

DS #: 5259-1

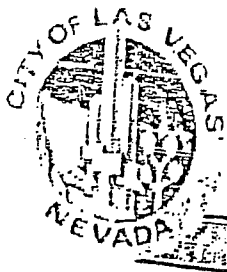
APN: 137-22-000.017

PROJECT: Summerlin West 4125 Zone North Reservoir - Update

SUBMITTAL: 3rd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		November 9, 2020
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	COPIES TO:	
Drainage Study for:	Atkins	
Summerlin West 4125 Zone North Reservoir - Update		
Cross Streets:	West of Lake Mead Blvd. & Park Drift Trail	Howard Hughes Properties Inc.
File Number:	F:\Depot\DSMemos\DS5259C.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-017	
Zoning Action:	CRG-78427	
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	3/5/2020	3/31/2020	Not Approved	\$400.00	3770635: \$400
2 nd Submittal	4/23/2020	5/20/2020	Approved	\$400.00	3824141: \$400
3 rd Submittal	10/26/2020	11/9/2020	See Comments Below	\$100.00	4044546: \$100
TOTAL FEES (LDDRS):				\$900.00	----

REMARKS:

3rd Submittal: Update

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.

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/22
AREA K-22

TDS Update for Summerlin West

4125 Zone North Reservoir

Prepared for the Howard Hughes Company, LLC

October 20, 2020

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: TDS Update for Summerlin 4125 Reservoir Date: 10/20/2020

Location of Development: a) Descriptive (Cross Streets) North/South: Street Z
East/West: Lake Mead Blvd

b) Section: 16 & 21 Township: 20S Range: 59E

c) APN : 137-21-101-002

Name of Owner: Howard Hughes Company, LLC

Telephone No.: (702) 791-4000 Fax No.: (702) 791-4450 E-Mail Address: chris.anderson@howardhughes.com

Address: 10845 Griffith Peak Drive, Ste 160, Las Vegas, NV 89135

Contact Person-Name: Vance Skidmore, PE Telephone No.: 702-551-0309

* E-Mail Address: vance.skidmore@atkinsglobal.com Fax No.: _____

Firm: Atkins

Address: 2270 Corporate Circle, Ste 200, Henderson, NV 89074

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: +/- 2006 acres Being Developed/Disturbed: +/- 6 acres

2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No

3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? Yes** ☒ No

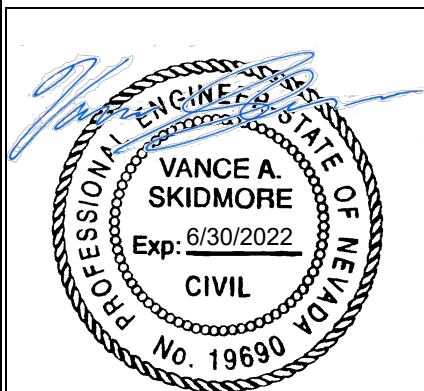
4. Proposed type of development (Residential, Commercial, Etc.): Potable Water Reservoir

5. Approximate upstream land area which drains to the subject site: 6.8 square miles

6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Summerlin West Village 30A Rough Grade Technical Drainage Memo

7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: There are three discharge points: 1 - A storm drain out to the existing wash north of the reservoir project site, 2 - A channel discharging to roughly the same location, and 3 - Flow running off onto the rough-grade access road

8. Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

10/20/2020

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.**

DS5259B Local Entity File No.	Revision	Date
	Update #1	October 2020

REFERENCE:

STANDARD FORM 1

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		May 20, 2020
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:	COPIES TO:
	Summerlin West 4125 Zone North Reservoir	Atkins
Cross Streets:	West of Lake Mead Blvd. & Park Drift Trail	Howard Hughes Properties Inc.
File Number:	F:\Depot\DSMemos\DS5259B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	137-22-000-017	
Zoning Action:	CRG-78427	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

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			TOTAL FEES (LDDRS):	\$800.00	----

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END OF REMARKS

ays

T/R/S: T20S/R59E/22
AREA K-22

1. Introduction

This Technical Drainage Study Update, prepared on behalf of the Howard Hughes Company, LLC (HHC), represents the updated hydrologic and hydraulic analyses for the 4125 Zone North Reservoir of the Summerlin West development and amends the previously approved Technical Drainage Study (TDS) DS5259B. The TDS was approved on May 20, 2020. This update supersedes the content of the original TDS.

Since the approval of the original TDS, on-site changes to the site have resulted in grading and drainage changes. The changes are limited to the on-site interim and ultimate conditions, all existing and offsite drainage basins and analysis remain unchanged from the original TDS.

2. Hydrologic Analysis

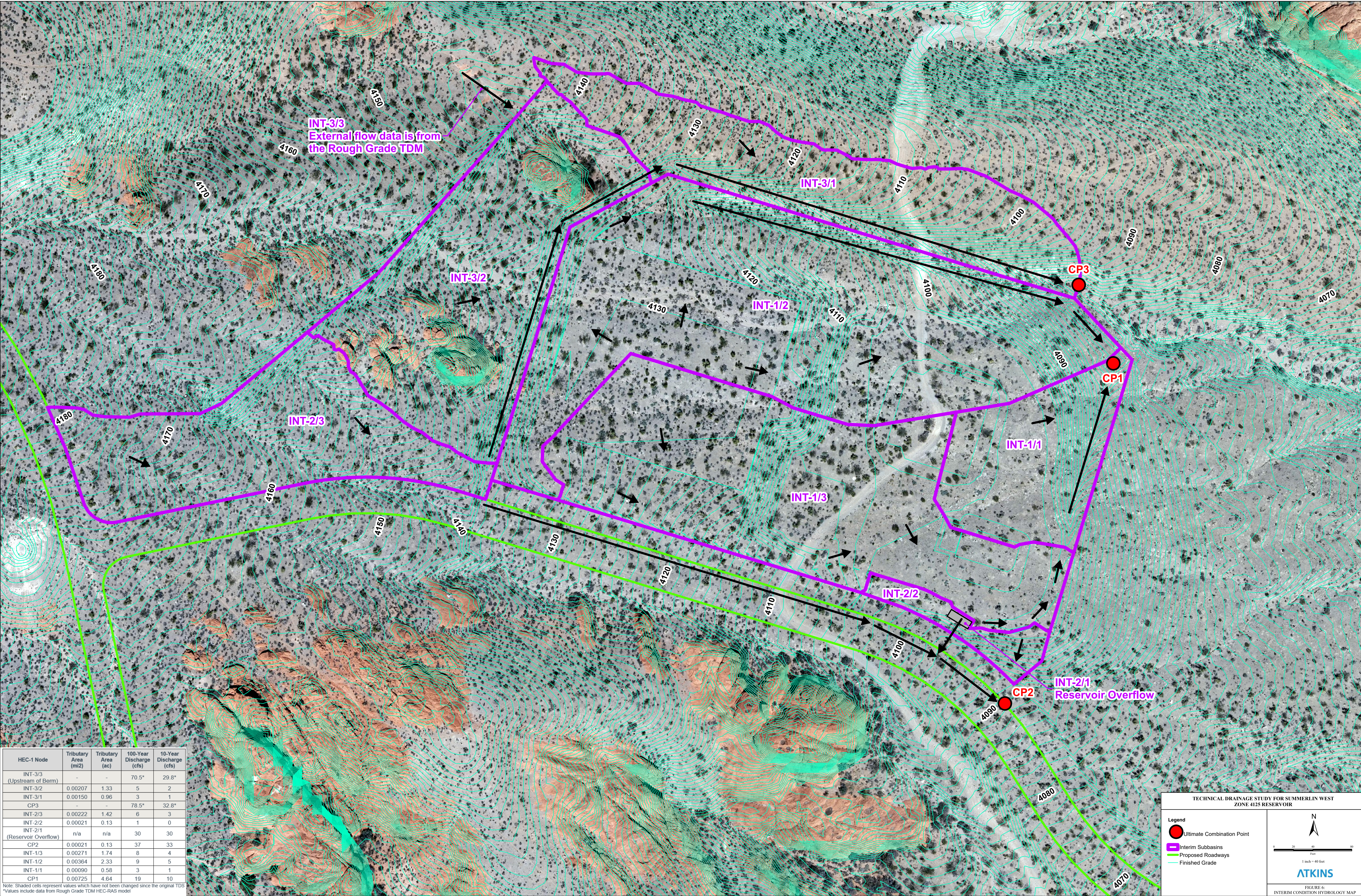
Since the original TDS, the proposed on-site grading has changed resulting in updated sub-basins and hydrologic properties for the interim and ultimate conditions. The three main combination points CP1 through CP3 remain in the same locations, however the size and properties of their catchment areas have changed. **Figure 6** shows the updated basin boundaries, and **Table 2** provides the updated flows. Since the original TDS, subbasin INT-2/3 has been eliminated and subbasin INT-1/3 has been added. Remaining subbasins have kept their names and have been adjusted to match the new grading plan. Updated lag time calculations and HEC-1 model outputs can be found in **Appendix A**.

