	ft
Channel Slope	5.83	%
Critical Slope	0.01606	ft/ft

Project Description

Manning Formula

Normal Depth

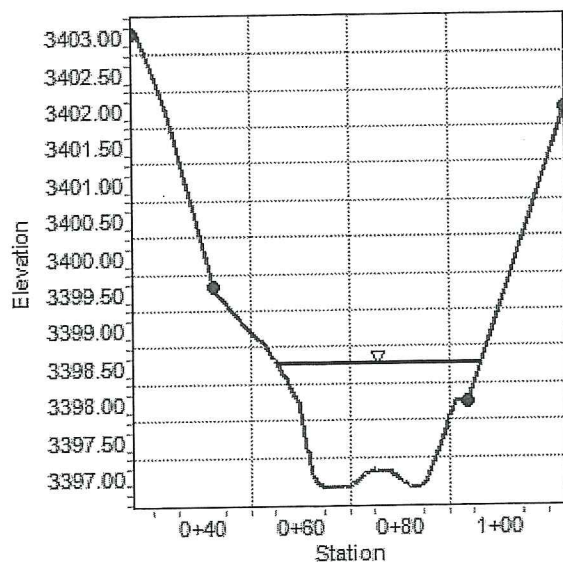
Input Data

5.83 %

1.70 ft

554.00 ft³/s

Cross Section Image



Project Description

Manning Formula

Normal Depth

Section Definitions

Station (ft)	Elevation (ft)
2+88.25	3395.80
2+88.35	3395.80
2+91.67	3395.69
3+01.11	3395.38
3+01.33	3395.37
3+02.46	3395.34
3+06.06	3395.20
3+08.97	3395.08
3+09.51	3395.07
3+12.81	3395.00
3+13.60	3394.95
3+16.92	3394.72
3+17.26	3394.69
3+18.66	3394.00
3+20.58	3393.05
3+20.68	3393.00
3+20.76	3392.90
3+22.69	3392.00
3+24.12	3391.25
3+24.16	3391.25
3+28.46	3391.05
3+28.69	3391.00
3+29.21	3390.85
3+30.74	3390.35
3+32.08	3390.00
3+32.11	3389.95
3+32.15	3389.95

Worksheet for Section 1450

Input Data

Station (ft)	Elevation (ft)
3+32.60	3389.88
3+33.02	3389.84
3+33.49	3389.84
3+34.12	3390.00
3+34.37	3390.06
3+34.45	3390.08
3+35.66	3390.26
3+36.59	3390.17
3+37.37	3390.00
3+37.58	3389.98
3+37.88	3389.97
3+38.00	3390.00
3+39.06	3390.28
3+41.17	3391.00
3+42.13	3391.27
3+42.82	3391.43
3+43.29	3391.44
3+45.47	3391.45
3+45.65	3391.44
3+47.43	3391.00
3+47.99	3390.73
3+49.61	3390.00
3+49.62	3390.00
3+49.99	3389.96
3+50.02	3389.96
3+50.04	3389.96
3+56.84	3389.31
3+64.41	3389.00
3+64.44	3389.00
3+67.50	3388.90
3+67.66	3388.89
3+69.90	3388.84
3+70.32	3388.84
3+70.49	3388.85
3+72.04	3389.00
3+73.63	3389.56
3+74.84	3390.00

Worksheet for Section 1450

Input Data

Station (ft)	Elevation (ft)
3+77.62	3391.22
3+89.57	3391.77
3+92.48	3393.31
3+97.63	3394.00
4+01.23	3394.02
4+01.62	3394.02
4+03.02	3394.02
4+03.12	3394.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(2+88.25, 3395.80)	(3+24.12, 3391.29)	0.040
(3+24.12, 3391.29)	(3+74.84, 3390.00)	0.035
(3+74.84, 3390.00)	(4+03.12, 3394.02)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.02 ft
Elevation Range	3388.84 to 3395.80 ft
Flow Area	49.23 ft ²
Wetted Perimeter	41.64 ft
Hydraulic Radius	1.18 ft
Top Width	40.71 ft
Normal Depth	2.02 ft
Critical Depth	2.72 ft

Worksheet for Section 1450

Results

Critical Slope	0.01681	ft/ft
Velocity	11.25	ft/s
Velocity Head	1.97	ft
Specific Energy	3.99	ft
Froude Number	1.80	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.02	ft
Critical Depth	2.72	ft
Channel Slope	5.71	%
Critical Slope	0.01681	ft/ft

Cross Section for Section 1450

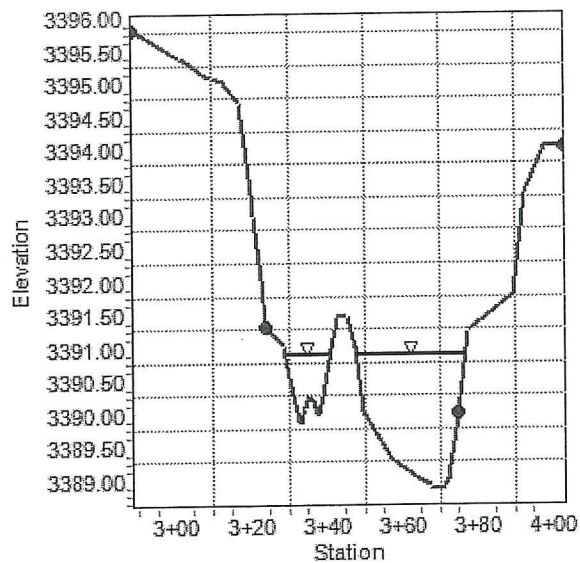
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.71 %
Normal Depth 2.02 ft
Discharge 554.00 ft³/s

Cross Section Image



Project Description

Manning Formula

Normal Depth

5.53 %

554.00 ft³/s

Elevation (ft)

0+07.63	3381.50
0+07.73	3381.50
0+09.37	3381.60
0+15.09	3381.55
0+17.03	3381.51
0+19.00	3381.46
0+20.93	3381.42
0+20.98	3381.42
0+27.57	3381.29
0+35.69	3381.12
0+36.70	3380.78
0+52.70	3376.78
0+55.22	3376.95
0+55.86	3376.99
0+55.98	3377.00
0+58.45	3377.45
0+58.84	3377.44
0+59.27	3377.42
0+59.90	3377.39
0+60.58	3377.44
0+60.95	3377.45
0+61.33	3377.45
0+62.33	3377.42
0+63.89	3377.35
0+64.86	3377.30
0+66.97	3377.15
0+67.37	3377.13

Worksheet for Section 1200

Input Data

Station (ft)	Elevation (ft)
0+68.83	3377.00
0+68.86	3377.00
0+69.28	3376.81
0+69.56	3376.69
0+70.93	3376.17
0+71.39	3376.00
0+72.79	3376.00
0+73.59	3376.00
0+75.17	3376.09
0+76.44	3376.16
0+76.74	3376.18
0+77.54	3376.20
0+78.92	3376.21
0+80.42	3376.20
0+83.29	3376.20
0+85.79	3376.19
0+85.88	3376.19
0+88.03	3376.19
0+88.08	3376.19
0+88.90	3376.21
0+89.86	3376.21
0+91.10	3376.17
0+91.94	3376.11
0+92.32	3376.00
0+92.55	3375.91
0+92.86	3375.88
0+94.30	3375.84
0+95.41	3375.82
0+96.36	3375.83
0+97.97	3375.98
0+98.14	3376.00
1+14.14	3380.00

Worksheet for Section 1200

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+07.63, 3381.50)	(0+52.70, 3376.78)	0.040
(0+52.70, 3376.78)	(0+98.14, 3376.00)	0.035
(0+98.14, 3376.00)	(1+14.14, 3380.00)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.79	ft
Elevation Range	3375.82 to 3381.60 ft	
Flow Area	56.53	ft ²
Wetted Perimeter	55.82	ft
Hydraulic Radius	1.01	ft
Top Width	55.21	ft
Normal Depth	1.79	ft
Critical Depth	2.25	ft
Critical Slope	0.01711	ft/ft
Velocity	9.80	ft/s
Velocity Head	1.49	ft
Specific Energy	3.28	ft
Froude Number	1.71	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft

Worksheet for Section 1200

GVF Output Data

Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.79	ft
Critical Depth	2.25	ft
Channel Slope	5.53	%
Critical Slope	0.01711	ft/ft

Project Description

Manning Formula

Normal Depth

554.00 ft³/s

The graph shows a road profile with the following data points:

Station	Elevation
0+00	3381.50
0+10	3381.25
0+20	3381.00
0+30	3380.75
0+40	3380.50
0+50	3376.80
0+60	3377.50
0+70	3377.25
0+80	3376.10
0+90	3376.10
1+00	3380.00

Worksheet for Section 1000

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 5.03 %
Discharge 554.00 ft³/s
Section Definitions

Station (ft)

Elevation (ft)

0+00.00	3373.00
0+00.10	3373.00
0+02.69	3373.04
0+08.74	3373.00
0+11.00	3372.85
0+12.49	3372.89
0+13.35	3372.91
0+14.42	3372.89
0+16.48	3372.83
0+27.65	3372.57
0+31.04	3372.49
0+32.75	3372.45
0+34.29	3372.42
0+35.42	3372.00
0+43.58	3369.28
0+53.85	3369.27
0+53.87	3369.29
0+53.98	3369.29
0+55.54	3369.00
0+55.61	3368.97
0+56.97	3368.40
0+57.71	3368.00
0+57.75	3367.98
0+58.76	3367.53
0+59.96	3367.00
0+59.97	3367.00
0+61.21	3366.83

Worksheet for Section 1000

Input Data

Station (ft)	Elevation (ft)
0+61.43	3366.82
0+65.53	3366.83
0+65.71	3366.83
0+66.55	3366.78
0+66.83	3366.78
0+66.84	3366.76
0+67.44	3366.57
0+68.25	3366.54
0+69.01	3366.51
0+69.47	3366.49
0+69.95	3366.47
0+70.52	3366.46
0+70.83	3366.42
0+70.99	3366.41
0+71.24	3366.41
0+74.82	3366.51
0+75.75	3366.54
0+76.53	3366.58
0+77.87	3366.66
0+82.63	3367.00
0+82.99	3367.03
0+90.45	3367.43
0+92.08	3367.46
0+93.18	3368.00
0+94.12	3368.47
0+94.89	3368.81
0+95.25	3368.98
0+95.32	3369.00
0+96.64	3369.65
0+97.35	3370.00
0+97.81	3370.23
0+98.96	3370.80
0+99.37	3371.00
1+00.67	3371.65
1+01.09	3371.85
1+10.24	3372.00

Worksheet for Section 1000

Input Data

Section Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 3373.00)	(0+43.58, 3369.28)	0.040
(0+43.58, 3369.28)	(0+92.08, 3367.46)	0.035
(0+92.08, 3367.46)	(1+10.24, 3372.00)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.88	ft
Elevation Range	3366.41 to 3373.04 ft	
Flow Area	48.86	ft ²
Wetted Perimeter	37.16	ft
Hydraulic Radius	1.31	ft
Top Width	36.59	ft
Normal Depth	1.88	ft
Critical Depth	2.49	ft
Critical Slope	0.01523	ft/ft
Velocity	11.34	ft/s
Velocity Head	2.00	ft
Specific Energy	3.88	ft
Froude Number	1.73	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

Worksheet for Section 1000

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.88	ft
Critical Depth	2.49	ft
Channel Slope	5.03	%
Critical Slope	0.01523	ft/ft

Project Description

Manning Formula

Normal Depth

554.00 ft³/s

Worksheet for Section 900

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 4.74 %
Discharge 554.00 ft³/s
Section Definitions

Station (ft)

Elevation (ft)

0+09.53	3370.01
0+11.74	3370.08
0+17.56	3370.03
0+18.09	3370.03
0+19.16	3370.04
0+20.93	3370.00
0+21.10	3370.00
0+35.01	3369.68
0+35.50	3369.67
0+39.53	3369.05
0+54.78	3366.00
0+58.03	3366.00
0+58.11	3366.00
0+61.09	3366.00
0+61.14	3365.99
0+63.42	3365.44
0+64.43	3365.13
0+64.87	3365.00
0+66.28	3364.66
0+66.72	3364.56
0+67.35	3364.50
0+68.91	3364.00
0+68.95	3364.00
0+71.59	3363.80
0+74.17	3363.61
0+78.83	3363.28
0+79.60	3363.24

Worksheet for Section 900

Input Data

Station (ft)	Elevation (ft)
0+79.67	3363.24
0+80.08	3363.22
0+80.95	3363.17
0+81.21	3363.16
0+81.32	3363.16
0+81.44	3363.16
0+81.71	3363.16
0+82.12	3363.17
0+82.23	3363.18
0+82.31	3363.18
0+82.46	3363.21
0+82.73	3363.27
0+82.83	3363.28
0+82.94	3363.29
0+83.04	3363.30
0+83.32	3363.29
0+84.03	3363.27
0+84.31	3363.27
0+84.65	3363.28
0+85.40	3363.31
0+85.89	3363.34
0+86.19	3363.35
0+88.27	3363.48
0+90.61	3363.66
0+91.00	3363.56
0+91.09	3363.55
0+91.25	3363.52
0+91.33	3363.44
0+91.58	3363.34
0+91.85	3363.31
0+92.19	3363.29
0+93.08	3363.31
0+93.47	3363.31
0+94.36	3363.33
0+94.67	3363.34
0+94.91	3363.36
0+99.10	3363.84

Worksheet for Section 900

Input Data

Station (ft)	Elevation (ft)
0+99.68	3363.88
1+00.64	3364.00
1+01.51	3364.12
1+21.11	3369.02

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+09.53, 3370.01)	(0+54.78, 3366.00)	0.040
(0+54.78, 3366.00)	(1+01.51, 3364.12)	0.035
(1+01.51, 3364.12)	(1+21.11, 3369.02)	0.040

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.83	ft
Elevation Range	3363.16 to 3370.08 ft	
Flow Area	51.66	ft ²
Wetted Perimeter	40.52	ft
Hydraulic Radius	1.27	ft
Top Width	40.11	ft
Normal Depth	1.83	ft
Critical Depth	2.39	ft
Critical Slope	0.01564	ft/ft
Velocity	10.72	ft/s
Velocity Head	1.79	ft
Specific Energy	3.62	ft

Worksheet for Section 900

Results

Froude Number	1.67
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.83	ft
Critical Depth	2.39	ft
Channel Slope	4.74	%
Critical Slope	0.01564	ft/ft

Cross Section for Section 900

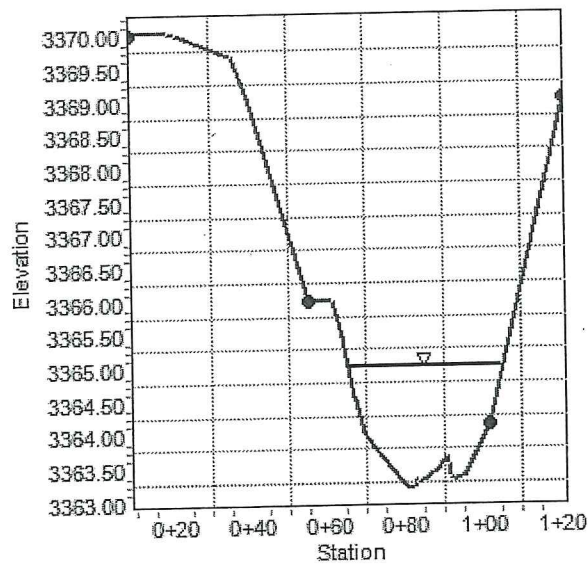
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	4.74	%
Normal Depth	1.83	ft
Discharge	554.00	ft ³ /s

Cross Section Image



Worksheet for Section 775

Input Data

Station (ft)	Elevation (ft)
0+58.29	3356.59
0+60.68	3356.00
0+61.81	3356.00
0+62.60	3356.00
0+64.76	3356.00
0+67.33	3356.00
0+67.63	3355.96
0+71.97	3355.56
0+74.81	3355.47
0+96.93	3361.00

Start Station	Ending Station	Roughness Coefficient
(0+16.13, 3361.07)	(0+32.41, 3357.00)	0.040
(0+32.41, 3357.00)	(0+74.81, 3355.47)	0.035
(0+74.81, 3355.47)	(0+96.93, 3361.00)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.09 ft
Elevation Range	3355.47 to 3361.07 ft
Flow Area	58.39 ft ²
Wetted Perimeter	53.76 ft
Hydraulic Radius	1.09 ft
Top Width	53.04 ft

Worksheet for Section 775

Results

Normal Depth	2.09	ft
Critical Depth	2.51	ft
Critical Slope	0.01712	ft/ft
Velocity	9.49	ft/s
Velocity Head	1.40	ft
Specific Energy	3.49	ft
Froude Number	1.59	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.09	ft
Critical Depth	2.51	ft
Channel Slope	4.75	%
Critical Slope	0.01712	ft/ft

Worksheet for Section 700

Input Data

Station (ft)	Elevation (ft)
2+38.48	3352.77
2+39.14	3352.84
2+40.43	3353.00
2+40.84	3353.06
2+41.86	3353.16
2+42.37	3353.18
2+42.96	3353.17
2+44.74	3353.11
2+47.22	3353.00
2+47.28	3353.00
2+49.76	3352.81
2+54.22	3352.51
2+54.38	3352.50
2+54.88	3352.46
2+56.24	3352.30
2+56.38	3352.29
2+56.72	3352.28
2+58.56	3352.27
2+58.63	3352.27
2+58.70	3352.26
2+59.06	3352.26
2+59.17	3352.27
2+59.23	3352.27
2+59.68	3352.28
2+60.08	3352.30
2+60.40	3352.31
2+60.69	3352.33
2+61.67	3352.40
2+62.34	3352.43
2+66.98	3352.45
2+67.45	3352.48
2+67.91	3352.48
2+68.00	3352.48
2+68.25	3352.47
2+68.49	3352.46
2+68.56	3352.45
2+68.71	3352.45

Worksheet for Section 700

Input Data

Station (ft)	Elevation (ft)
2+69.22	3352.50
2+71.84	3352.92
2+72.38	3353.00
2+72.40	3353.00
2+72.82	3353.12
2+76.16	3353.96
2+76.23	3353.98
2+93.11	3358.20

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(2+17.53, 3358.39)	(2+31.63, 3353.71)	0.040
(2+31.63, 3353.71)	(2+76.23, 3353.98)	0.035
(2+76.23, 3353.98)	(2+93.11, 3358.20)	0.040

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.69 ft
Elevation Range	3352.26 to 3358.39 ft
Flow Area	52.35 ft²
Wetted Perimeter	45.42 ft
Hydraulic Radius	1.15 ft
Top Width	44.94 ft
Normal Depth	1.69 ft
Critical Depth	2.22 ft

Worksheet for Section 700

Results

Critical Slope	0.01559	ft/ft
Velocity	10.58	ft/s
Velocity Head	1.74	ft
Specific Energy	3.43	ft
Froude Number	1.73	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.69	ft
Critical Depth	2.22	ft
Channel Slope	5.16	%
Critical Slope	0.01559	ft/ft

Project Description

Manning Formula

Normal Depth

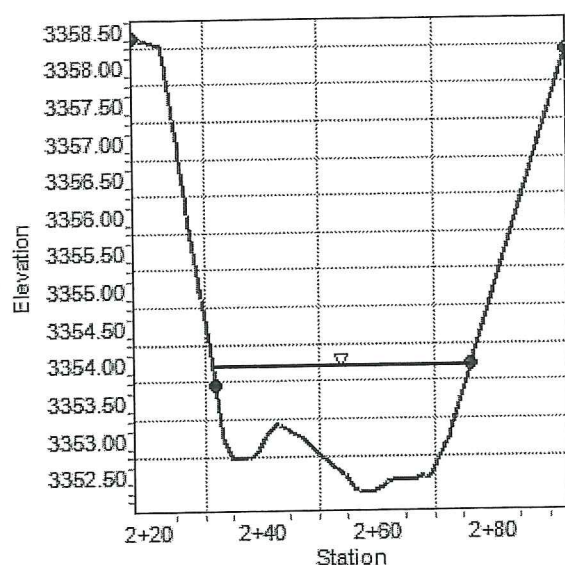
Channel Slope

5.16 %

1.69 ft

554.00 ft³/s

Cross Section Image



Storm Drain Hydraulics Calculations

G.C. Wallace, Inc.

Mainline 48-inch RCP (Ultimate)

DATE 10/13/16 FILE: SF6.xls

G.C. Wallace, Inc.

CONDUIT DATA										FLOW DATA										ENERGY LOSS DATA																				EGL & HGL				COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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STATION			PIPE	BOX		IRREG		#	INVERT ELEV		L	S	A	Φ	Q	V	V2/2g	Sf	Ave. S _f	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend			Misc	Total	U/S EGL	U/S HGL	U/S EGL	U/S HGL	FULL/ PART FLOW	CRTL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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						(Optional)		HGL with respect to FG	Pressure Gasket Required?
STATION	INVERT	SOFFIT	EGL	HGL	GRADE	LOCATION	DESCRIPTION		
1	1000.00	3309.26	3313.26	3317.67	3316.91	3331.00		OK	NO
2	1045.12	3318.877	3322.88	3323.64	3322.88	3331.80		OK	NO
3	1050.12	3319.46	3323.46	3324.22	3323.46	3331.80		OK	NO
4	1125.53	3320.97	3324.97	3325.73	3324.97	3330.90		OK	NO
5	1130.53	3321.109	3325.11	3326.10	3325.34	3330.90		OK	NO
6	1228.03	3324.57	3328.57	3329.33	3328.57	3333.00		OK	NO
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Storm Drain Hydraulics Calculations

G.C. Wallace, Inc.

Mainline 48-inch RCP (Interim)

DATE 10/13/16 FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)=										0.013		Inlet Structure Type or K _i =										d		Headwall: Square Edge (cut concrete and CMP)										EGL & HGL				COMMENTS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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STATION		PIPE		BOX		IRREG		#		INVERT ELEV		L		S		A		Φ		Q		V		V2/2g		Sf		Ave.		PIPE		Frict		Frict		Manhole		Junction		Contraction/ Inlet		Expansion/Outlet		Bend		Misc		CONDUIT		TRANSITION		FULL/																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
FROM		TO		T/R		D		SPAN		RISE		AREA		HYD RAD		#		D/S		U/S		L		S		A		Φ		Q		V		V2/2g		Sf		Ave.		H _f		H _f		θ		K _{mh}		H _{mh}		θ		K _j		H _i		Inlet/		K _i		H _e		θ		K _o		H _o		R _{bend}		θ		K _b		H _b		H _m		Total		U/S		U/S		U/S		U/S		PART		CTRL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
(ft)		(ft)		(in)		(ft)		(ft)		(ft ²)		(ft)		#		(ft)		(ft)		(cfs)		(ft/s)		(ft)		(ft/ft)		(ft/ft)		(ft)		(ft)		(deg)		K _{mh}		H _{mh}		(deg)		K _j		H _i		Inlet/		K _i		H _e		(deg)		K _o		H _o		(ft)		(deg)		K _b		H _b		H _m		Total		U/S		U/S		U/S		U/S		PART		CTRL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

Summary of Results Mainline 48-inch RCP (Interim)

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TRAPEZOIDAL CHANNEL

Interim Ditch at Crossbridge Drive

Flow "Q" 1 cfs

Manning's "n" 0.025

Slope (%) 0.56

Bottom Width 0.0 ft

Side Slope (Lt) 3.0 H:1V

Side Slope (Rt) 3.0 H:1V

Radius 0.0 ft

OUTPUT:

Velocity 1.60 ft/sec

Depth 0.46 ft

Freeboard 0.54 ft

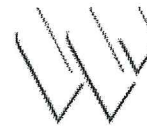
Total Depth 1.00 ft

Froude No. 0.59 ft

Superelevation 0.00 ft

Normal depth calculations using Manning's equation

$Fb = 1 + 0.025Vd^{1/3}$ Supercritical; $0.5 + V^2/2g$ Subcritical



G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS

PROPOSED NDOT TYPE 2 DROP INLET			
	WEIR		ORIFICE
Q100 =	<u>1</u>	Q100 =	<u>1</u>
L =	<u>13.69</u>	CLEAR AREA =	<u>7.57</u>
	<u> </u>	C =	<u>0.65</u>
CLOGGING FACTOR	<u>50%</u>	CLOGGING FACTOR	<u>50%</u>
ASSUME H1 =	<u>0.50</u>	ASSUME H1 =	<u>0.5</u>
C (FOR H1) =	<u>2.7</u>		
Q _F = CL(H) ^{3/2}	<u>6.5</u>	Q = CA(64.4 H) ^{1/2}	<u>14.0</u>
	CONTROL =	WEIR	
	Q INT =	<u>6.5</u>	

1

13.69

50%

0.50

2.7

6.5

1

7.57

0.65

50%

0.5

14.0

WEIR
6.5

6.5

APPENDIX B

Reference Materials

**RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 24
PARCEL COS-2 WASH**

62024-232

March 2016

Prepared for:

**The Howard Hughes Company, LLC
10801 W. Charleston Blvd., 3rd Floor
Las Vegas, Nevada 89135
Phone: (702) 791-4300
Fax: (702) 791-4450**

GCVV'
ENGINEERS & SURVEYORS

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		April 7, 2016
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	
	Summerlin Village 24 – Parcel COS-2 Wash	
Cross Streets:	Open Space between Parcel C and Parcel D	COPIES TO:
File Number:	F:\Depot\DSMemos\DS4774B.doc	GCW Engineers & Surveyors
Parcel Number:	137-33-801-002	Howard Hughes Company, LLC
Zoning Action:	FMP-62680	Bart Anderson, P.E., DevCo
FEMA Flood Zone	YES	NO
		X
Proposed Storm Drain	YES	NO
		X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	12/30/2015	1/21/2016	Not Approved	\$400.00	427966: \$400
2 nd Submittal	3/10/2016	4/6/2016	See Comments Below	\$400.00	436538: \$400
TOTAL FEES (LDDRS):				\$800.00	----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

X	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

- The subject "COS-2" parcel is a common lot and public drainage easement to be privately maintained by the developer and future *Homeowners Association*. Record as such in the final map.

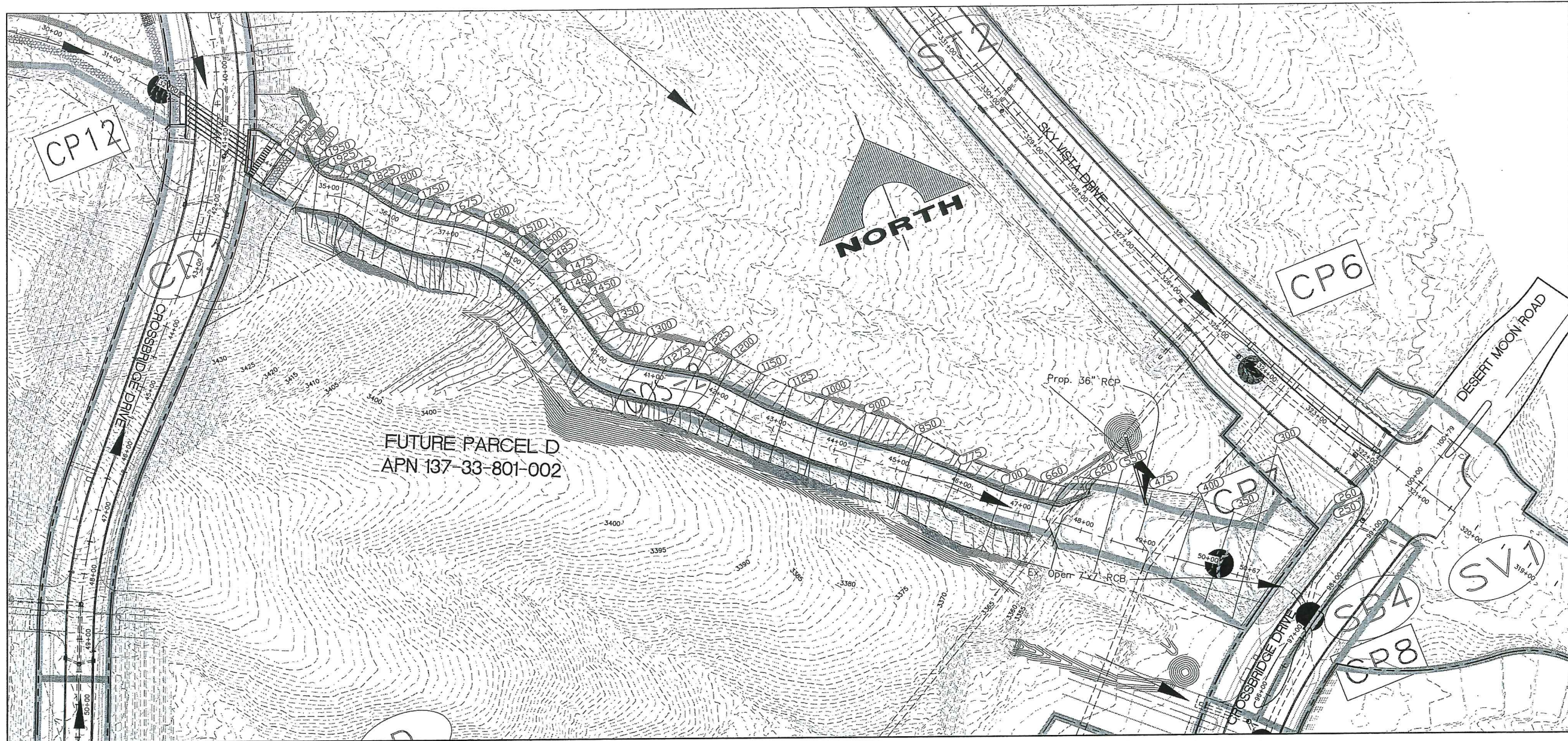
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional acceptance of a drainage study is valid for a period of one (1) year. If the proposed construction has not been completed in that time period, the *City of Las Vegas* reserves the right to require additional conditions and/or submission and acceptance of a complete drainage study update prior to further construction of a project.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see <http://ndep.nv.gov/bwpc/storm01.htm> or call (775) 687-9429.

END OF REMARKS

ays

T/R/S: T20S/R59E/33
AREA K-33



COS-2 - HYDRAULIC MODELS RESULTS SUMMARY AND SUPER-ELEVATION CALCULATIONS (ULTIMATE CONDITIONS)

COS-2 - HYDRAULIC MODELS RESULTS SUMMARY AND SUPER-ELEVATION CALCULATIONS (EXISTING CONDITIONS)													
Sta	ULT Q	FL Elevation	WS Elevation	Depth	Vel	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	Berm Height	Riprap (DSB-inches)
(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	
2051.55	554	3422.27	3426.57	4.30	4.73	64.00	0.62	0	1.0	0.0	5.3	-	-
2051	554	3420.30	3422.66	2.36	7.40	72.69	1.29	0	1.2	0.0	3.6	-	-
1950	554	3419.00	3420.95	1.95	3.26	184.32	0.60	0	1.0	0.0	2.9	-	-
1900	554	3417.34	3419.60	2.26	6.32	71.56	1.01	0	1.2	0.0	3.5	-	-
1875	554	3414.43	3416.61	2.18	8.56	55.31	1.40	0	1.3	0.0	3.5	-	-
1825	554	3411.57	3413.17	1.60	8.93	60.17	1.55	0	1.3	0.0	2.9	-	-
1800	554	3409.75	3410.74	0.99	6.15	125.83	1.28	0	1.2	0.0	2.1	-	-
1750	554	3406.00	3408.23	2.23	7.53	58.19	1.18	200	1.2	0.3	3.7	-	-
1675	554	3403.00	3404.57	1.57	8.28	64.96	1.44	200	1.2	0.3	3.2	-	-
1600	554	3399.00	3401.23	2.23	8.73	51.69	1.39	200	1.3	0.3	3.8	-	-
1510	554	3396.00	3399.35	3.35	9.87	50.97	1.66	200	1.3	0.4	3.0	-	-
1500	554	3394.00	3394.99	0.99	14.17	44.43	2.66	200	1.4	0.7	3.0	-	-
1485	554	3393.00	3394.06	1.06	12.53	48.73	2.32	200	1.3	0.6	3.0	-	-
1475	554	3390.00	3391.90	1.90	11.85	51.85	2.20	200	1.4	0.6	3.8	-	-
1460	554	3389.00	3391.09	2.09	10.07	54.28	1.76	146	1.3	0.6	4.0	-	-
1450	554	3388.00	3389.53	1.53	5.12	144.29	1.04	146	1.1	0.4	3.1	-	-
1350	554	3385.00	3386.67	1.67	7.27	98.87	1.46	146	1.2	0.6	3.4	-	-
1300	554	3382.00	3383.50	1.50	6.73	113.73	1.39	146	1.2	0.5	3.2	-	-
1275	554	3380.00	3381.82	1.82	7.43	88.10	1.42	0	1.2	0.0	3.0	-	-
1225	554	3378.00	3379.13	1.13	7.29	122.38	1.63	0	1.2	0.0	2.3	-	-
1200	554	3376.00	3377.03	1.03	7.78	93.74	1.57	0	1.2	0.0	2.2	-	-
1150	554	3373.00	3374.80	1.80	7.84	74.24	1.44	0	1.2	0.0	3.1	-	-
1125	554	3369.00	3371.12	2.12	9.77	56.50	1.72	0	1.3	0.0	3.4	-	-
1000	554	3367.00	3368.49	1.49	10.50	43.31	1.68	0	1.3	0.0	2.8	-	-
900	554	3364.00	3365.41	1.41	10.84	40.96	1.71	0	1.3	0.0	2.7	-	-
850	554	3360.00	3361.31	1.31	10.02	55.66	1.77	0	1.3	0.0	2.6	-	-
775	554	3356.00	3357.57	1.57	9.72	56.29	1.70	0	1.3	0.0	2.9	-	-
700	554	3353.00	3354.22	1.22	9.74	50.79	1.62	0	1.3	0.0	2.5	-	-
680	554	3349.00	3350.10	1.10	10.60	60.28	2.01	0	1.3	0.0	2.4	-	-
620	554	3346.20	3347.00	0.80	9.28	88.71	2.00	0	1.2	0.0	2.0	-	-
550	554	3340.30	3341.10	0.80	9.83	81.13	2.08	0	1.2	0.0	2.0	-	-
475	554	3334.40	3335.09	0.69	10.55	89.37	2.42	0	1.2	0.0	1.9	-	-
400	595	3328.50	3329.33	0.83	9.72	80.82	1.97	0	1.2	0.0	2.1	-	-
350	595	3322.60	3323.37	0.77	10.70	76.77	2.22	0	1.2	0.0	2.0	-	-
300	595	3317.00	3323.75	6.75	0.55	216.83	0.04	0	1.0	0.0	7.8	-	-
260	595	3312.00	3323.75	11.75	0.35	186.00	0.02	0	1.0	0.0	12.8	-	-
250	595	3312.00	3323.75	11.75	0.35	197.16	0.02	0	1.0	0.0	12.8	-	-

Sta	Plan Sta	ULT Q	FL Elevation	WS Elevation	Depth	EG Slope	Vel	Flow Area	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	Channel Depth	Riprap (DSB-inches)	Footing Depth
(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
2051.55	34+05.55	554	3422.27	3426.57	4.30	0.0313	6.56	84.46	64.00	1.01	0	1.3	0.0	5.6	6.2	36	7.0
2051	34+20.15	554	3420.21	3422.79	2.58	0.0198	6.93	80.82	67.70	1.08	0	1.2	0.0	3.8	4.5	12 (LOB, ROB)	7.0
1950	34+49.82	554	3418.67	3420.27	1.60	0.0979	11.53	48.13	58.62	2.25	0	1.3	0.0	2.9	4.4	12 (LOB, ROB)	7.0
1925	34+61.73	554	3418.08	3419.92	1.84	0.0260	7.39	76.24	70.16	1.23	0	1.2	0.0	3.1	4.5	12 (LOB, ROB)	7.0
1900	34+80.98	554	3416.68	3418.22	1.54	0.0627	10.48	53.60	55.35	1.86	0	1.3	0.0	2.8	4.9	12 (LOB, ROB)	7.0
1875	35+21.02	554	3414.26	3416.10	1.84	0.0498	9.86	57.09	54.20	1.68	100	1.3	0.8	4.0	4.3	12 (LOB, ROB)	7.0
1825	35+65.12	554	3410.33	3412.90	2.57	0.0923	10.78	49.86	60.91	2.17	100	1.4	1.1	5.0	5.3	12 (LOB, ROB)	7.0
1800	36+06.88	554	3408.24	3410.73	2.49	0.0427	10.01	56.39	45.44	1.59	250	1.3	0.3	4.1	5.1	12 (LOB, ROB)	7.0
1750	36+50.00	554	3405.74	3407.40	1.66	0.0836	12.45	44.52	43.38	2.16	250	1.4	0.4	3.4	5.1	12 (LOB, ROB)	7.0
1675	37+04.82	554	3401.92	3404.10	2.18	0.0616	10.76	51.80	50.68	1.85	250	1.3	0.4	3.9	5.3	12 (LOB, ROB)	7.0
1600	37+60.05	554	3398.81	3400.93	2.12	0.0584	10.74	51.56	45.94	1.79	250	1.3	0.3	3.8	5.2	12 (LOB, ROB)	7.0
1510	38+02.07	554	3396.83	3398.51	1.68	0.0574	11.66	47.74	39.18	1.85	250	1.3	0.3	3.4	5.2	12 (LOB, ROB)	7.0
1500	38+26.99	554	3395.29	3397.14	1.85	0.0655	11.39	48.70	45.10	1.93	250	1.3	0.4	3.6	5.0	12 (LOB, ROB)	7.0
1485	38+40.33	554	3394.22	3396.18	1.96	0.0682	11.59	48.23	45.53	1.97	250	1.4	0.4	3.7	5.7	12 (LOB, ROB)	7.0
1475	38+65.53	554	3392.76	3394.67	1.91	0.0678	11.09	49.97	49.19	1.94	250	1.3	0.4	3.6	5.4	12 (LOB, ROB)	7.0
1460	38+88.54	554	3391.37	3393.24	1.87	0.0699	11.19	49.56	49.71	1.97	250	1.3	0.4	3.6	5.4	12 (LOB, ROB)	7.0
1450	39+29.84	554	3388.84	3390.92	2.08	0.0469	10.79	51.88	41.33	1.67	0	1.3	0.0	3.4	5.2	12 (LOB, ROB)	7.0
1350	39+93.16	554	3385.52	3387.17	1.65	0.0690	11.94	47.13	43.99	1.99	100	1.4	1.0	4.0	5.3	12 (LOB, ROB)	5.0
1300	40+61.69	554	3382.23	3384.14	1.91	0.0403	10.18	55.52	45.46	1.57	0	1.3	0.0	3.2	5.0	12 (LOB, ROB)	5.0
1275	41+06.62	554	3379.81	3381.75	1.94	0.0614	11.46	48.35	42.14	1.89	0	1.4	0.0	3.2	4.7	12 (LOB, ROB)	5.0
1225	41+52.98	554	3377.86	3379.79	1.93	0.0477	9.98	56.11	51.67	1.65	0	1.3	0.0	3.1	4.9	12 (LOB, ROB)	5.0
1200	41+96.94	554	3375.82	3377.63	1.81	0.0533	10.49	54.18	50.69	1.75	0	1.3	0.0	3.1	4.6	12 (LOB, ROB)	5.0
1150	42+45.74	554	3373.09	3375.02	1.93	0.0578	10.59	53.29	52.31	1.81	0	1.3	0.0	3.3	4.6	12 (LOB, ROB)	5.0
1125	43+09.02	554	3369.96	3371.95	1.99	0.0643	11.38	49.60	47.68	1.91	0	1.4	0.0	3.3	5.3	12 (LOB, ROB)	5.0
1000	43+65.35	554	3366.41	3368.39	1.98	0.0382	11.04	52.30	36.95	1.57	0	1.3	0.0	3.3	5.7	12 (LOB, ROB)	5.0
900	44+33.05	554	3363.16	3364.88	1.72	0.0545	12.19	46.75	37.74	1.83	0	1.4	0.0	3.1	5.8	12 (LOB, ROB)	5.0
850	45+15.85	554	3359.34	3360.99	1.65	0.0517	10.74	52.57	46.91	1.74	0	1.3	0.0	3.0	5.7	12 (LOB, ROB)	3.0
775	45+89.12	554	3355.47	3357.61	2.14	0.0456	10.17	55.82	47.91	1.64	0	1.3	0.0	3.5	5.5	12 (LOB, ROB)	3.0
700	46+65.77	554	3352.26	3353.97	1.71	0.0474	10.37	53.49	45.09	1.67	0	1.3	0.0	3.0	6.0	12 (LOB, ROB)	3.0
680	47+22.95	554	3348.65	3350.02	1.37	0.0717	12.25	45.24	40.09	2.03	0	1.3	0.0	2.7	7.3	12 (LOB, ROB)	3.0
620	47+66.26	554	3345.20	3346.95	0.75	0.1056	18.48	53.46	82.46	2.27	0	1.2	0.0	2.1	5.7	-	-
550	48+37.26	554	3340.30	3341.13	0.83	0.0759	9.41	58.87	81.47	1.95	0	1.2	0.0	2.1	5.7	-	-
475	49+08.89	554	3334.40	3335.05	0.65	0.1555	11.28	49.13	88.83	2.67	0	1.2	0.0	1.9	3.6	-	-
400	49+55.53	595	3328.50	3329.38	0.88	0.0627	9.16	64.97	81.16	1.80	0	1.2	0.0	2.1	5.5	-	-
350	50+15.45	595	3322.60	3323.31	0.71	0.1303	11.68	50.93	76.41	2.52	0	1.3	0.0	2.0	7.4	-	-
300	50+60.00	595	3317.00	3323.75	6.75	0.0000	0.55	1063.47	216.83	0.04	0	1.0	0.0	7.8	13.0	-	-
260	Crossbridge Dr	595	3312.00	3323.75	11.75	0.0000	0.35	1699.45	186.00	0.02	0	1.0	0.0	12.8	14.0	-	-
250	Crossbridge Dr	595	3312.00	3323.75	11.75	0.0000	0.35	1676.89	197.16	0.02	0	1.0	0.0	12.8	13.0	-	-