Table 1: Interim Condition Hydrologic Model Results

HEC-1 Node	Tributary Area (mi ²)	Tributary Area (ac)	100-Year Discharge (cfs)	10-Year Discharge (cfs)
INT-3/3 (Upstream of Berm)	-	-	70.5*	29.8*
INT-3/2	0.00207	1.33	5	2
INT-3/1	0.00150	0.96	3	1
CP3	-	-	78.5*	32.8*
INT-2/3	0.00222	1.42	6	3
INT-2/2	0.00021	0.13	1	0
INT-2/1 (Reservoir Overflow)	n/a	n/a	30	30
CP2	0.00021	0.13	37	33
INT-1/3	0.00271	1.74	8	4
INT-1/2	0.00364	2.33	9	5
INT-1/1	0.00090	0.58	3	1
CP1	0.00725	4.64	19	10

Note: Shaded cells represent values which have not been changed since the original TDS

*Values include data from Rough Grade TDM HEC-RAS model



3. Hydraulic Analysis

This Section of the report documents the results of the hydraulic analysis pertaining to the updated drainage facilities proposed for this project. The proposed facilities are designed for a 6hr, 100yr storm for the interim condition as described above and in the original TDS. The proposed facilities which have been affected since the last submittal are summarized below in **Table 3** and depicted on **Figure 8**.

Since the original TDS, the location of the reservoir overflow vault has changed and an associated concrete channel and block wall openings have been designed to accommodate the potential 30cfs overflow. These new facilities include CHNL-5, a 25-ft wide rectangular concrete channel; WEIR-1 and WEIR-2, 4-ft wide block wall openings; and WEIR-3 and WEIR-4, 5.3-ft wide block wall openings. These facilities are summarized below in **Table 3**, depicted on **Figure 8**, and detailed in the design plans provided in **Appendix B**.

Since the original TDS, an upstream portion of CHNL-1 has been added to the proposed plans. This portion of the channel shall be henceforth referred to as CHNL-1B. Similar to CHNL-1, CHNL-1B is a triangular channel, however it has a much shallower slope and does not require riprap.

Table 2: Proposed Facilities

Name	Facility Type	100-yr Design Flow (cfs)	Corresponding HEC-1 Node
WEIR-4	5.3' Block Wall Opening	8.5	INT-2/1
WEIR-3	5.3' Block Wall Opening	8.5	INT-2/1
WEIR-2	4.0' Block Wall Opening	6.5	INT-2/1
WEIR-1	4.0' Block Wall Opening	6.5	INT-2/1
CHNL-5	Rectangular Channel	30	INT-2/1
CHNL-4	Triangular Channel	5	INT-3/2
CHNL-3	Trapezoidal Channel	78.5	CP3
CHNL-2	Trapezoidal Channel	9	INT-1/2
CHNL-1B	Triangular Channel	8	INT-1/3
CHNL-1	Triangular Channel	11	INT-1/1 and INT1/3
INLT-1	NDOT Type 2 Drop Inlet	19	CP1
SD-1	24" RCP	19	CP1

Note: Shaded cells represent values which have not been changed since the original TDS

3.1. Channel and Riprap Calculations

All proposed channels have maintained their location and geometry since last submittal, however the flows they are expected to pass have changed. The calculations from the original TDS have been updated to ensure the affected facilities are still able to pass these new design flows. The size of riprap proposed for CHNL-1 has been increased from a D50 of 6" to a D50 of 12" to accommodate increased flows, while all other channels remain as originally designed. The updated calculations can be found in **Appendix A**. The updated grading plans provided in **Appendix B** depict the proposed channels in plan and section view and provide for the updates in riprap sizing.

Table 3: Riprap Locations and Sizing

Location	Riprap D50 (inches)	Riprap Layer Thickness (inches)	Representative Manning's Roughness Coefficient
CHNL-1	12"	24"	0.040
CHNL-2	12"	24"	0.040

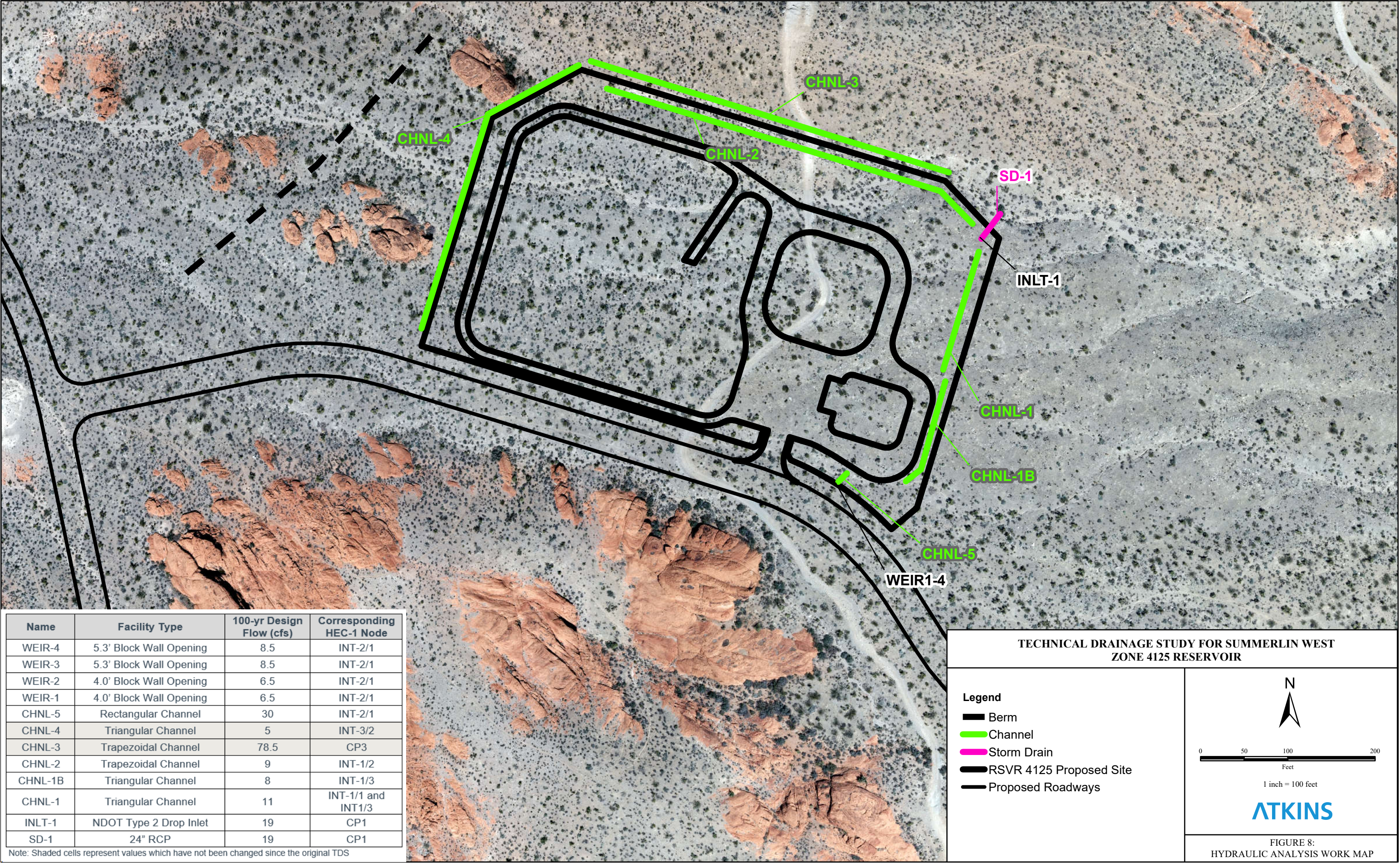
In addition to the locations tabulated above, a pad of 16" D50 riprap with a thickness of 36" is located at the outfall of SD-1. The minimum length of riprap from the outlet of SD-1 is 6'. This complies with the minimum riprap pad size stated in the Design Manual as three times the diameter of the pipe.

3.2. Drop Inlet Calculations

The design flow to INLT-1 has increased from 14cfs to 19cfs. Updated calculations confirm that this inlet has the capacity to pass this new design flow as originally designed. Updated calculations are provided in **Appendix A**.

3.3. Storm Drain Calculations

The design flow to SD-1 has increased from 14cfs to 19cfs. In response to this increase in flow, as well as other design considerations, the layout of SD-1 has been updated since last submittal. SD-1 is designed as 24" RCP with a 1.00% slope. Updated calculations confirm that SD-1 has the capacity to pass its new design flow. Updated calculations are provided in **Appendix A**.