LEGEND

- COS-1 DRAINAGE SUBBASIN
- CP1 CONCENTRATION POINT
- SUBBASIN BOUNDARY
- HEC-RAS CROSS SECTION

HEC-RAS Plan: ult_berm River: River #5 Reach: Reach #5 Profile: Profile 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #5	2051.55	Profile 1	554.00	3422.27	3423.69	3423.69	3424.36	0.031257	6.56	84.46	64.00	1.01
Reach #5	2051	Profile 1	554.00	3420.21	3422.79	3422.86	3423.53	0.019780	6.93	80.82	67.70	1.08
Reach #5	1950	Profile 1	554.00	3418.67	3420.27	3420.87	3422.34	0.097895	11.53	48.13	59.82	2.25
Reach #5	1925	Profile 1	554.00	3418.08	3419.92	3420.07	3420.75	0.025997	7.39	76.24	70.16	1.23
Reach #5	1900	Profile 1	554.00	3416.68	3418.22	3418.72	3419.90	0.062665	10.48	53.60	55.35	1.86
Reach #5	1875	Profile 1	554.00	3414.26	3416.10	3416.53	3417.58	0.049814	9.86	57.09	54.20	1.68
Reach #5	1825	Profile 1	554.00	3410.33	3412.90	3413.45	3414.86	0.092282	10.78	49.86	60.91	2.17
Reach #5	1800	Profile 1	554.00	3408.24	3410.73	3411.20	3412.24	0.042653	10.01	58.39	45.44	1.59
Reach #5	1750	Profile 1	554.00	3405.74	3407.40	3408.13	3409.80	0.083607	12.45	44.52	43.38	2.16
Reach #5	1675	Profile 1	554.00	3401.92	3404.10	3404.62	3405.89	0.061565	10.76	51.80	50.68	1.85
Reach #5	1600	Profile 1	554.00	3398.81	3400.93	3401.46	3402.72	0.056376	10.74	51.56	45.94	1.79
Reach #5	1510	Profile 1	554.00	3396.83	3398.51	3399.19	3400.62	0.057416	11.66	47.74	39.18	1.85
Reach #5	1500	Profile 1	554.00	3395.29	3397.14	3397.76	3399.15	0.065485	11.39	48.70	45.10	1.93
Reach #5	1485	Profile 1	554.00	3394.22	3396.18	3396.81	3398.25	0.068210	11.59	48.23	45.53	1.97
Reach #5	1475	Profile 1	554.00	3392.76	3394.67	3395.23	3396.57	0.067785	11.09	49.97	49.19	1.94
Reach #5	1460	Profile 1	554.00	3391.37	3393.24	3393.81	3395.18	0.069941	11.19	49.56	49.71	1.97
Reach #5	1450	Profile 1	554.00	3388.84	3390.92	3391.52	3392.72	0.046907	10.79	51.88	41.33	1.67
Reach #5	1350	Profile 1	554.00	3385.52	3387.17	3387.84	3389.36	0.069006	11.94	47.13	43.99	1.99
Reach #5	1300	Profile 1	554.00	3382.23	3384.14	3384.60	3385.73	0.040317	10.18	55.52	45.46	1.57
Reach #5	1275	Profile 1	554.00	3379.81	3381.75	3382.37	3383.79	0.061358	11.46	48.35	42.14	1.89
Reach #5	1225	Profile 1	554.00	3377.86	3379.79	3380.24	3381.33	0.047723	9.99	56.11	51.67	1.66
Reach #5	1200	Profile 1	554.00	3375.82	3377.63	3378.12	3379.30	0.053293	10.49	54.18	50.69	1.75
Reach #5	1150	Profile 1	554.00	3373.09	3375.02	3375.53	3376.74	0.057791	10.59	53.29	52.31	1.81
Reach #5	1125	Profile 1	554.00	3368.96	3370.95	3371.53	3372.93	0.064341	11.36	49.60	47.68	1.91
Reach #5	1000	Profile 1	554.00	3366.41	3368.39	3368.91	3370.21	0.038243	11.04	52.30	36.95	1.57
Reach #5	900	Profile 1	554.00	3363.16	3364.88	3365.57	3367.16	0.054476	12.19	46.75	37.74	1.83
Reach #5	850	Profile 1	554.00	3359.34	3360.99	3361.51	3362.76	0.051663	10.74	52.57	46.91	1.74
Reach #5	775	Profile 1	554.00	3355.47	3357.61	3358.07	3359.17	0.045632	10.17	55.82	47.91	1.64
Reach #5	700	Profile 1	554.00	3352.26	3353.97	3354.46	3355.64	0.047428	10.37	53.49	45.09	1.67
Reach #5	660	Profile 1	554.00	3348.65	3350.02	3350.70	3352.35	0.071655	12.25	45.24	40.09	2.03
Reach #5	620	Profile 1	554.00	3346.20	3346.95	3347.44	3348.63	0.105609	10.48	53.46	82.46	2.27
Reach #5	550	Profile 1	554.00	3340.30	3341.13	3341.54	3342.51	0.075867	9.41	58.87	81.47	1.95
Reach #5	475	Profile 1	554.00	3334.40	3335.05	3335.57	3337.02	0.155469	11.28	49.13	88.83	2.67
Reach #5	400	Profile 1	595.00	3328.50	3329.38	3329.76	3330.68	0.062744	9.16	64.97	81.16	1.80
Reach #5	350	Profile 1	595.00	3322.60	3323.31	3323.89	3325.43	0.130321	11.68	50.93	76.41	2.52
Reach #5	300	Profile 1	595.00	3317.00	3323.75	3318.17	3323.75	0.000020	0.55	1083.47	216.83	0.04
Reach #5	260	Profile 1	595.00	3312.00	3323.75		3323.75	0.000004	0.35	1699.45	186.00	0.02
Reach #5	250	Profile 1	595.00	3312.00	3323.75	3313.30	3323.75	0.000004	0.35	1676.89	197.16	0.02