4. Conclusion

On-site grading changes to the Summerlin 4125 Reservoir have resulted in changes to the on-site drainage patterns. Flow to concentration point CP1 has increased by 5cfs while flow to CP2 has been reduced by 6cfs. Summerlin 4125 Reservoir remains in compliance with the Design Manual.

Because the site is planned to ensure the 100-year developed flows are directed to the existing wash, as in existing conditions, the ultimate condition will not change the impacts that would occur off-site with a 100-year storm.

Appendices



Appendix A

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL																
TIME OF CONCENTRATION																
Atkins File: FORM4.XLS						Summerlin 4125 Reservoir Ultimate Condition						BY: DATE:		BPM 10/19/20		
SUB-BASIN DATA						INITIAL / OVERLAND TIME (Ti)			TRAVEL TIME (Tt)					Tc	Tc Check	Tlag
DESIG:	DEV./EX. (D or E)	CN	K	AREA Ac	AREA Mi^2	INITIAL LENGTH Feet	SLOPE %	Ti Min	TRAVEL LENGTH Feet	SLOPE %	V1 VELOCITY FPS	V2 VELOCITY FPS	Tt Min	Min	Min	Tlag= 0.6Tc/60 Hours
INT-2/2	D	93.0	0.8376	0.13	0.00021	31	18.63	1.0	54	10.34	6.5	9.8	0.1	1.1	10.5	0.050*
INT-1/3	D	93.0	0.8376	1.74	0.00271	40	3.72	1.9	638	4.46	4.3	6.5	2.3	4.2	13.8	0.050*
INT-1/2	D	93.0	0.8376	2.33	0.00364	79	0.48	5.3	805	6.19	5.0	7.6	2.3	7.7	14.9	0.077
INT-1/1	D	93.0	0.8376	0.58	0.00090	49	4.22	2.1	281	8.05	5.7	8.7	0.8	2.9	11.8	0.050*
$T_c = T_i + T_t$ $T_{lag} = 0.6 T_c$ $T_i = 1.8 (1.1 - K) L^{1/2} / S^{1/3}$ $K = 0.0132 (CN) - 0.39$ $T_c \text{ Check} = L/180 + 10$ For the travel time (Tt) calculations, V1 applies to the first 500 feet of travel distance; V2 applies to the remaining travel distance. $V1 = 14.8 (S/100)^{1/2}$ Developed $V2 = 29.4 (S/100)^{1/2}$ Developed $V1 = 20.2 (S/100)^{1/2}$ $V2 = 30.6 (S/100)^{1/2}$																
REFERENCE :													STANDARD FORM 4			

*Minimum recommended Tc for developed subbasins is 5 mins. A value of 0.05 was used for the Tlag where the calculated Tc was less than 5 mins.

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
*
* RUN DATE 19OCT20 TIME 09:16:56 *
*

*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*

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

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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

*DIAGRAM

*** FREE ***

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1 ID *****
2 ID *
3 ID * TECHNICAL DRAINAGE STUDY REVISION FOR SUMMERLIN 4125 RESERVOIR
4 ID * INTERIM CONDITION
5 ID * CLIENT_ _ _ _ _ THE HOWARD HUGHES CORP
6 ID * RETURN PERIOD_ _ _ _ 100-YEAR AND 10-YEAR
7 ID * DISTRIBUTION_ _ _ _ 6-HOUR SDN3
8 ID * PROJECT NO_ _ _ _ 100065611
9 ID * FILENAME_ _ _ _ _ 4125INT REVISION.PRN
10 ID * DATE_ _ _ _ _ 9/17/20
11 ID *
12 ID * JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
13 ID * AREA (SQUARE MILE)
14 ID * 100-YR DARF
15 ID * 0 - 0.25 1.000
16 ID * 10-YR DARF
17 ID * 0 - 0.25 0.555
18 ID *****
19 ID
20 ID
21 IT 5 0 0 300
22 IN 5 0 0
23 IO 5
24 JR PREC 1 0.555
25 ID
26 ID
27 KK INT-1/1
28 KM ROUTE TO CP1
29 BA0.000901
30 PB 3.575
31 PC 0 0.02 0.057 0.07 0.087 0.108 0.124 0.13 0.13 0.13
32 PC 0.13 0.13 0.13 0.133 0.14 0.142 0.148 0.158 0.172 0.181
33 PC 0.19 0.197 0.199 0.2 0.201 0.204 0.214 0.229 0.241 0.249
34 PC 0.251 0.256 0.27 0.278 0.281 0.283 0.295 0.322 0.352 0.409
35 PC 0.499 0.59 0.71 0.744 0.781 0.812 0.819 0.835 0.851 0.856
36 PC 0.86 0.868 0.876 0.888 0.91 0.926 0.937 0.95 0.97 0.976
37 PC 0.982 0.985 0.987 0.989 0.99 0.993 0.993 0.994 0.995 0.998
38 PC 0.998 0.999 1
39 LS 0 93.0
40 UD 0.050
41 *
42 KK INT-1/2
43 KM ROUTE TO CP1
44 BA0.003638
45 LS 0 93.0
46 UD 0.077
47 *
```

1 HEC-1 INPUT PAGE 2

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

46 KK INT-1/3
47 KM ROUTE TO CP1
48 BA0.002712
49 LS 0 93.0
50 UD 0.050
*

51 KK CP1
52 HC 3
*

53 KK INT-2/1RSVR OVERFLOW
54 KM ROUTE TO CP2
55 BA0.000001
56 PB 0
57 LS 0 93.0
58 BF 30
*

59 KK INT-2/2
60 KM ROUTE TO CP2
61 BF 0
62 BA0.000208
63 PB 3.575
64 LS 0 93.0
65 UD 0.050
*

66 KK INT-2/3
67 KM ROUTE TO CP2
68 BA0.002222
69 LS 0 93.0
70 UD 0.050
*

71 KK CP2
72 HC 3
*
73 ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
27 INT-1/1
.
41 . INT-1/2
.
46 . INT-1/3
.
51 CP1.....
.
53 . INT-2/1
.
59 . INT-2/2
.
66 . INT-2/3
.
71 . CP2.....

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
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*
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*
* TECHNICAL DRAINAGE STUDY REVISION FOR SUMMERLIN 4125 RESERVOIR
* INTERIM CONDITION


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*      CLIENT _ _ _ _ _ THE HOWARD HUGHES CORP
*      RETURN PERIOD _ _ _ _ _ 100-YEAR AND 10-YEAR
*      DISTRIBUTION _ _ _ _ _ 6-HOUR SDN3
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*      FILENAME _ _ _ _ _ 4125INT REVISION.PRN
*      DATE _ _ _ _ _ 9/17/20
*
*      JR CARDS CONTAIN DARFS BASED ON THE FOLLOWING VALUES:
*      AREA (SQUARE MILE)
*      100-YR DARF
*      0 - 0.25      1.000
*      10-YR DARF
*      0 - 0.25      0.555
*****

```

```

23 IO      OUTPUT CONTROL VARIABLES
          IPRNT      5 PRINT CONTROL
          IPLOT      0 PLOT CONTROL
          QSCAL      0. HYDROGRAPH PLOT SCALE

```

```

IT      HYDROGRAPH TIME DATA
          NMIN      5 MINUTES IN COMPUTATION INTERVAL
          IDATE      1 0 STARTING DATE
          ITIME      0000 STARTING TIME
          NQ      300 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE      2 0 ENDING DATE
          NDTIME      0055 ENDING TIME
          ICENT      19 CENTURY MARK

```

```

          COMPUTATION INTERVAL      .08 HOURS
          TOTAL TIME BASE      24.92 HOURS

```

```

ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW      CUBIC FEET PER SECOND
STORAGE VOLUME      ACRE-FEET
SURFACE AREA      ACRES
TEMPERATURE      DEGREES FAHRENHEIT

```

```

JP      MULTI-PLAN OPTION
          NPLAN      1 NUMBER OF PLANS

```

```

JR      MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          1.00      .56

```

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				1.00	.56
HYDROGRAPH AT					
+	INT-1/1	.00	1 FLOW	3.	1.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	INT-1/2	.00	1 FLOW	9.	5.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	INT-1/3	.00	1 FLOW	8.	4.
			TIME	3.50	3.50
3 COMBINED AT					
+	CP1	.01	1 FLOW	19.	10.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	INT-2/1	.00	1 FLOW	30.	30.
			TIME	.00	.00
HYDROGRAPH AT					
+	INT-2/2	.00	1 FLOW	1.	0.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	INT-2/3	.00	1 FLOW	6.	3.
			TIME	3.50	3.50
3 COMBINED AT					