COS2.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X   X   XXXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXXXX XXXX   X   XXX XXXX XXXXXX XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
X   X   XXXXXX   XXXX   X   X   X   XXXXX

```

PROJECT DATA
Project Title: COS1-2
Project File : COS2.prj
Run Date and Time: 3/8/2016 1:46:12 PM

Project in English units

Project Description:

PLAN DATA

Plan Title: COS1-2_CULVERT_rough_ULI berms
Plan File : f:\Projects\600\62024-232\Division\Fct1\Calcs\RTC\HEC-RAS\COS2.p16
Geometry Title: COS1-2_CULVERT_rough_int berms
Geometry File : f:\Projects\600\62024-232\Division\Fct1\Calcs\RTC\HEC-RAS\COS2.g03
Flow Title : COS1-2_ULI
Flow File : f:\Projects\600\62024-232\Division\Fct1\Calcs\RTC\HEC-RAS\COS2.f03

Plan Summary Information:
Number of: Cross Sections = 38 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: COS1-2_ULI
Flow File : f:\Projects\600\62024-232\Division\Fct1\Calcs\RTC\HEC-RAS\COS2.f03

Flow Data (cfs)

River	Reach	RS	Profile 1
River #5	Reach #5	2051.55	554
River #5	Reach #5	400	595

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River #5	Reach #5	Profile 1	Known WS = 3426.57	Known WS = 3323.75

GEOMETRY DATA

Geometry Title: COS1-2_CULVERT_rough_int berms
Geometry File : f:\Projects\600\62024-232\Division\Fct1\Calcs\RTC\HEC-RAS\COS2.g03

CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 2051.55

INPUT

Description:
Station Elevation Data num= 6

COS2.rep

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3435	0	3422.47	36	3422.27	38	3422.27	64	3422.47
64	3428.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.047	64	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

0	64		33.6	33.6	33.6	.1	.3
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 2051

INPUT

Description:
 Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3422.98	.1	3422.99	.5	3423.09	.66	3423.11	.83	3423.11
1.83	3423.03	1.99	3423.01	2.18	3423	2.33	3422.99	3.08	3422.95
3.35	3422.94	4.3	3422.91	4.99	3422.9	5.74	3422.9	5.93	3422.9
9.79	3422.9	10.03	3422.9	11.1	3422.94	13.06	3423	13.07	3423
13.08	3423	13.09	3423	13.1	3422.99	13.98	3422.99	13.99	3422.99
16.62	3422.78	17.55	3422.66	18.59	3422.56	21.97	3422.41	23.82	3422
24.18	3422	24.43	3422	24.68	3422	25.49	3422.12	27.78	3422.47
28.53	3422.51	29.54	3422.59	30.14	3422.61	30.69	3422.62	30.99	3422.62
31.02	3422.62	31.04	3422.62	31.2	3422.62	31.54	3422.6	35	3422.37
35.07	3422.37	36.19	3422.34	38.92	3422.21	39.21	3422.2	39.98	3422.16
40.06	3422.16	43.39	3422	43.56	3421.99	45.02	3421.9	48.58	3421.69
48.99	3421.7	49.21	3421.71	49.96	3421.72	50.08	3421.72	50.82	3421.72
51.37	3421.66	51.54	3421.63	51.86	3421.61	53.55	3421.53	54.97	3421.44
55.02	3421.44	55.05	3421.44	55.68	3421.39	57.44	3421.22	59.29	3421
59.98	3420.91	59.99	3420.91	60.14	3420.89	62.58	3420.61	63.51	3420.52
65.02	3420.42	65.37	3420.4	65.56	3420.4	66.05	3420.39	66.57	3420.39
66.82	3420.39	67.9	3420.23	68.03	3420.21	68.17	3420.21	68.39	3420.22
69.16	3420.23	69.62	3420.25	70.06	3420.27	70.12	3420.28	70.49	3420.31
71.19	3420.33	75.02	3420.74	77.44	3420.99	77.53	3421	77.64	3421.04
77.67	3421.04	77.73	3421.05	78.02	3421.06	82.25	3421.55	84.14	3421.62
84.24	3421.66	84.34	3427.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	21.97	.035	84.34	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

21.97	84.34		30	30	30	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1950

INPUT

Description:
 Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3423.72	.02	3423.74	.1	3423.74	2.28	3423.77	1.9	3423.63
20.07	3423.1	21.29	3422.48	24.91	3420.72	26.48	3419.96	26.63	3419.96
26.82	3419.95	27.86	3419.93	28.06	3419.92	33.36	3419.7	34.42	3419.69
35.07	3419.69	37.55	3419.63	39.49	3419.61	42.87	3419.67	46.56	3419.52
51.63	3419.32	52.15	3419.3	52.48	3419.31	53.09	3419.33	53.49	3419.34
54.44	3419.42	55.6	3419.35	56.81	3419.5	57.55	3419.48	57.96	3419.51
58.49	3419.53	58.98	3419.55	59.58	3419.6	60.09	3419.6	62.27	3419.56
63.31	3419.62	64.11	3419.65	64.34	3419.65	64.74	3419.63	65.07	3419.62
66.31	3419.49	66.69	3419.48	68.55	3419.31	71.35	3419	71.53	3418.97
72.63	3418.71	72.85	3418.68	73.02	3418.67	73.57	3418.69	79.1	3419
80.85	3419.21	84.7	3420	84.71	3420	86.51	3420.52	86.73	3420.55
87.02	3420.56	92.03	3421	92.03	3427				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	26.48	.035	92.03	.013

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

26.48	92.03		32.32	32.32	32.32	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1925

INPUT

Description:
 Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
18.84	3423	23.62	3420.54	25.79	3419.41	25.91	3419.4	26.14	3419.39
26.25	3419.39	26.28	3419.39	26.72	3419.36	28.75	3419.25	30.13	3419.16
33.23	3419.06	35.4	3419.03	35.51	3419.03	35.58	3419.02	45.17	3419.03
45.72	3419	49.45	3418.57	53.22	3418.58	54.65	3418.51	55.48	3418.48
55.98	3418.49	56.59	3418.51	57.34	3418.5	57.74	3418.48	58.08	3418.46
58.74	3418.39	59.26	3418.37	60.11	3418.4	61.02	3418.41	62.84	3418.38
63.56	3418.36	65.06	3418.23	65.23	3418.23	65.76	3418.21	66.01	3418.19
66.18	3418.18	66.56	3418.21	66.91	3418.16	67.14	3418.14	67.26	3418.12
67.38	3418.09	67.41	3418.08	67.43	3418.08	67.49	3418.08	68.24	3418.12

COS2.rep

68.51	3418.14	68.79	3418.16	69.04	3418.18	70.5	3418.3	71.17	3418.36
73.97	3418.61	75.91	3418.75	77.11	3418.83	78.13	3418.95	78.69	3419
79.17	3419.05	80.13	3419.13	82.73	3419.24	82.9	3419.24	85.47	3419.29
86.3	3419.28	86.98	3419.25	89.01	3419.03	89.25	3419	91.12	3418.72
92.1	3418.55	93.27	3419.07	95.38	3420.12	99.24	3422.02	101.7	3422.06
103.39	3422.09	103.49	3422.1						

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
18.84	.04	26.72	.035
92.1	.04		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	26.72	92.1		21.15	21.15		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1900

INPUT

Description:		num= 114	
Station	Elevation	Data	num= 114
Sta	Elev	Sta	Elev
181.67	3424.53	181.77	3424.52
186.09	3424.2	187.96	3424.06
188.59	3423.97	189.19	3423.87
192.22	3423.63	193.57	3423.52
199.99	3422.62	201.44	3421.96
202.46	3421.49	202.53	3421.45
206.86	3419.5	206.98	3419.45
208.81	3418.61	209.07	3418.58
212.63	3418.32	213.11	3418.3
215.44	3418.18	215.69	3418.17
218.63	3418.01	218.72	3418
233.2	3417.06	233.29	3417.06
238.59	3417.04	238.65	3417.04
240.99	3417.02	241.06	3417.02
241.12	3417.02	241.16	3417.02
241.38	3417.03	241.55	3417.04
252.42	3417.13	252.5	3417.13
256.86	3417.3	259.55	3417.12
263.99	3416.71	264.65	3416.69
266.22	3416.68	266.73	3416.7
267.62	3416.97	268.61	3417.46
273.63	3419.96	274.09	3420.19
290.47	3420.49	294.2	3420.56
181.87	3424.51	187.98	3424.06
190.24	3423.79	194.03	3423.42
197.76	3422.97	201.54	3421.91
201.68	3421.85	203.85	3420.84
204	3420.77	207.97	3419
208.07	3418.95	209.34	3418.56
209.37	3418.56	213.84	3418.26
214.14	3418.25	217.07	3418.16
218.48	3418.01	224.81	3417.41
230.71	3417.22	234.16	3417.03
234.41	3417.02	240.95	3417.03
240.97	3417.03	241.08	3417.02
241.1	3417.02	241.23	3417.02
241.28	3417.02	242.08	3417.04
251.02	3417.09	254.82	3417.32
255.28	3417.35	260.83	3417
261.56	3416.94	264.79	3416.69
265.43	3416.68	266.93	3416.7
267.09	3416.71	269.62	3417.97
271.63	3418.97	276.69	3420.24
278.39	3420.27	294.3	3420.56
279.5	3420.29		
294.4	3420.57		

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
181.67	.04	209.37	.035
267.09	.04		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	209.37	267.09		41.2	41.2		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1875

INPUT

Description:		num= 85	
Station	Elevation	Data	num= 85
Sta	Elev	Sta	Elev
0	3419.83	.1	3419.83
5.83	3419.68	6.77	3419.66
7.72	3419.41	7.81	3419.37
11.68	3417.42	13.67	3416.42
15.13	3416.09	15.29	3416.09
18.16	3416.01	18.29	3416
24.57	3415.62	24.83	3415.62
30.21	3415.38	33.58	3415
39.66	3414.46	39.97	3414.44
45.61	3414.4	45.91	3414.42
50.82	3415	50.88	3415.01
52.68	3414.99	53.61	3414.94
57.84	3414.79	58.06	3414.77
60.56	3414.56	61.7	3414.47
64.24	3414.26	64.48	3414.29
64.7	3414.32	64.95	3414.43
68.36	3416.04	68.59	3416.14
.2	3419.83	.2	3419.83
6.91	3419.66	7.26	3419.65
8.12	3419.21	9.7	3418.42
14.31	3416.1	15.11	3416.09
15.66	3416.09	16.68	3416.06
19.69	3415.87	22.45	3415.72
25.94	3415.58	28.1	3415.61
34.05	3414.9	34.64	3414.9
41.01	3414.35	41.24	3414.34
45.95	3414.43	46.73	3414.5
51.75	3415.09	52.49	3415.03
56.93	3414.83	57.25	3414.82
58.14	3414.76	59.07	3414.67
62.75	3414.38	63.53	3414.3
64.5	3414.29	64.54	3414.29
66.14	3414.99	66.49	3415.16
70.35	3416.97	70.69	3417.13
5.57	3419.69	7.63	3419.46
11.67	3417.43	15.12	3416.09
17.92	3416.04	23.62	3415.68
28.36	3415.59	37.46	3414.62
41.71	3414.34	48.08	3414.65
52.61	3415	57.61	3414.81
59.2	3414.66	63.59	3414.29
64.62	3414.31	67.64	3415.7
71.8	3417.65		

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.04	14.31	.035
64.7	.04		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	14.31	64.7		40.8	40.8		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1825

INPUT

Description:		num= 122	
Station	Elevation	Data	num= 122

COS2.rep

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3416.42	.1	3416.41	.2	3416.41	.3	3416.41	.4	3416.4
.6	3416.4	1.01	3416.38	1.57	3416.36	3.11	3416.31	7.88	3416.14
8.11	3416.03	8.31	3415.93	8.45	3415.86	9.11	3415.55	9.73	3415.25
12.54	3413.91	14.59	3412.93	15.53	3412.49	16.49	3412.47	16.79	3412.47
17.21	3412.46	17.54	3412.45	22.79	3412.16	23.43	3412.14	23.54	3412.13
23.86	3412.12	23.98	3412.11	24.06	3412.11	24.4	3412.12	24.79	3412.13
25.99	3412	26.29	3411.96	27.03	3411.9	27.41	3411.89	28.37	3411.92
29.08	3411.96	29.32	3411.97	29.84	3412	32.96	3412.36	35.19	3412.61
35.72	3412.7	36.4	3412.78	36.4	3412.79	36.65	3412.83	36.92	3412.93
36.94	3412.93	36.94	3412.94	36.98	3412.94	37.01	3412.94	37.06	3412.94
37.13	3412.94	37.16	3412.94	37.34	3412.94	37.56	3412.93	37.61	3412.93
37.65	3412.93	37.68	3412.9	37.78	3412.88	37.85	3412.86	37.97	3412.85
38.22	3412.84	41.02	3412.73	41.24	3412.72	43.12	3412.63	43.38	3412.62
43.63	3412.62	44.81	3412.55	45.36	3412.62	45.84	3412.67	46.06	3412.68
46.55	3412.69	46.8	3412.68	47.16	3412.67	48.63	3412.6	49.62	3412.55
55.67	3412.23	56.38	3412.19	57.11	3412.15	58.73	3412.07	59.93	3412
61.87	3411.64	64.43	3411	64.68	3410.95	64.82	3410.92	66.28	3410.6
66.62	3410.49	67.75	3410.33	67.76	3410.34	67.89	3410.36	69.57	3410.66
69.64	3410.67	70.17	3410.62	70.28	3410.64	70.62	3410.7	70.72	3410.72
71.31	3410.96	72.22	3411.31	73.67	3411.87	74.92	3412.26	76.77	3413.07
76.93	3413.14	77.82	3413.48	78.22	3413.64	78.34	3413.69	78.67	3413.66
82.35	3413.84	86.08	3414.03	86.47	3414.03	88.54	3414.02	91.45	3414
97.54	3413.97	98.14	3413.97	100.85	3413.95	101.47	3413.96	104.87	3414.03
108.76	3414.11	114.17	3414.21	114.22	3414.22	114.27	3414.22	114.37	3414.22
114.47	3414.22	114.57	3414.22						

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .04 15.53 .035 69.64 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 15.53 69.64 42.52 42.52 42.52 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1800

INPUT

Description:

Station Elevation Data			num=	104	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
55.67	3415.63	56.08	3415.66	58.01	3415.75	60.31	3415.7	60.75	3415.68				
60.83	3415.67	69.71	3415.29	76.12	3415	79.22	3414.78	81.76	3414.6				
82.14	3414.57	83.3	3414	84.68	3413.32	85.33	3413	86.83	3412.27				
87.24	3412.06	87.36	3412	88.18	3411.62	89.17	3411.11	89.22	3411.09				
89.4	3411	89.86	3411	90	3411	90.02	3411	90.06	3410.99				
90.64	3411	92.38	3411	93.73	3410.95	95.85	3410.82	97.03	3410.8				
97.53	3410.75	98.15	3410.69	100.16	3410.49	104.92	3410	105.5	3409.79				
106.14	3409.41	106.58	3409.31	107.19	3409.34	108.11	3409.35	108.45	3409.38				
109.14	3409.51	111.56	3409.85	111.63	3409.86	112.49	3410	112.5	3410				
113.73	3410.13	114.37	3410.06	114.68	3410.03	115.5	3410.03	117.38	3410.01				
118.42	3410	118.58	3410	121.03	3409.8	121.49	3409.82	121.67	3409.81				
122.03	3409.8	122.2	3409.79	122.67	3409.72	123.3	3409.6	126.07	3409				
126.12	3408.98	126.73	3408.79	127.82	3408.58	128.46	3408.38	129.16	3408.29				
129.47	3408.25	129.75	3408.24	130	3408.24	130.25	3408.26	130.48	3408.28				
130.77	3408.33	131.7	3408.42	132.13	3408.42	133.14	3408.4	136.15	3408.51				
137.14	3408.52	141.15	3409.59	141.67	3410	143	3410.59	143.6	3411				
144.07	3411.22	144.37	3411.35	145.77	3412	146.81	3412.48	147.53	3412.84				
147.85	3413	148.53	3413.02	148.92	3413.04	149.08	3413.04	150.93	3413.34				
151.08	3413.36	151.87	3413.42	152.64	3413.48	154.54	3413.48	158.23	3413.5				
167.19	3413.53	168.63	3413.53	169.77	3413.54	173.13	3413.57	175.49	3413.58				
178.43	3413.74	183.11	3413.86	183.13	3413.97	183.21	3413.97						

Manning's n Values num= 3
 Sta n Val Sta n Val
 55.67 .04 89.4 .035 137.14 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 89.4 137.14 41.03 41.03 41.03 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1750

INPUT

Description:

Station	Elevation	Data	num=	112	Sta	Elev	Sta	Elev	Sta	Elev
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
213.91	3412.05	214.01	3412.04	214.21	3412.04	215.32	3412	222.84	3411.77	
223.49	3411.75	225.77	3411.67	231.61	3411.49	235.35	3411.38	236.02	3411.35	
236.46	3411.34	236.62	3411.26	237.12	3411	239.25	3410	239.41	3409.92	
240.91	3409.16	240.98	3409.12	241.23	3409	242.78	3408.18	243.13	3408	
243.66	3407.75	244.19	3407.5	244.21	3407.5	244.65	3407.25	250.1	3407.23	
251.8	3407.01	251.94	3407	253.79	3406.54	254.32	3406.42	255.21	3406.33	
255.61	3406.27	255.94	3406.25	256.65	3406.24	256.89	3406.24	257.09	3406.24	
257.39	3406.22	258.78	3406.43	259.6	3406.55	259.88	3406.55	260.35	3406.54	
260.77	3406.5	260.83	3406.49	262.09	3406.27	262.39	3406.14	262.98	3406	
263.51	3406	265.02	3406	265.95	3406.13	266.38	3406.17	267.2	3406.25	
267.55	3406.31	268.19	3406.3	268.72	3406.3	269.12	3406.28	269.55	3406.24	
271.73	3406.03	272.09	3406	272.73	3405.96	274.36	3405.83	275.25	3405.78	
277.64	3405.74	279.17	3405.75	279.92	3405.76	280.52	3405.77	281.28	3405.81	
283.43	3406.01	284.16	3406.24	286.56	3406.99	286.6	3407	286.67	3407.02	
288.31	3407.58	289.68	3407.98	295.33	3408	295.61	3408.135	296.94	3408.78	
297.37	3409	297.58	3409.1	299.18	3409.89	299.4	3410	300.82	3410.7	

COS2.rep

301.03	3410.7	304.1	3410.75	309.05	3410.83	309.25	3410.83	311.75	3410.87
311.96	3410.87	313.07	3410.92	313.65	3410.93	314.04	3410.94	317.79	3411
319.11	3411.02	328.35	3411.16	332.91	3411.23	338.38	3411.84	339.81	3412
340.47	3412.32	341.87	3413	342.7	3413.4	343.93	3414	345.24	3414.64
345.98	3415	347.53	3415.75	348.51	3416.23	348.71	3416.33	348.8	3416.37
348.81	3416.38	348.91	3416.43	349.01	3416.47	349.11	3416.52	349.21	3416.57
349.26	3416.6	349.31	3416.6						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
213.91	.04	244.65	.035	295.33	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	244.65	295.33		54.06	54.06		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1675

INPUT

Description:

Station	Elevation	Data	num=	85	Sta	Elev	Sta	Elev	Sta	Elev
17.39	3407.16	17.49	3407.16	19.6	3407.2	20.97	3407.19	26.22	3407.07	
28.55	3407.02	29.23	3407	30.74	3406.24	31.23	3406	31.93	3405.65	
33.32	3405	34.69	3404.28	35.25	3404	35.55	3404	35.63	3404	
35.64	3404	35.67	3404	35.72	3404	35.73	3404	35.74	3404	
35.8	3404	36.68	3403.9	37.13	3403.86	44.43	3403	44.6	3402.92	
46.27	3402.12	46.46	3402	46.77	3401.97	47.2	3401.95	48.79	3401.92	
49.98	3402	51.47	3402	51.49	3402	52.55	3402.56	52.8	3402.62	
54.59	3402.92	54.97	3403	55.91	3403	63.89	3403	64.53	3402.69	
64.99	3402.61	68.2	3402.85	68.61	3402.91	69.02	3403	70.65	3403.17	
75.8	3403.49	77	3403.48	77.58	3403.48	78.05	3403.5	78.78	3403.56	
79.42	3403.6	79.65	3403.61	80.18	3403.64	80.64	3403.68	80.69	3403.64	
80.82	3403.62	81.2	3403.59	82.77	3403.48	83.1	3403.44	83.37	3403.45	
84.38	3403.43	85.52	3403.99	85.54	3404	86.19	3404.32	86.2	3404.32	
87.6	3405	88.42	3405.44	88.49	3405.47	89.53	3406	90.18	3406.32	
91.61	3407	91.65	3407	94.95	3407.32	98.32	3407.65	99.77	3407.79	
102.57	3407.86	102.66	3407.86	104.73	3407.9	109.24	3408	109.91	3408.02	
116.17	3408.19	117.24	3408.22	121.99	3408.37	124.9	3408.45	125	3408.48	

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
17.39	.04	35.25	.035	84.38	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	35.25	84.38		53.71	53.71		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1600

INPUT

Description:

Station	Elevation	Data	num=	71	Sta	Elev	Sta	Elev	Sta	Elev
212.18	3405.01	212.28	3405.01	217.76	3405.05	221.86	3405.02	224.68	3405	
225.17	3404.79	226.76	3404	227.49	3403.64	228.9	3403	233.96	3402	
233.97	3402	233.97	3401.99	233.98	3401.99	234.44	3401.86	236.64	3401.41	
237.25	3401.19	237.38	3401.12	237.51	3401	237.67	3400.84	237.87	3400.62	
238.54	3400	238.87	3399.95	239.7	3399.87	240.31	3399.84	241.42	3399.82	
243.13	3399.81	246.86	3399.8	248.34	3399.79	248.69	3399.8	248.91	3399.82	
250.86	3400	253.19	3400.58	253.51	3400.63	253.65	3400.62	255.16	3400.53	
257.52	3400.38	263.68	3400	263.72	3400	263.73	3400	263.75	3399.99	
263.8	3399.99	268.4	3399.41	270.66	3399	271.29	3398.9	271.65	3398.87	
273.05	3398.84	275.49	3398.81	276	3398.89	276.49	3399	278.6	3399.39	
281.56	3399.98	281.68	3400	282.66	3400.58	282.84	3400.66	283.1	3400.79	
283.21	3400.82	283.41	3400.87	285.52	3401.91	285.7	3402	285.96	3402.12	
286.31	3402.28	286.9	3402.56	287.86	3403	288.49	3403.3	290	3404	
290.04	3404	290.46	3404.01	292.44	3404.03	296.38	3404.08	299.93	3404.2	
300.03	3404.2									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
212.18	.04	233.97	.035	285.7	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	233.97	285.7		36.6	36.6		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1510

INPUT

Description:

Station	Elevation	Data	num=	127	Sta	Elev	Sta	Elev	Sta	Elev
25.86	3403.04	25.96	3403.03	26.06	3403.03	27.03	3403	32.84	3402.35	
33.67	3402.29	34.79	3402.2	35.54	3402.15	36.82	3402.05	37.5	3402	
37.95	3401.77	38.9	3401.3	39.51	3401	41.07	3400.22	41.31	3400.1	
41.36	3400.07	41.43	3400.04	41.5	3400	41.53	3399.99	41.86	3399.82	
42.31	3399.59	42.34	3399.59	42.79	3399.5	43.91	3399.43	49.19	3399	
49.37	3398.99	49.43	3398.99	49.93	3398.95	50.13	3398.94	52.47	3398.79	

COS2.rep

52.97	3398.75	54.35	3398.61	54.46	3398.6	54.77	3398.57	54.78	3398.57
54.98	3398.54	56.27	3398.4	56.95	3398.32	57.46	3398.26	58.8	3398.1
59.61	3398	61.23	3397.36	61.28	3397.34	61.73	3397.14	62.36	3397
62.5	3396.97	62.9	3396.92	62.97	3396.91	63.41	3396.88	64.99	3396.85
66.04	3396.84	66.08	3396.84	66.48	3396.84	67.16	3396.83	67.63	3396.83
68.18	3396.84	68.38	3396.84	68.58	3396.84	69.78	3396.86	70.29	3396.88
70.42	3396.89	70.99	3396.92	72.4	3397	72.76	3397.02	74.56	3397.08
75.27	3397.07	76.62	3397.06	77.79	3397.07	78.48	3397.03	79.05	3397
79.92	3396.95	80.16	3396.94	80.29	3396.94	80.47	3396.93	80.58	3396.92
80.81	3396.91	80.93	3396.9	81.25	3396.88	81.38	3396.88	81.43	3396.88
81.63	3396.87	81.78	3396.86	81.86	3396.86	81.92	3396.86	82.12	3396.85
82.47	3396.84	82.83	3396.83	83.32	3396.83	83.56	3396.83	84.16	3396.85
84.51	3396.86	85.08	3396.92	87.33	3397.34	88.99	3397.62	89.69	3397.76
89.83	3397.78	90	3397.82	90.33	3397.88	90.96	3398	93.51	3398
93.55	3398	93.63	3398.01	93.71	3398.01	93.72	3398.01	93.88	3398.02
93.9	3398.04	93.93	3398	94.15	3398.14	94.49	3398.59	94.8	3399
96.23	3399.68	96.37	3399.75	96.69	3399.89	96.95	3400	98.83	3400.9
99.05	3401	100.94	3401.91	101.11	3402	101.12	3402	101.14	3402
101.52	3402	104.67	3402.01	104.85	3402.02	104.86	3402.02	104.89	3402.02
105.15	3402.02	105.25	3402.02						

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
25.86	.04	42.34	.035
		93.51	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	42.34	93.51		23.75	23.75		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1500

INPUT

Description:		num= 89	
Station	Elevation	Data	num=
Sta	Elev	Sta	Elev
57.7	3400.98	57.75	3401
61.12	3400.95	61.25	3400.95
74.65	3400.54	75.6	3400.05
79.63	3398.06	79.77	3398
81.61	3396.44	82.09	3396.25
83.39	3396.05	83.49	3396.06
88.03	3396.37	91.41	3396.38
94.34	3396.53	94.68	3396.55
99.14	3396.59	99.72	3396.57
102.1	3396.32	102.21	3396.3
106.29	3395.63	109.25	3395.37
110.13	3395.29	110.42	3395.29
115.16	3395.35	115.3	3395.34
119.5	3395.75	120.14	3395.79
123.33	3396.45	125.5	3397
128.63	3397.48	129.47	3397.61
134.4	3398.89	134.86	3399.12
137.79	3400.24	137.89	3400.26
		100.88	3396.51
		103.19	3396.08
		109.61	3395.32
		111.35	3395.3
		115.46	3395.34
		120.33	3395.79
		125.52	3397
		129.73	3397.64
		136.61	3400
		137.99	3400.28
		58	3401.01
		70.24	3400.79
		76.44	3399.65
		81.3	3397.3
		82.85	3396.06
		84.29	3396.07
		93.23	3396.45
		97.84	3396.58
		101.36	3396.47
		103.28	3396
		109.74	3395.31
		113.09	3395.34
		115.65	3395.35
		121.2	3395.78
		127.99	3397.36
		132.1	3397.74
		137.59	3400.2
		138.09	3400.3
		59.13	3401
		74.16	3400.72
		77.76	3399
		81.32	3397.29
		82.93	3396.07
		85.79	3396.17
		93.8	3396.49
		98.62	3396.59
		101.87	3396.39
		105.67	3395.69
		109.91	3395.3
		113.93	3395.35
		117	3395.49
		122.11	3396
		128.44	3397.45
		132.63	3398
		137.69	3400.22

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
57.7	.04	81.61	.035
		132.1	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	81.61	132.1		13.38	13.38		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1485

INPUT

Description:		num= 94	
Station	Elevation	Data	num=
Sta	Elev	Sta	Elev
60.77	3399.89	60.87	3399.89
73.83	3398.84	77.09	3397.23
79.88	3395.53	80.48	3395.18
80.58	3395.08	80.59	3395.07
80.8	3395.08	81.05	3395.1
84.18	3395.26	85.79	3395.34
87.92	3395.55	89.04	3395.58
92.46	3395.59	92.95	3395.56
94.96	3395.51	98.52	3395.24
104.08	3395.05	105.24	3395.01
109.1	3394.85	110.2	3394.78
113.38	3394.42	114.08	3394.39
115.15	3394.22	115.37	3394.23
117.2	3394.28	117.47	3394.31
120.96	3395.02	123.68	3396
127.28	3396.79	127.52	3396.83
128.98	3396.89	129.22	3396.92
132.35	3398.14	135.79	3399.88
138.36	3400.17	138.46	3400.18
		72.02	3399.1
		77.24	3397.16
		80.53	3395.09
		80.64	3395.07
		81.14	3395.12
		86.08	3395.37
		90.25	3395.6
		93.17	3395.52
		98.84	3395.23
		105.36	3395
		110.51	3394.74
		114.48	3394.31
		115.61	3394.25
		117.73	3394.35
		125.15	3396.34
		127.77	3396.86
		130.08	3397
		136.04	3400
		138.56	3400.18
		73.5	3399
		78.31	3396.62
		80.53	3395.08
		80.67	3395.07
		81.21	3395.13
		86.82	3395.5
		91.28	3395.61
		93.51	3395.48
		99.26	3395.22
		105.49	3395
		111.58	3394.61
		114.82	3394.26
		115.79	3394.26
		118.29	3394.34
		125.99	3396.52
		128.65	3396.91
		131.58	3397.75
		138.16	3400.13
		138.66	3400.18
		79.03	3396.12
		80.55	3395.08
		80.71	3395.07
		83.25	3395.23
		87.19	3395.52
		91.99	3395.6
		94.13	3395.49
		99.89	3395.18
		108.75	3394.91
		112.57	3394.54
		115.06	3394.22
		116.9	3394.26
		120.92	3395
		126.87	3396.72
		128.92	3396.89
		132.07	3398
		138.26	3400.17

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
60.77	.04	80.53	.035
		130.08	.04

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.

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.05 .1

80.53 130.08 24.44 24.44 24.44

CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1475

INPUT
Description:

Station	Elevation	Data	num=	100	Sta	Elev	Sta	Elev	Sta	Elev
53.5	3398.02	53.59	3398.02	53.6	3398.02	54.09	3398.02	57.35	3398.16	
58.51	3398.15	70.31	3397.99	70.5	3397.98	71.86	3397.92	71.99	3397.91	
72.18	3397.9	72.27	3397.9	73.13	3397.54	74.3	3397	76.01	3396.1	
76.23	3396	76.41	3395.91	78.28	3395	78.6	3395	79.25	3394.88	
82.2	3394.19	85.86	3394.18	89.17	3394.18	90.76	3394.18	92.43	3394.13	
93.67	3394	93.72	3393.98	95.94	3393.2	96.2	3393.19	96.53	3393.11	
96.6	3393.09	96.74	3393.06	96.75	3393.05	96.76	3393.05	96.86	3393.04	
96.88	3393.05	96.93	3393.06	96.97	3393.07	97.05	3393.08	97.16	3393.09	
97.61	3393.16	97.79	3393.16	99.23	3393.42	99.66	3393.5	100.04	3393.55	
100.92	3393.62	102.02	3393.7	102.49	3393.72	103.82	3393.76	103.98	3393.75	
104.19	3393.75	104.33	3393.73	104.53	3393.7	104.75	3393.67	105.46	3393.59	
105.97	3393.56	109.31	3393.36	111.9	3393.27	114.4	3393	114.67	3392.98	
115.94	3392.9	117.24	3392.79	117.88	3392.76	118.79	3392.78	120.4	3392.83	
121.15	3392.87	121.8	3393	122.57	3393.25	124.87	3394	127.17	3394.42	
128.17	3394.58	128.57	3394.63	128.73	3394.64	129	3394.63	129.3	3394.62	
129.49	3394.78	129.67	3394.97	129.68	3394.97	129.78	3394.97	129.8	3394.98	
129.83	3395	129.87	3395.02	131.82	3396	132.72	3396.46	132.94	3396.57	
133.8	3397	135.79	3398	136.88	3398.56	136.89	3398.57	140.04	3398.66	
140.75	3398.68	145.71	3398.81	152.35	3399	153.56	3399.04	154.9	3399.08	
165.11	3399.07	165.21	3399.04	165.31	3399.04	165.41	3399.04	165.51	3399.04	

Manning's n Values- num= 3

Sta	n Val	Sta	n Val	Sta	n Val
53.5	.04	79.25	.035	129.83	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
79.25 129.83 20.15 20.15 20.15 .05 .1

CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1460

INPUT
Description:

Station	Elevation	Data	num=	106	Sta	Elev	Sta	Elev	Sta	Elev
0	3396.76	.1	3396.76	.2	3396.75	.3	3396.75	.7	3396.74	
1.53	3396.71	1.54	3396.71	1.75	3396.71	3.15	3396	3.68	3395.73	
5.24	3395	5.65	3394.79	6.61	3394.3	7.22	3394	7.63	3393.8	
8.53	3393.35	8.61	3393.31	9.07	3393.242	10.7	3393	11.47	3393	
12.2	3393	12.92	3393	14.18	3393	14.64	3393	15.37	3392.84	
15.51	3392.84	15.7	3392.84	15.84	3392.84	15.92	3392.84	16.27	3392.85	
16.4	3392.85	16.47	3392.86	16.6	3392.86	16.91	3392.86	17.76	3392.86	
18.5	3392.86	18.92	3392.85	19.27	3392.84	19.38	3392.84	20.29	3392.71	
21.07	3392.61	23.04	3392.36	23.93	3392.25	24.66	3392.16	25.51	3392.06	
26.05	3392	26.28	3392	26.37	3392	26.63	3392.03	26.69	3392.03	
27.97	3392.16	28.61	3392.2	30.6	3392.3	31.07	3392.31	31.73	3392.33	
32.68	3392.34	33.39	3392.31	34.96	3392.13	35.07	3392.13	35.51	3392.12	
35.59	3392.12	35.72	3392.17	37.36	3392.35	37.6	3392.39	37.91	3392.43	
38.91	3392.5	42.15	3392	42.23	3391.99	42.46	3391.96	43.54	3391.81	
44.03	3391.75	45.17	3391.59	45.75	3391.58	46.07	3391.57	46.82	3391.5	
47.62	3391.44	48.49	3391.4	48.98	3391.4	49.52	3391.38	50.53	3391.37	
50.59	3391.37	50.99	3391.37	51.22	3391.37	51.29	3391.37	51.37	3391.37	
52.69	3391.48	52.92	3391.48	53.48	3391.48	54.32	3391.58	56.32	3392	
56.72	3392.2	58.26	3392.96	58.35	3393	58.62	3393.15	58.63	3393.15	
61.02	3394.37	63.54	3395.62	64.31	3396	65.02	3396.35	65.12	3396.4	
65.22	3396.45	65.32	3396.5	65.42	3396.55	65.52	3396.6	65.62	3396.62	
65.64	3396.66									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	9.07	.035	58.35	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9.07 58.35 43.2 43.2 43.2 .05 .1

CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1450

INPUT
Description:

Station	Elevation	Data	num=	79	Sta	Elev	Sta	Elev	Sta	Elev
288.25	3395.8	288.35	3395.8	291.67	3395.69	301.11	3395.38	301.33	3395.37	
302.46	3395.34	306.06	3395.2	308.97	3395.08	309.51	3395.07	312.81	3395	
313.6	3394.95	316.92	3394.72	317.26	3394.69	318.66	3394	320.58	3393.05	
320.68	3393	320.76	3392.96	322.69	3392	324.12	3391.29	324.16	3391.29	
328.46	3391.03	328.69	3391	329.21	3390.82	330.74	3390.38	332.08	3390	
332.11	3389.99	332.15	3389.98	332.6	3389.88	333.02	3389.84	333.49	3389.84	
334.12	3390	334.37	3390.06	334.45	3390.08	335.66	3390.26	336.59	3390.17	
337.37	3390	337.58	3389.98	337.88	3389.97	338	3390	339.06	3390.28	
341.17	3391	342.13	3391.27	342.82	3391.43	343.29	3391.44	345.47	3391.45	

COS2.rep

345.65	3391.44	347.43	3391	347.99	3390.73	349.61	3390	349.62	3390
349.99	3389.96	350.02	3389.96	350.04	3389.96	356.84	3389.31	364.41	3389
364.44	3389	367.5	3388.9	367.66	3388.89	369.9	3388.84	370.32	3388.84
370.49	3388.85	372.04	3389	373.63	3389.56	374.84	3390	375.52	3390.31
376.1	3390.57	376.3	3390.66	377.05	3390.99	377.08	3391	379.18	3391.98
379.24	3392	379.36	3392.06	381.39	3393	383.16	3393.83	397.63	3394
401.23	3394.02	401.62	3394.02	403.02	3394.02	403.12	3394.02		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
288.25	.04	324.12	.035	374.84	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

324.12	374.84	59.28	59.28	59.28	.05	.1
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CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1350

INPUT

Description:

Station	Elevation	Data	num=	88	Sta	Elev	Sta	Elev	Sta	Elev
71.45	3393	71.55	3393	72.36	3393.01	79.97	3392.76	84.08	3392.6	
90.39	3392.37	95.01	3392.2	100.39	3392	106.79	3391.49	107.47	3391.43	
108.99	3390.7	109.05	3390.66	110.29	3390	111.5	3389.41	112.34	3389	
112.45	3388.95	113.53	3388.44	114.28	3388.1	114.51	3388	117.84	3387.64	
119.3	3387.49	123.11	3387	123.22	3387	124.14	3386.83	126.57	3386.03	
126.65	3386	127.45	3385.84	127.88	3385.68	128.1	3385.64	128.57	3385.6	
128.79	3385.59	128.93	3385.59	129.52	3385.65	129.68	3385.7	130.08	3385.84	
131.61	3386	131.64	3386	134.1	3386.13	134.95	3386.16	137.16	3386.23	
139	3386.26	140.59	3386.28	141.31	3386.29	142.4	3386.32	142.75	3386.33	
143.25	3386.32	145.01	3386	146.04	3385.84	147.26	3385.63	147.41	3385.61	
148.01	3385.55	148.9	3385.52	150.22	3385.52	151.8	3385.53	154.69	3385.58	
155.55	3385.66	157.08	3385.82	158.71	3386	158.97	3386.08	159.61	3386.42	
159.8	3386.45	160.12	3386.46	161	3386.47	161.87	3386.47	162.73	3386.38	
165.42	3387	166.06	3387.28	166.45	3387.45	166.57	3387.5	167.73	3388	
169.19	3388.7	169.21	3388.71	169.33	3388.77	169.81	3389	171.56	3389.81	
171.72	3389.89	171.96	3390	173.62	3390.16	173.67	3390.17	178.74	3390.66	
179.04	3390.67	183.04	3390.78	185.08	3390.84	185.23	3390.85	187.82	3390.89	
187.92	3390.95	188.02	3390.95	188.12	3390.95					

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
71.45	.04	114.51	.035	162.73	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

114.51	162.73	68.84	68.84	68.84	.05	.1
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CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1300

INPUT

Description:

Station	Elevation	Data	num=	76	Sta	Elev	Sta	Elev	Sta	Elev
145.73	3387.88	145.8	3387.91	145.83	3387.91	146.01	3387.92	146.19	3387.92	
158.44	3387.84	165.31	3387.8	178.88	3387.33	187.93	3387.19	188.34	3387	
188.67	3386.85	190.48	3386	192.61	3385	194.75	3384	196.36	3383.67	
198.37	3383.57	200.81	3383.45	203.64	3383.35	205.01	3383.3	207.35	3383.23	
211.27	3383.07	211.62	3383.05	212.58	3383	214.9	3382.71	216.7	3382.5	
217.26	3382.48	217.94	3382.51	218.33	3382.45	218.93	3382.33	219.08	3382.32	
219.87	3382.27	221.31	3382.35	221.7	3382.31	223.93	3382.44	224.48	3382.4	
225.19	3382.33	225.58	3382.24	225.74	3382.24	225.91	3382.24	226.15	3382.23	
226.28	3382.23	226.44	3382.23	226.78	3382.24	226.9	3382.25	226.9	3382.26	
226.99	3382.27	227.28	3382.28	229.38	3382.33	229.93	3382.35	230.26	3382.36	
230.68	3382.39	237.28	3383	237.31	3383	238.56	3383.63	239.49	3384	
241.26	3384.61	242.27	3385	246.45	3385.15	246.98	3385.42	248.16	3386	
249.1	3386.47	250.17	3387	251.19	3387.5	251.55	3387.68	252.18	3388	
256.11	3388.21	260.56	3388.45	265.13	3388.7	265.16	3388.7	271.2	3388.98	
273.48	3388.99	273.7	3389	274.47	3389.38	276.2	3390	276.51	3390.38	
277.1	3390.67									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
145.73	.04	196.36	.035	237.31	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

196.36	237.31	39	39	39	.05	.1
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CROSS SECTION

RIVER: River #5
REACH: Reach #5 RS: 1275

INPUT

Description:

Station	Elevation	Data	num=	75	Sta	Elev	Sta	Elev	Sta	Elev
46.56	3385	48.5	3384.11	48.56	3384.08	48.73	3384	50.89	3383	
51.43	3382.75	51.67	3382.64	52.99	3382.03	53.01	3382.02	53.05	3382	
53.17	3382	53.19	3382	54.22	3381.93	54.84	3381.9	58.43	3381.78	
61.34	3381.66	64.17	3381.53	66.49	3381.43	69.39	3381.22	72.61	3381	

COS2.rep

72.76	3380.97	76.68	3380	78.1	3379.91	78.6	3379.84	78.84	3379.82
79.13	3379.81	79.54	3379.81	81.2	3379.82	81.89	3379.83	84.21	3379.86
84.29	3379.86	92.26	3380	92.55	3380.01	92.67	3380.02	95.71	3380.21
98.24	3380.97	100.94	3381.68	101.313381.774		101.49	3381.82	102.14	3382
102.85	3382.16	103.2	3382.24	104.25	3382.45	105	3382.64	105.54	3383
105.66	3383.06	106.24	3383.34	106.77	3383.6	106.79	3383.61	107.58	3384
108.88	3384.64	109.61	3385	110.46	3385.42	112.08	3386.22	112.57	3386.24
114.57	3386.33	115.77	3386.39	116.27	3386.42	118.28	3386.54	120.77	3386.69
122.14	3386.75	122.19	3386.75	122.64	3386.77	126.1	3386.93	126.62	3386.94
128.37	3386.98	129.03	3387	131.23	3387.09	132.28	3387.13	133.64	3387.18
133.71	3387.19	135.35	3388	136.4	3388.25	136.5	3388.57	136.6	3388.62

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
46.56	.04	52.99	.035	105	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

52.99	105	44.76	44.76	44.76	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1225

INPUT
 Description:

Station	Elevation	Data	num=	96	Sta	Elev	Sta	Elev	Sta	Elev
15.74	3382.87	15.84	3382.87	18.21	3382.84	19.39	3382.96	19.75	3382.97	
20.01	3382.97	21.17	3382.95	22.26	3382.92	23.34	3382.89	25.37	3382.83	
29.06	3382.79	30.61	3382.78	33.66	3382.76	33.87	3382.75	36.03	3382.74	
45.5	3382.66	48.78	3382.63	51.89	3382.6	52.35	3382.6	53.63	3382	
55.02	3381.36	55.02	3381.35	55.78	3381	56.91	3380.47	59.16	3379.65	
59.42	3379.56	63.98	3379.65	67.1	3379.63	69.02	3379.58	69.91	3379.56	
70.69	3379.55	71.44	3379.52	78.52	3379	80.87	3378	80.99	3377.99	
82.42	3377.86	85.15	3377.91	88.43	3377.97	90.34	3378	95.77	3378.13	
96.1	3378.14	96.85	3378.1	96.91	3378.1	96.93	3378.1	97.01	3378.1	
97.15	3378.1	97.67	3378.1	97.99	3378.11	98.84	3378.12	99.14	3378.12	
99.21	3378.12	99.31	3378.12	99.57	3378.14	100.02	3378.15	103.34	3378.22	
105.56	3378.54	105.8	3378.55	106.72	3378.6	107.46	3378.66	108.3	3378.74	
108.83	3379	109.98	3379.57	110.85	3380	112.39	3380.83	112.45	3380.87	
112.71	3381	112.92	3381.11	114.73	3382	114.77	3382.02	115.69	3382.48	
116.74	3383	117.26	3383.26	118.05	3383.65	118.14	3383.66	118.42	3383.67	
120.93	3383.84	121.5	3383.88	124.86	3384.05	125.57	3384.08	126.25	3384.1	
128.28	3384.21	129.6	3384.28	131.65	3384.39	132.97	3384.47	136.33	3384.65	
137.68	3384.72	138.38	3384.76	139.7	3384.83	140.13	3384.85	142.13	3384.96	
143.11	3385	143.21	3385.21	143.31	3385.26	143.41	3385.31	143.51	3385.37	
143.61	3385.42									

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.74	.04	59.42	.035	108.3	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

59.42	108.3	40.31	40.31	40.31	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1200

INPUT
 Description:

Station	Elevation	Data	num=	103	Sta	Elev	Sta	Elev	Sta	Elev
7.63	3381.5	7.73	3381.5	9.37	3381.6	15.09	3381.55	17.03	3381.51	
19	3381.46	20.93	3381.42	20.98	3381.42	27.57	3381.29	35.69	3381.12	
38.41	3381.06	39.58	3381.03	41.16	3381	44.43	3380.78	44.77	3380.76	
45.12	3380.59	46.29	3380	47.34	3379.47	48.14	3379.07	48.28	3379	
48.77	3378.76	48.84	3378.72	49.08	3378.68	50.63	3377.82	51.45	3377.41	
52.26	3377	52.7	3376.78	55.22	3376.95	55.86	3376.99	55.98	3377	
58.45	3377.45	58.84	3377.44	59.27	3377.42	59.9	3377.39	60.58	3377.44	
60.95	3377.45	61.33	3377.45	62.33	3377.42	63.89	3377.35	64.86	3377.3	
66.97	3377.15	67.37	3377.13	68.83	3377	68.86	3377	69.28	3376.81	
69.56	3376.69	70.93	3376.17	71.39	3376	72.79	3376	73.59	3376	
75.17	3376.09	76.44	3376.16	76.74	3376.18	77.54	3376.2	78.92	3376.21	
80.42	3376.2	83.29	3376.2	85.79	3376.19	85.88	3376.19	88.03	3376.19	
88.08	3376.19	88.9	3376.21	89.86	3376.21	91.1	3376.17	91.94	3376.11	
92.32	3376	92.55	3375.91	92.86	3375.88	94.3	3375.84	95.41	3375.82	
96.36	3375.83	97.97	3375.98	98.14	3376	98.2	3376.03	100.15	3377	
100.33	3377.03	101.31	3377.45	101.53	3377.54	102.34	3377.94	102.47	3378	