+	CP2	.00	1	FLOW	37.	33.
				TIME	3.50	3.50

*** NORMAL END OF HEC-1 ***

Worksheet for CHNL-1B

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.022
Channel Slope	0.016 ft/ft
Left Side Slope	10.570 H:V
Right Side Slope	7.390 H:V
Discharge	8.00 cfs
Results	
Normal Depth	6.1 in
Flow Area	2.3 ft ²
Wetted Perimeter	9.2 ft
Hydraulic Radius	3.0 in
Top Width	9.13 ft
Critical Depth	6.6 in
Critical Slope	0.011 ft/ft
Velocity	3.45 ft/s
Velocity Head	0.18 ft
Specific Energy	0.69 ft
Froude Number	1.205
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.1 in
Critical Depth	6.6 in
Channel Slope	0.016 ft/ft
Critical Slope	0.011 ft/ft

Worksheet for CHNL-1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.040
Channel Slope	0.105 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Discharge	11.00 cfs
Results	
Normal Depth	9.3 in
Flow Area	1.8 ft ²
Wetted Perimeter	4.9 ft
Hydraulic Radius	4.4 in
Top Width	4.63 ft
Critical Depth	11.6 in
Critical Slope	0.032 ft/ft
Velocity	6.15 ft/s
Velocity Head	0.59 ft
Specific Energy	1.36 ft
Froude Number	1.744
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.3 in
Critical Depth	11.6 in
Channel Slope	0.105 ft/ft
Critical Slope	0.032 ft/ft

CHNL-2 (11.8% slope)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.040
Channel Slope	0.118 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	3.00 ft
Discharge	9.00 cfs
Results	
Normal Depth	4.6 in
Flow Area	1.6 ft ²
Wetted Perimeter	5.4 ft
Hydraulic Radius	3.5 in
Top Width	5.31 ft
Critical Depth	6.5 in
Critical Slope	0.033 ft/ft
Velocity	5.64 ft/s
Velocity Head	0.49 ft
Specific Energy	0.88 ft
Froude Number	1.813
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.6 in
Critical Depth	6.5 in
Channel Slope	0.118 ft/ft
Critical Slope	0.033 ft/ft

CHNL-2 (0.7% slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.040
Channel Slope	0.007 ft/ft
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	3.00 ft
Discharge	9.00 cfs
Results	
Normal Depth	9.9 in
Flow Area	4.5 ft ²
Wetted Perimeter	8.2 ft
Hydraulic Radius	6.6 in
Top Width	7.93 ft
Critical Depth	6.5 in
Critical Slope	0.033 ft/ft
Velocity	2.00 ft/s
Velocity Head	0.06 ft
Specific Energy	0.88 ft
Froude Number	0.470
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	9.9 in
Critical Depth	6.5 in
Channel Slope	0.007 ft/ft
Critical Slope	0.033 ft/ft

Worksheet for CHNL-5

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.276 ft/ft
Bottom Width	25.00 ft
Discharge	30.00 cfs
Results	
Normal Depth	1.2 in
Flow Area	2.4 ft ²
Wetted Perimeter	25.2 ft
Hydraulic Radius	1.1 in
Top Width	25.00 ft
Critical Depth	4.3 in
Critical Slope	0.004 ft/ft
Velocity	12.52 ft/s
Velocity Head	2.43 ft
Specific Energy	2.53 ft
Froude Number	7.127
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.2 in
Critical Depth	4.3 in
Channel Slope	0.276 ft/ft
Critical Slope	0.004 ft/ft

INLT-1

Project Description	
Solve For	Spread
Input Data	
Discharge	19.00 cfs
Left Side Slope	10.000 H:V
Right Side Slope	10.000 H:V
Bottom Width	10.00 ft
Grate Width	2.50 ft
Grate Length	4.0 ft
Local Depression	0.0 in
Local Depression Width	0.0 in
Grate Type	P-50 mm x 100 mm (P-1- 7/8"-4")
Clogging	50.0 %
Results	
Spread	25.6 ft
Depth	9.4 in
Wetted Perimeter	25.7 ft
Top Width	25.62 ft
Open Grate Area	4.0 ft ²
Active Grate Weir Length	10.5 ft

SD-1

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.010 ft/ft
Diameter	24.0 in
Discharge	19.00 cfs
Results	
Normal Depth	16.8 in
Flow Area	2.4 ft ²
Wetted Perimeter	4.0 ft
Hydraulic Radius	7.1 in
Top Width	1.83 ft
Critical Depth	18.8 in
Percent Full	70.2 %
Critical Slope	0.008 ft/ft
Velocity	8.07 ft/s
Velocity Head	1.01 ft
Specific Energy	2.41 ft
Froude Number	1.253
Maximum Discharge	24.33 cfs
Discharge Full	22.62 cfs
Slope Full	0.007 ft/ft
Flow Type	Supercritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.0 %
Normal Depth Over Rise	70.2 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	16.8 in
Critical Depth	18.8 in
Channel Slope	0.010 ft/ft
Critical Slope	0.008 ft/ft

WEIR-1&2

Project Description	
Solve For	Discharge
Input Data	
Headwater Elevation	1.33 ft
Crest Elevation	0.67 ft
Tailwater Elevation	0.00 ft
Weir Coefficient	3.00 ft ^{1/2} /s
Crest Length	4.0 ft
Number Of Contractions	0
Results	
Discharge	6.43 cfs
Headwater Height Above Crest	0.66 ft
Tailwater Height Above Crest	-0.67 ft
Flow Area	2.6 ft ²
Velocity	2.44 ft/s
Wetted Perimeter	5.3 ft
Top Width	4.00 ft

WEIR-3&4

Project Description	
Solve For	Discharge
Input Data	
Headwater Elevation	1.33 ft
Crest Elevation	0.67 ft
Tailwater Elevation	0.00 ft
Weir Coefficient	3.00 ft ^(1/2) /s
Crest Length	5.3 ft
Number Of Contractions	0
Results	
Discharge	8.53 cfs
Headwater Height Above Crest	0.66 ft
Tailwater Height Above Crest	-0.67 ft
Flow Area	3.5 ft ²
Velocity	2.44 ft/s
Wetted Perimeter	6.6 ft
Top Width	5.30 ft