103.24	3378.43	104.39	3379	105.56	3379.58	106.4	3380	106.75	3380.17	
107.9	3380.74	108.02	3380.76	108.26	3380.79	109.97	3381	111.87	3381.09	
114.33	3381.19	115.34	3381.24	115.55	3381.25	120.8	3381.33	122.67	3381.36	
124.02	3381.39	128.69	3381.61	129.28	3381.62	130.02	3381.63	132.89	3381.66	
134.58	3381.68	135.47	3381.68	135.57	3382.05					

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7.63	.04	52.7	.035	98.14	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

52.7	98.14	45.95	45.95	45.95	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1150

INPUT

Description:

Station	Elevation	Data	num=	126	Sta	Elev	Sta	Elev	Sta	Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
186.43	3378.82	186.44	3378.82	186.53	3378.82	186.68	3378.94	186.8	3379		
186.88	3379.04	188.53	3379	191.39	3378.86	192.71	3378.79	193.83	3378.74		
196.48	3378.6	201.44	3378.63	201.47	3378.63	206.6	3378.56	207.07	3378.55		
209.21	3378.5	211.17	3378.45	213.33	3378.4	213.92	3378.38	218.11	3378.28		
219.73	3378.24	222.52	3378.12	223.12	3378.09	224.94	3378.01	225.18	3378		
225.59	3377.79	227.17	3377	228.55	3376.3	228.57	3376.29	229.15	3376		
230.23	3375.46	230.98	3375.08	231.14	3375	231.86	3374.64	232.37	3374.38		
232.66	3374.23	233.12	3374	233.29	3373.91	233.423373.994		233.43	3374		
234.42	3374.06	235.07	3374.1	236.79	3374.15	237.1	3374.16	238.37	3374.17		
238.57	3374.17	242.45	3374.17	242.6	3374.17	243.92	3374.16	244.51	3374.13		
247.2	3374	248.03	3373.9	248.41	3373.87	248.97	3373.92	249.47	3374		
252.46	3374.2	253.18	3374.25	254.6	3374.43	254.93	3374.45	255.31	3374.45		
257.03	3374.45	257.71	3374.46	258	3374.47	258.27	3374.48	259.05	3374.5		
259.42	3374.5	259.7	3374.49	260.4	3374.37	261.52	3374	263.21	3373.43		
264.11	3373.33	265.57	3373.27	267.22	3373.25	268.35	3373.09	268.38	3373.09		
268.47	3373.09	268.53	3373.09	268.63	3373.09	268.91	3373.1	269.14	3373.11		
269.27	3373.12	269.45	3373.14	270.1	3373.23	272.54	3373.24	275.29	3374		
275.36	3374.01	278.29	3374.22	279.47	3374.25	280.6	3374.28	281.46	3374.31		
281.63	3374.33	281.89	3374.43	282.09	3374.5	282.26	3374.57	283.26	3374.98		
283.36	3375	285.04	3375.83	285.38	3376	285.86	3376.24	287.4	3377		
287.67	3377.13	288.56	3377.57	288.77	3377.68	289.11	3377.69	292.65	3377.8		
293.99	3377.84	295.11	3377.87	296.03	3377.9	296.22	3377.91	299.12	3378		
299.34	3378	299.76	3378.01	302.24	3378.05	302.94	3378.06	303.26	3378.06		
303.28	3378.07	306.52	3378.43	306.78	3378.46	309.43	3378.76	310.26	3378.81		
310.36	3378.87	310.46	3378.88	310.56	3378.89	310.66	3378.9	310.76	3378.91		
310.86	3378.93										

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
186.43	.04	233.29	.035	281.46	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
233.29	281.46	62.3	62.3	62.3	.05		.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1125

INPUT

Description:

Station Elevation Data			num= 122									
Sta	Elev		Sta	Elev		Sta	Elev		Sta	Elev		
50.93	3375.29		51.03	3375.29		52.72	3375.21		59.06	3375.06	62.77	3375
63.67	3374.98		70.5	3374.83		75.69	3374.72		77.39	3374.67	80.57	3374.55
82.6	3374.52		83.26	3374.51		85.42	3374.48		87.19	3374.16	88.12	3374
89.59	3373.27		89.63	3373.24		90.12	3373		90.95	3372.58	92.11	3372
92.71	3371.7		93.88	3371.11		94.11	3371	94.12	3371		94.19	3370.97
94.45	3370.84		95.18	3370.47		95.79	3370.16	96.12	3370		96.42	3369.95
97.78	3369.9		98.86	3369.9		99.78	3369.91	100.4	3369.95		100.68	3370
100.69	3370		104.71	3370.59		106.54	3370.86	107.34	3370.98		107.91	3370.99
108.19	3370.99		108.2	3370.99		108.21	3370.99	108.21	3371		108.22	3371
108.23	3371		108.24	3371		108.27	3370.99	108.28	3370.99		108.34	3370.98
109.54	3370.95		110.81	3370.69		111.94	3370.4	112.53	3370.25		113.5	3370
115.39	3369.54		117.46	3369.03		117.52	3369.02	117.59	3369		117.6	3369
117.61	3368.99		117.85	3368.96		118.02	3368.96	118.93	3369		119.1	3369.02
119.22	3369.03		119.34	3369.04		121.42	3369.22	122.02	3369.27		122.42	3369.31
123.19	3369.37		125.44	3369.53		127.2	3369.65	127.73	3369.46		127.93	3369.32
128.06	3369.32		128.31	3369.32		128.72	3369.32	129.23	3369.34		129.55	3369.35
129.75	3369.36		129.93	3369.37		130.21	3369.39	130.53	3369.42		130.62	3369.43
131.8	3369.61		133.75	3370		133.77	3370	134	3370		134.28	3370
136.09	3370		136.62	3370		138.16	3370	142.46	3370.33		144.51	3371
145.88	3371.68		146.13	3371.81		146.52	3372	146.91	3372.2		148.53	3373
149.21	3373.34		150.54	3374		151.25	3374.05	151.3	3374.05		153.95	3374.24
155.65	3374.37		156.4	3374.4		158.96	3374.5	160.52	3374.56		162.18	3374.63
162.34	3374.64		163.2	3374.68		165.87	3374.81	168.36	3374.93		168.58	3374.95
170.95	3375		171.05	3375.31		171.15	3375.36	171.25	3375.41		171.35	3375.46
171.45	3375.51		171.55	3375.56								

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
50.93	.04	96.12	.035	142.46	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
96.12	142.46	55.56	55.56	55.56	.05		.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 1000

INPUT

Description:

Station	Elevation	Data	num=	77	Sta	Elev	Sta	Elev	Sta	Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3373	.1	3373	2.69	3373.04	8.74	3373	11	3372.85		
12.49	3372.89	13.35	3372.91	14.42	3372.89	16.48	3372.83	27.65	3372.57		
31.04	3372.49	32.75	3372.45	34.29	3372.42	38.15	3372	39.81	3371.17		
40.15	3371	40.68	3370.73	41.68	3370.23	42.14	3370	43.58	3369.28		
53.85	3369.27	53.87	3369.29	53.98	3369.29	55.54	3369	55.61	3368.97		

COS2.rep

56.97	3368.4	57.71	3368	57.75	3367.98	58.76	3367.53	59.96	3367
59.97	3367	61.21	3366.83	61.43	3366.82	65.53	3366.83	65.71	3366.83
66.55	3366.78	66.83	3366.78	66.84	3366.76	67.44	3366.57	68.25	3366.54
69.01	3366.51	69.47	3366.49	69.95	3366.47	70.52	3366.46	70.83	3366.42
70.99	3366.41	71.24	3366.41	74.82	3366.51	75.75	3366.54	76.53	3366.58
77.87	3366.66	82.63	3367	82.99	3367.03	90.45	3367.43	92.08	3367.46
93.18	3368	94.12	3368.47	94.89	3368.81	95.25	3368.98	95.32	3369
96.64	3369.65	97.35	3370	97.81	3370.23	98.96	3370.8	99.37	3371
100.67	3371.65	101.09	3371.85	101.39	3372	102.47	3372.07	104.18	3372.08
106.75	3372.24	107.14	3372.25	108.97	3372.28	110.58	3372.31	110.84	3372.32
121.39	3372.94	121.49	3372.94						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	61.21	.035	92.08	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

61.21	92.08	66.92	66.92	66.92	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 900

INPUT
 Description:

Station	Elevation	Data	num=	103	Sta	Elev	Sta	Elev	Sta	Elev
9.53	3370.01	11.74	3370.08	17.56	3370.03	18.09	3370.03	19.16	3370.04	
20.93	3370	21.1	3370	35.01	3369.68	35.5	3369.67	39.82	3369.58	
47.56	3369.05	48.36	3369	49.49	3368.43	50.36	3368	50.84	3367.76	
52.35	3367	52.3533366.999		53.88	3366.23	54.78	3366	58.03	3366	
58.11	3366	61.09	3366	61.14	3365.99	63.42	3365.44	64.43	3365.13	
64.87	3365	66.28	3364.66	66.72	3364.56	67.35	3364.5	68.91	3364	
68.95	3364	71.59	3363.8	74.17	3363.61	78.83	3363.28	79.6	3363.24	
79.67	3363.24	80.08	3363.22	80.95	3363.17	81.21	3363.16	81.32	3363.16	
81.44	3363.16	81.71	3363.16	82.12	3363.17	82.23	3363.18	82.31	3363.18	
82.46	3363.21	82.73	3363.27	82.83	3363.28	82.94	3363.29	83.04	3363.3	
83.32	3363.29	84.03	3363.27	84.31	3363.27	84.65	3363.28	85.4	3363.31	
85.89	3363.34	86.19	3363.35	88.27	3363.48	90.61	3363.66	91	3363.56	
91.09	3363.55	91.25	3363.52	91.33	3363.44	91.58	3363.34	91.85	3363.31	
92.19	3363.29	93.08	3363.31	93.47	3363.31	94.36	3363.33	94.67	3363.34	
94.91	3363.36	99.1	3363.84	99.68	3363.88	100.64	3364	101.51	3364.12	
101.58	3364.13	103.18	3364.93	103.29	3364.98	103.33	3365	103.35	3365.01	
103.5	3365.09	104.63	3365.73	105.11	3366	106.95	3366.92	107.39	3367.13	
108.66	3367.76	109.14	3368	111.15	3369	111.4	3369.02	115.96	3369.32	
117.06	3369.34	118.4	3369.36	119.76	3369.39	120.93	3369.41	122.04	3369.43	
122.39	3369.43	124.37	3369.47	125.96	3369.5	128.24	3369.54	128.41	3369.54	
131.89	3369.6	134.71	3369.64	134.81	3369.98					

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9.53	.04	68.91	.035	101.51	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

68.91	101.51	82.06	82.06	82.06	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 850

INPUT
 Description:

Station	Elevation	Data	num=	100	Sta	Elev	Sta	Elev	Sta	Elev
169.13	3365.81	169.23	3365.81	170.84	3365.83	180.08	3365.66	181.49	3365.63	
188.44	3365.49	189.57	3365.47	195.63	3365.35	195.95	3365.34	198.88	3365.28	
201.43	3364.01	201.45	3364	201.48	3363.98	203.45	3363	204.84	3362.3	
205.45	3362	205.88	3361.78	207.12	3361.16	207.45	3361	207.79	3360.83	
208.6	3360.42	209.02	3360.21	209.29	3360.08	209.45	3360.07	211.08	3360.06	
211.91	3360.06	216.74	3360.09	216.79	3360.09	216.93	3360.08	217.09	3360.08	
217.45	3360.08	217.79	3360.08	221.63	3360.1	226.04	3360.13	226.37	3360.13	
226.68	3360.11	230.59	3359.92	230.88	3359.91	231	3359.91	232.97	3359.74	
234.52	3359.73	236.94	3359.57	237.23	3359.55	238.66	3359.44	239.72	3359.37	
241.89	3359.34	242.63	3359.34	243.89	3359.35	244.34	3359.38	245.15	3359.43	
245.39	3359.44	246.29	3359.47	246.58	3359.47	246.66	3359.46	246.78	3359.45	
247.09	3359.38	247.31	3359.35	247.62	3359.36	248.02	3359.39	248.55	3359.44	
248.75	3359.43	250.27	3359.63	250.45	3359.64	250.95	3359.69	252.42	3360	
252.89	3360.23	254.02	3360.8	254.42	3361	255.59	3361.62	255.88	3361.77	
256.32	3362	258.17	3362.92	258.2	3362.94	258.21	3362.94	258.32	3363	
258.46	3363.07	260.32	3364	261.27	3364.47	262.32	3365	262.88	3365.03	
263.41	3365.06	269.76	3365.42	269.87	3365.42	271.95	3365.46	273.89	3365.5	
276.41	3365.55	285.22	3365.72	290.02	3365.72	290.12	3365.34	290.13	3365.34	
290.22	3365.33	290.32	3365.32	290.42	3365.31	290.52	3365.3	290.62	3365.29	
290.72	3365.27	290.82	3365.26	290.85	3365.26	290.92	3365.25	291.02	3365.24	

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
169.13	.04	209.29	.035	252.42	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

209.29	252.42	73.58	73.58	73.58	.05	.1
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CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 775

INPUT

Description:

Station Elevation		Data		num=79		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.87	3361.42	23.38	3361.1	23.39	3361.1	23.74	3361.09	24.3	3361.07	27.13	3359.65
24.43	3361	24.65	3360.89	24.95	3360.74	26.43	3360				
27.75	3359.34	28.42	3359	29.19	3358.62	30.51	3357.95	32.41	3357		3357
34.42	3356.83	36.85	3356.63	38.56	3356.48	38.91	3356.47	39.7	3356.48		
40.37	3356.51	41.28	3356.58	41.56	3356.6	42	3356.59			43.5	3356.58
44.38	3356.58	45.29	3356.6	46.17	3356.65	47.05	3356.72	47.89	3356.81		
48.58	3356.91	48.99	3357	49.14	3357.09	49.2	3357.28	49.31	3357.26		
49.54	3357.07	50.68	3357.01	51.02	3357	55.4	3356.77	58.18	3356.62		
58.29	3356.59	60.68	3356	61.81	3356	62.6	3356	64.76	3356		
67.33	3356	67.63	3355.96	71.97	3355.56	74.81	3355.47	75.88	3356		
77.33	3356.72	77.88	3357	78.14	3357.13	79.89	3358	79.99	3358.01		
80.08	3358.02	80.42	3358	80.49	3358	80.55	3358	80.77	3358.11		
80.92	3358.19	82.55	3359	82.74	3359.09	84.56	3360	85.52	3360.48		
86.14	3360.79	86.57	3361	93.93	3361.16	94.03	3361.33	94.13	3361.34		
94.23	3361.34	94.33	3361.34	94.43	3361.35	94.53	3361.35	94.63	3361.35		
94.73	3361.35	94.83	3361.36	94.93	3361.36	95.03	3361.36				

Manning's	n Values		num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
15.87	.04	32.41	.035	74.81	.04

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	32.41	74.81		75.75	75.75	75.75		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 700

INPUT

Description:

Station	Elevation	Data	num=	114	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
217.53	3358.39	217.63	3358.38	218.93	3358.38	218.93	3358.36	222.21	3358.29				
222.9	3358	224.28	3357.31	224.32	3357.29	224.89	3357	225.44	3356.73				
226.72	3356.09	226.72	3356.08	226.89	3356	228.25	3355.32	228.89	3355				
228.93	3354.95	229.06	3354.99	229.07	3355	229.16	3354.96	229.32	3354.88				
230.51	3354.27	231.63	3353.71	233.04	3353	234.66	3352.72	236.34	3352.71				
237.07	3352.72	237.64	3352.73	238.48	3352.77	239.14	3352.84	240.43	3353				
240.84	3353.06	241.86	3353.16	242.37	3353.18	242.96	3353.17	244.74	3353.11				
247.22	3353	247.28	3353	249.76	3352.81	254.22	3352.51	254.38	3352.5				
254.88	3352.46	256.24	3352.3	256.38	3352.29	256.72	3352.28	258.56	3352.27				
258.63	3352.27	258.7	3352.26	259.06	3352.26	259.17	3352.27	259.23	3352.27				
259.68	3352.28	260.08	3352.3	260.4	3352.31	260.69	3352.33	261.67	3352.4				
262.34	3352.43	266.98	3352.45	267.45	3352.48	267.91	3352.48	268.3352.477					
268.25	3352.47	268.49	3352.46	268.56	3352.45	268.71	3352.45	269.22	3352.5				
271.84	3352.92	272.38	3353	272.4	3353	272.82	3353.12	276.16	3353.96				
276.23	3353.98	276.3	3354	277.2	3354	278.85	3354.77	279.3	3355				
279.34	3355.01	279.43	3355	279.44	3355	279.6	3355	279.72	3355				
279.88	3355.08	279.98	3355.13	280.08	3355.18	280.18	3355.23	280.28	3355.28				
280.38	3355.33	280.48	3355.38	280.79	3355.53	281	3355.64	281.73	3356				
282.49	3356.38	283.74	3357	285.08	3357.66	285.48	3357.86	285.76	3358				
286.45	3358.1	287.19	3358.2	289.73	3358.26	293.11	3358.33	296.54	3358.41				
299.93	3358.48	305.79	3358.61	313.53	3358.77	321.24	3358.94	321.25	3358.94				
323.9	3359	324.7	3359.01	324.8	3359.27	324.9	3359.32	325	3359.37				
325.1	3359.42	325.2	3359.47	325.3	3359.52	325.4	3359.57						

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
217.53	.04	231.63	.035	276.23	.04

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	231.63	276.23		56.53	56.53	56.53		.05	.1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 660

INPUT

Description:

Station	Elevation	Data	num=	82	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10	3356.03	10.05	3356.03	10.07	3356.03	14.7	3356.02	14.94	3356.02				
14.97	3356.02	15.05	3356.01	15.2	3356.01	15.37	3356	15.4	3356				
15.46	3356	17.22	3356.02	17.93	3356.02	20.16	3356	20.37	3356				
20.44	3355.97	21.57	3355.43	22.43	3355	22.44	3354.99	23.6	3354.42				
24.44	3354	26.38	3353.04	26.53	3352.96	27.01	3352.73	27.02	3352.72				
27.03	3352.71	27.12	3352.67	27.46	3352.5	28.47	3352	30.35	3351.07				
30.48	3351	30.58	3350.95	32.47	3350.01	32.49	3350	33.03	3349.73				
33.24	3349.63	34.51	3349	35.24	3348.9	36.95	3348.8	37.62	3348.81				
38.92	3348.81	50.07	3348.71	50.3	3348.71	51.12	3348.67	51.51	3348.65				
52.16	3348.66	54	3348.67	56.56	3348.69	56.72	3348.69	59.34	3348.74				
59.78	3348.76	60.07	3348.77	60.4	3348.78	65.79	3348.91	67.41	3348.96				
68.03	3349	69.29	3349.13	72.51	3350	72.53	3350.01	73.79	3350.63				
76.53	3351	75.32	3351.39	75.56	3351.5	76.56	3352	77.2	3352.31				
77.21	3352.32	77.53	3352.48	79.64	3354	80.22	3354.29	80.24	3354.3				
80.78	3354.57	81.63	3355	83.24	3355.8	83.63	3356	83.82	3356.09				
85.61	3356.13	85.71	3356.13	85.81	3356.13	85.91	3356.13	86.01	3356.13				
86.11	3356.14	86.21	3356.14										

Manning's n Values num= 3
 Sta n Val Sta n Val
 10 .04 32.47 .035 72.53 .04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 32.47 72.53 42.28 42.28 42.28 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 620

INPUT
 Description:
 Station Elevation Data num= 9
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 3348 16.68 3347 20.88 3346.2 71 3346.2 80.96 3346.2
 81.74 3346.2 100.7 3347 112.06 3348 123.03 3349

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .04 20.88 .035 123.03 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 20.88 123.03 68.6 68.6 68.6 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 550

INPUT
 Description:
 Station Elevation Data num= 13
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 153.2 3346 157.44 3346 183.37 3345 190.95 3343 195.24 3342
 202.32 3341 212.1 3340.3 270.2 3340.3 282.35 3341 286.35 3342
 290.52 3343 299.6 3345 314.45 3346

Manning's n Values num= 3
 Sta n Val Sta n Val
 153.2 .035 153.2 .035 314.45 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 153.2 314.45 51.81 51.81 51.81 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 475

INPUT
 Description:
 Station Elevation Data num= 15
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 3342 4.03 3341 8.11 3340 12.47 3339 19.75 3338
 23.18 3337 26.66 3336 34.05 3335 39.9 3334.4 74.57 3334.4
 100.78 3334.4 122.16 3335 129.1 3336 132.46 3337 136.44 3338

Manning's n Values num= 3
 Sta n Val Sta n Val
 0 .035 0 .035 136.44 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 0 136.44 68.04 68.04 68.04 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 400

INPUT
 Description:
 Station Elevation Data num= 20
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 154.49 3339 155.36 3340 159.16 3339 162.92 3338 166.69 3337
 170.55 3336 174.01 3335 180.51 3333 183.74 3332 188.05 3331
 192.75 3330 196.55 3329 205.61 3328.5 267.16 3328.5 274.96 3329
 278.48 3330 281.43 3331 284.44 3332 290.08 3333 293.48 3334

Manning's n Values num= 3
 Sta n Val Sta n Val
 154.49 .035 154.49 .035 293.48 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 154.49 293.48 59.4 59.4 59.4 .05 .1

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 350

INPUT

Description:
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3330	6.2	3329	11.36	3328	15.42	3327	18.92	3326
24.39	3325	28.27	3324	30.25	3323	36.6	3322.6	98.6	3322.6
104.77	3323	108.81	3324	112.93	3325	117.02	3326	126.7	3327
129.68	3328	132.64	3329	135.7	3330	139.82	3331	144.12	3332

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	144.12	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 0 144.12 43.92 43.92 43.92 .1 .3

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 300

INPUT
 Description:
 Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3330	9.51	3329	19.55	3327	23.4	3326	26.95	3325