4125 Reservoir Riprap Sizing

Design Manual Eq. 734: $V = 3(d_{50})^{0.5}(S_s - 1)/S^{0.17}$

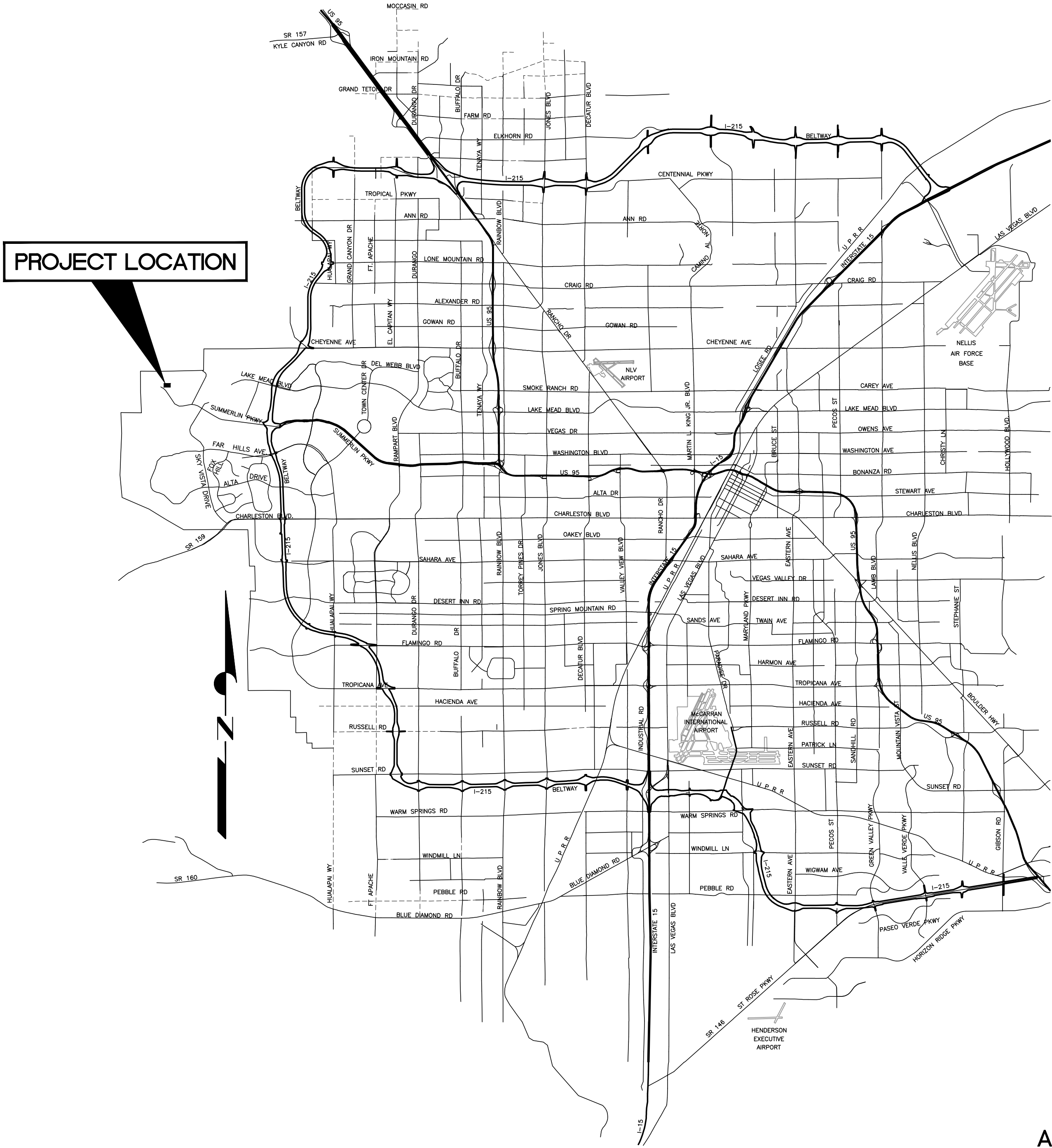
Ss= 2.5

	V	S	d50
CHNL-1	6.15	0.105	0.87
CHNL-2	5.64	0.118	0.76

Appendix B

Grading Plans

LAS VEGAS VALLEY WATER DISTRICT
CONTRACT NO. C1548
4125 ZONE NORTH RESERVOIR



LOCATION MAP
NOT TO SCALE

CAUTION TO CONTRACTOR:

THE CONTRACTOR SHALL BE RESPONSIBLE TO INVESTIGATE AND VERIFY THE ACTUAL LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND FACILITIES AT LEAST 48 HOURS IN ADVANCE OF THE PERFORMANCE OF ANY WORK.

BASIS OF BEARINGS :

THE BASIS OF BEARINGS FOR THIS PROJECT HAS BEEN DERIVED FROM MEASUREMENTS TAKEN ON CONTROLLING MONUMENTS USED TO DETERMINE THE LOCATION OF THE PROPERTIES SHOWN HEREON AND APPLYING THE NEVADA COORDINATE REFERENCE SYSTEM (NCRS) PROJECTION PARAMETERS DEFINED AS FOLLOWS:

BENCHMARK :

CITY OF LAS VEGAS VERTICAL CONTROL POINT "7LV0934SW6", RIVET & PLATE TOP CURB S.E. CORNER
DESERT MOON RD. & SKY VISTA DR.

NAVD 88 (2008) - 1,011.422 METERS
3,318.31 U.S. SURVEY FEET

JUDY KARECK, P.E.	P.E. NO.	DATE
RESPONSIBLE FOR DRAWINGS G1 THRU G7, C1 THRU C12, CD1 THRU CD14 M1 THRU M15, AND MD1 THRU MD10		

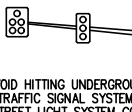
ERIC CHRISTIANSON, P.L.S.	P.L.S. NO.	DATE
RESPONSIBLE FOR DRAWINGS SV1 THRU SV6		

NINGYU GAO, P.E.S.E. P.E. NO. DATE
RESPONSIBLE FOR DRAWING S1, S14 THRU S23, SD7

BRETT BRADY, P.E.S.E. P.E. NO. DATE
RESPONSIBLE FOR DRAWINGS S2 THRU S13, SD1 THRU SD6

A MOHOTTI ALAGIYAWANNA, P.E.S.E P.E. NO. DATE
RESPONSIBLE FOR DRAWINGS S19, S21, AND SD8

CAREY MILLER, P.E.	P.E. NO.	DATE
RESPONSIBLE FOR DRAWINGS	E1 THRU E25, ED1 THRU ED14, I1	THRU I25



A diagram showing a traffic light pole with a traffic light and a computer monitor connected by a cable, illustrating the integration of traffic signals with a computerized system.

**Avoid hitting underground
traffic signal systems
and street light system conduits
it's costly**

**Call before
you dig
underground**

**Call
before you
Underground**

1-702-455-7511

CLARK COUNTY TRAFFIC OPERATIONS
AND

1-702-229-6611

LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

Avoid overhead power line contact. It's costly.

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

Call
811

Call
before you
OVERHEAD

1-702-593-6111

CLV DWG #

LAS VEGAS VALLEY WATER DISTRICT

VERIFY SCALE

BAR REPRESENTS
ONE AND ONE-HALF
INCHES ON ORIGINAL

HORIZ. SCALE
NONE
VERT. SCALE

4125 ZONE NORTH RESERVOIR

COVER SHEET

DRAWN BY: _____
E. KINLOCH
CHECKED BY: _____
09/25/2020

RECOMMENDED BY: L. STEVEN ANDERSON DATE



CONTRACT NUMBER

C1548
DRAWING NUMBER G1
SHEET 1 OF 159

ATKINS
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200

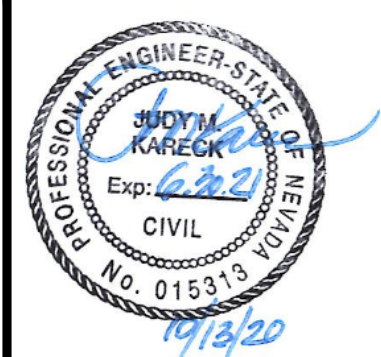
LEGEND

DESCRIPTION	SYMBOL	
	PROPOSED	EXISTING
12" WATER PIPELINE		
66" WATER PIPELINE		
IN-LINE VALVE VAULT		
ACCESS MANHOLE (TO PIPELINE)		
BLOWOFF		
COMBINATION AIR VALVE		
TEST STATION (CATHODIC)		
REDUCER		
END CAP FOR WATER PIPELINE		
WATER VALVE		
FIRE HYDRANT ASSEMBLY		
WATER METER		
WATER METER SIZE		
IDENTIFICATION HEXAGON		
EDGE OF PAVEMENT		
SANITARY SEWER MANHOLE		
STORM DRAIN MANHOLE		
POWER POLE W/GUY WIRE		
STREET LIGHT (GENERIC SYMBOL NOT RELATED TO WATTAGE)		
SURVEY MONUMENT		
POLYGON FOR TRANSMISSION POLE		
ELECTRICAL BOX		
ELECTRICAL PANEL BOX		
CABLE TV		
FENCE		
GAS LINE		
CONTOURS		
DITCH		
SANITARY SEWER		
STORM DRAIN		
UNDERGROUND POWER		
UNDERGROUND TELEPHONE		
CURB, GUTTER AND SIDEWALK		
PROPERTY LINE		
CENTER LINE		
BLOCK WALL		
RIGHT-OF-WAY LINE		
PATENT RESERVATION OR EASEMENT LINE		
SECTION LINE		
ANGLE (HORIZONTAL OR VERTICAL)		
ANGLE OF CURVE		
FIELD WELD		
REFERENCE BUBBLE	DETAIL OR SECTION REFERENCE NUMBER (DETAIL) OR LETTER (SECTION) DRAWING NUMBER OF SHEET WHERE DETAIL OR SECTION RESIDES C1, C9, C11 — ALL SHEETS THAT REFERENCE TO THE DETAIL OR SECTION	

CLV DWG #

REVISIONS:

DRAWN BY:	E. BERG	09/25/2020
CHECKED BY:	M. CARR	09/25/2020
RECOMMENDED BY:		
L. STEVEN ANDERSON		DATE
ACCEPTED BY:		
RYAN C. PEARSON		DATE



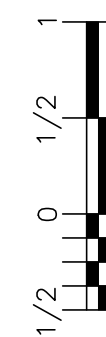
CONTRACT NUMBER
C1548
DRAWING NUMBER G5
SHEET 5 OF 159

4125 ZONE NORTH RESERVOIR

LEGEND

SCALE
HORIZ. SCALE
NONE
VERT. SCALE
NONE

VERIFY SCALE

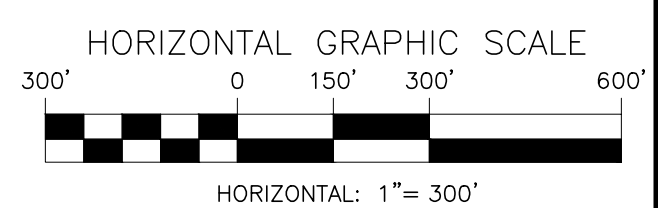
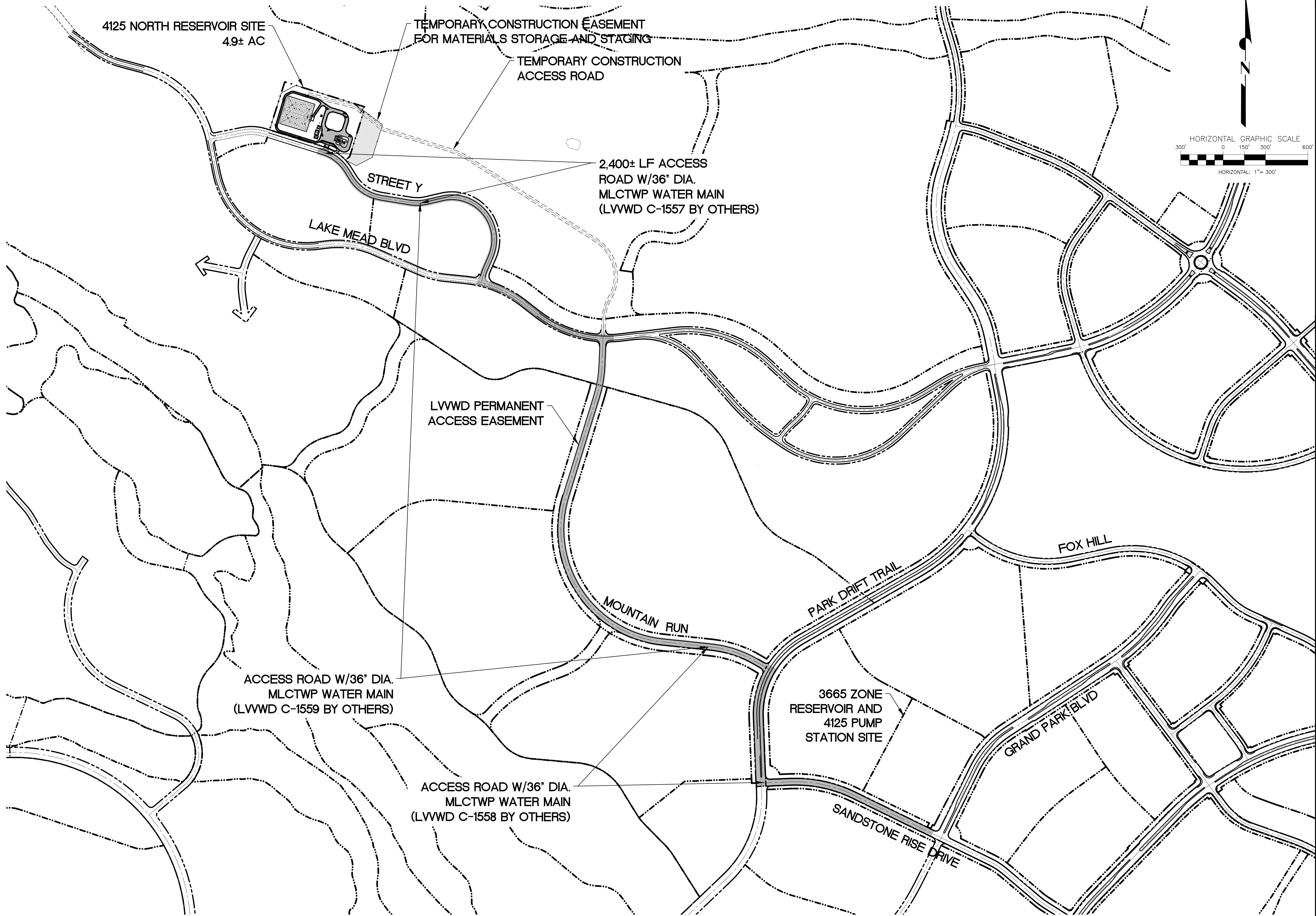


BAR REPRESENTS
ONE AND ONE-HALF
INCHES ON ORIGINAL

LAS VEGAS VALLEY WATER DISTRICT

ATKINS

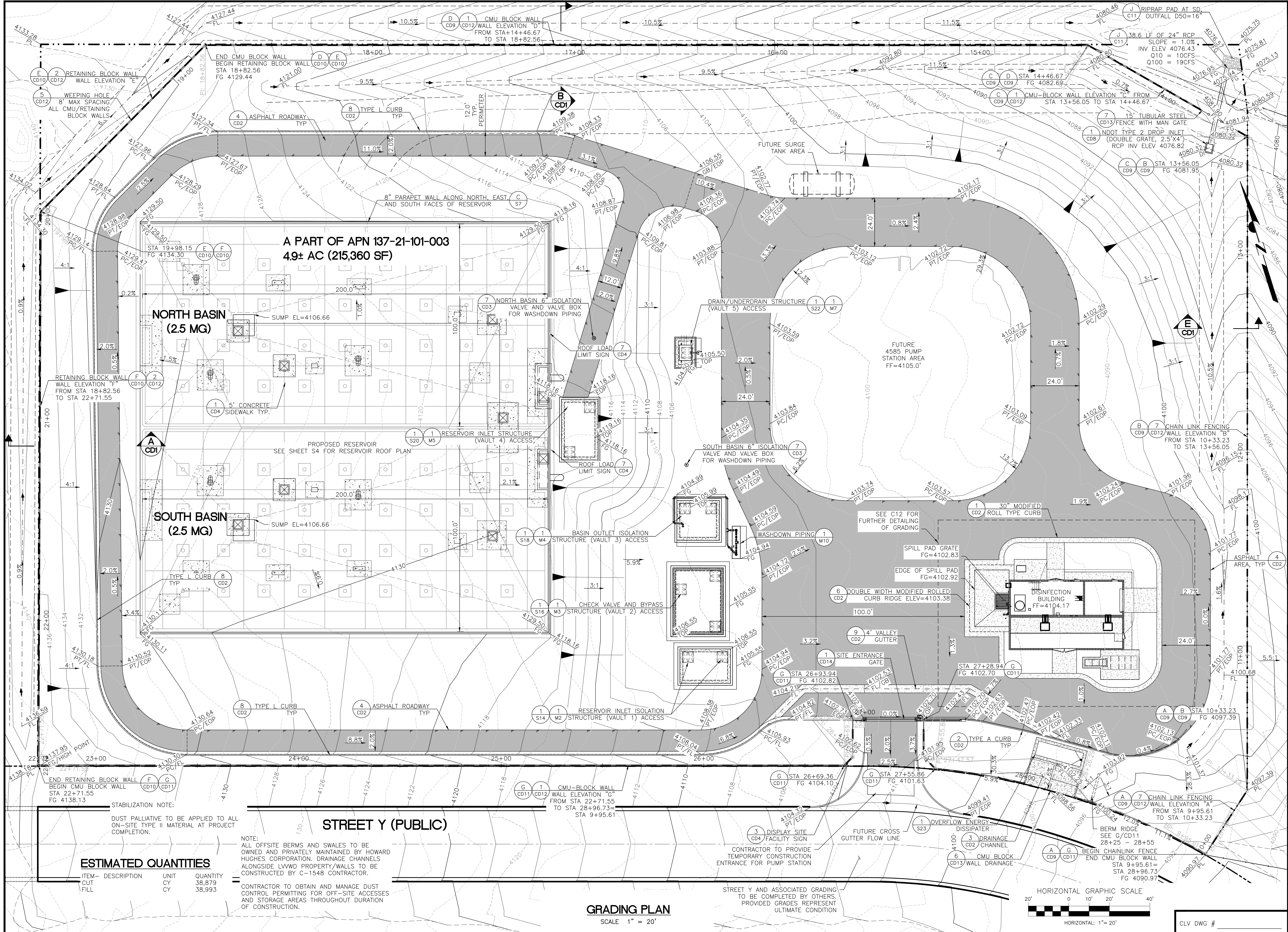
2270 Corporate Circle Suite 200
Henderson, Nevada 89074
Telephone: +1.702.263.7275
Fax: +1.702.263.7200



SITE VICINITY MAP
SCALE 1" = 300'

CLV DWG # _____

LAS VEGAS VALLEY WATER DISTRICT		2270 Corporate Circle Suite 200 Las Vegas, NV 89129 Telephone: +1.702.263.7275 Fax: +1.702.263.7200	
VERIFY SCALE	1/2" = 0' 1/2" = 1'	BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL	
4125 ZONE NORTH RESERVOIR		SITE VICINITY MAP	
DRAWN BY: M. CARR		09/25/2020	
CHECKED BY: L. STEVEN ANDERSON		09/25/2020	
RECOMMENDED BY: RYAN C. PEARSON		DATE: _____	
ACCEPTED BY: _____		DATE: _____	
		CONTRACT NUMBER	
		C1548	
		DRAWING NUMBER 67	
		SHEET 7 OF 159	



ESTIMATED QUANTITIES

ITEM	DESCRIPTION	UNIT	QUANTITY
1	CUT	CY	38,879
2	FILL	CY	38,993

NOTE:
ALL OFFSITE BERMS AND SWALES TO BE OWNED AND PRIVATELY MAINTAINED BY HOWARD HUGHES CORPORATION. DRAINAGE CHANNELS ALONGSIDE LVWD PROPERTY/WALLS TO BE CONSTRUCTED BY C-1548 CONTRACTOR.
CONTRACTOR TO OBTAIN AND MANAGE DUST CONTROL PERMITTING FOR OFF-SITE ACCESSSES AND STORAGE AREAS THROUGHOUT DURATION OF CONSTRUCTION.