29.96	3324	32.99	3323	39.55	3322	50.11	3321	66.84	3320
77.32	3320	84.96	3320	103.3	3319	117.11	3318	128.22	3318
129.81	3318	138.51	3317	146.7	3317	148.58	3317	151.89	3317
154.73	3317	157.37	3317	216.6	3317	227.51	3318	230.48	3319
233.45	3320	237.52	3321	241.25	3322	245.03	3323	248.4	3324
251.71	3325	260.21	3327	264.58	3328	265.78	3329	270.91	3330
271.97	3331								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	271.97	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 0 271.97 47.2 47.2 47.2 .1 .3

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 260

INPUT
 Description:
 Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3326	28.22	3325	32.6	3324	35.29	3323	37.96	3322
40.5	3321	43.89	3320	47.24	3319	53.31	3317	56.43	3316
56.54	3316	63.04	3316	66.04	3315	69.11	3314	72.19	3313
77.34	3312	140.19	3312	180.99	3313	185.52	3314	188.8	3315
192.59	3316	197.19	3317	203.97	3319	207	3320	210.03	3321
213.22	3322	216.59	3323	220.17	3324	223.09	3325	225.94	3326
229.18	3327	233.16	3328	237.17	3329				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	237.17	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 0 237.17 12 12 12 .1 .3

CROSS SECTION

RIVER: River #5
 REACH: Reach #5 RS: 250

INPUT
 Description:
 Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	3325	1.97	3324	7.5	3323	11.91	3322	16.29	3321
20.43	3320	26.06	3318	32.21	3317	36.16	3316	36.73	3316
47.22	3316	51.2	3315	73.43	3312	91.12	3312	115.71	3312
123.27	3312	124.67	3312	135.34	3312	135.58	3312	148.71	3313
154.15	3314	170.08	3316	175.91	3317	181.22	3318	185.02	3319
188.56	3320	195.1	3322	198.19	3323	201.28	3324	204.3	3325
207.3	3326	210.42	3327	219.15	3328	219.15	3329		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	0	.035	219.15	.035

Bank Sta: Left Right Coeff Contr. Expan.
 0 219.15 .1 .3

SUMMARY OF MANNING'S N VALUES

River: River #5

Reach	River Sta.	n1	n2	n3

COS2.rep

Reach #5	2051.55	.013	.047	.013
Reach #5	2051	.035	.035	.013
Reach #5	1950	.04	.035	.013
Reach #5	1925	.04	.035	.04
Reach #5	1900	.04	.035	.04
Reach #5	1875	.04	.035	.04
Reach #5	1825	.04	.035	.04
Reach #5	1800	.04	.035	.04
Reach #5	1750	.04	.035	.04
Reach #5	1675	.04	.035	.04
Reach #5	1600	.04	.035	.04
Reach #5	1510	.04	.035	.04
Reach #5	1500	.04	.035	.04
Reach #5	1485	.04	.035	.04
Reach #5	1475	.04	.035	.04
Reach #5	1460	.04	.035	.04
Reach #5	1450	.04	.035	.04
Reach #5	1350	.04	.035	.04
Reach #5	1300	.04	.035	.04
Reach #5	1275	.04	.035	.04
Reach #5	1225	.04	.035	.04
Reach #5	1200	.04	.035	.04
Reach #5	1150	.04	.035	.04
Reach #5	1125	.04	.035	.04
Reach #5	1000	.04	.035	.04
Reach #5	900	.04	.035	.04
Reach #5	850	.04	.035	.04
Reach #5	775	.04	.035	.04
Reach #5	700	.04	.035	.04
Reach #5	660	.04	.035	.04
Reach #5	620	.04	.035	.035
Reach #5	550	.035	.035	.035
Reach #5	475	.035	.035	.035
Reach #5	400	.035	.035	.035
Reach #5	350	.035	.035	.035
Reach #5	300	.035	.035	.035
Reach #5	260	.035	.035	.035
Reach #5	250	.035	.035	.035

SUMMARY OF REACH LENGTHS

River: River #5

Reach	River Sta.	Left	Channel	Right
Reach #5	2051.55	33.6	33.6	33.6
Reach #5	2051	30	30	30
Reach #5	1950	32.32	32.32	32.32
Reach #5	1925	21.15	21.15	21.15
Reach #5	1900	41.2	41.2	41.2
Reach #5	1875	40.8	40.8	40.8
Reach #5	1825	42.52	42.52	42.52
Reach #5	1800	41.03	41.03	41.03
Reach #5	1750	54.06	54.06	54.06
Reach #5	1675	53.71	53.71	53.71
Reach #5	1600	36.6	36.6	36.6
Reach #5	1510	23.75	23.75	23.75
Reach #5	1500	13.38	13.38	13.38
Reach #5	1485	24.44	24.44	24.44
Reach #5	1475	20.15	20.15	20.15
Reach #5	1460	43.2	43.2	43.2
Reach #5	1450	59.28	59.28	59.28
Reach #5	1350	68.84	68.84	68.84
Reach #5	1300	39	39	39
Reach #5	1275	44.76	44.76	44.76
Reach #5	1225	40.31	40.31	40.31
Reach #5	1200	45.95	45.95	45.95
Reach #5	1150	62.3	62.3	62.3
Reach #5	1125	55.56	55.56	55.56
Reach #5	1000	66.92	66.92	66.92
Reach #5	900	82.06	82.06	82.06
Reach #5	850	73.58	73.58	73.58
Reach #5	775	75.75	75.75	75.75
Reach #5	700	56.53	56.53	56.53
Reach #5	660	42.28	42.28	42.28
Reach #5	620	68.6	68.6	68.6
Reach #5	550	51.81	51.81	51.81
Reach #5	475	68.04	68.04	68.04
Reach #5	400	59.4	59.4	59.4
Reach #5	350	43.92	43.92	43.92
Reach #5	300	47.2	47.2	47.2
Reach #5	260	12	12	12
Reach #5	250			

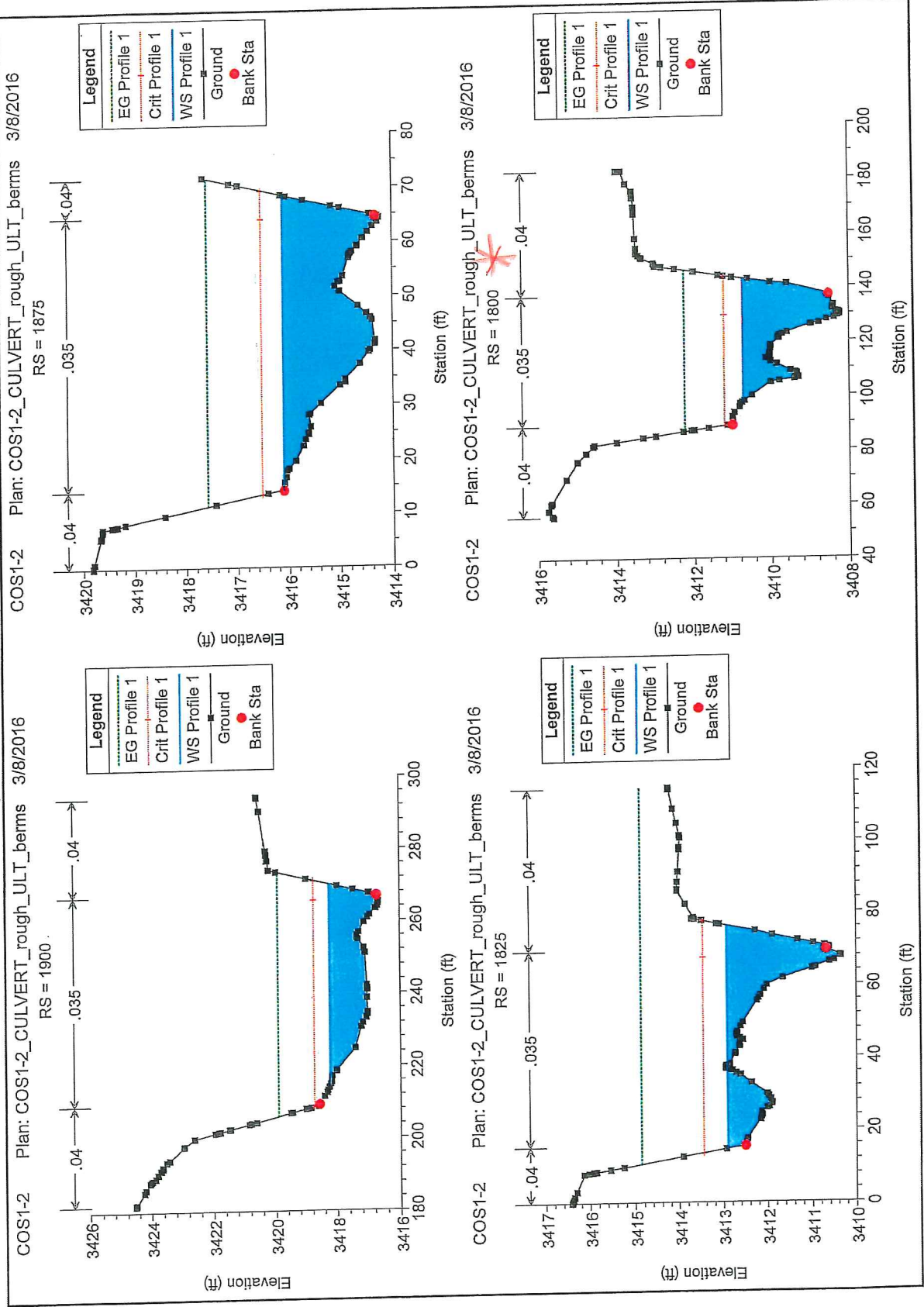
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

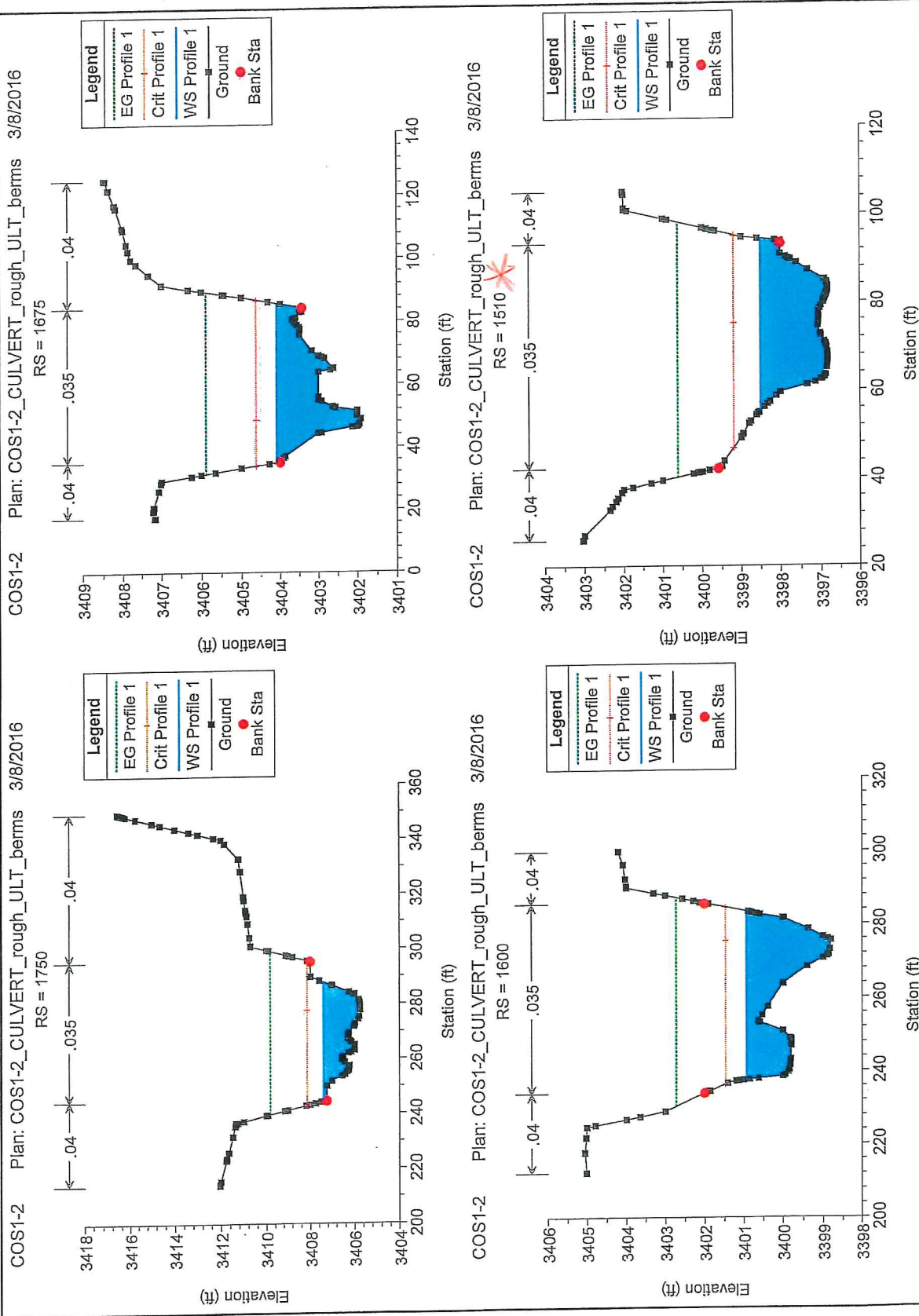
River: River #5

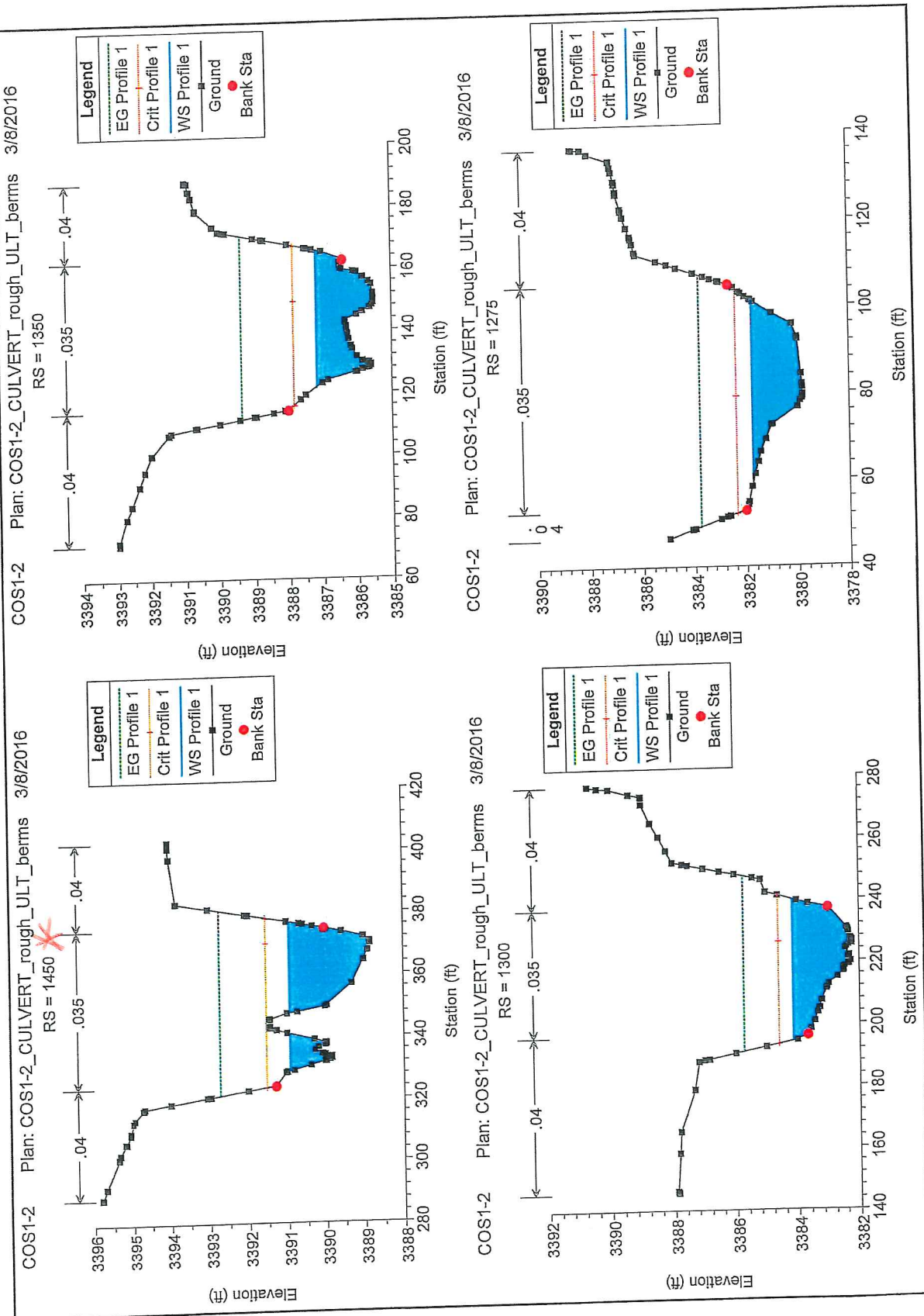
Reach	River Sta.	Contr.	Expan.
Reach #5	2051.55	.1	.3
Reach #5	2051	.05	.1
Reach #5	1950	.05	.1

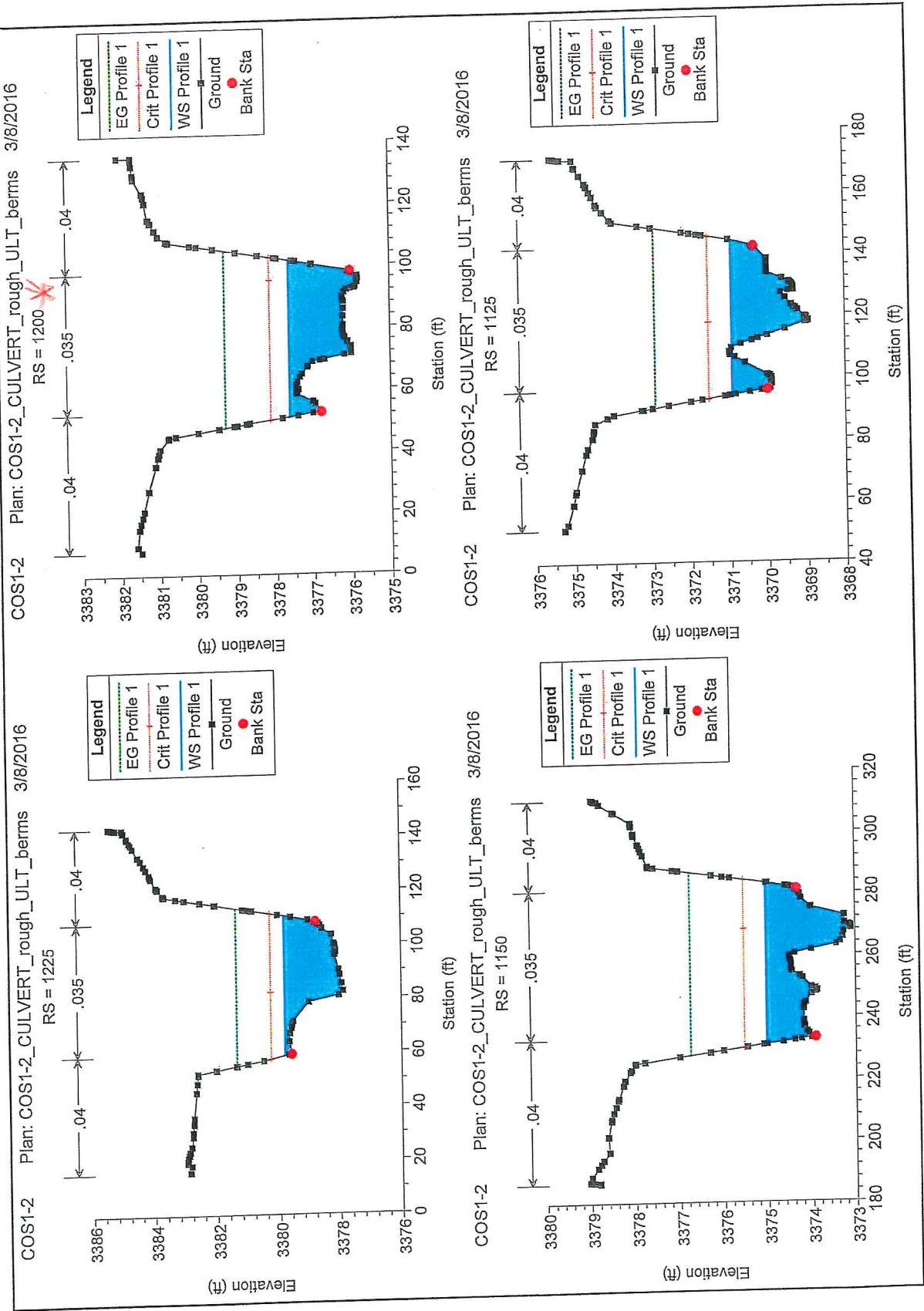
COS2.rep

Reach #5	1925	.05	.1
Reach #5	1900	.05	.1
Reach #5	1875	.05	.1
Reach #5	1825	.05	.1
Reach #5	1800	.05	.1
Reach #5	1750	.05	.1
Reach #5	1675	.05	.1
Reach #5	1600	.05	.1
Reach #5	1510	.05	.1
Reach #5	1500	.05	.1
Reach #5	1485	.05	.1
Reach #5	1475	.05	.1
Reach #5	1460	.05	.1
Reach #5	1450	.05	.1
Reach #5	1350	.05	.1
Reach #5	1300	.05	.1
Reach #5	1275	.05	.1
Reach #5	1225	.05	.1
Reach #5	1200	.05	.1
Reach #5	1150	.05	.1
Reach #5	1125	.05	.1
Reach #5	1000	.05	.1
Reach #5	900	.05	.1
Reach #5	850	.05	.1
Reach #5	775	.05	.1
Reach #5	700	.05	.1
Reach #5	660	.05	.1
Reach #5	620	.05	.1
Reach #5	550	.05	.1
Reach #5	475	.05	.1
Reach #5	400	.05	.1
Reach #5	350	.1	.3
Reach #5	300	.1	.3
Reach #5	260	.1	.3
Reach #5	250	.1	.3

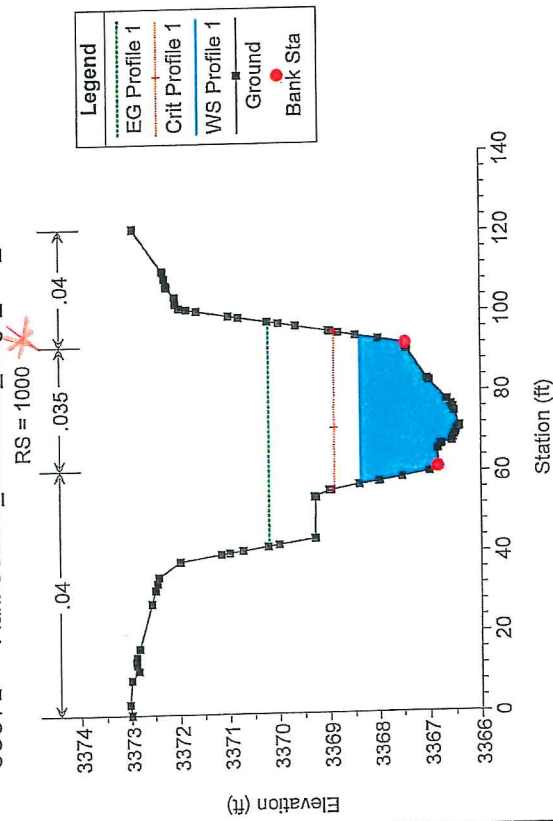




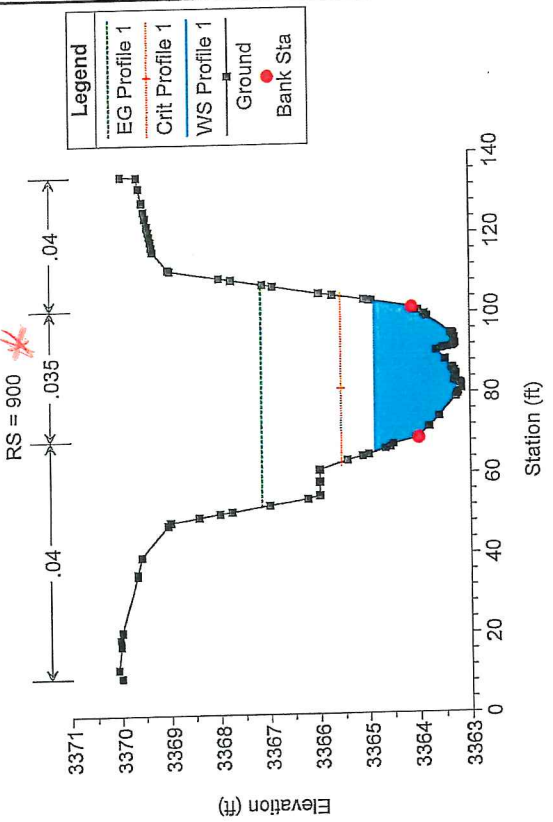




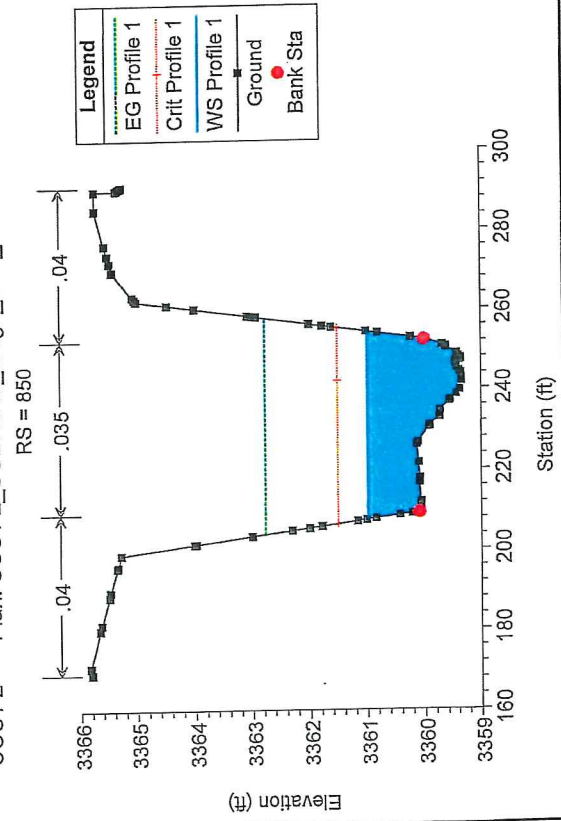
COS1-2 Plan: COS1-2_CULVERT_rough_ULT_berms 3/8/2016



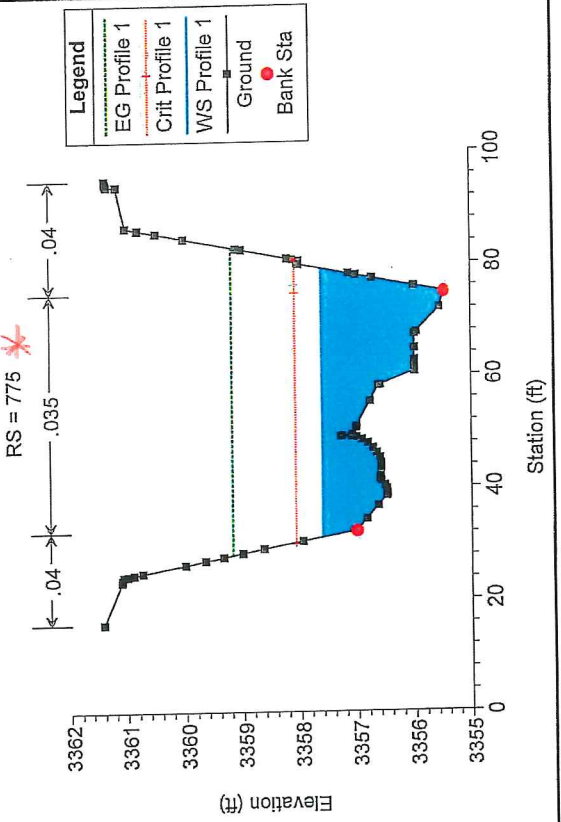
COS1-2 Plan: COS1-2_CULVERT_rough_ULT_berms 3/8/2016

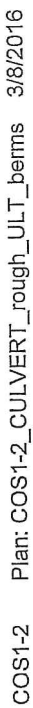
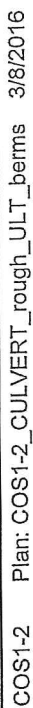


COS1-2 Plan: COS1-2_CULVERT_rough_ULT_berms 3/8/2016



COS1-2 Plan: COS1-2_CULVERT_rough_ULT_berms 3/8/2016





Storm Drain Hydraulics Calculations

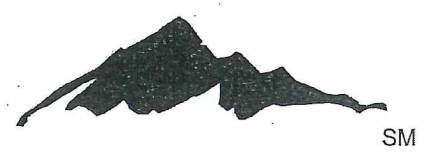
G.C. Wallace, Inc.

Mainline 48-inch RCP (Interim)

DATE 12/22/15 FILE SF6.xls

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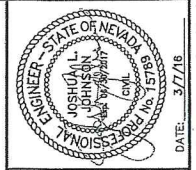
SUMMERLIN



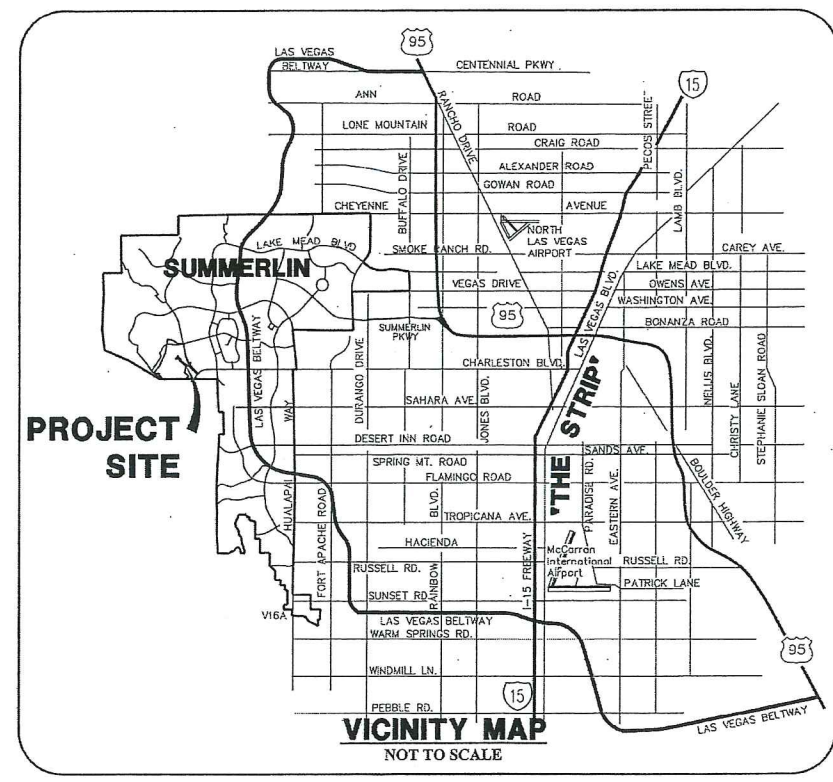
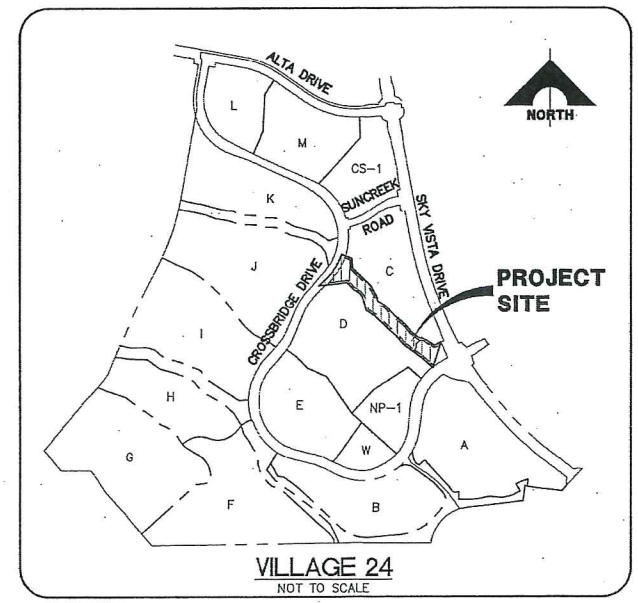
VILLAGE 24 COS 2 WASH IMPROVEMENT PLANS

2015
A.P.N. 137-33-801-002

INDEX OF SHEETS	
SHT. #	DESCRIPTION
1	COVER SHEET
2	GENERAL NOTES
3	HORIZONTAL CONTROL PLAN
4	GRADING PLAN - OVERVIEW
5	GRADING PLAN 1
6	GRADING PLAN 2
7	GRADING PLAN 3
8	GRADING PLAN 4
9	GRADING PLAN 5
10	GRADING PLAN 6
11	GRADING PLAN 7
12	DETAIL SHEET 1
13	DETAIL SHEET 2



TECHNICAL DRAINAGE STUDY SUBMITTAL - NOT FOR CONSTRUCTION



OWNER/DEVELOPER
THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300

ENGINEER
GCV
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowengineering.com

Call before you Dig
811
1-800-227-2000
CLARK COUNTY
1-702-435-6000

CALL BEFORE YOU DIG
OVERHEAD
1-702-227-2929

FAST
Call before you UnderGround
1-702-432-5300
FREIGHTWAY AND AIRPORT
SYSTEMS OF TRANSPORTATION

DRAINAGE CERTIFICATION
I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
JOSHUA L. JOHNSON P.E. 15789 DATE

DAVID BOWERS: PE, PTOE, PE# 16736 DATE
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA
APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLV PLANNING DEPARTMENT
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT
CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY DATE

THE HOWARD HUGHES COMPANY, LLC
KEVIN ORROCK
VICE PRESIDENT DATE

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 24 - US WATERS
COS-2 WASH
COVER SHEET

DRAWING
1
1 OF 13 SHTS

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE LIMITS SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPE SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION, ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY OBTAINED FOR THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTATION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTATION
A. PAVEMENT AREA SUBGRADE	0.1±	+0.0' TO -0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5±	+0.1' TO -0.1'	SEE SOILS REPORT
7. COMPACTATION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE. CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE ENGINEER.
8. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
9. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
10. THE CONTRACTOR SHALL CLEAN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC AREAS THAT MAY BE AFFECTED BY THE CONSTRUCTION. ALL SPILL OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL EXISTING PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
11. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERM, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY BE DETECTED OR OBSERVED ON THE CONSTRUCTION SITE. IN ALL WAYS OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT, SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED IF THE ENGINEER OR HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON ALL DISTURBED AREAS THAT ARE NOT EROSION-CONTROLABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY DOWNSIDE.
4. THE ENGINEER, CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS AND AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPs WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCH OR MORE. A PREVENTION PLAN IS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF CONSTRUCTION ACTIVITY DUE TO WEATHER, STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVRI00000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPs SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT. EXCESSIVE SEDIMENT SHALL BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA", LATEST ISSUE; THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, CLARK COUNTY AREA NEVADA", LATEST REVISED EDITION; THE "UNIFORM STANDARD SPECIFICATIONS FOR IMPROVEMENTS TO THE SUMNERLIN AREA; AND OTHER APPLICABLE APPROVED STANDARDS ISSUED BY THE CONTROLLING AGENCY; THE UNIFORM BUILDING CODE; AND ALL LOCAL CITY CODES AND ORDINANCES APPLICABLE, EXCEPT AS NOTED ON THIS SHEET AS "DEVIATIONS FROM STANDARDS".
2. THE EXISTENCE AND LOCATION OF ANY OVERHEAD OR UNDERGROUND UTILITY LINES, PIPES, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A RESEARCH OF THE CITY ENGINEER RECORDS. EXISTING UTILITIES AS SHOWN ON CIVL PLANS LIBRARY ARE APPROXIMATE AND FOR RECORD PURPOSES. EXISTING UTILITIES ARE LOCATED ON PLANS ONLY FOR THE CONVENIENCE OF THE CONTRACTOR. EXISTING UTILITY SERVICE LATERALS ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE OWNERS EXPENSE, LOCATE ALL UNDERGROUND AND OVERHEAD INTERFERENCE WHICH MAY AFFECT HIS OPERATION DURING CONSTRUCTION AND SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO EXISTING UTILITIES. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
3. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN. DAMAGE TO EXISTING UTILITIES OR STRUCTURES OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORILY TO THE CITY ENGINEER OR OWNING UTILITY COMPANY AT THE EXPENSE OF THE CONTRACTOR.
4. ALL CONSTRUCTION SHALL BE AS SHOWN ON THESE PLANS; ANY REVISIONS SHALL HAVE THE PRIOR WRITTEN APPROVAL OF THE CITY ENGINEER.
5. TYPE V CEMENT SHALL BE USED IN ALL OFF-SITE CONCRETE WORK. CONCRETE TO BE 3000 P.S.I. MINIMUM @ 28 DAYS. MIX DESIGN TO BE APPROVED BY THE QUALITY CONTROL DIVISION. PRIOR TO THE USE ON THE PROJECT.
6. PERMITS ARE REQUIRED FOR ANY WORK IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL SECURE ALL PERMITS AND INSPECTIONS REQUIRED FOR THIS CONSTRUCTION.
7. JOINTS REQUIRED, MAXIMUM EVERY 300' IN EXTENDED-TYPE CURBS.
8. AC PAVEMENT TO BE 1/2" ABOVE LIP OF ALL GUTTERS AFTER COMPACTION, EXCEPT AT SIDEWALK RAMPS.
9. CURB AND GUTTER WITH A GRADE OF LESS THAN FOUR-TENTHS OF ONE PERCENT SHALL BE WATER-TESTED AS SOON AS POSSIBLE AFTER CONSTRUCTION. ANY CURB AND GUTTER FOUND TO BE UNACCEPTABLE TO THE CITY SHALL BE REMOVED AND REPLACED PER US 216.
10. SIDEWALK RAMPS SHALL BE CONSTRUCTED AT EACH QUADRANT OF AN INTERSECTION PER US 216. THE EXACT LOCATION OF RAMPS MAY BE ADJUSTED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE.
11. CONTRACTOR SHALL PROVIDE ALL NECESSARY HORIZONTAL AND VERTICAL TRANSITIONS BETWEEN NEW CONSTRUCTION AND EXISTING SURFACES TO PROVIDE FOR PROPER DRAINAGE AND FOR INGRESS AND EGRESS TO NEW CONSTRUCTION. THE EXTENT OF ADJUSTMENTS TO BE SHOWN ON PLANS, OR AS DESIGNATED IN THE FIELD BY CITY PROJECT REPRESENTATIVE.
12. EXACT LOCATION OF ALL SAWCUT LINES MAY BE DETERMINED IN THE FIELD BY A CITY PROJECT REPRESENTATIVE IF LOCATION ON PLANS IS NOT CLEARLY SHOWN, OR EXISTING PAVEMENT CONDITION REQUIRES RELOCATIONS.
13. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EXISTING PERMANENT SURVEY MONUMENTS. ANY MONUMENTS DISTURBED SHALL BE REPLACED, AND SHALL BE DONE ONLY BY A NEVADA PROFESSIONAL LAND SURVEYOR IN ACCORDANCE WITH THE UNIFORM STANDARD DRAWINGS- CLARK COUNTY AREA. A RECORD-OF-SURVEY FOR REPLACEMENT OF PERMANENT SURVEY MONUMENTS SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL PRIOR TO RECORDING. THE RECORD-OF-SURVEY SHALL BE PREPARED IN ACCORDANCE WITH NEVADA REVISED STATUTES 625.350.
14. UTILITY COMPANY METER BOXES, MANHOLE LIDS, VALVE COVERS, ETC., SHALL BE LOCATED OUT OF DRIVEWAYS, DRIVEWAY APRONS, FLOWLINES, AND GROSS GUTTER UNLESS WRITTEN APPROVAL IS GRANTED BY THE AFFECTED UTILITY COMPANY AND THE CITY ENGINEER.
15. ALL WALLS, NEW OR EXISTING, ARE ONLY SHOWN ON CIVL PLANS FOR THE PURPOSE OF REVIEWING GRADING RELATIONSHIPS; FLOOD CONTROL AND SIGHT DISTANCE AT INTERSECTIONS. ALL WALLS REQUIRE A SEPARATE PERMIT AND INSPECTION BY THE CIVL BUILDING DEPARTMENT.
16. ASPHALT MIX DESIGN MUST BE SUBMITTED AND APPROVED BY THE CITY ENGINEER PRIOR TO THE PLACEMENT OF ASPHALT WITHIN CITY RIGHTS OF WAY.
17. CONTRACTOR SHALL ADJUST ALL NEW AND EXISTING INLETS, VALVE BOXES, MANHOLE RIMS, SEWER CLEANOUTS, ETC. TO FINISH GRADE AS APPLICABLE WHETHER OR NOT THEY ARE SHOWN ON THE PLANS.
18. MATERIALS, HANDLING AND PLACEMENT OF PORTLAND CEMENT CONCRETE SHALL BE IN ACCORDANCE WITH APPLICABLE SECTIONS OF NDOT AND CLARK COUNTY AREA SPECIFICATIONS (AS APPLICABLE) AND THE PLANS AND DETAILS SHOWN HEREON.
19. WHEN INSTALLING UNDERGROUND FACILITIES THAT REQUIRE UNDERGROUND LOCATING DEVICES SUCH AS MARKER BALLS, LOCATING RIBBON, ETC., THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE DEVICES. THE DEVICES MUST BE PLACED AND VERIFIED TO BE IN GOOD WORKING CONDITION PRIOR TO THE CONSTRUCTION OF ANY ROAD BASE.
20. SANITARY SEWER AND STORM DRAIN FINAL LOCATION INFORMATION SHALL BE PROVIDED TO THE ENGINEER PRIOR TO PROJECT ACCEPTANCE. THE INFORMATION SHALL INCLUDE THE HORIZONTAL AND VERTICAL (INVERT) LOCATION OF PUBLIC SEWER MAINS, STORM DRAIN MAINS, AND STORM DRAIN DROPPERS. THE INFORMATION TO THE STORM DRAIN MAIN AND AT THE CONNECTION TO A DROP INLET, AND THE CONNECTION OF SEWER SERVICE LATERALS TO THE SEWER MAIN AND WHERE THE SEWER SERVICE LATERAL SHALL BE LOCATED. THE INFORMATION SHALL BE PROVIDED TO THE ENGINEER BY COORDINATES WHICH SHALL BE BASED ON THE OFFICIAL HORIZONTAL AND VERTICAL CONTROL NETWORKS OF THE CITY OF LAS VEGAS, FINAL LOCATION INFORMATION MUST BE SEALED AND SIGNED BY A NEVADA PROFESSIONAL LAND SURVEYOR. THE INFORMATION TO HAVE POSITIVE (CERTAIN) INFORMATION (± 0.3 FEET) HORIZONTALLY AND VERTICALLY. A SEPARATE ELECTRONIC COMMON DELIMITED FILE FOR THE SANITARY SEWER AND STORM DRAIN COORDINATES SHALL ALSO COMPANY THE SANITARY SEWER AND STORM DRAIN FINAL LOCATION INFORMATION.
21. CITY VIDEO INSPECTION IS REQUIRED FOR ALL SEWER AND STORM DRAINS. THE CCTV VIDEO AND LOG TO BE PERFORMED PER THE DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS LATEST ADDITION.
22. A SEPARATE BORING PERMIT IS REQUIRED FOR ALL BORING ACTIVITIES.

REVISED JANUARY 23, 2014 (CPU VERSION)

NO PORTION OF THE SITE FALLS WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA. SITE LOCATED ON PANEL 32003C2150E, DATED SEPTEMBER 27, 2002, TO REFLECT A LOMR. THIS PANEL SHOWS THAT THE PROJECT IS LOCATED WITHIN A ZONE X AND NOT LOCATED WITHIN A FEMA DESIGNATED 100-YEAR ZONE A OR SPECIAL FLOOD HAZARD AREA.

	PROPOSED UTILITIES		DRAWING NUMBER FOR DETAIL W/ REF. TO THE SHEET WHERE IT IS SHOWN
	EXISTING UTILITIES		STANDARD DRAWING NUMBER
	FUTURE UTILITIES		GOVERNING AGENCY
	SECTION LINE		BENCHMARK
	EASEMENT LINE		POTHOLE LOCATION
	RIGHT-OF-WAY LINE		EXISTING NVR RS-100
	PROPERTY LINE		EXISTING DROP INLET
	CENTERLINE		PROPOSED DROP INLET
	100 YR HYDRAULIC GRADE LINE (ULT)		FUTURE DROP INLET
	100 YR HYDRAULIC GRADE LINE (INT)		EXISTING GATE VALVE
	PROPOSED UTILITY (BY OTHERS)		PROPOSED GATE VALVE
	PROPOSED SEWER LINE W/MH		FUTURE GATE VALVE
	FUTURE SEWER LINE W/MH		EXISTING WATER METER
	EXISTING SEWER LINE W/MH		PROPOSED WATER METER
	EXISTING WATER LINE & GATE VALVE		EXISTING TRAFFIC SIGNAL PULL BOX
	PROPOSED WATER LINE & GATE VALVE		PROPOSED SIGNAL PULLBOX
	FUTURE WATER LINE & GATE VALVE		EXISTING TELEPHONE MANHOLE
	2" G EXISTING GAS LINE		EXISTING POWER POLE
	2-6" E EXISTING UNDERGROUND ELECTRICAL		EXISTING ELEC MARKER
	CATV EXISTING CABLE TV		EXISTING TRAFFIC SIGNAL
	TEL EXISTING TELEPHONE		PROPOSED TRAFFIC SIGNAL
	OHP EXISTING OVERHEAD AND POWER POLES		EXISTING FIRE HYDRANT
	PROPOSED STORM DRAIN W/MH		PROPOSED FIRE HYDRANT
	EXISTING STORM DRAIN W/MH		FUTURE FIRE HYDRANT
	FUTURE STORM DRAIN W/MH		EXISTING UTILITY BOX
	EXISTING SIDEWALK AND RAMP		EXISTING METER BOX
	CONSTRUCT CURB DEPRESSION FOR FUTURE HANDICAP RAMP		PROPOSED CONTOUR
	VIEW FENCE		(3005) SPOT ELEVATION
	NEW ABANDONED PIPE		(60.50) TC EXISTING SPOT ELEVATION
	EXISTING ABANDONMENT		(60.50) TC FUTURE SPOT ELEVATION
	SAWCUT		EXISTING CLARK COUNTY STREET LIGHT (STLT)
	STEEL CASING		ROAD SLOPE
	APPROXIMATE PAVEMENT RESTORATION		EXISTING SUMMERLIN STREET LIGHT (STLT)