GRADING PLAN
SCALE 1" = 20'

LAS VEGAS VALLEY WATER DISTRICT

2270 Corporate Circle Suite 200
Las Vegas, NV 89162
Telephone: +1.702.263.7775
Fax: +1.702.263.7200

ATKINS

VERIFICATION SCALE
1/2" = 0' 1/2" = 1'
BAR REPRESENTS
ONE AND ONE-HALF
INCHES ON ORIGINAL

4125 ZONE NORTH RESERVOIR

GRADING PLAN

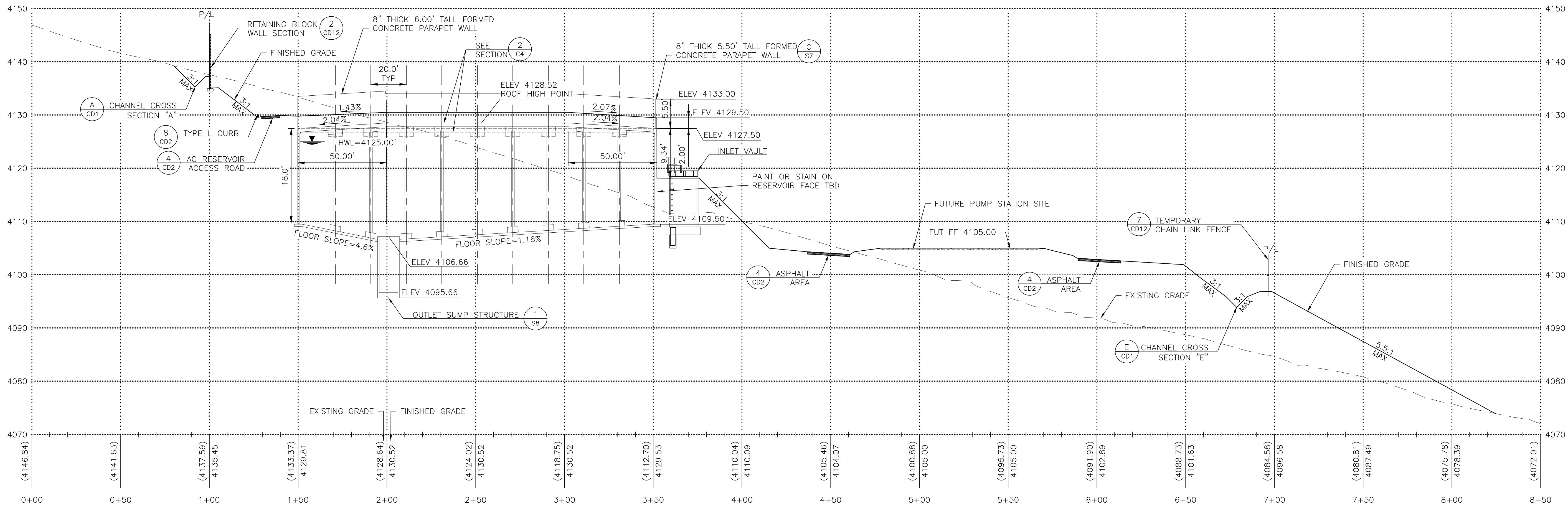
REVISIONS:

DRAWN BY: 09/25/2020
CHECKED BY: 09/25/2020
RECOMMENDED BY: L. STEVEN ANDERSON
ACCEPTED BY: RYAN C. PEARSON

DATE: DATE
DATE: DATE

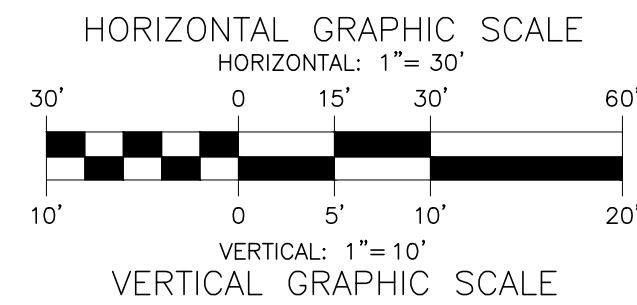
CONTRACT NUMBER
C1548

DRAWING NUMBER C2
SHEET 15 OF 159



RESERVOIR PROFILE
SCALE: HORIZ. 1" = 30'
VERT. 1" = 10'

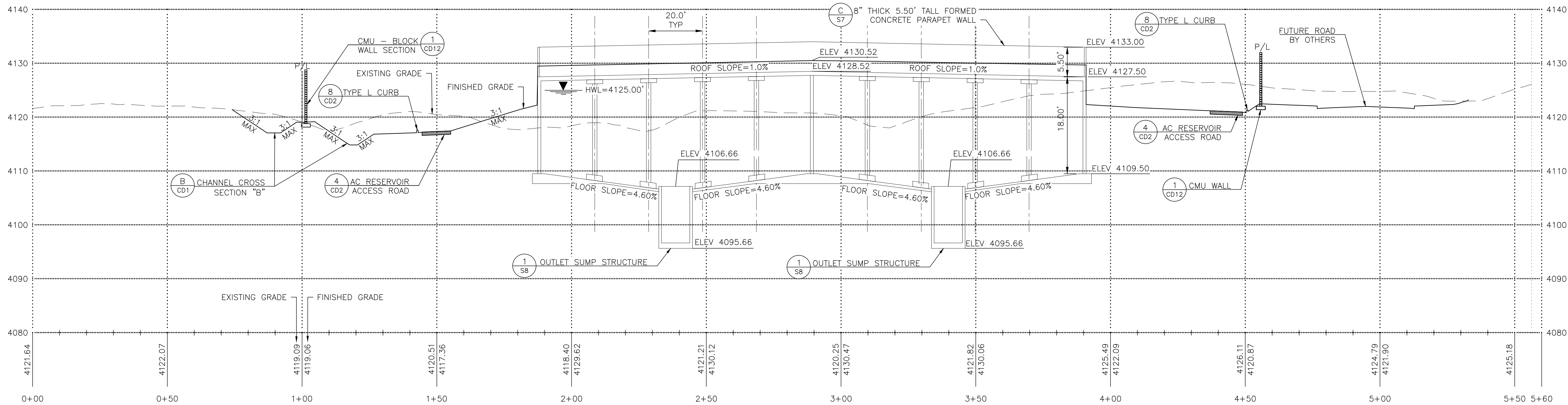
1
C3
C1



CLV DWG # _____

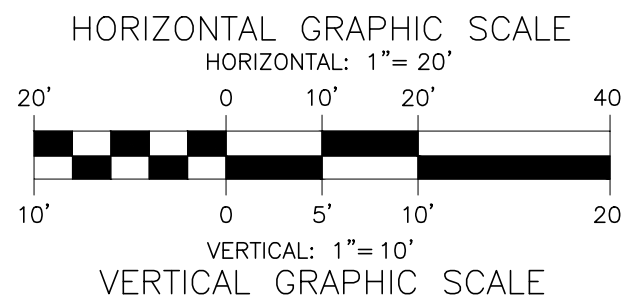
REVISIONS:	DRAWN BY: _____		09/25/2020	
	CHECKED BY: _____		09/25/2020	
RECOMMENDED BY: _____		DATE: _____		
ACCEPTED BY: _____		DATE: _____		
RYAN C. PEARSON		DATE: _____		
CONTRACT NUMBER				
C1548				
DRAWING NUMBER C3				
SHEET 16 OF 159				

VERIFY SCALE	LAS VEGAS VALLEY WATER DISTRICT	
	ATKINS	
2270 Corporate Circle, Suite 200 Las Vegas, NV 89162 Telephone: +1.702.263.7775 Fax: +1.702.263.7200		



RESERVOIR PROFILE

SCALE: HORIZ. 1" = 20'
VERT. 1" = 10'



2
C4
C1

CLV DWG # _____

REVISIONS:	DRAWN BY: J. RIVERA		CHECKED BY: M. CARR		RECOMMENDED BY: L. STEVEN ANDERSON		ACCEPTED BY: RYAN C. PEARSON	
	DATE: 09/25/2020		DATE: 09/25/2020		DATE: 09/25/2020		DATE: 09/25/2020	
CONTRACT NUMBER		DRAWING NUMBER		SHEET		OF		
C1548		C4		17		159		