	TO BE ABANDONED PROFILE HATCH		PROPOSED SUMMERLIN STREET LIGHT (STLT)
	WATER STUB WITH BLOW-OFF		TOP SLOPE
	FUTURE WATER STUB WITH BLOW-OFF		TOE SLOPE
	SEWER STUB WITH CAP		3:1 SLOPE UNLESS OTHERWISE NOTED ON PLAN
	FUTURE SEWER STUB WITH CAP		
	EDGE OF PAVEMENT		
	OUTSIDE EDGE		
	CUT LIMIT LINE		
	FILL LIMIT LINE		

AC	ASPHALT CONCRETE, ACRE	FI	FIRE HYDRANT	RCP	REINFORCED CONCRETE BOX
AC	ASBESTOS CEMENT PIPE	FL	FIRE LINE	RCD	REINFORCED CONCRETE PIPE
AD	ADDITIONAL	FO	FIBER OPTIC	RD	ROAD
ADL	ADDITIONAL	FR	FIBERGLASS REINFORCED PLASTIC	RDW	ROADWAY
AP	ANGLE POINT	FS	FINISH SURFACE	REC	RECTANGULAR
APN	ASSESSOR'S PARCEL NUMBER	FT	FOOT/FEET	REF	REFERENCE
APPROX	APPROXIMATELY	FTG	FOOTING	REFR	REFRIGERANT
ASSTO	ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS	FUT	FUTURE	REQO	REQUIRED
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS	GA	GAS, GUT ANCHOR	RIM	RIGHT OF WAY
AVE	AVENUE	GB	GRADE BREAK	RIM/R	RIGHT OF WAY
AVAR	AIR VALVE, AIR RELEASE	GND	GROUND	RP	RADIUS POINT
	ASSEMBLY	GRO	GRADE, GROUND	RPM	RAISED PAVEMENT MARKERS
AWWA	AMERICAN WATER WORKS ASSOCIATION	HGT	HEIGHT	RSOV	RESILIENT SEAT GATE VALVE
BC	BENCH CURB RETURN	HDWL	HEADWALL	S	SOUTH
BCR	BENCH CURB RETURN	HGL	HYDRAULIC GRADE LINE	SCH	SCHEDULE
BLM	BUREAU OF LAND MANAGEMENT	HC	HORIZONTAL	SD	STORM DRAIN
BLVD	BOULEVARD	HP	HIGH POINT, HIGH PRESSURE	SDMH	STORM DRAIN MANHOLE
BM	BENCHMARK	HPS	HIGH PRESSURE SODIUM	SECT	SECTION
BO	BLOW-OFF	IBC	INTERNATIONAL BUILDING CODE	SF	SQUARE FOOT/FEET
BVC	BEGIN VERTICAL CURVE ELEVATION	INT	INTERM	SHLDR	SHOULDER
BVCS	BEGIN VERTICAL CURVE STATION	JT	JUNCTION	SHT	SHEET
C	CURB OF SIDEWALK	LT	LEFT	SIS	SUMMERLIN IMPROVEMENT
C	CURB OF SIDEWALK	LT	LEFT	SL	STANDARD
C&G	CURB AND GUTTER	LP	LINEAR FEET	SLT	STREET LIGHT
CATV	UNDERGROUND CABLE TV	LP	LINEAR FEET	SP	SERVICE POINT
CBOM	CLARK COUNTY BENCH MARK	LN	LANE	SQ	SQUARE
CCPW	CLARK COUNTY PUBLIC WORKS	LVWD	LAS VEGAS VALLEY WATER DISTRICT	SR	SEWER RECLAIM MAIN
CCTV	CLOSED-CIRCUIT TELEVISION	MAX	MAXIMUM	SSA	SANITARY SEWER
COWRD	CLARK COUNTY WATER	MH	MANHOLE	STA	SANITARY SEWER MANHOLE
CPS	CUBIC FEET PER SECOND	MIN	MINIMUM	STL	STREET
CIF	CALCULATED IMPROVEMENTS PROJECT, CORROGATED IRON PIPE	MCLP	MORTAR LINED AND COATED PIPE	STD	STANDARD
CIPM	CAST-IN-PLACE MANHOLE	MES	MESA PARK	STRUC	STRUCTURE
CIPR	CAST-IN-PLACE PIPE	MOD	MODIFY/MODIFIED	SVZ	SIGHT VISIBILITY ZONE
CL	CLEAR	MON	MONUMENT	SWG	SOUTHWEST GAS
CLR	CLEAR OR CLEARANCE	MPH	MILES PER HOUR	T	TELEPHONE OR TOP
CLM	CONTROLLED LOW STRENGTH MORTAR	NDOT	NEVADA DEPARTMENT OF TRANSPORTATION	TAN	TANGENT
CLV	CITY OF LAS VEGAS	NO	NUMBER	TB	TOP OF CURB
CMP	CORRUGATED METAL PIPE	NOHSA	STATE OF NEVADA OCCUPATIONAL SAFETY AND HEALTH	TCE	TOP OF CONSTRUCTION ESM
CML	CONCRETE MASONRY UNIT	NVE	ADMINISTRATION	TELE	TELEPHONE
CNLY	CITY OF NORTH LAS VEGAS	NTS	NOT TO SCALE	TEMP	TEMPORARY
CO	CONDUIT	OB	OVERHEAD	TF	TOP OF FOOTING
CONC	CONCRETE	OC	ON CENTER	TG	TOP OF GRATING
CONSD	CONSTRUCT OR CONSTRUCTION	OHP	OVERHEAD COX COMMUNICATION	THM	TOP OF MANHOLE
COR	CORNER	OP	OVERHEAD POWER LINE	TOP	TOP OF PIPE
CPEP	CORRUGATED POLYETHYLENE PIPE	PB	PULL BOX	TRANS	TRANSITION
CRT	CURB YARD(S)	PBS	PLANTINX BITUMINOUS SURFACE CLASS	TRW	TOP OF RETAINING WALL
DEL	DELTA	PC	POINT OF CURVE, PRESSURE	TS	TRAFFIC SIGNAL
DES	DESIGN	PCC	PORTLAND CEMENT OR POLYMER CONCRETE	TW	TOP OF WALL
DEFL	DEFLECTION	PE	POINT OF COMPOUND CURVE	UDMS	UNDERGROUND DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS (LATEST EDITION)
DIA	DIAMETER	PED	PEDESTRIAN	UG	UNDERGROUND
DIP	DUCTILE IRON PIPE	PEH	PIPE	ULT	ULTIMATE
DIST	DISTANCE	PL	PROFILE GRADE LINE	USD	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
DIT	DOWNSPOUT	POT	POT HOLE	USDOCA	UNIFORM STD. DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION
DNL	DRIVE	PI	POINT OF INTERSECTION		OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA (LATEST EDITION)
DNG	DRIVEWAY	PV	POST INDICATOR VALVE		UNDERGROUND TELEPHONE
DWG	DRAWING	PR	PROPERTY LINE	UT	UTAH
ECR	END CURB RETURN	POT	POT HOLE	VAR	VARIABLE/VARIES
ELEC	ELECTRICAL	P.P.	POWER POLE	VCP	VERTICAL
ELEV	ELEVATION	PROP	PROPOSED	VCT	VERTICAL CLAY PIPE
EOP	EDGE OF PAVEMENT	PRC	POINT OF REVERSE CURVE	VOL	VOLUME
ESMT	EASEMENT	PRVC	POINT OF REVERSE VERTICAL CURVE	W	WITH
EXP	EXPANSION JOINT	PSI	POUNDS PER SQUARE INCH	WOTUS	WATERS OF THE UNITED STATES
EXP	EXPANSION JOINT	PT	POINT OF TANGENCY	W	WATER
EXP	EXPANSION JOINT	PVC	POLYVINYL CHLORIDE	WTR	WATER
FF	FINISH GRADE	PWT	PAVEMENT	XING	CROSSING
FF	FINISH GRADE	PZ	PRESSURE ZONE	Y	YARD, YARD DRAIN
FG	FINISH GRADE	R, RAD	RADIUS, RADIUS	YD	PRESSURE ZONE
		RT	RIGHT		

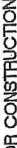
1. NONE

THIS SET OF DRAWINGS IS BASED UPON NAVJ 88 DATUM, PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS

SOUTH 89°47'23" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN IN FILE 118, PAGE 100 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BM #	DESCRIPTION	NAD 83 DATUM	NAD 83 ELEVATION
CLV BM No. D358	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN	3246.63 (FEET)	989.574 (METERS)

FAST
before
UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL
SYSTEM OF TRANSPORTATION



62024-226-2

T: 702.804.2000
F: 702.804.2299

lon\V24-228-2_NT.dwg

Matthew Burge

THE HOWARD HUGHES COMPANY, LLC

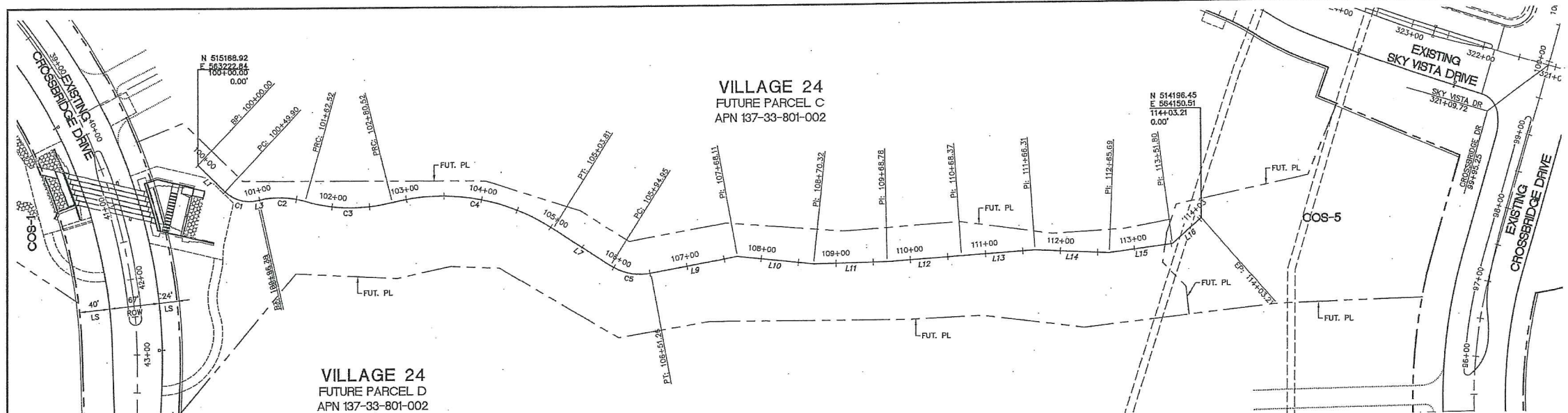
VILLAGE 24 - US WATERS
COS-2 WASH

GENERAL NOTES

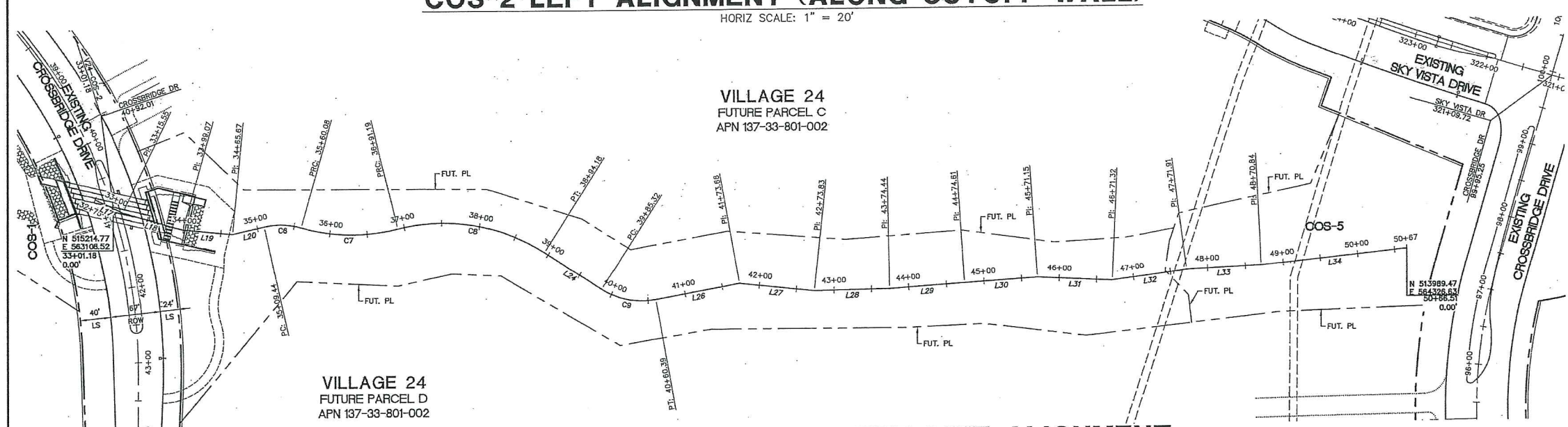
DRAWING

2

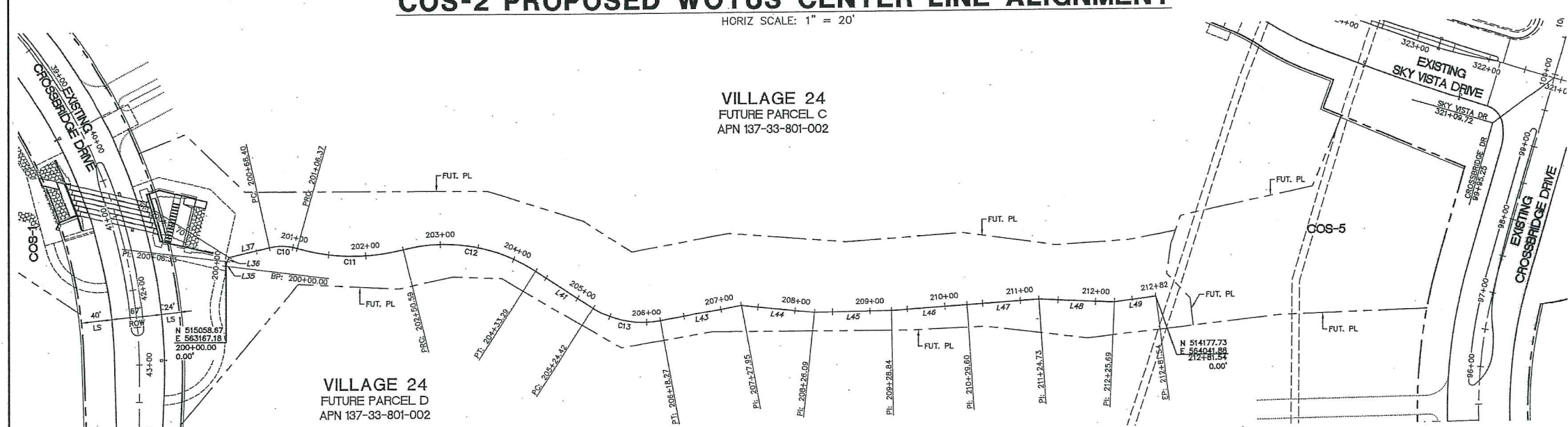
2 OF 13 SHTS



COS-2 LEFT ALIGNMENT (ALONG CUTOFF WALL)
HORIZ SCALE: 1" = 20'



COS-2 PROPOSED WOTUS CENTER LINE ALIGNMENT
HORIZ SCALE: 1" = 20'



COS-2 RIGHT ALIGNMENT (ALONG CUTOFF WALL)
HORIZ SCALE: 1" = 20'

CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C1	46.48'	47.00'	25.34'	56°39'49"
C2	63.29'	125.00'	32.34'	29°00'43"
C3	118.00'	225.00'	60.39'	30°02'53"
C4	223.29'	275.00'	118.21'	46°31'21"
C5	56.31'	75.00'	29.56'	43°00'59"
C6	50.64'	100.00'	25.87'	29°00'43"
C7	131.11'	250.00'	67.10'	30°02'53"
C8	202.99'	250.00'	107.47'	46°31'21"
C9	75.08'	100.00'	39.41'	43°00'59"
C10	37.98'	75.00'	19.40'	29°00'43"
C11	144.22'	275.00'	73.81'	30°02'53"
C12	182.69'	225.00'	96.72'	46°31'21"
C13	93.85'	125.00'	49.26'	43°00'59"

LINE TABLE			LINE TABLE		
LINE #	LENGTH	DIRECTION	LINE #	LENGTH	DIRECTION
L1	49.90'	S31°3'16"E	L28	100.61'	S48°09'13"E
L3	2.85'	S59°53'05"E	L29	100.17'	S50°54'13"E
L7	91.14'	S14°22'53"E	L30	96.54'	S50°50'41"E
L9	116.85'	S57°23'51"E	L31	100.17'	S44°27'28"E
L10	102.21'	S41°05'02"E	L32	100.59'	S54°26'16"E
L11	98.46'	S48°09'13"E	L33	98.93'	S49°42'13"E
L12	99.59'	S50°54'13"E	L34	195.67'	S53°09'23"E
L13	97.94'	S50°50'41"E	L35	6.33'	N49°55'36"E
L14	99.38'	S44°27'28"E	L36	6.36'	N75°07'57"E
L15	86.10'	S54°26'16"E	L37	55.70'	S59°52'03"E
L16	51.42'	S87°57'43"E	L41	91.14'	S14°22'53"E
L17	40.55'	S21°09'36"E	L43	109.68'	S57°23'51"E
L18	83.52'	S31°09'49"E	L44	98.13'	S41°05'02"E
L19	66.60'	S41°29'09"E	L45	102.75'	S48°09'13"E
L20	43.77'	S59°52'03"E	L46	100.76'	S50°54'13"E
L24	91.14'	S14°22'53"E	L47	95.13'	S50°50'41"E
L26	113.26'	S57°23'51"E	L48	100.96'	S44°27'28"E
L27	100.17'	S41°05'02"E	L49	55.85'	S54°26'16"E

NOTE
THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS.

BASIS OF BEARINGS
SOUTH 89°47'23" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN IN FILE 118, PAGE 100 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM (FEET)	NAVD 88 DATUM (METERS)
CLV BM No. D369	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD. & WEST OF DETENTION BASIN.	3246.03	989.574

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1-702-455-0000

FAST
1-702-227-2929

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 24 - US WATERS
COS-2 WASH
HORIZONTAL CONTROL PLAN

DRAWING
3
3 OF 13 SHTS

PROJECT NO. **62024-226-2**
DESIGN: MJB
DRAWN: MJB
CHECK: JJJ
PLOT DATE: 03-07-16
PLOT TIME: 18:25:18

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowingengineering.com

GOWING ENGINEERS & SURVEYORS

F:\Projects\62024-226-2\Draw Production\24-226-2_1C.dwg
Matthew Burge



MATCHLINE 106+11.34 & 205+42.76 - SEE SHEET 7

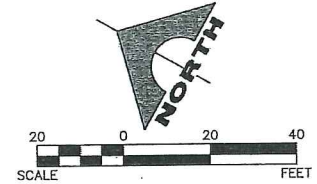
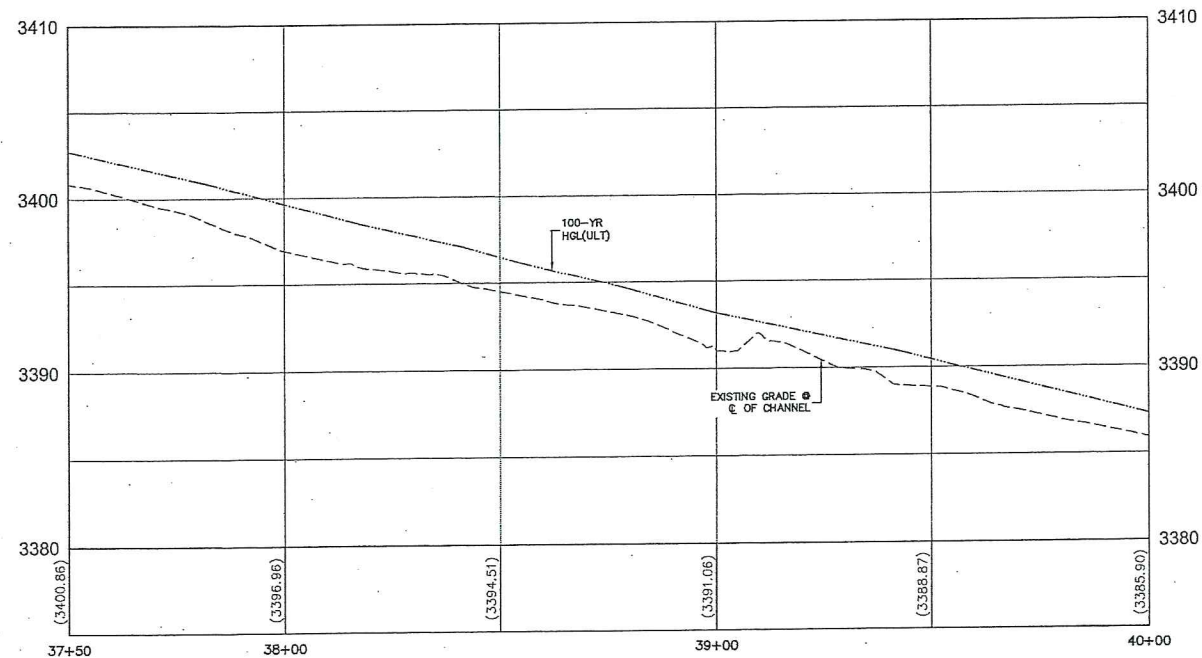
MATCHLINE - SEE SHEET 11

COS-2 (WATERS OF THE US)

HORIZ SCALE: 1" = 20'
VERT SCALE: 1" = 5'

GRAVEL MAINTENANCE ROAD

2" CRUSHED ROCK/GRAVEL @ 95%



RIPRAP GENERAL NOTE:

ALL RIPRAP, EXCLUDING CONCRETE EMBEDDED RIPRAP, SHALL ADHERE TO REQUIREMENTS OF UNIFORM STANDARD SPECIFICATION SECTION 610 "SLOPE AND CHANNEL PROTECTION." FOR CONCRETE EMBEDDED RIPRAP, SEE ADDITIONAL REQUIREMENTS PER DETAIL 3 SHEET 12.

COS WASH MAINTENANCE GENERAL NOTE:

HOA TO MAINTAIN DESIGN GRADES AND RIPRAP ALONG CUTOFF WALLS AFTER EVERY MEASURABLE STORM EVENT. IF THERE IS MEASURABLE RAINFALL DEPTH IN THE CCRFCD GAUGES 4329 AND 4344, THE COS WASH SHOULD BE INSPECTED BY HOA AFTER CESSATION OF THE STORM EVENT.

CCRFCD RAINFALL GAUGE 4329 IS LOCATED IN BROWNSTONE CANYON
UPSTREAM OF VILLAGE 24.

CCRFCD RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK
DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

JOSHUA L. JOHNSON P.E. 15789

DATE _____

NOTE

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BASIS OF BEARINGS

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BENCHMARK

BM #	DESCRIPTION	NAD 83 DATUM	NAD 83 DATUM
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63 (FEET)	989.574 (METERS)

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before you
UnderGround

1-702-432-5300

FREWAY AND ARTERIAL
SYSTEM OF TRANSPORTATION



DATE: 3/7/18

[illegible][illegible]

DESCRIPTION

[illegible][illegible]

PROJECT	DESIGN: MDD
62024-222	DRAWN: MDD
	CHECK: J.L.
	PLOT DATE: 03--
	PLOT TIME: 16:2

RAINBOW BLVD
LAS, NV 89146
4.2000
4.2299
eering.com
6-2_CD.dwg

1555 S. F
LAS VEG
T: 702.80
F: 702.80
gwwglin

CL1 SURVEYOR

GC
ENGINEERS

LLC		
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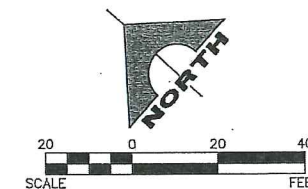
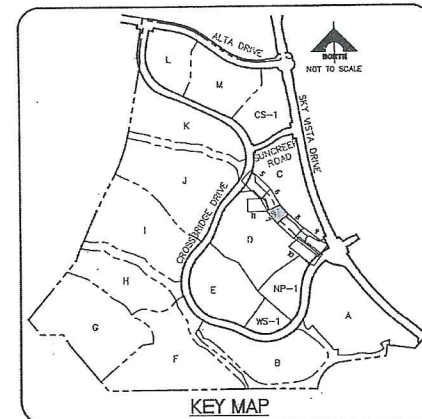
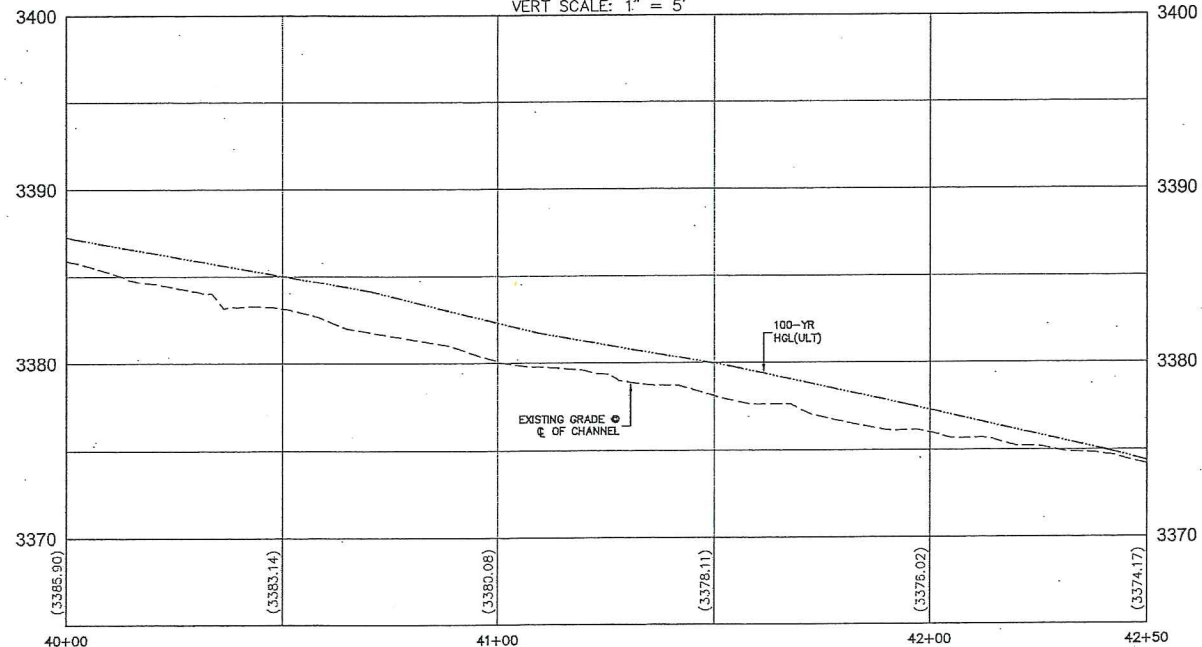
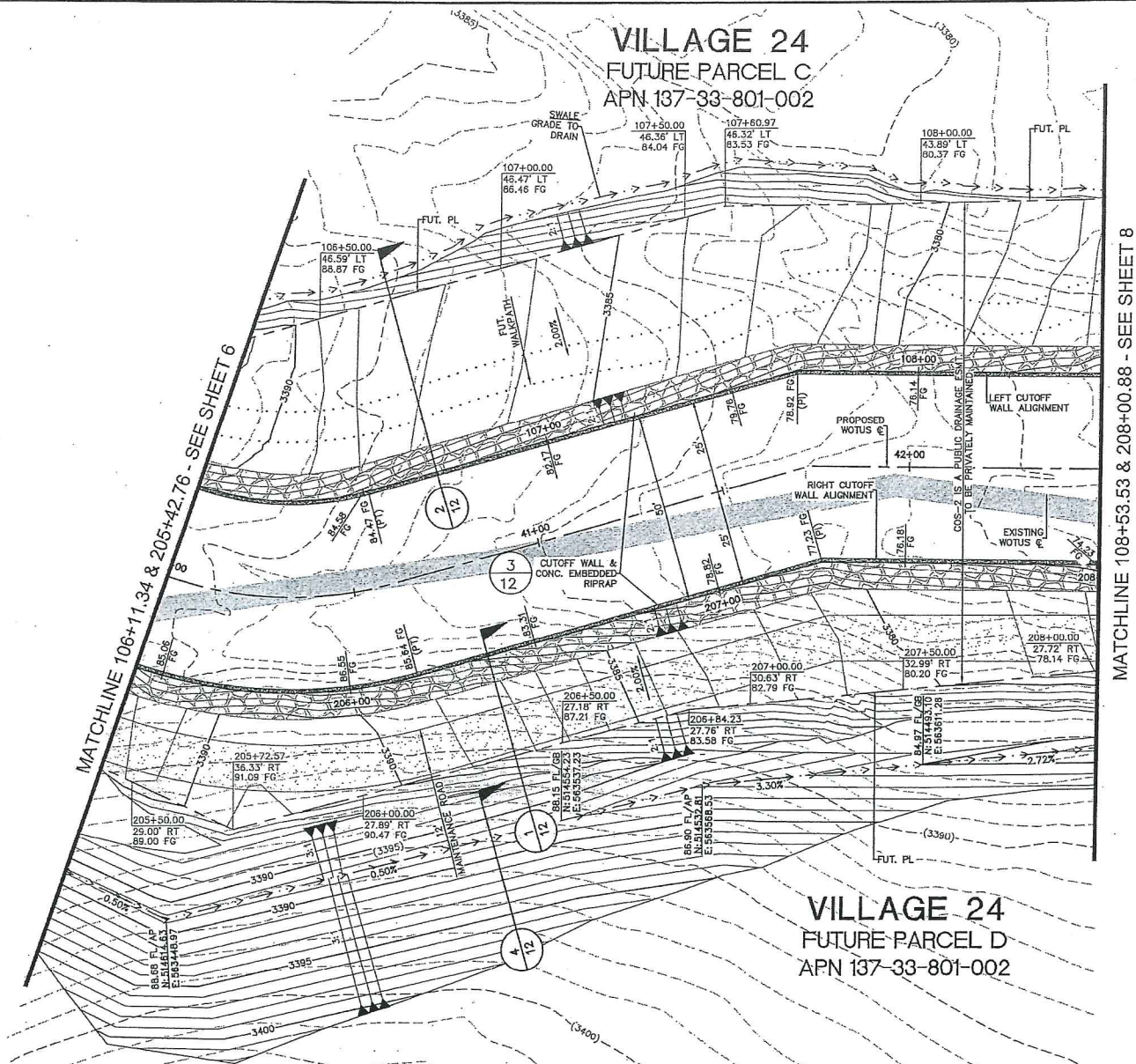
COMPANY,
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COS-2 WASH
ADING PLA

HOWARD	VILLAGE	GR
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THE		
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DRAWING
6



RIPRAP GENERAL NOTE:
ALL RIPRAP, EXCLUDING CONCRETE EMBEDDED RIPRAP, SHALL ADHERE TO REQUIREMENTS OF UNIFORM STANDARD SPECIFICATION SECTION 610 "SLOPE AND CHANNEL PROTECTION," FOR CONCRETE EMBEDDED RIPRAP, SEE ADDITIONAL REQUIREMENTS PER DETAIL 3 SHEET 12.

COS WASH MAINTENANCE GENERAL NOTE:
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CORFCD RAINFALL GAUGE 4329 IS LOCATED IN BROWNSTONE CANYON UPSTREAM OF VILLAGE 24.
CORFCD RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

DRAINAGE CERTIFICATION
I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

JOSHUA L. JOHNSON P.E. 15789 DATE

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BENCHMARK		NAVD 88 DATUM	NAVD 88 DATUM
BM #	DESCRIPTION	(FEET)	(METERS)
CLV BM No. 0368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63	989.574

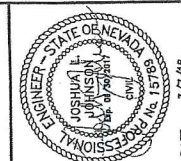
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SYSTEM OF TRANSMISSION



DATE	AGN APP	DATE	CGW APP	DATE

DESCRIPTION	DATE	REV

PROJECT NO.	62024-226-2
DESIGN:	MOB
DRAWN:	MOB
CHECK:	JLJ
PLOT DATE:	03-07-15
PLOT TIME:	16:24:07

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowingengineering.com

GOWING ENGINEERS & SURVEYORS

F:\Projects\62024-226-2\DWG Production\24-226-2_00.dwg
Matthew Buge

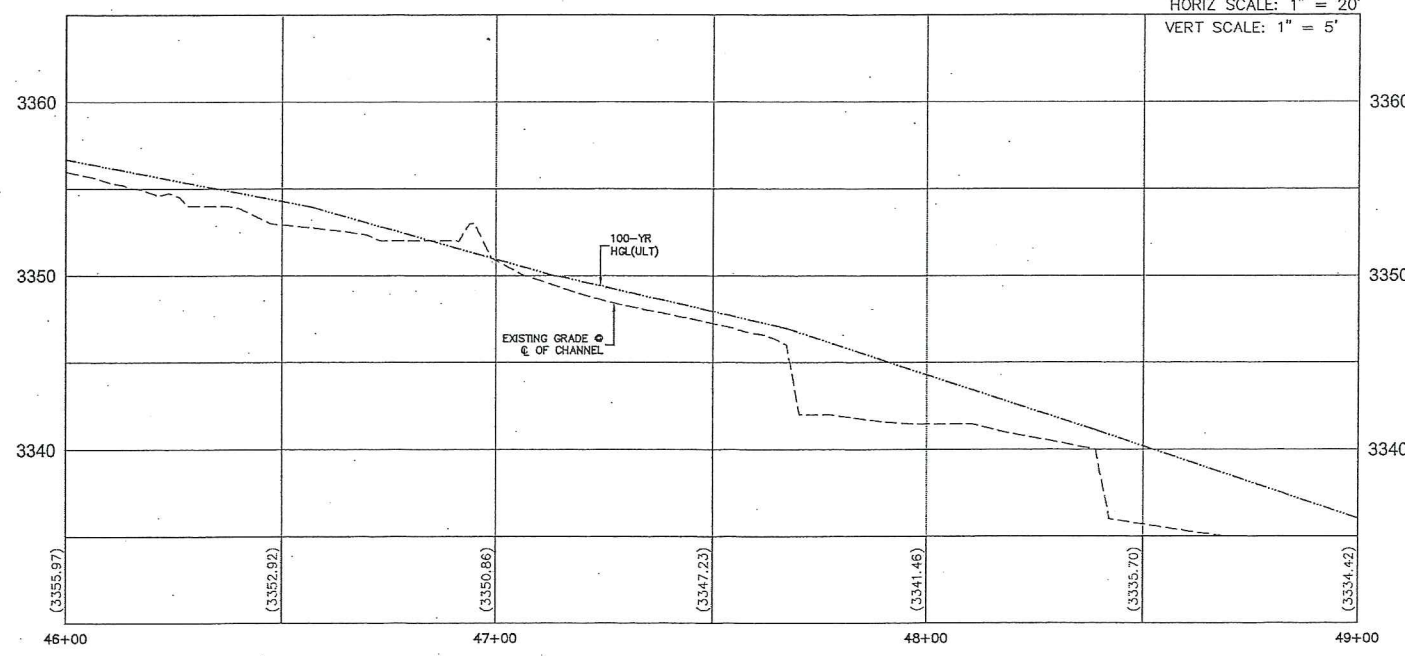
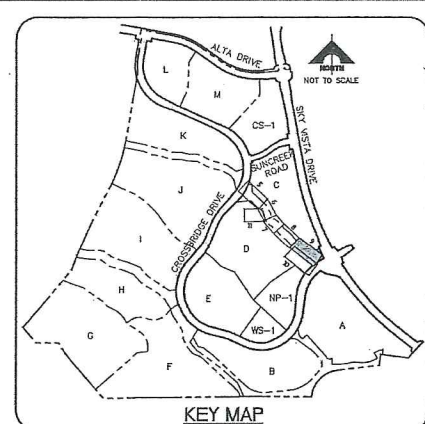
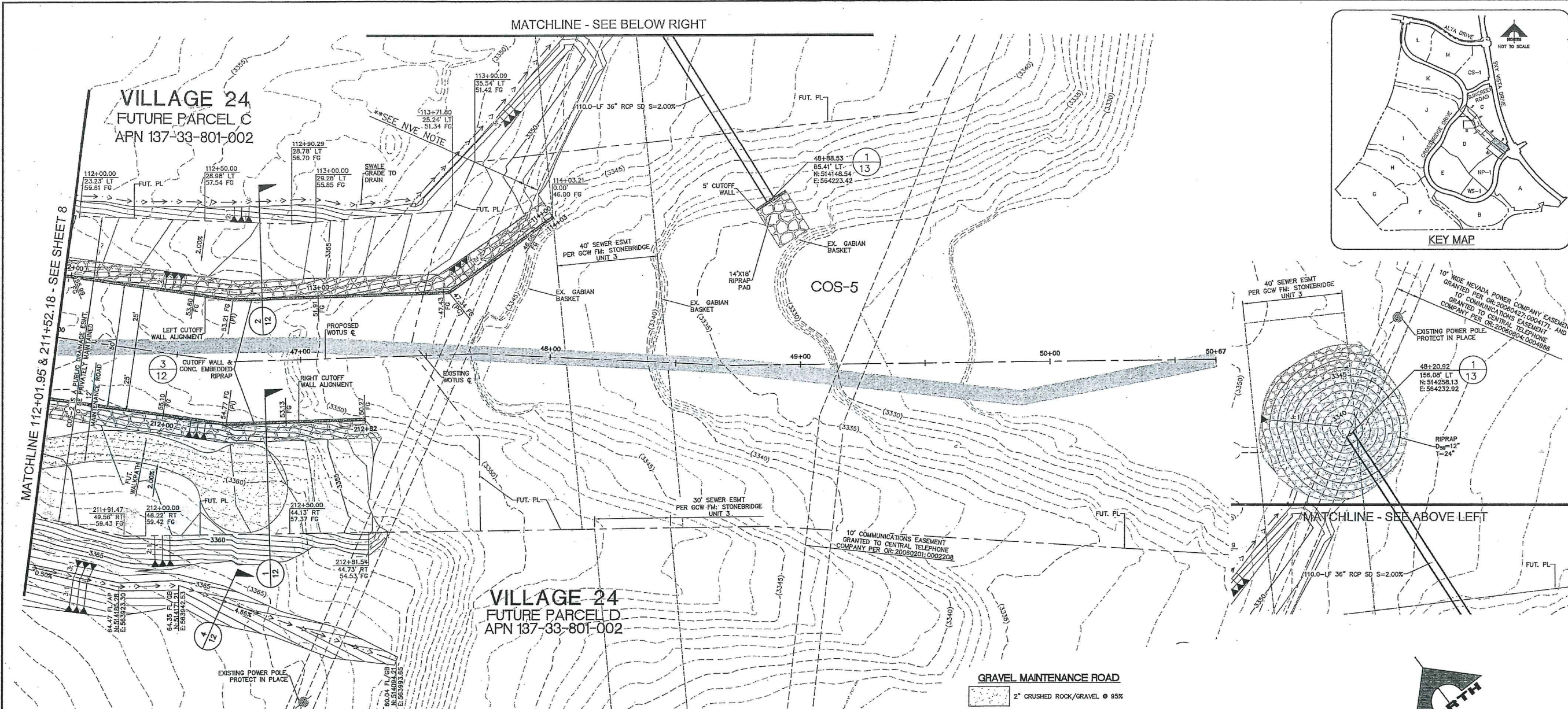
THE HOWARD HUGHES COMPANY, LLC

VILLAGE 24 - US WATERS
COS-2 WASH

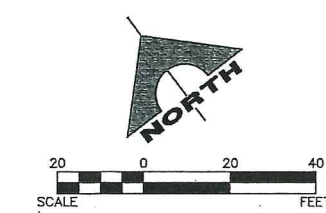
GRADING PLAN 3

DRAWING
7
7 OF 13 SHTS

TECHNICAL DRAINAGE STUDY SUBMITTAL - NOT FOR CONSTRUCTION



GRAVEL MAINTENANCE ROAD
2" CRUSHED ROCK/GRAVEL @ 95%



DRAINAGE CERTIFICATION
I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.
JOSHUA L. JOHNSON P.E. 15788 DATE

NOTE
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BENCHMARK

BM #	DESCRIPTION	NAVD 88 DATUM (FEET)	NAVD 88 DATUM (METERS)
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63	989.574

NVE NOTE:
10' WIDE NEVADA POWER COMPANY EASEMENT GRANTED PER OR:20060427:0004171. AND 10' COMMUNICATIONS EASEMENT GRANTED TO CENTRAL TELEPHONE COMPANY PER OR:20060804:0004986

RIPRAP GENERAL NOTE:
ALL RIPRAP, EXCLUDING CONCRETE EMBEDDED RIPRAP, SHALL ADHERE TO REQUIREMENTS OF UNIFORM STANDARD SPECIFICATION SECTION 610 "SLOPE AND CHANNEL PROTECTION." FOR CONCRETE EMBEDDED RIPRAP, SEE ADDITIONAL REQUIREMENTS PER DETAIL 3 SHEET 12.

COS WASH MAINTENANCE GENERAL NOTE:
HOA TO MAINTAIN DESIGN GRADES AND RIPRAP ALONG CUTOFF WALLS AFTER EVERY MEASURABLE STORM EVENT. IF THERE IS MEASURABLE RAINFALL DEPTH IN THE COSRD GAUGES 4329 AND 4344, THE COS WASH SHOULD BE INSPECTED BY HOA AFTER CESSATION OF THE STORM EVENT.
COSRD RAINFALL GAUGE 4329 IS LOCATED IN BROWNSTONE CANYON UPSTREAM OF VILLAGE 24.
COSRD RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

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FREEMAN AIR ANTERIAL
DIVISION OF TRANSPORTATION

PROJECT NO.	DATE	REV	DESCRIPTION
62024-226-2			

DESIGN: MJB
DRAWN: MJB
CHECK: JJJ
PLOT DATE: 03-07-16
PLOT TIME: 16:23:38

PROJECT NO. 62024-226-2
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

GCV
ENGINEERS & SURVEYORS

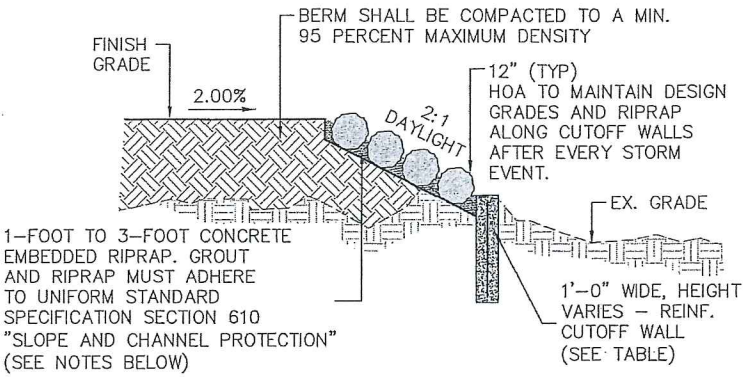
THE HOWARD HUGHES COMPANY, LLC
VILLAGE 24 - US WATERS
COS-2 WASH
GRADING PLAN 5

DRAWING 9
9 OF 13 SHTS

TECHNICAL DRAINAGE STUDY SUBMITTAL - NOT FOR CONSTRUCTION

APPROXIMATE STATIONING OF CUTOFF WALLS FOR COS-2		
HEIGHT	STATION	COMMENTS
7'	100+00.00 & 200+00.00	BEGIN
TRANS	105+45.02 & 204+69.11	10' TRANSITION
5'	105+55.02 & 204+79.11	-
TRANS	110+29.13 & 209+85.00	10' TRANSITION
3'	110+39.13 & 209+95.00	-
	114+09.00 & 212+82.00	END

NOTES:
1. WASHES MUST BE INSPECTED AND MAINTAINED AFTER EACH STORM EVENT. IF THE CUTOFF WALL IS EXPOSED, BACKFILL MUST BE PLACED TO THE TOP OF CUTOFF WALL, BENCHED 1-FOOT HORIZONTALLY AND GRADED TO A 3:1 SLOPE.

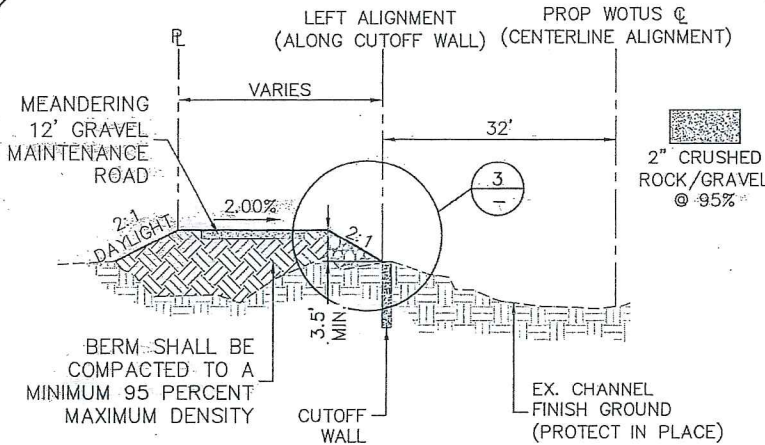


TYPICAL WASH SIDE SLOPE SECTION

3
NOT TO SCALE

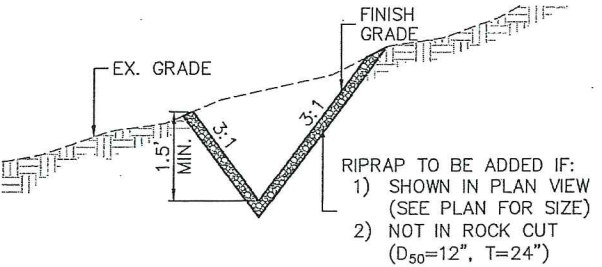
SECTION 610
SLOPE AND CHANNEL PROTECTION ADDITIONAL NOTES

- 610.02.04 STONES FOR RIPRAP
- A. STONES USED FOR RIPRAP SHALL BE HARD, DURABLE, ANGULAR IN SHAPE, RESISTANT TO WEATHERING AND EROSION, AND FREE FROM SPOILS, CRACKS, AND ORGANIC MATTER.
- ADD 4 AND 5 TO THIS SUBSECTION:
4. THE SPECIFIC GRAVITY OF THE CONCRETE EMBEDDED RIPRAP SHALL NOT BE LESS THAN 2.45.
5. THE NOMINAL STONE SIZE FOR THE CONCRETE EMBEDDED RIPRAP SHALL BE 1-FOOT TO 3-FOOT.
- C. CONTROL OF GRADATION WILL BE BY VISUAL INSPECTION.
- REVISE SUBSECTION AS FOLLOWS:
1. THE CONTRACTOR SHALL PROVIDE A SAMPLE OF STONE OF AT LEAST 5 TONS MEETING THE GRADATION FOR CONCRETE EMBEDDED RIPRAP.
- REVISE SUBSECTION D. AS FOLLOWS:
- D. CALICHE STONE OR CEMENTITIOUS MATERIALS MEETING THE REQUIREMENTS OF THIS SECTION MAY BE USED AS RIPRAP WITH PRIOR APPROVAL OF THE ENGINEER. CALICHE STONE OR CEMENTITIOUS MATERIAL MAY NOT BE USED FOR CONCRETE EMBEDDED RIPRAP.



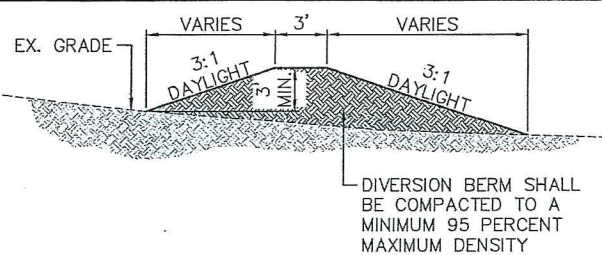
TYPICAL COS-2 LEFT ALIGNMENT BERM

STATION 100+00.00 TO 114+09.00 NOT TO SCALE



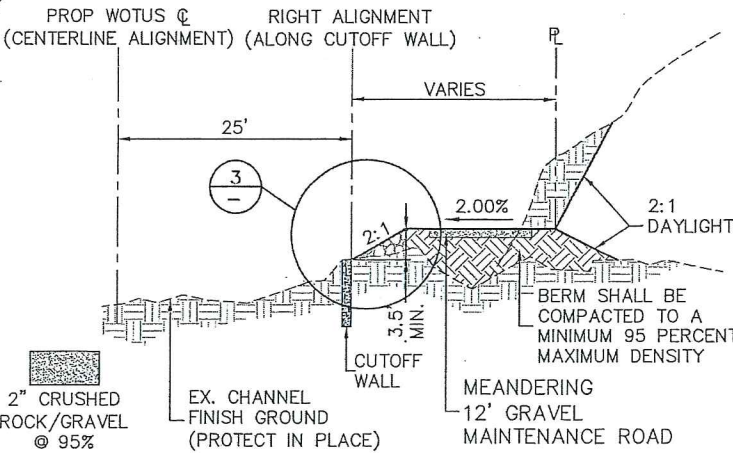
TYPICAL V-DITCH SECTION

4
NOT TO SCALE



TYPICAL UNLINED BERM SECTION

5
NOT TO SCALE



TYPICAL COS-2 RIGHT ALIGNMENT BERM

STATION 200+00.00 TO 212+82.00 NOT TO SCALE

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1-702-432-5300
PRIMARY AND SECONDARY SYSTEMS OF TRANSPORTATION

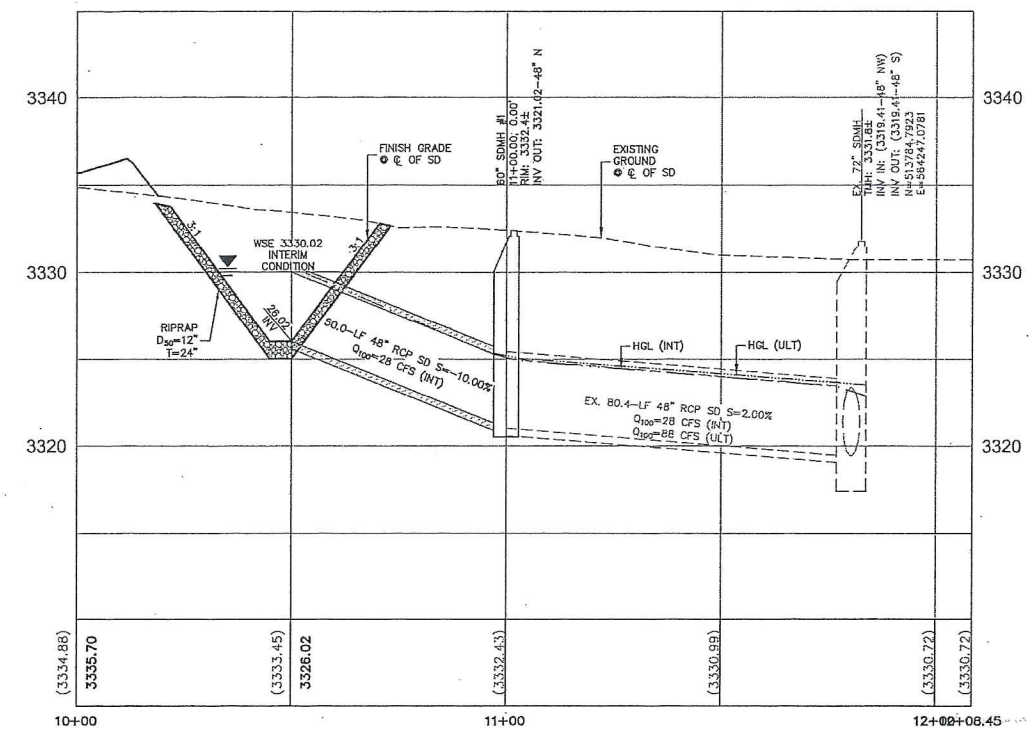
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CHECK: JJJ
PLOT DATE: 03-07-16
PLOT TIME: 16:22:55
REV. DATE DESCRIPTION

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowengineering.com

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 24 - US WATERS
COS-2 WASH

DRAWING 12
12 OF 13 SHTS

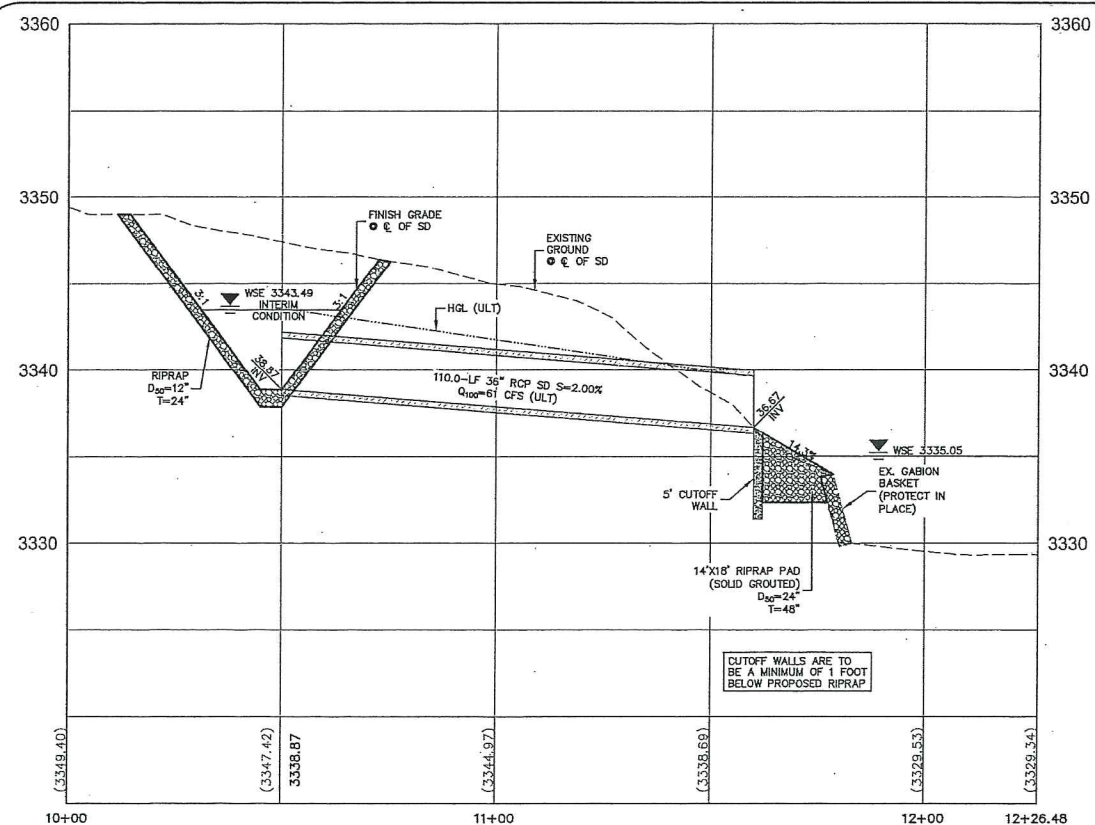
ENGINEER'S SURVEYORS
DETAIL SHEET 1



48" RCP AND SUMP PROFILE

NOT TO SCALE

2



36" RCP AND SUMP PROFILE

NOT TO SCALE

1



THE HOWARD HUGHES COMPANY, LLC

VILLAGE 24 - US WATERS
COS-2 WASH

DETAIL SHEET 2

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowingengineering.com

GCM
ENGINEERS & SURVEYORS

PROJECT NO.
62024-226-2

DESIGN: MJB
DRAWN: MJB
CHECK: JLI
PLOT DATE: 03-07-16
PLOT TIME: 16:22:52

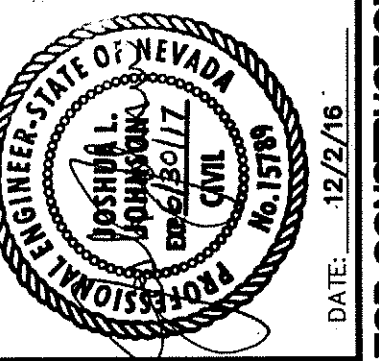


TECHNICAL DRAINAGE STUDY SUBMITTAL - NOT FOR CONSTRUCTION

2016

A.P.N. 137-33-710-003

INDEX OF SHEETS	
SHT. #	DESCRIPTION
1	COVER SHEET
2	GENERAL NOTES
3	HORIZONTAL CONTROL PLAN 1
4	HORIZONTAL CONTROL PLAN 2
5	HORIZONTAL CONTROL PLAN 3
6	GRADING PLAN – OVERVIEW
7	GRADING PLAN 1
8	GRADING PLAN 2
9	GRADING PLAN 3
10	GRADING PLAN 4
11	GRADING PLAN 5
12	GRADING PLAN 6
13	GRADING PLAN 7
14	DETAIL SHEET 1
15	DETAIL SHEET 2
16	DETAIL SHEET 3

[illegible][illegible]

DESIGN:	MDB
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CHECK:	JJJ
PLOT DATE: 12-02-16	
PLOT TIME: 16:14:52	

GCV
ENGINEERS\ SURVEYORS

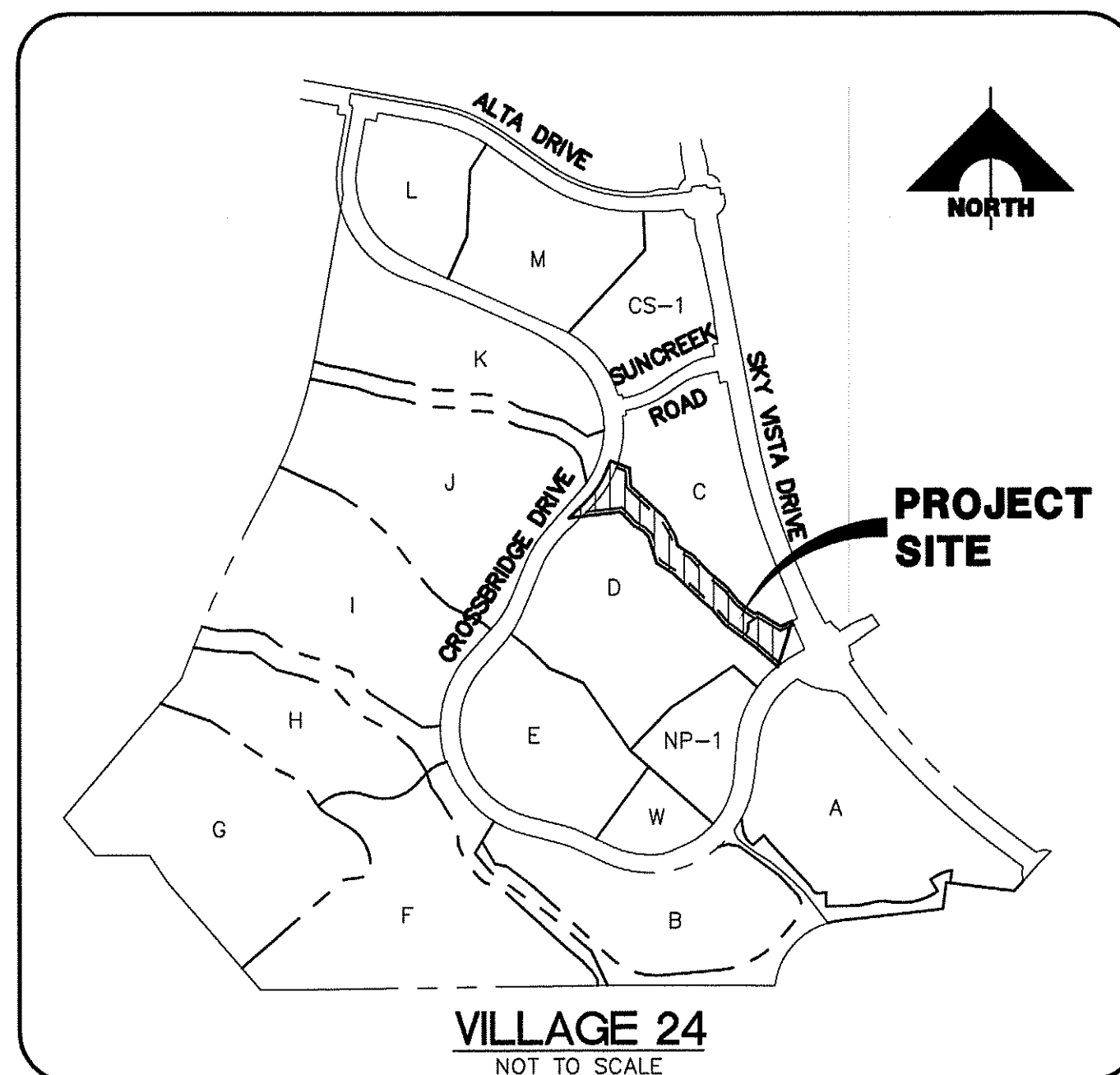
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowngengineering.com

Project# 600 (6/24-226-2) DWS\production VZ4-226-2_CV.dwg
Steven Dunge

THE HOWARD HUGHES COMPANY, LLC VILLAGE 24 - US WATERS COS-2 WASH IMPROVEMENT PLANS
COVER SHEET

DRAWING
1
1 OF 16 SHTS

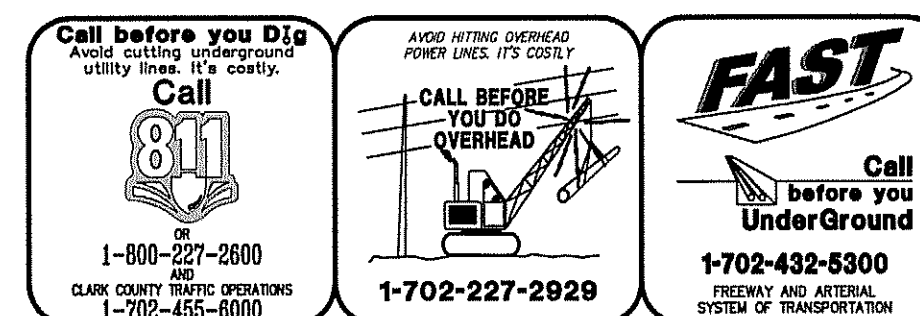
FOR AGENCY REVIEW - NOT FOR CONSTRUCTION



**THE HOWARD HUGHES COMPANY, LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NEVADA 89146
OFFICE PHONE NO. (702) 791-4300**

GCV'
ENGINEERS \ SURVEYORS

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com



DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY DS4774 ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

JOSHUA L. JOHNSON P.E. 15789 DATE _____

THE HOWARD HUGHES COMPANY, LLC

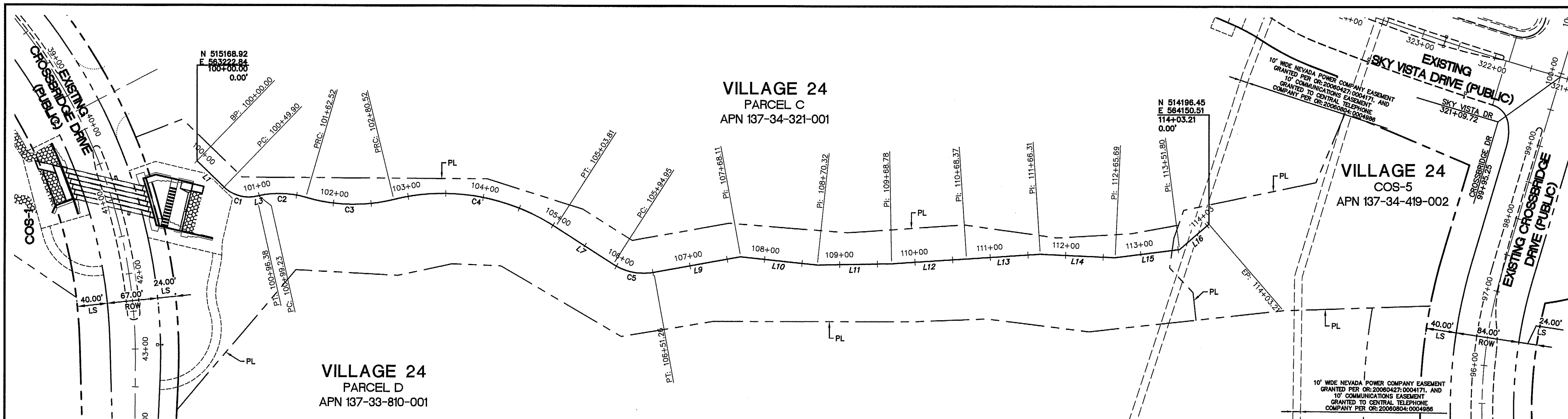
KEVIN ORROCK
VICE PRESIDENT

DATE

ALLEN PAVELKA; PE, PG# 9029 DATE _____
CITY ENGINEER
CITY OF LAS VEGAS, NEVADA

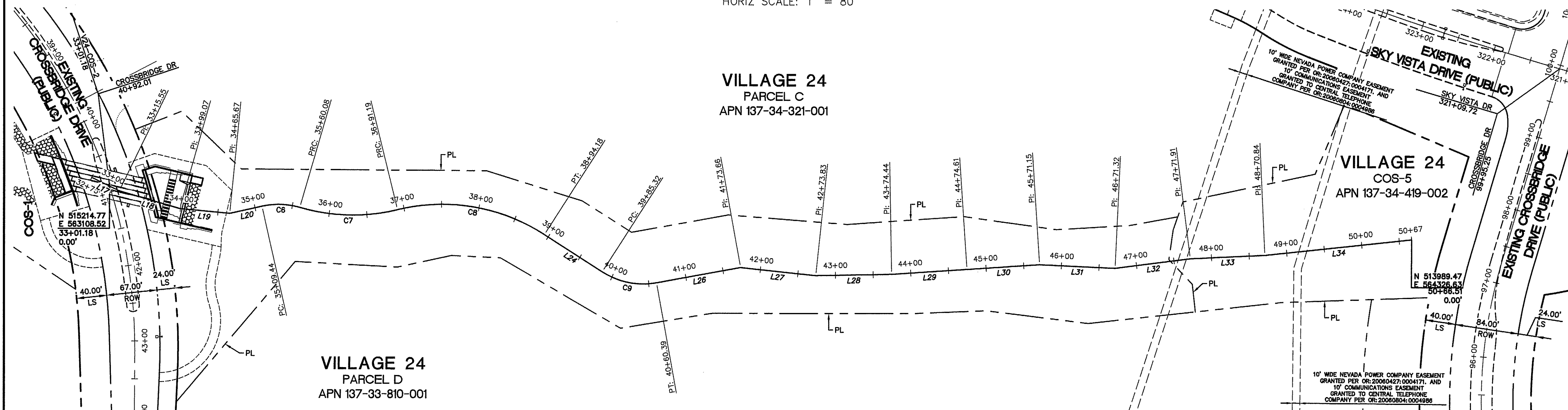
APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY OTHER IMPROVEMENTS DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN DEVIATIONS FROM STANDARDS IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLV PLANNING DEPARTMENT	
THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT	
CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY	DATE



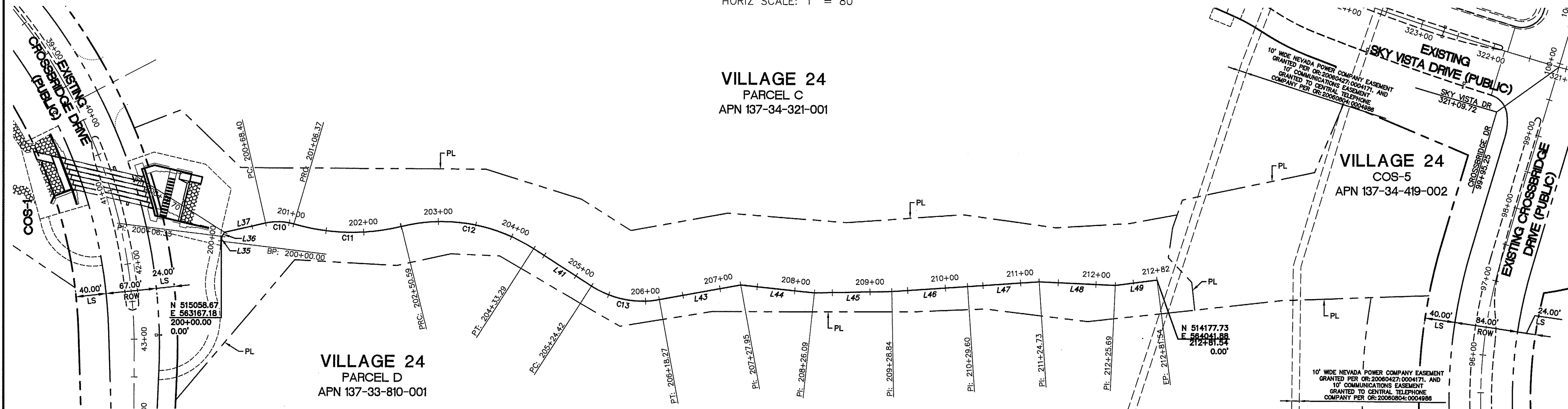
COS-2 LEFT ALIGNMENT (ALONG CUTOFF WALL)

HORIZ SCALE: 1" = 80'



COS-2 PROPOSED WOTUS CENTER LINE ALIGNMENT

HORIZ SCALE: 1" = 80'

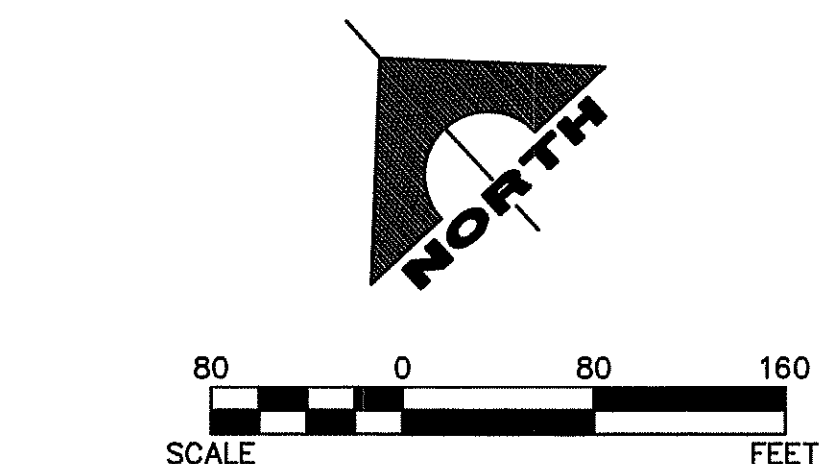


COS-2 RIGHT ALIGNMENT (ALONG CUTOFF WALL)

HORIZ SCALE: 1" = 80'

CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C1	46.48'	47.00'	25.34'	56°39'49"
C2	63.29'	125.00'	32.34'	29°00'43"
C3	118.00'	225.00'	60.39'	30°02'53"
C4	223.29'	275.00'	118.21'	46°31'21"
C5	56.31'	75.00'	29.56'	43°00'59"
C6	50.64'	100.00'	25.87'	29°00'43"
C7	131.11'	250.00'	67.10'	30°02'53"
C8	202.99'	250.00'	107.47'	46°31'21"
C9	75.08'	100.00'	39.41'	43°00'59"
C10	37.98'	75.00'	19.40'	29°00'43"
C11	144.22'	275.00'	73.81'	30°02'53"
C12	182.69'	225.00'	96.72'	46°31'21"
C13	93.85'	125.00'	49.26'	43°00'59"

LINE TABLE			LINE TABLE		
LINE #	LENGTH	DIRECTION	LINE #	LENGTH	DIRECTION
L1	49.90'	S31°3'16"E	L28	100.61'	S48°09'13"E
L3	2.85'	S59°53'05"E	L29	100.17'	S50°54'13"E
L7	91.14'	S14°22'53"E	L30	96.54'	S50°50'41"E
L9	116.85'	S57°23'51"E	L31	100.17'	S44°27'28"E
L10	102.21'	S41°05'02"E	L32	100.59'	S54°26'16"E
L11	98.46'	S48°09'13"E	L33	98.93'	S49°42'13"E
L12	99.59'	S50°54'13"E	L34	195.67'	S53°09'23"E
L13	97.94'	S50°50'41"E	L35	6.33'	N49°55'36"E
L14	99.38'	S44°27'28"E	L36	6.36'	N75°07'57"E
L15	86.10'	S54°26'16"E	L37	55.70'	S59°52'03"E
L16	51.42'	S87°57'43"E	L41	91.14'	S14°22'53"E
L17	40.55'	S21°09'36"E	L43	109.68'	S57°23'51"E
L18	83.52'	S31°09'49"E	L44	98.13'	S41°05'02"E
L19	66.60'	S41°29'09"E	L45	102.75'	S48°09'13"E
L20	43.77'	S59°52'03"E	L46	100.76'	S50°54'13"E
L24	91.14'	S14°22'53"E	L47	95.13'	S50°50'41"E
L26	113.26'	S57°23'51"E	L48	100.96'	S44°27'28"E
L27	100.17'	S41°05'02"E	L49	55.85'	S54°26'16"E



NOTE
THIS SET OF DRAWINGS IS BASED UPON NAVD 88 DATUM. PREVIOUS DRAWINGS MAY BE BASED ON OTHER DATUM. CARE SHOULD BE OBSERVED WHEN UTILIZING THIS SET OF DRAWINGS

BASIS OF BEARINGS
SOUTH 89°47'23" EAST, BEING THE BEARING OF THE NORTH LINE OF SECTION 33, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN IN FILE 118, PAGE 100 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK		NAVD 88 DATUM	NAVD 88 DATUM
BM #	DESCRIPTION	3246.63 (FEET)	989.574 (METERS)
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.		

Call before you Dig
Avoid cutting underground utility lines. It's costly.

811
1-800-222-2800
CLARK COUNTY TRAFFIC OPERATORS
1-702-455-0000

CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

FAST
Call before you UnderGround
1-702-432-5300
FREEMAN AND ARTERIAL SYSTEMS OF TRANSPORTATION

PROJECT NO. **62024-232**

DESIGN:	MOB
DRAWN:	MOB
CHECK:	JLU
PLOT DATE:	12-02-16
PLOT TIME:	16:15:41

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Matthew Burge

THE HOWARD HUGHES COMPANY, LLC

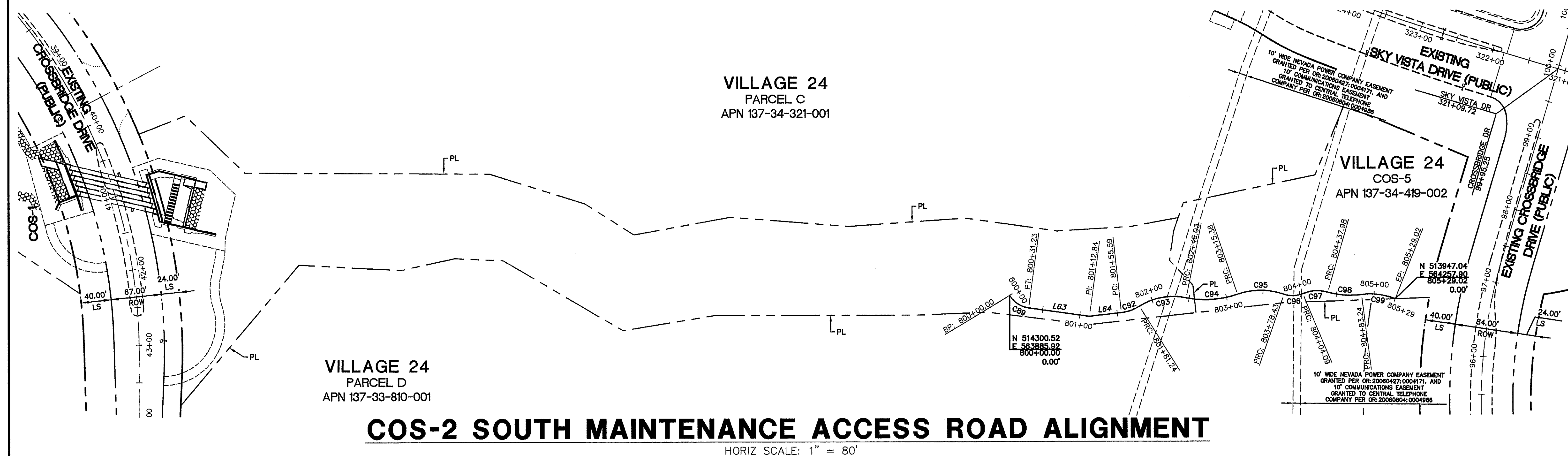
VILLAGE 24 - US WATERS
COS-2 WASH IMPROVEMENT PLANS

HORIZONTAL CONTROL PLAN 1

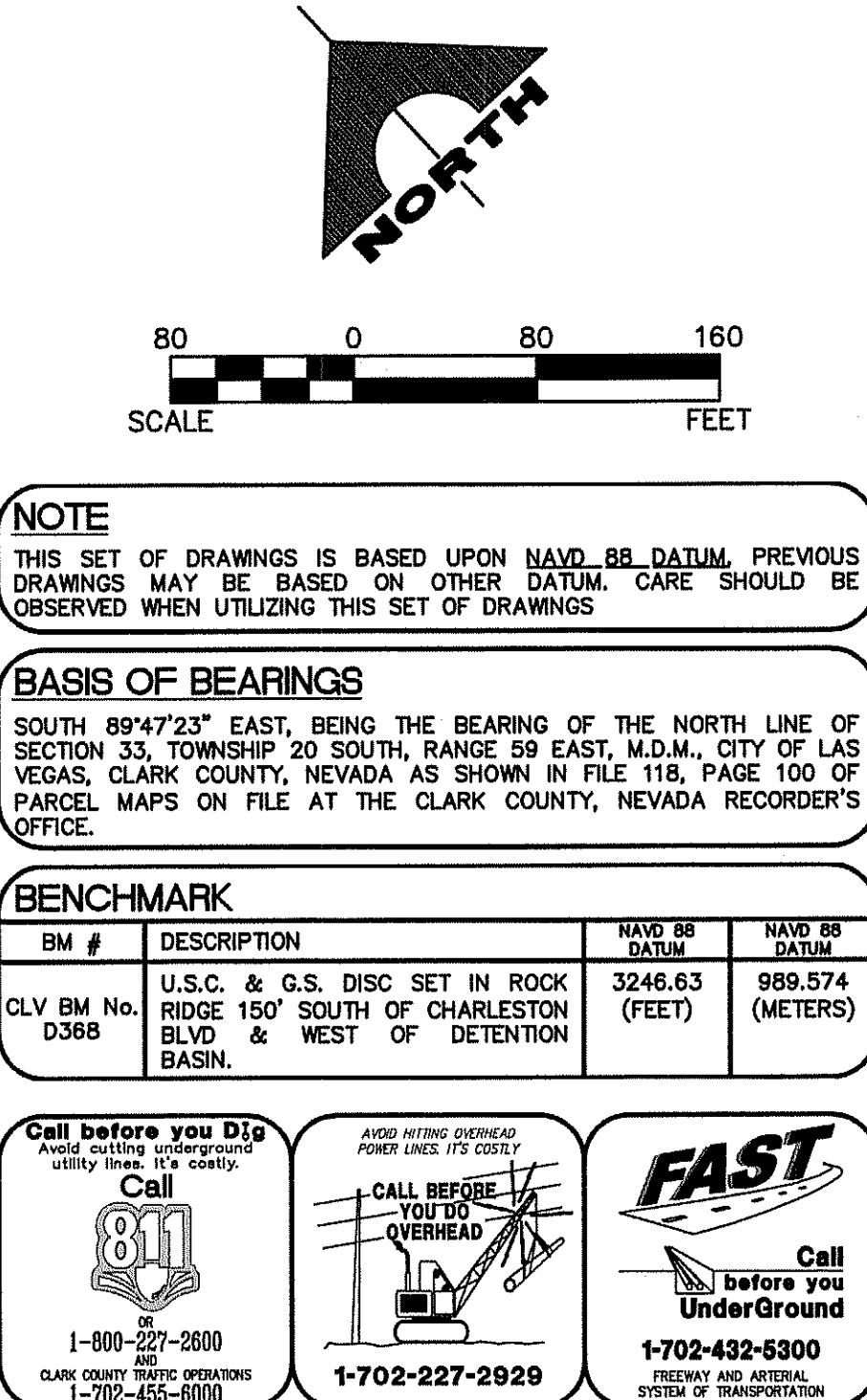
DRAWING
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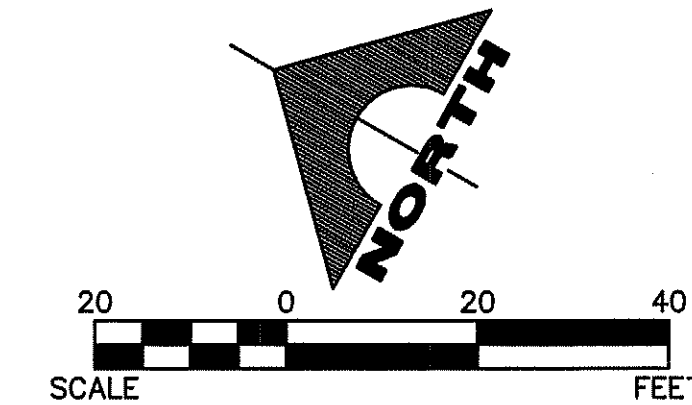
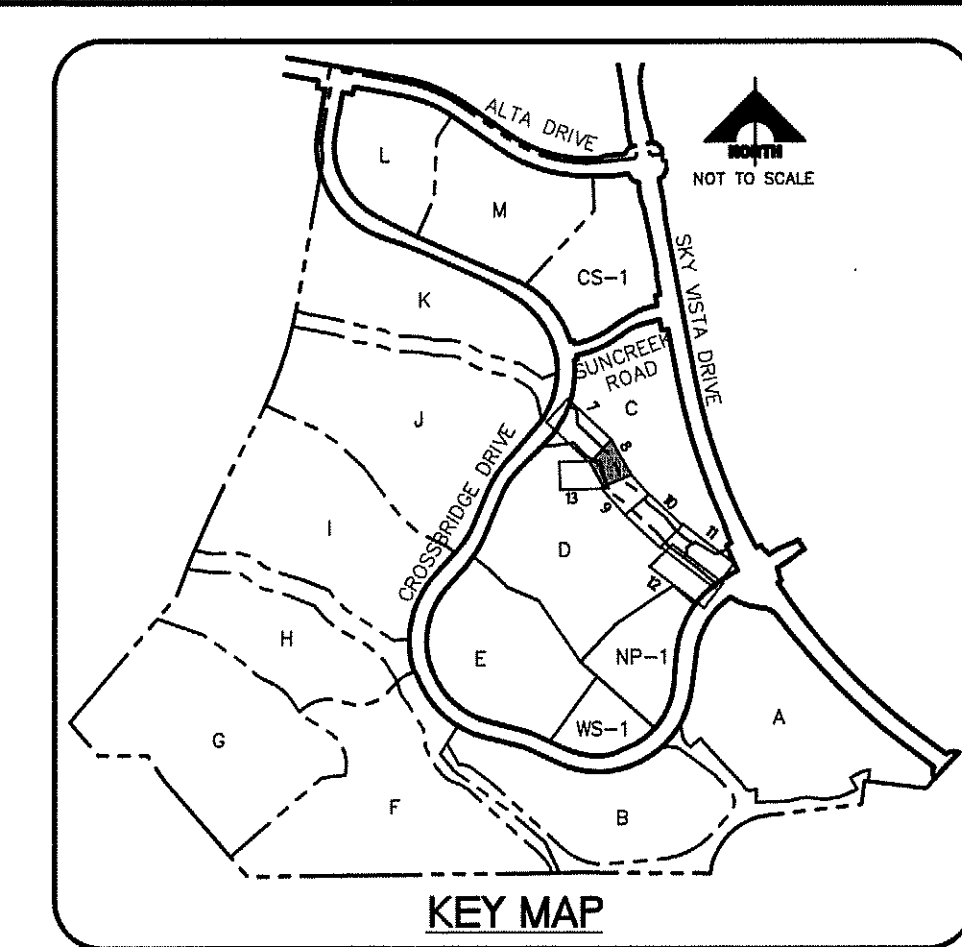
3 OF 16 SHTS

FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

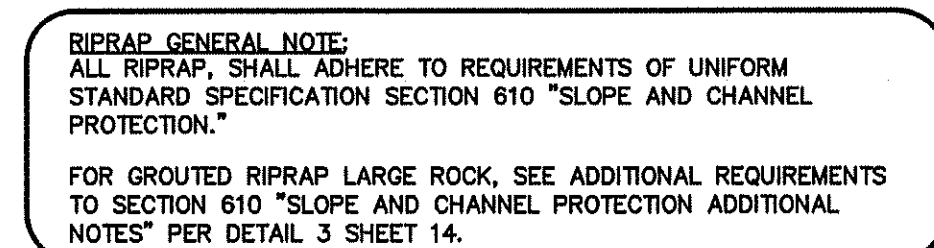


CURVE TABLE					CURVE TABLE				
CURVE #	LENGTH	RADIUS	TANGENT	DELTA	CURVE #	LENGTH	RADIUS	TANGENT	DELTA
C76	38.99'	40.00'	21.20'	55°50'47"	C86	33.06'	56.00'	17.03'	33°49'15"
C77	41.64'	50.00'	22.11'	47°42'45"	C89	31.23'	35.00'	16.74'	51°07'39"
C78	51.16'	35.00'	31.38'	83°45'20"	C92	25.65'	57.00'	13.05'	25°47'10"
C79	31.25'	80.00'	15.83'	22°22'49"	C93	64.79'	85.00'	34.06'	43°40'29"
C80	43.31'	297.00'	21.69'	8°21'20"	C94	69.35'	130.00'	35.52'	30°33'58"
C81	32.52'	80.00'	16.49'	23°17'32"	C95	63.04'	94.50'	32.75'	38°13'27"
C82	42.92'	50.00'	22.88'	49°11'12"	C96	25.66'	35.00'	13.44'	42°00'18"
C83	52.62'	58.00'	28.28'	51°58'47"	C97	33.89'	50.00'	17.62'	38°49'58"
C84	41.37'	45.00'	22.28'	52°40'29"	C98	45.26'	110.00'	22.96'	23°34'30"
C85	14.48'	28.00'	7.41'	29°37'47"	C99	45.78'	90.00'	23.40'	29°08'48"



GRAVEL MAINTENANCE ROAD

2" THICK CRUSHED ROCK/GRAVEL
OVER 4" TYPE II @ 95% PER USDCCA



COS WASH MAINTENANCE GENERAL NOTE:

HOA TO MAINTAIN DESIGN GRADES AND RIPRAP ALONG CUTOFF WALLS
TO PREVENT MEASURABLE STORM EVENT. THERE IS MEASURABLE
RAINFALL DEPTH IN THE CORFCO GAUGES 4329 AND 4344, THE COS
WASH SHOULD BE INSPECTED BY HOA AFTER CESSATION OF THE
STORM EVENT.

CORFCO RAINFALL GAUGE 4329 IS LOCATED IN BROWNSTONE CANYON
UPSTREAM OF VILLAGE 24.

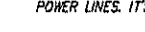
CORFCO RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK
DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

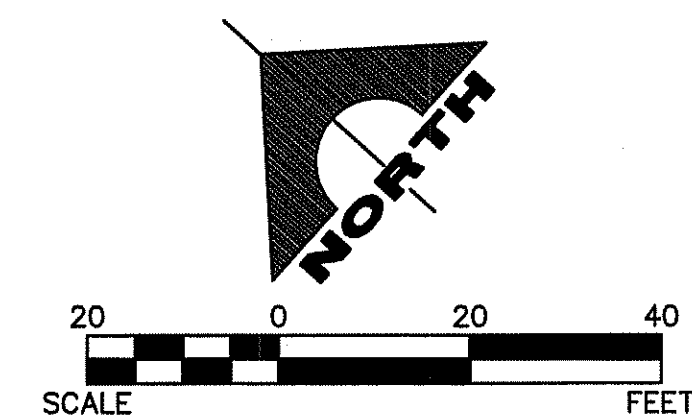
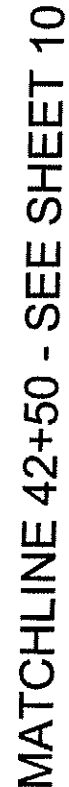
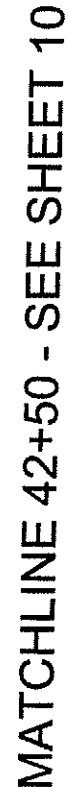
NOTE
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BENCHMARK			
BM #	DESCRIPTION	NAVD 88 DATUM	NAVD 88 DATUM
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63 (FEET)	989.574 (METERS)

Call before you Dig Avoid cutting underground utility lines. It's costly. Call  OR 1-800-227-2800 CLARK COUNTY WATER OPERATIONS 700 N. 1ST ST. DEERFIELD BEACH, FL 33442	AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY CALL BEFORE YOU TO OVERHEAD  1-702-227-2929	<i>FAST</i> Call before you UnderGround 1-702-432-5300 FREEMAN AND ARTS 2000 S. THUNDERBOLT RD. LAS VEGAS, NV 89119
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Call before you Dig
 Avoid cutting underground utility lines. It's costly.

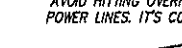
Call



OR
 1-800-227-2800

OR
 CLARK COUNTY TRAFFIC OPERATIONS
 702-462-6000

A100 HITING OVERHEAD
 POWER LINES IT'S COSTLY



**CALL BEFORE
 YOU DO
 OVERHEAD**

1-702-227-2929

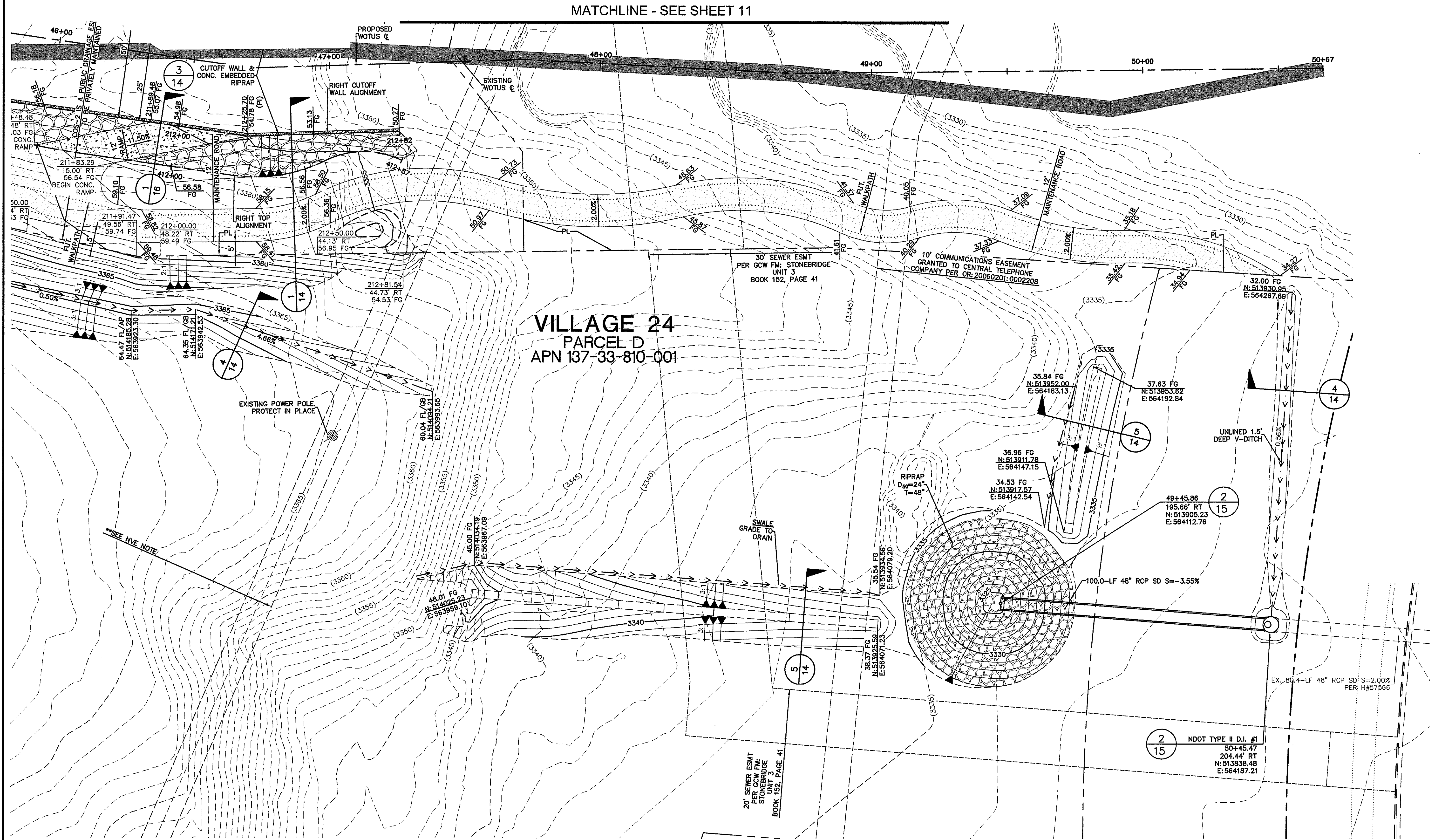
FAST

**Call
 before you
 UnderGround**

1-702-432-5300

PREMIUM AND AIRTEL
 SYSTEMS OF ASSURANCE

DRAWING		
9		
9 OF 16 SHTS		



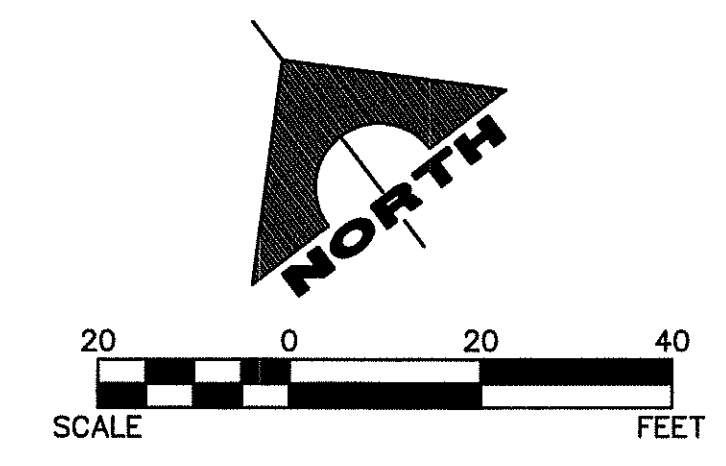
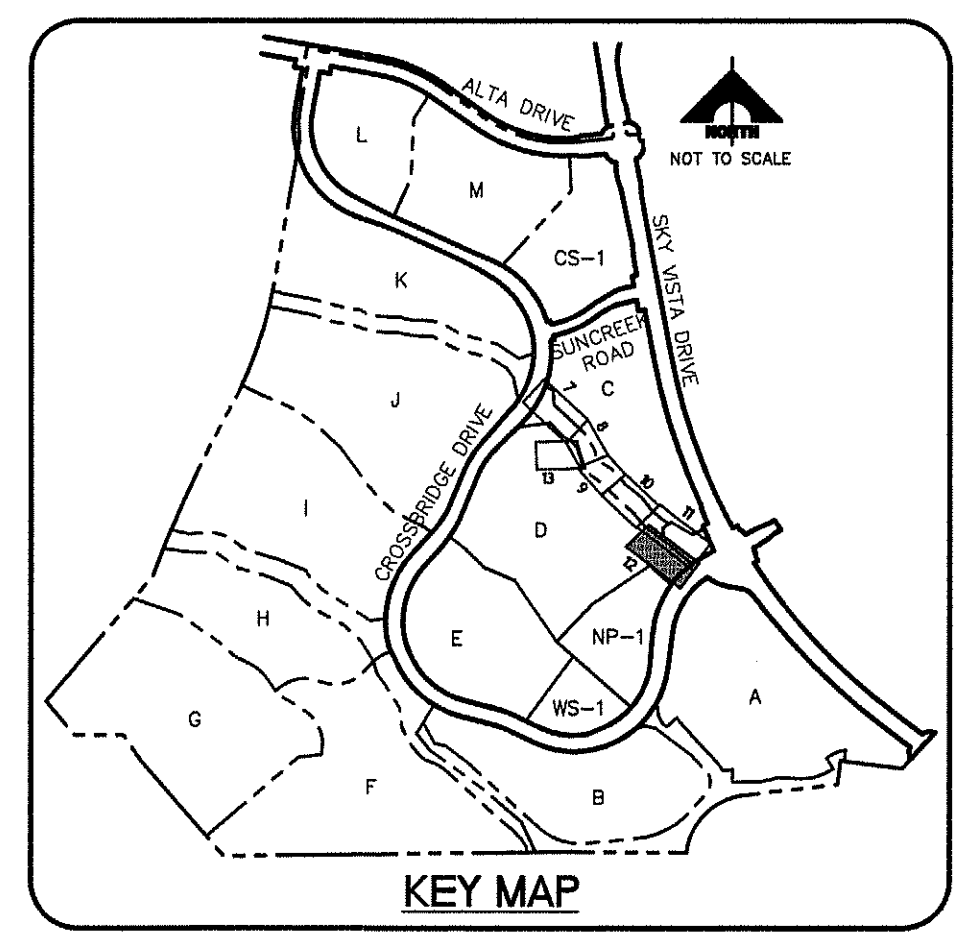
MATCHLINE - SEE SHEET 11

VILLAGE 24
PARCEL D
APN 137-33-810-001

COS-2 (WATERS OF THE US)
HORIZ SCALE: 1" = 20'

GRAVEL MAINTENANCE ROAD
2" THICK CRUSHED ROCK/GRAVEL
OVER 4" TYPE II @ 95% PER USDOCA

CONCRETE RAMP
6" THICK CONCRETE RAMP PER
DETAIL 1 DRAWING 16.



NVE NOTE:
10' WIDE NEVADA POWER COMPANY EASEMENT GRANTED PER OR: 20060427:0004171, AND 10' COMMUNICATIONS EASEMENT GRANTED TO CENTRAL TELEPHONE COMPANY PER OR: 20060804:0004986

RIPRAP GENERAL NOTE:
ALL RIPRAP, SHALL ADHERE TO REQUIREMENTS OF UNIFORM STANDARD SPECIFICATION SECTION 610 "SLOPE AND CHANNEL PROTECTION".

FOR GROUTED RIPRAP LARGE ROCK, SEE ADDITIONAL REQUIREMENTS TO SECTION 610 "SLOPE AND CHANNEL PROTECTION" ADDITIONAL NOTES" PER DETAIL 3 SHEET 14.

COS WASH MAINTENANCE GENERAL NOTE:
HOA TO MAINTAIN DESIGN GRADES AND RIPRAP ALONG CUTOFF WALLS AFTER EVERY MEASURABLE STORM EVENT. IF THERE IS MEASURABLE RAINFALL DEPTH IN THE CORFCD GAUGES 4329 AND 4344, THE COS WASH SHOULD BE INSPECTED BY HOA AFTER CESSATION OF THE STORM EVENT.

CORFCD RAINFALL GAUGE 4329 IS LOCATED IN BROWNSTONE CANYON UPSTREAM OF VILLAGE 24.

CORFCD RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

NOTE
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BENCHMARK		NAVD 88 DATUM	NAVD 88 DATUM
BM #	DESCRIPTION		
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.835 (FEET)	989.574 (METERS)

Call before you Dig
Avoid hitting underground utility lines. It's costly.

Call
1-800-227-2600
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000

Call before you Overhead
Avoid hitting overhead power lines. It's costly.

Call
1-702-227-2629

FAST
Call before you UnderGround
Freeway and Arterial System of Transportation
1-702-432-5300

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 24 - US WATERS
COS-2 WASH IMPROVEMENT PLANS

GRADING PLAN 6

DRAWING
12
12 OF 16 SHEETS

PROJECT NO.
62024-232

DESIGN: MDS
DRAWN: MDS
CHECK: JJJ

PLOT DATE: 12-02-16
PLOT TIME: 16:20:37

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowingengineering.com

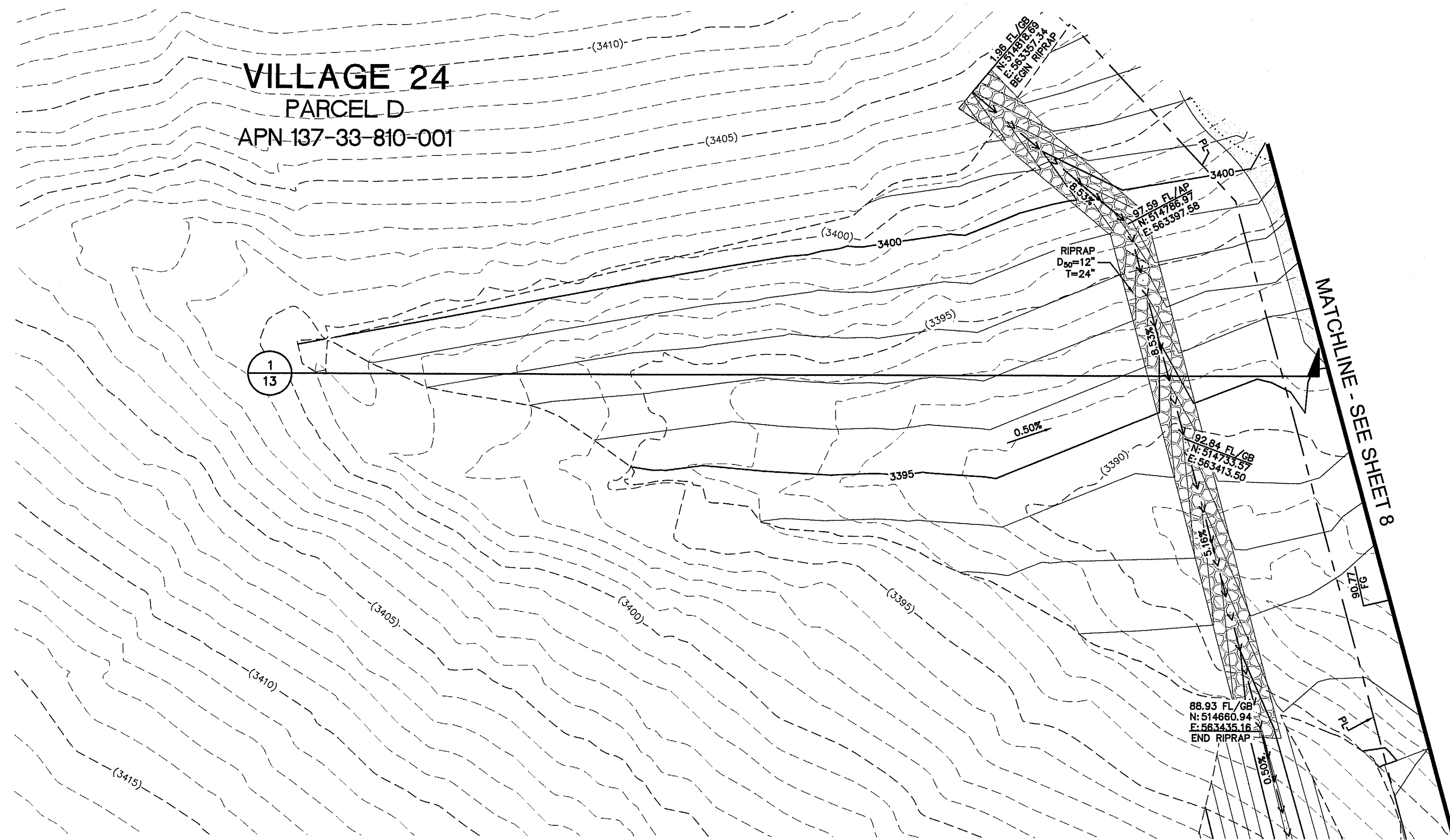
ENGINEERS' SURVEYORS

F:\Projects\600\62024-232-2\JWG\Production\V24-232-2_6D.dwg
Matthew Burge

PROFESSIONAL ENGINEER
STATE OF NEVADA
JOSHUA J. JENNINGS
No. 62997
Exp. 12/31/2021

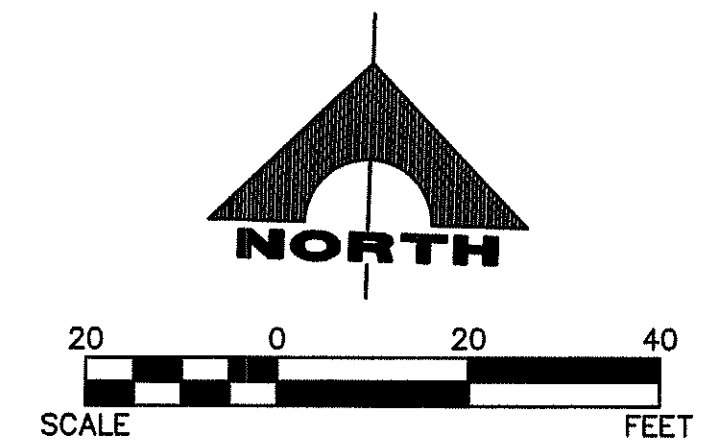
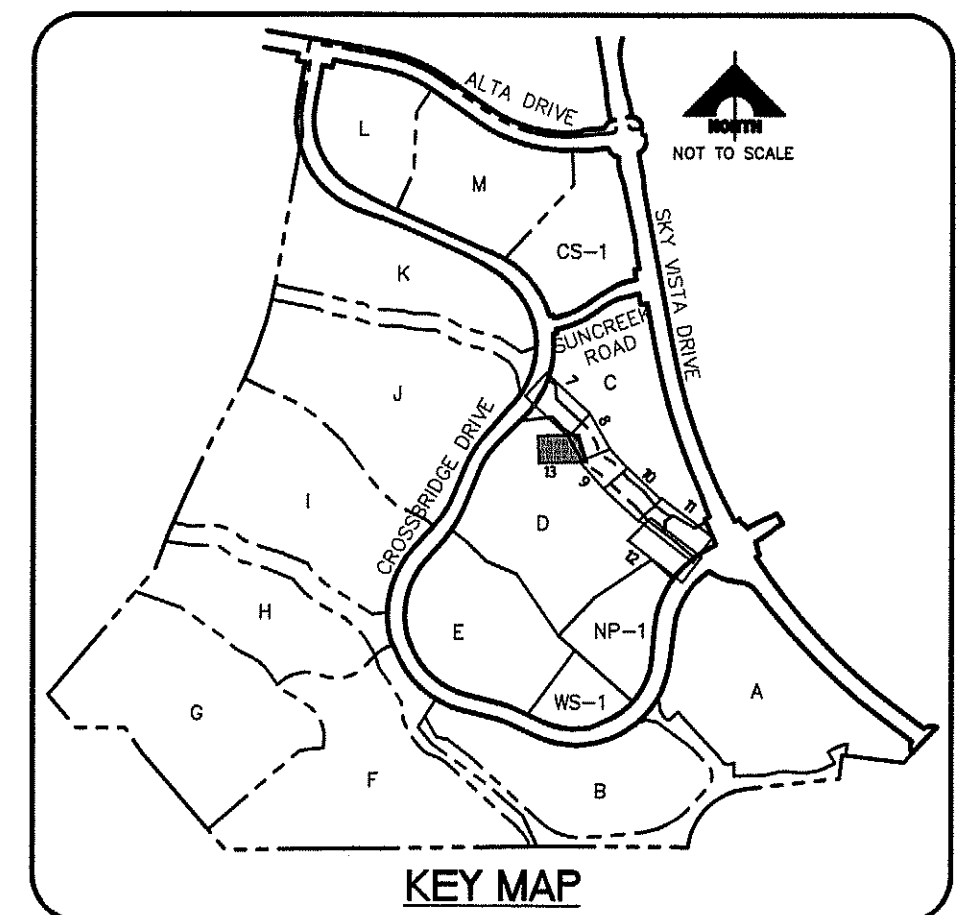
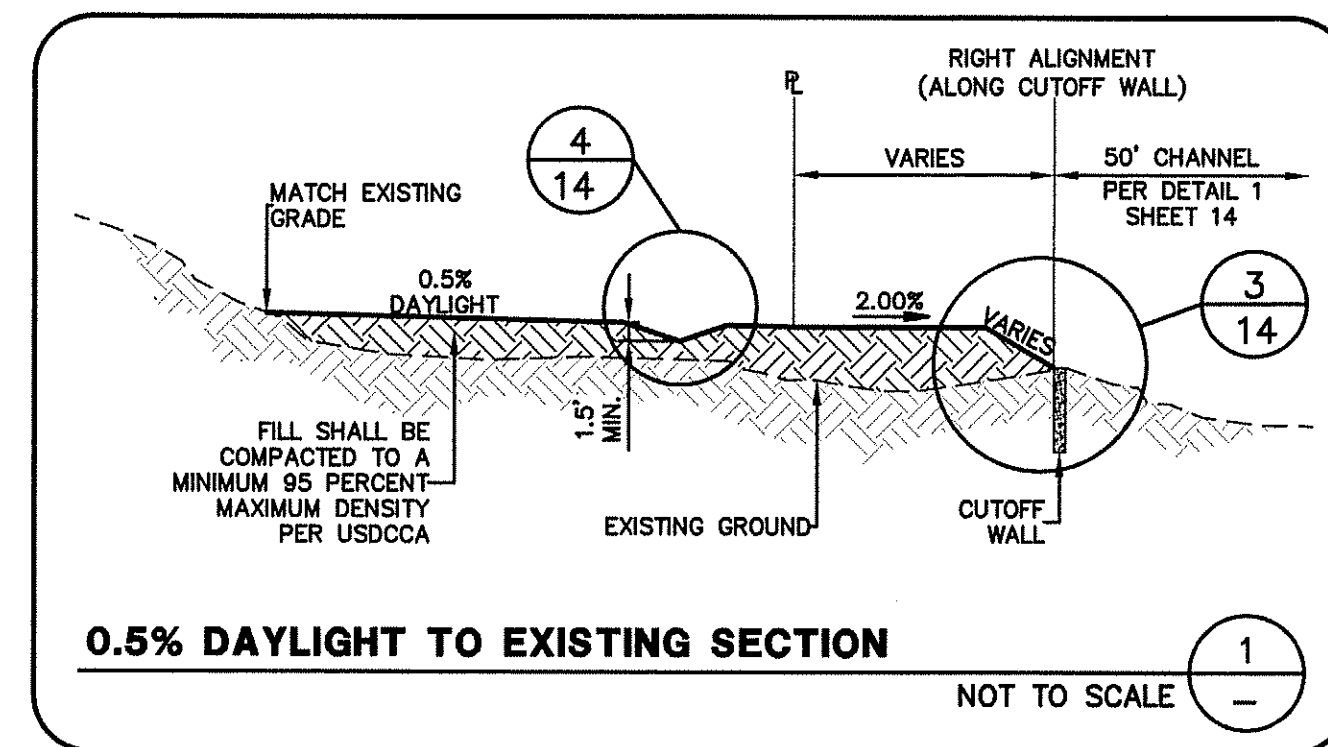
DATE: 12/2/16
GCW APP
DATE
AGN APP
DATE
REV
DATE
DESCRIPTION

FOR AGENCY REVIEW - NOT FOR CONSTRUCTION



0.5% DAYLIGHT TO EXISTING GRADE

HORIZ SCALE: 1" = 20'



RIPRAP GENERAL NOTE:
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FOR GROUTED RIPRAP LARGE ROCK, SEE ADDITIONAL REQUIREMENTS TO SECTION 610 "SLOPE AND CHANNEL PROTECTION ADDITIONAL NOTES" PER DETAIL 3 SHEET 14.

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CORFCD RAINFALL GAUGE 4344 IS LOCATED IN THE RED ROCK DETENTION BASIN DOWNSTREAM OF VILLAGE 24.

NOTE
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BENCHMARK		NAVD 88 DATUM	NAVD 88 DATUM
BM #	DESCRIPTION		
CLV BM No. D368	U.S.C. & G.S. DISC SET IN ROCK RIDGE 150' SOUTH OF CHARLESTON BLVD & WEST OF DETENTION BASIN.	3246.63 (FEET)	989.574 (METERS)

Call before you Dig
Avoid hitting underground utility lines. It's costly.
Call 811
1-800-227-2800
CLARK COUNTY TRAFFIC OPERATIONS
1-702-455-6000

CALL BEFORE YOU DIG OVERHEAD
AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
1-702-227-2829

FAST
Call before you UnderGround
1-702-432-5300
FREIGHTWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

THE HOWARD HUGHES COMPANY, LLC
VILLAGE 24 - US WATERS
COS-2 WASH IMPROVEMENT PLANS
GRADING PLAN 7

PROJECT NO.
62024-282

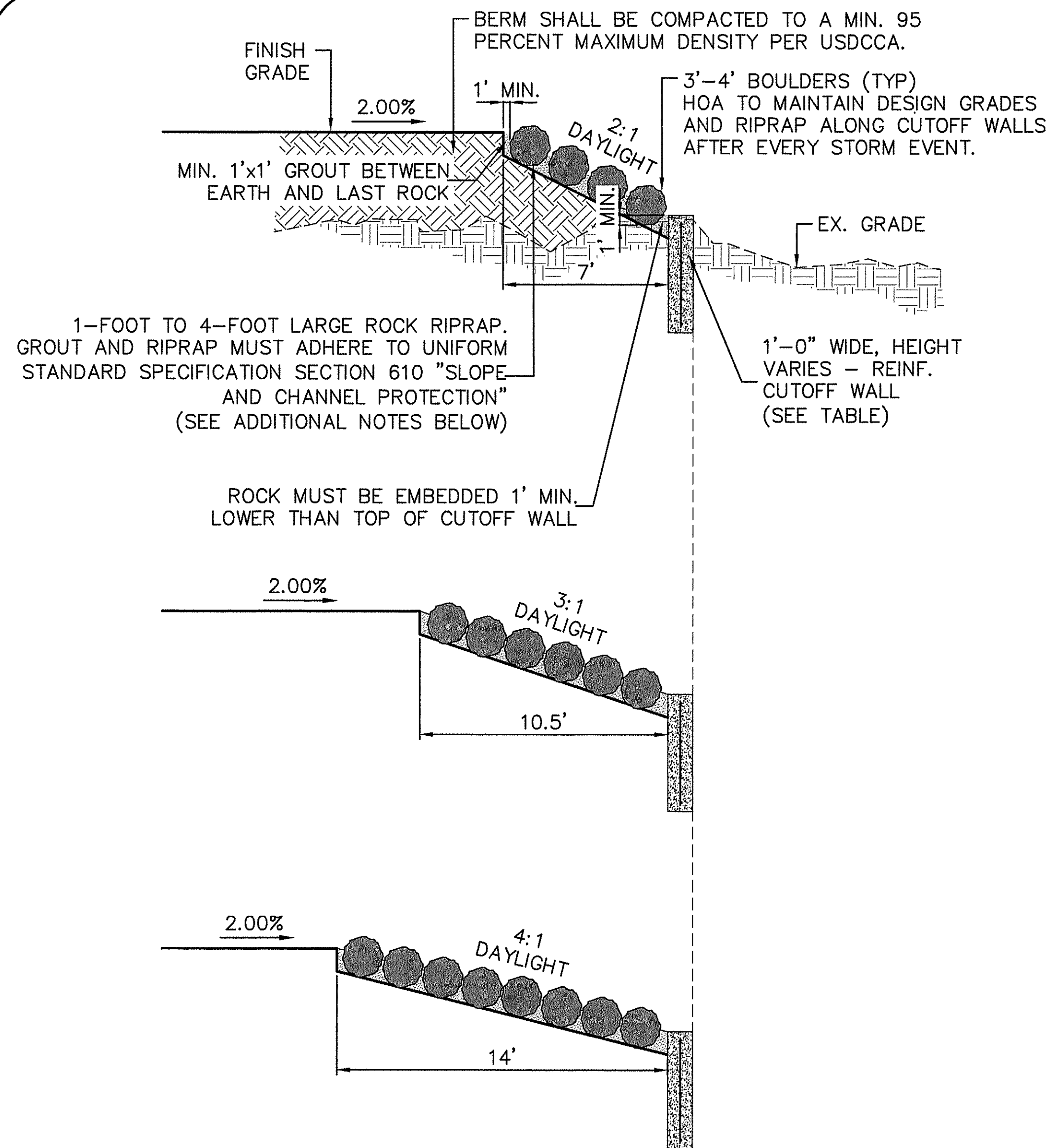
DESIGN: MGB
DRAWN: MGB
CHECK: J.L.J.
PLOT DATE: 12-02-16
PLOT TIME: 16:20:54

1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gowingengineering.com

ENGINEERS & SURVEYORS

FOR AGENCY REVIEW - NOT FOR CONSTRUCTION

DRAWING
13
13 OF 16 SHEETS



NOTES:

1. WASHES MUST BE INSPECTED AND MAINTAINED AFTER EACH STORM EVENT. IF THE CUT-OFF WALL IS EXPOSED, BACKFILL MUST BE PLACED TO THE TOP OF CUT-OFF WALL, BENCHED 1-FOOT HORIZONTALLY AND GRADED TO A 3:1 SLOPE.
2. CONTRACTOR SHALL USE PRIMARILY 3-FOOT AND 4-FOOT LARGE ROCK (BOULDER) RIPRAP FOR SLOPE PROTECTION, WITH 1-FOOT AND 2-FOOT ROCK USED TO FILL VOIDS BETWEEN THE 3-FOOT AND 4-FOOT BOULDERS.
3. ALL VOIDS SHALL BE FILLED WITH GROUT TO A MINIMUM DEPTH OF HALF THE DEPTH OF THE ROCK/BOULDER.
4. BOTTOM ROW OF ROCK/BOULDER ADJACENT TO THE CUT-OFF WALL MUST BE EMBEDDED 1-FOOT BELOW THE TOP OF THE CUT-OFF WALL.
5. EXCLUDING THE BOTTOM ROW OF ROCK/BOULDER, THE BOTTOM OF ALL 3-FOOT AND 4-FOOT ROCK/BOULDER MUST BE A MINIMUM OF 1-FOOT BELOW THE TOP OF THE LOWER ROCK, AND 1-FOOT AND 2-FOOT ROCK MUST BE A MINIMUM OF 6" BELOW THE TOP OF THE LOWER ROCK.

SECTION 610
SLOPE AND CHANNEL PROTECTION ADDITIONAL NOTES

610.02.04 STONES FOR RIPRAP

- A. STONES USED FOR RIPRAP SHALL BE HARD, DURABLE, ANGULAR IN SHAPE, RESISTANT TO WEATHERING AND EROSION, AND FREE FROM SPOILS, CRACKS, AND ORGANIC MATTER.

ADD 4 AND 5 TO THIS SUBSECTION:

4. THE SPECIFIC GRAVITY OF THE CONCRETE EMBEDDED RIPRAP SHALL NOT BE LESS THAN 2.45.
5. THE NOMINAL STONE SIZE FOR THE GROUTED RIPRAP LARGE ROCK SHALL BE 3-FOOT TO 4-FOOT, WITH 1-FOOT TO 2-FOOT FILLER ROCK.

- C. CONTROL OF GRADATION WILL BE BY VISUAL INSPECTION.

REVISE SUBSECTION AS FOLLOWS:

1. THE CONTRACTOR SHALL PROVIDE A SAMPLE OF STONE OF AT LEAST 5 TONS MEETING THE GRADATION FOR GROUTED RIPRAP LARGE ROCK.

REVISE SUBSECTION D. AS FOLLOWS:

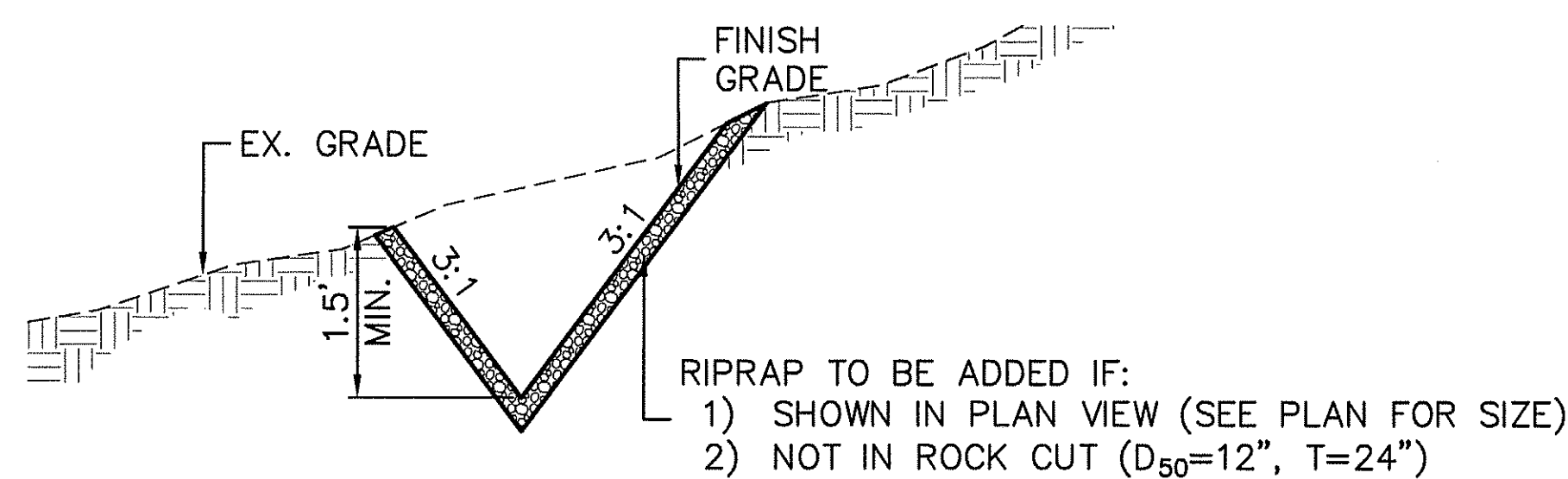
- D. CALICHE STONE OR CEMENTITIOUS MATERIALS MEETING THE REQUIREMENTS OF THIS SECTION MAY BE USED AS RIPRAP WITH PRIOR APPROVAL OF THE ENGINEER. CALICHE STONE OR CEMENTITIOUS MATERIAL MAY NOT BE USED FOR GROUTED RIPRAP LARGE ROCK.

APPROXIMATE STATIONING OF CUTOFF WALLS FOR COS-2		
HEIGHT	STATION	COMMENTS
7'	100+00.00 & 200+00.00	BEGIN
TRANS	105+45.02 & 204+69.11	10' TRANSITION
5'	105+55.02 & 204+79.11	—
TRANS	110+29.13 & 209+85.00	10' TRANSITION
3'	110+39.13 & 209+95.00	—
	114+03.21 & 212+82.00	END

GROUTED RIPRAP LARGE ROCK

NOT TO SCALE

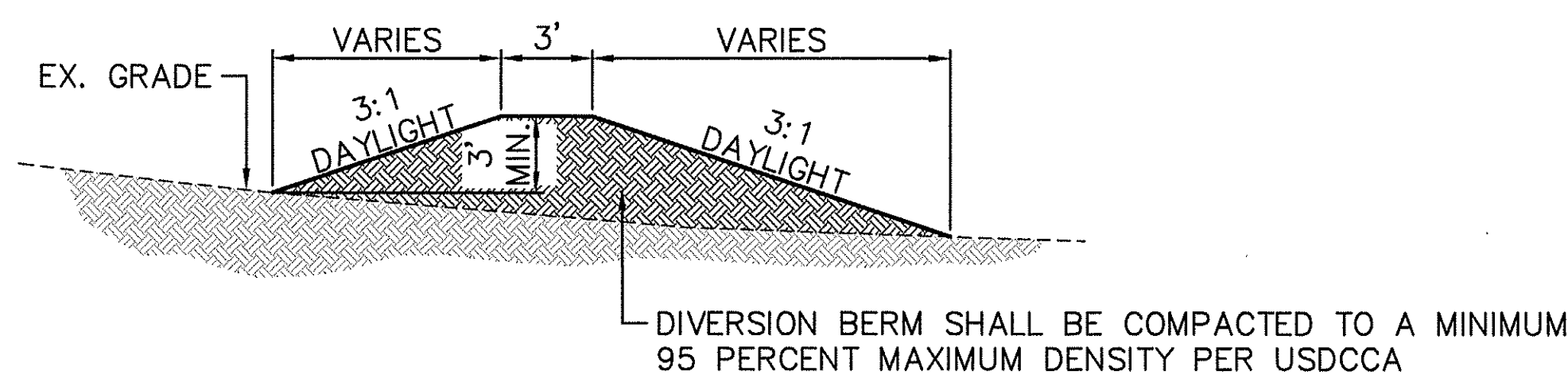
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TYPICAL V-DITCH SECTION

NOT TO SCALE

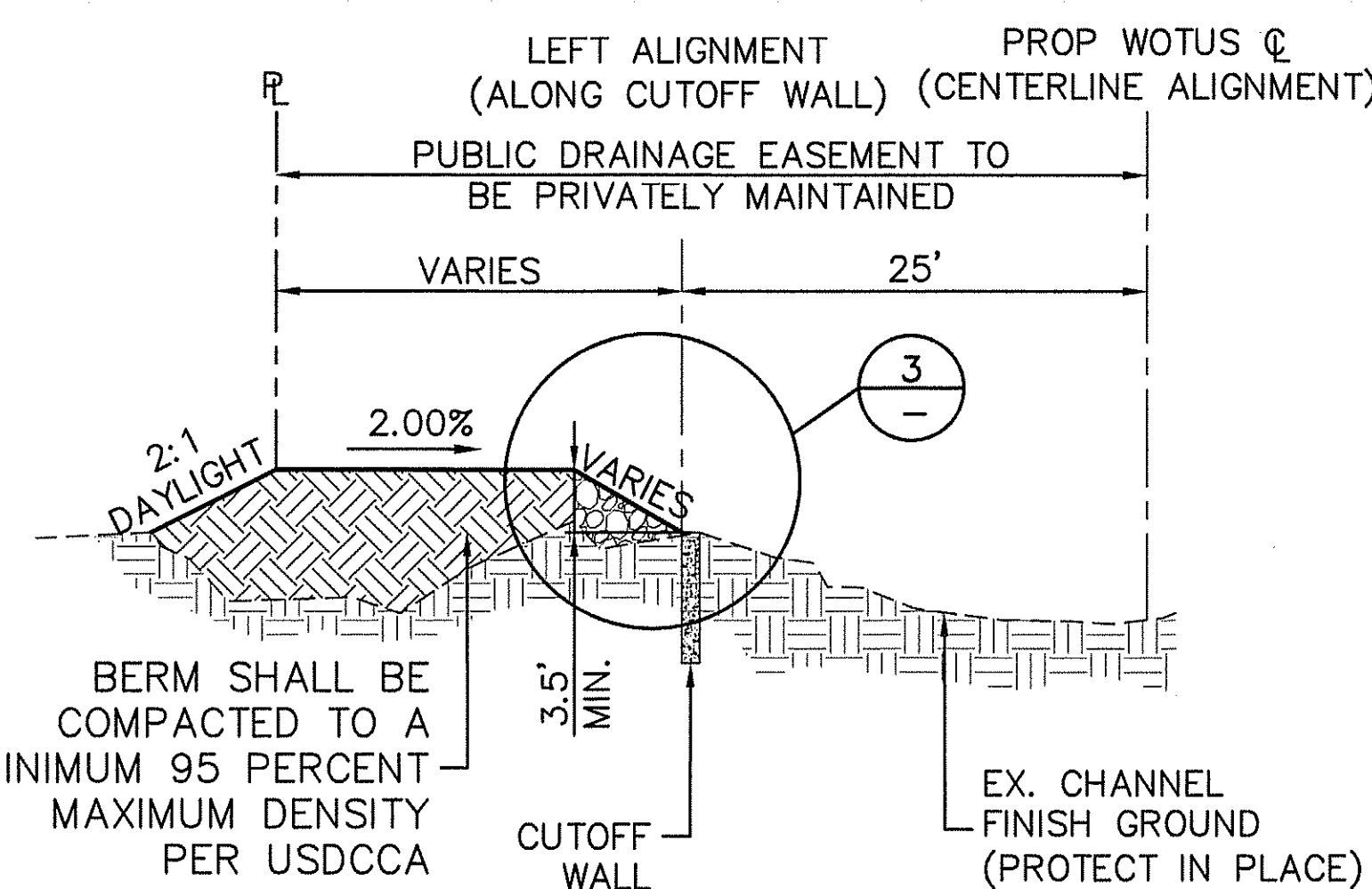
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TYPICAL UNLINED BERM SECTION

NOT TO SCALE

5

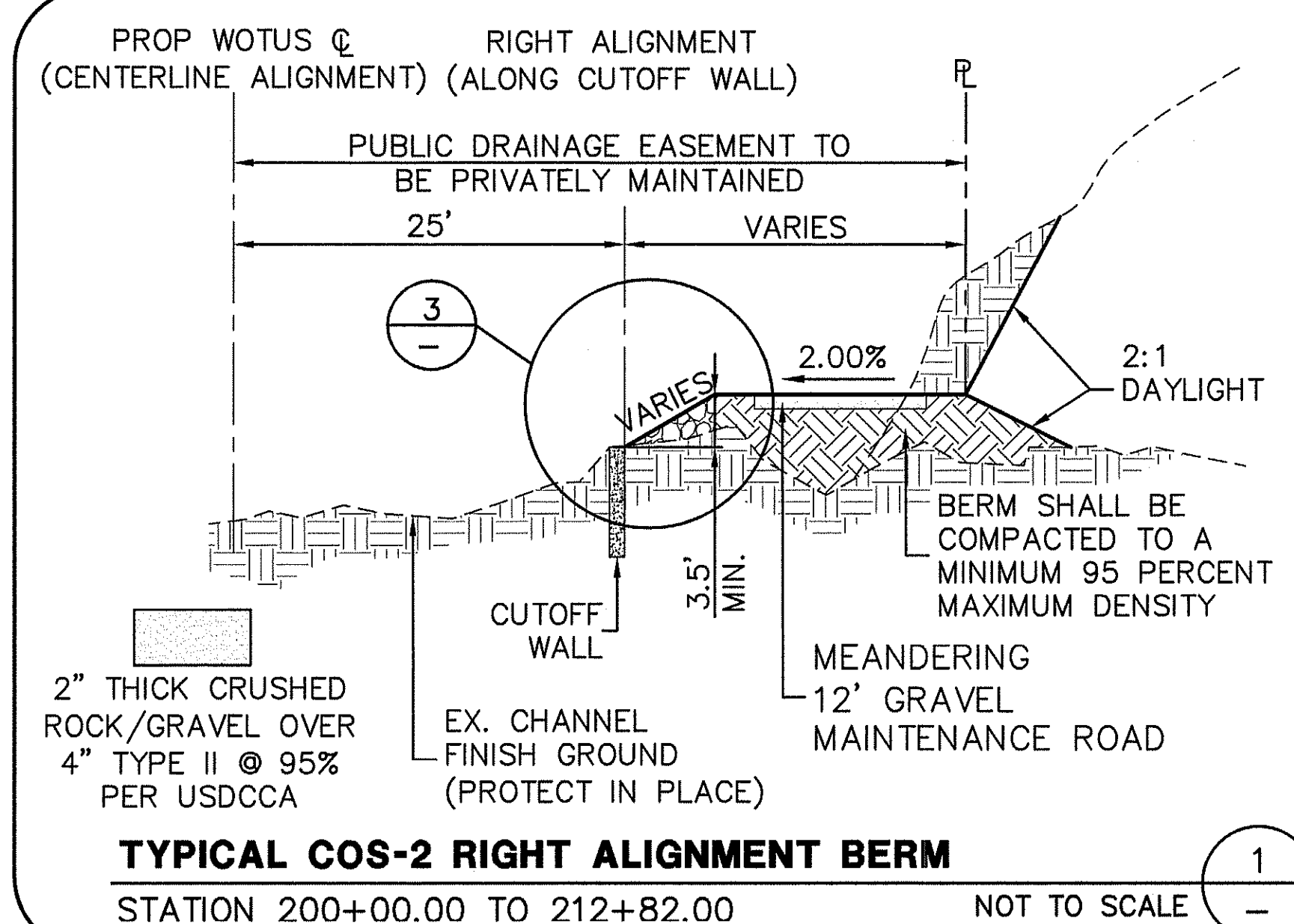


TYPICAL COS-2 LEFT ALIGNMENT BERM

STATION 100+00.00 TO 114+09.00

NOT TO SCALE

2



TYPICAL COS-2 RIGHT ALIGNMENT BERM

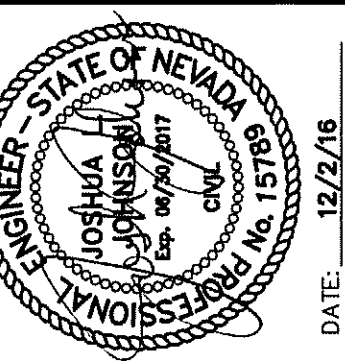
STATION 200+00.00 TO 212+82.00

NOT TO SCALE

1

RIPRAP GENERAL NOTE:
ALL RIPRAP SHALL ADHERE TO REQUIREMENTS OF UNIFORM STANDARD SPECIFICATION SECTION 610 "SLOPE AND CHANNEL PROTECTION."

FOR GROUTED RIPRAP LARGE ROCK, SEE ADDITIONAL REQUIREMENTS TO SECTION 610 "SLOPE AND CHANNEL PROTECTION ADDITIONAL NOTES" PER DETAIL 3 SHEET 14.



DATE	AGEN APP	DATE	GCW APP

DATE	DESCRIPTION	REV	DATE

PROJECT NO.	62024-232
DESIGN	MOB
DRAWN	MOB
CHECK	MOB
PLOT DATE	12-02-16
PLOT TIME	16:22:21

1555 S. RAINBOW BLVD.
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gcnwengineering.com

Gcnw
ENGINEERS' SURVEYORS

F:\Projects\600\62024-232-2\W00\Production\W04-232-2_JT.dwg
Matthew Burge

THE HOWARD HUGHES COMPANY, LLC

VILLAGE 24 - US WATERS
COS-2 WASH IMPROVEMENT PLANS

DETAIL SHEET 1

DRAWING

14

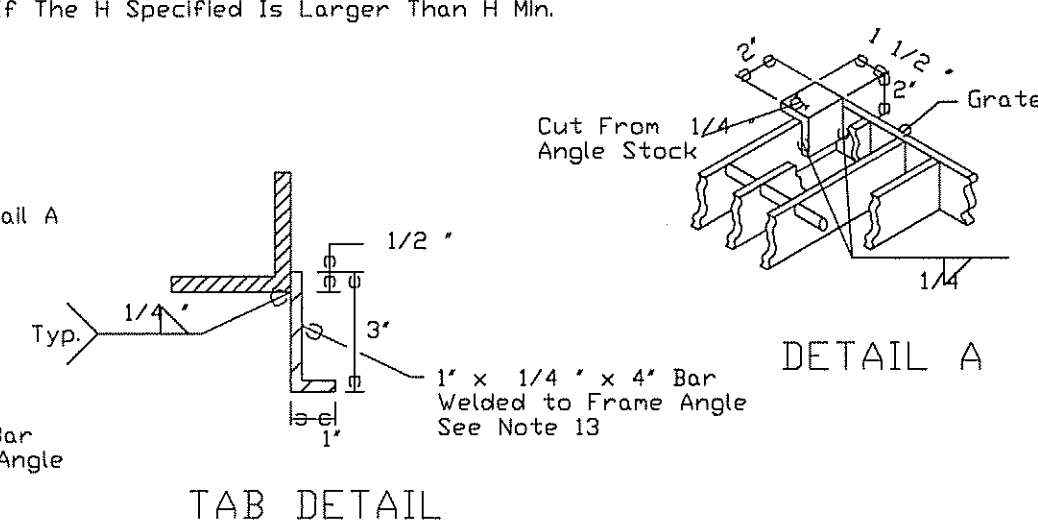
14 OF 16 SHTS

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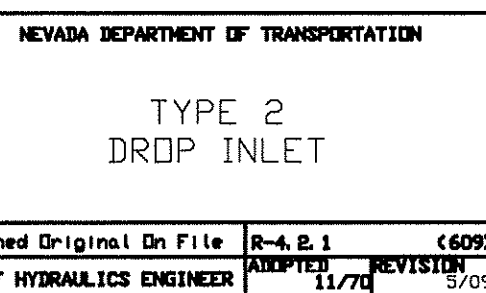
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

Figure 1: Typical Details of Bridge Deck and Approach Slab. The diagram illustrates the cross-section of a bridge deck and approach slab. Key dimensions and components include:

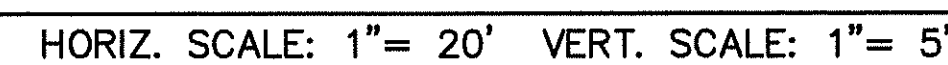
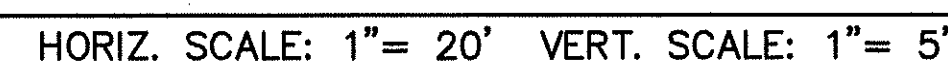
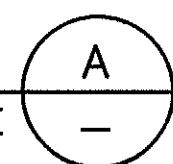
- Gate Thickness:** 1 1/2 inches.
- Slab Thickness:** 1/4 inch.
- Deck Width:** 6" (Typ.).
- Approach Slab Width:** 3" (Typ.).
- Total Width:** A.
- Deck Height:** H.
- Support Surface:** P.C.C. Surface or Dense Graded Surface.
- Optional Construction Joint:** Indicated at the bottom right, with a reference to Note II.
- Vertical Dimension:** 12" Min. (Minimum).
- Opening Diameter:** D.

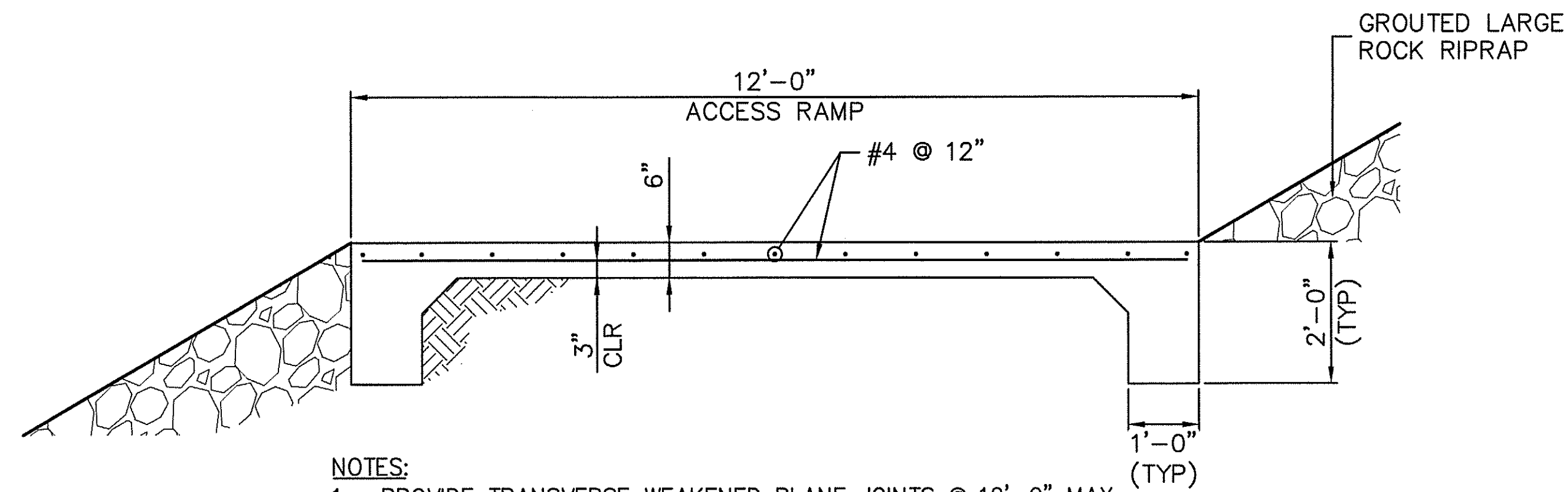


4. ALL CONCRETE SHALL BE CLASS A OR AA.
2. REINFORCING STEEL SHALL BE NO. 4 BARS WITH MAXIMUM SPACING AT 18" CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED 2" CLEAR OF THE CONCRETE SURFACES.
3. EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
4. DIMENSIONS MAY BE VARIED TO FIT LOCAL CONDITIONS IF ORDERED BY THE ENGINEER.
5. COMMERCIAL PREFABRICATED GRATINGS APPROVED BY THE BRIDGE DIVISION MAY BE USED IN LIEU OF THE FIELD-WELDED GRATING SHOWN ABOVE.
6. EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY HYDRAULICS ENGINEER.
7. SLOPE CATCH BASIN FLOORS 104 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE AND PROVIDE A 104 SLOPE TO FLOW LINE(S).
8. SEE SHEET R-2.91 FOR DETAILS IF CONNECTING FLOW PIPE.
9. A SINGLE TYPE 2 DROP INLET SHALL BE CONSTRUCTED UNLESS A DOUBLE OR TRIPLE IS SPECIFIED.
10. SINGLE GRATE CONFIGURATION SHOWN FOR CLARITY. OUTSIDE DIMENSIONS OF EACH GRATE SHALL MEASURE 2' BY A+4 3/4'.
11. RUN REBAR CONTINUOUS THRU CONSTRUCTION JOINT. JOINT MUST BE A MINIMUM OF 3' FROM HORIZONTAL BARS.
12. WELD ONE TAB ON/LC OF GRATE AND REMAINING TWO TABS 6" FROM EDGE OF FRAME. SIX TABS PER INLET, THREE TABS ON EACH SIDE.
13. WELD TABS 6" FROM EDGE OF FRAME. FOUR TABS PER GRATE, TWO ON EACH SIDE.

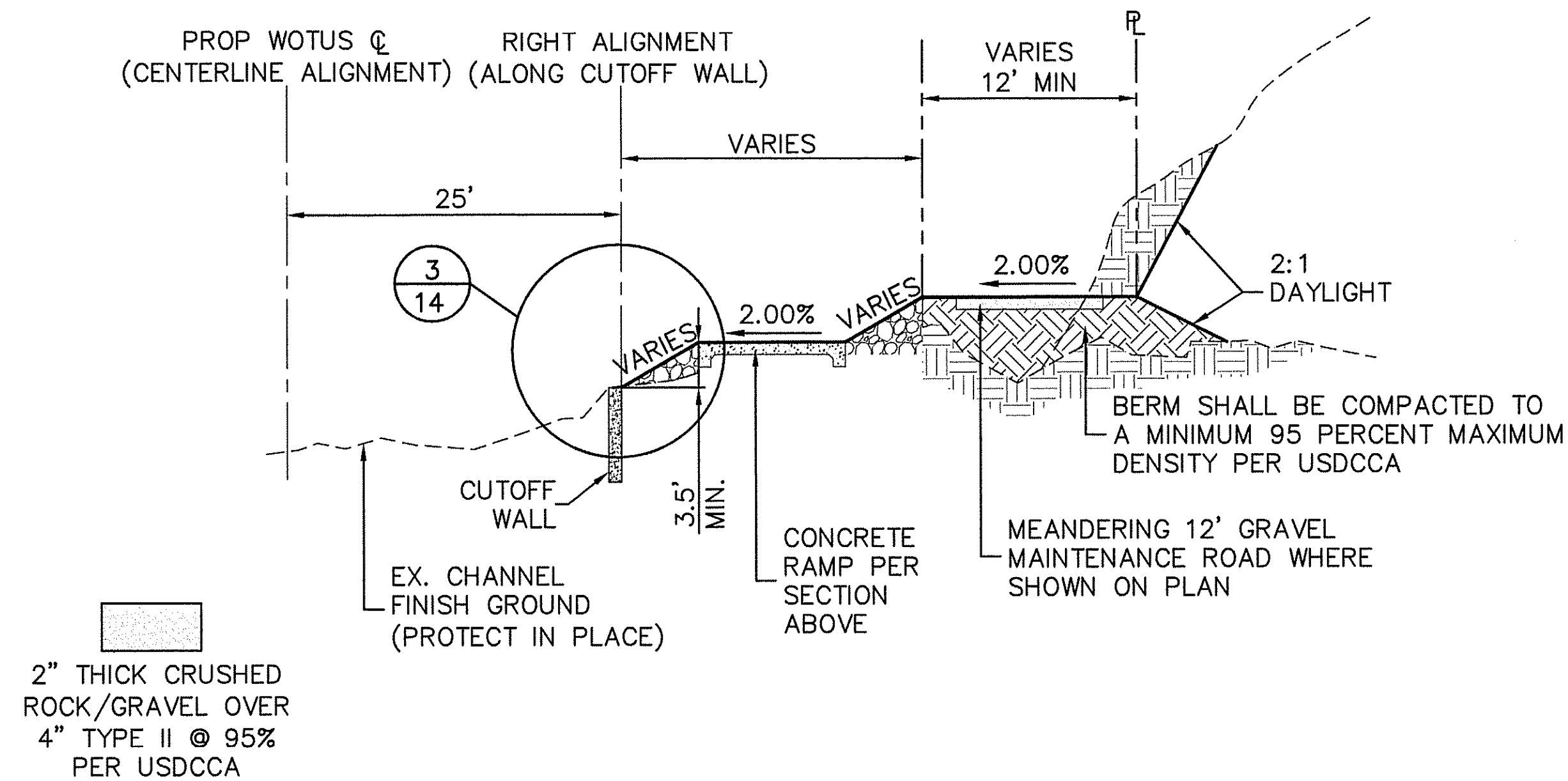


NOT TO SCALE





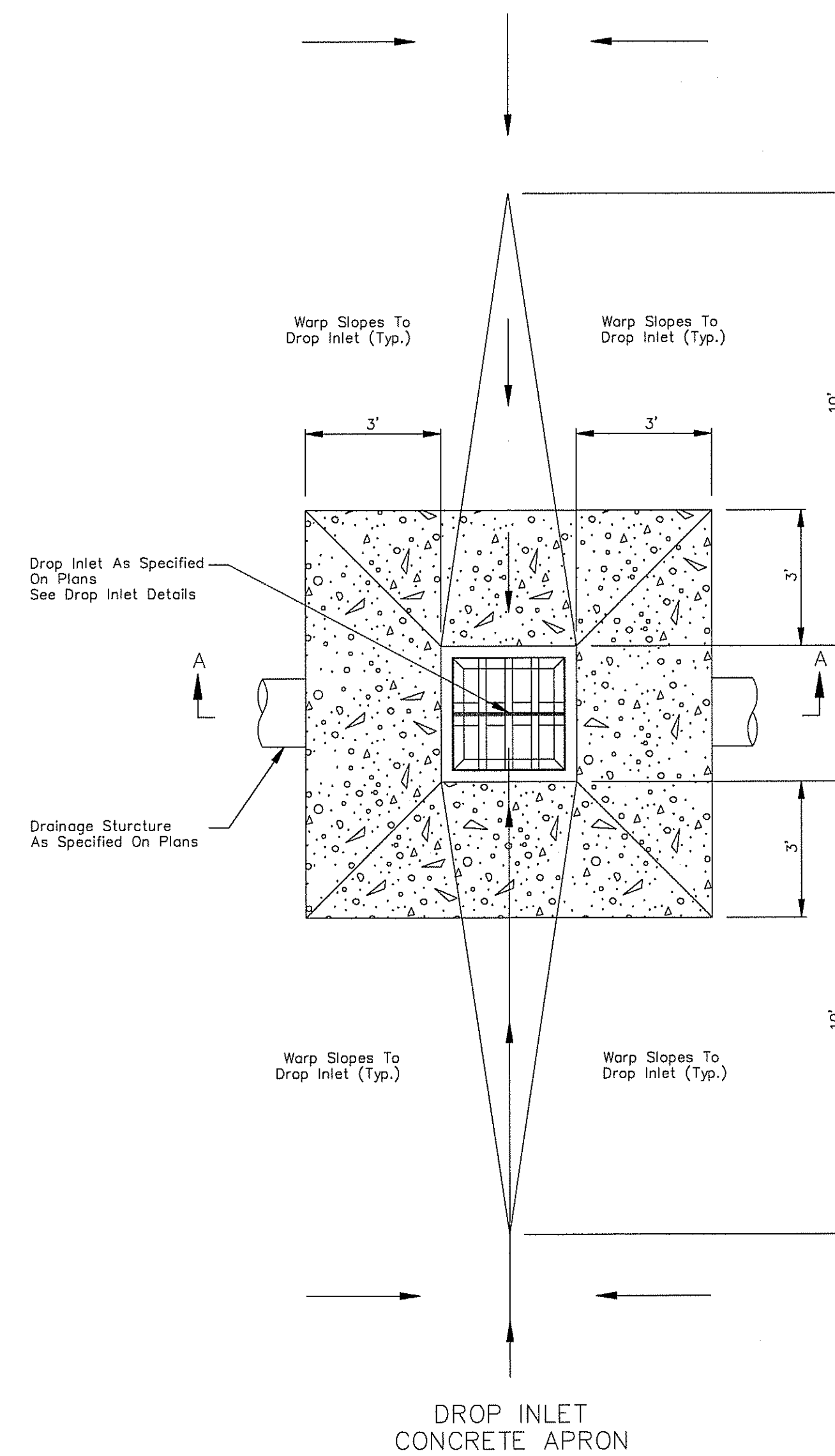
- NOTES:
1. PROVIDE TRANSVERSE WEAKENED PLANE JOINTS @ 12'-0" MAX
 2. CONCRETE: $f'_c=4,500$ psi @ 28 DAYS
 3. REINFORCING STEEL: ASTM A615



TYPICAL 12' CONCRETE RAMP SECTION

NOT TO SCALE

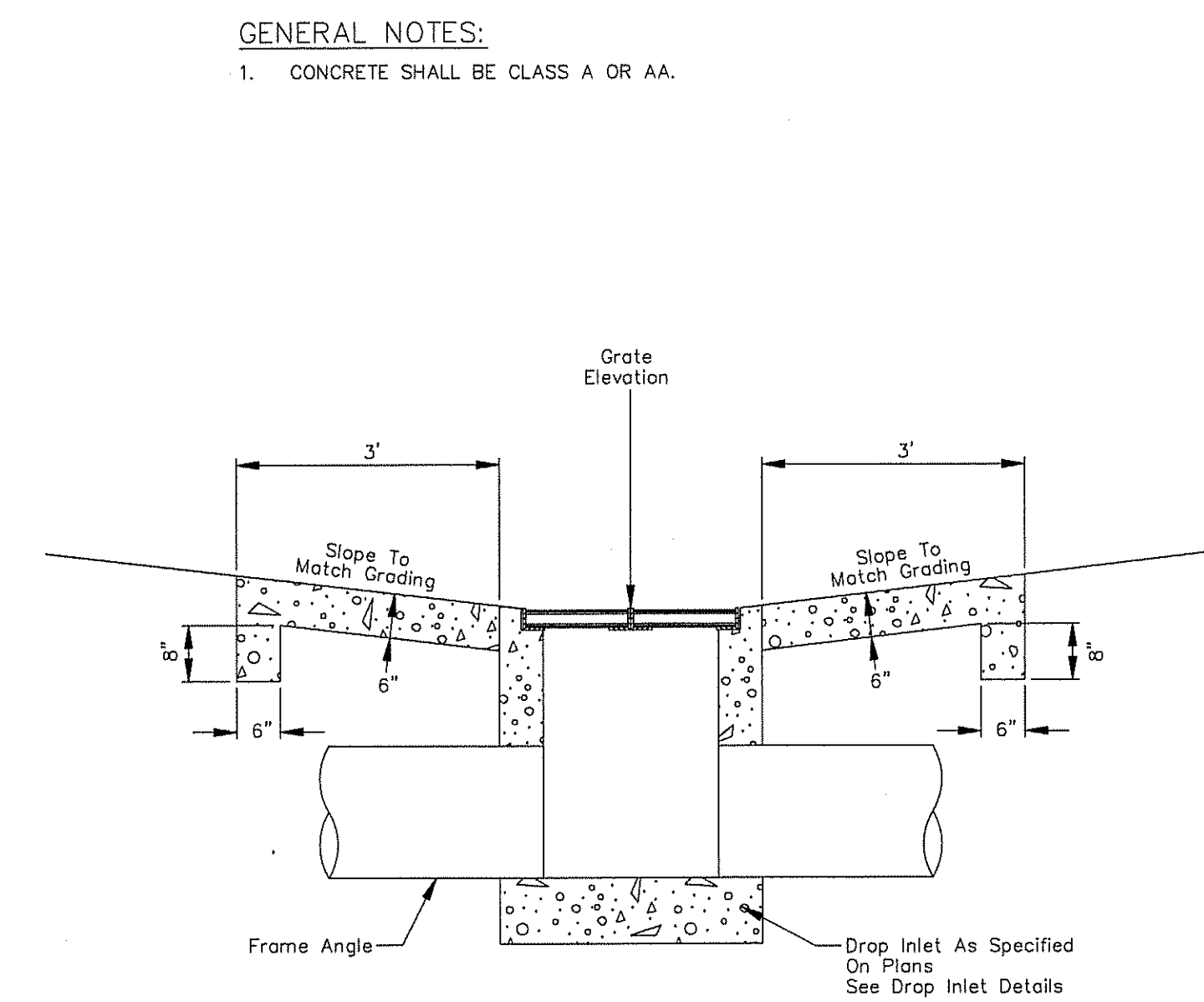
1



NDOT DROP INLET CONCRETE APRON

NOT TO SCALE

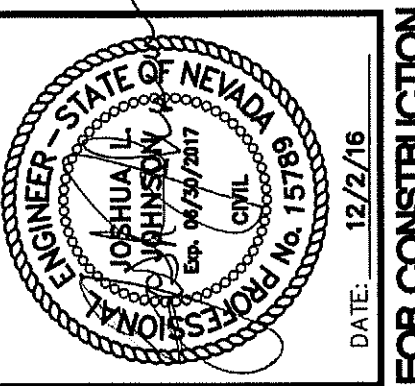
A



SECTION A-A

- GENERAL NOTES:
1. CONCRETE SHALL BE CLASS A OR AA.

NEVADA DEPARTMENT OF TRANSPORTATION	
DROP INLET CONCRETE APRON	
Signed Original On File	R-4.2.7 (609)
CHIEF HYDRAULICS ENGINEER	ADOPTED, 10/18



DATE	AGEN APP	DATE	GCW APP	DATE

DATE	AGEN APP	DATE	GCW APP	DATE

PROJECT NO.	DESIGN	DRAWN	CHECK	PLOT DATE	REV
62024-232	MOB	MOB	JJJ	12-02-16	

1555 S. RAINBOW BLVD. LAS VEGAS, NV 89146 T: 702.804.2000 F: 702.804.2299 gawengineering.com	PROJECT NO. 62024-232 DESIGN: MOB DRAWN: MOB CHECK: JJJ PLOT DATE: 12-02-16 PLOT TIME: 16:22:49
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THE HOWARD HUGHES COMPANY, LLC	VILLAGE 24 - US WATERS COS-2 WASH IMPROVEMENT PLANS	DETAIL SHEET 3
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DRAWING	16
16 OF 16 SHTS	

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