4125 ZONE NORTH RESERVOIR

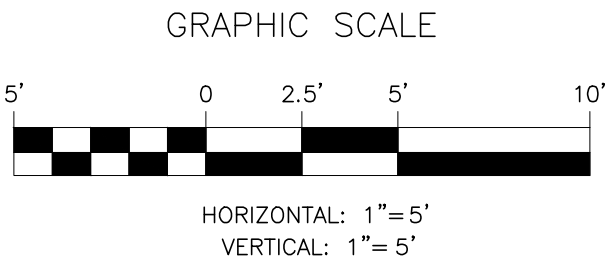
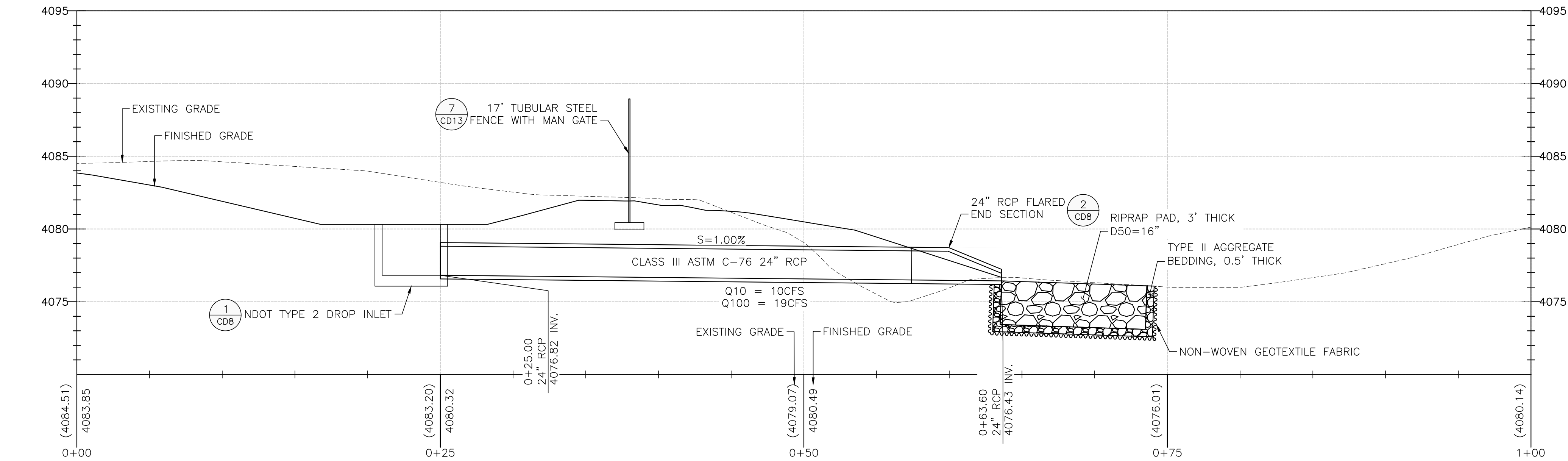
RESERVOIR PROFILE II

SCALE: HORIZ. 1" = 20'
VERT. 1" = 10'

LAS VEGAS VALLEY WATER DISTRICT

2270 Corporate Circle, Suite 200
Las Vegas, Nevada 89166
Telephone: +1.702.263.7775
Fax: +1.702.263.7200

ATKINS



PROFILE "J" - 24" RCP STORM DRAIN

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

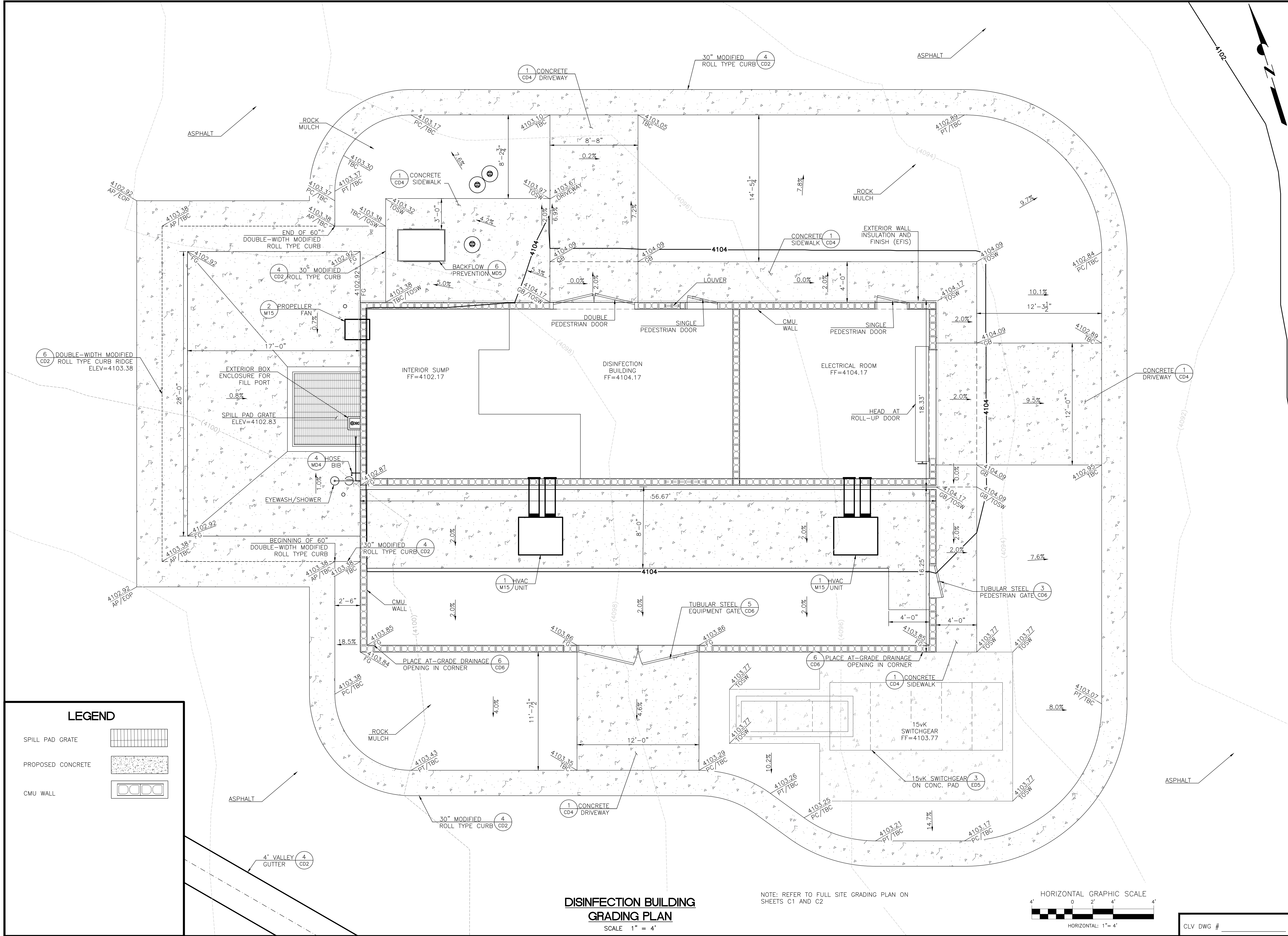
- NOTES:
- 24" RCP, 3-INCH WALL PIPE TO CONFORM TO SECTIONS 601, 708, AND SUBSECTION 708.03.01 OF THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

J
C11
C1, C2

CLV DWG #

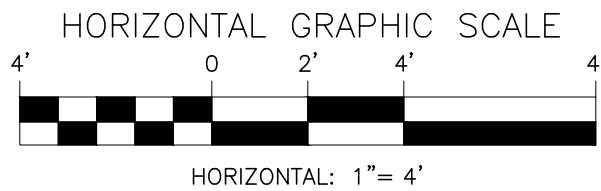
REVISIONS:

4125 ZONE NORTH RESERVOIR		LAS VEGAS VALLEY WATER DISTRICT	
SITE PIPING PROFILES III		VERIFY SCALE	
SCALE HORIZ. SCALE VERT. SCALE AS SHOWN		1/2" 0 1/2" 1" BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL	
DRAWN BY: R. ANDREZ CHECKED BY: M. CARR RECOMMENDED BY: L. STEVEN ANDERSON ACCEPTED BY: RYAN C. PEARSON		2270 Corporate Circle, Suite 200 Las Vegas, NV 89166 Telephone: +1.702.263.7775 Fax: +1.702.263.7200	
CONTRACT NUMBER C1548		ATKINS	
DRAWING NUMBER C11 SHEET 24 OF 159			



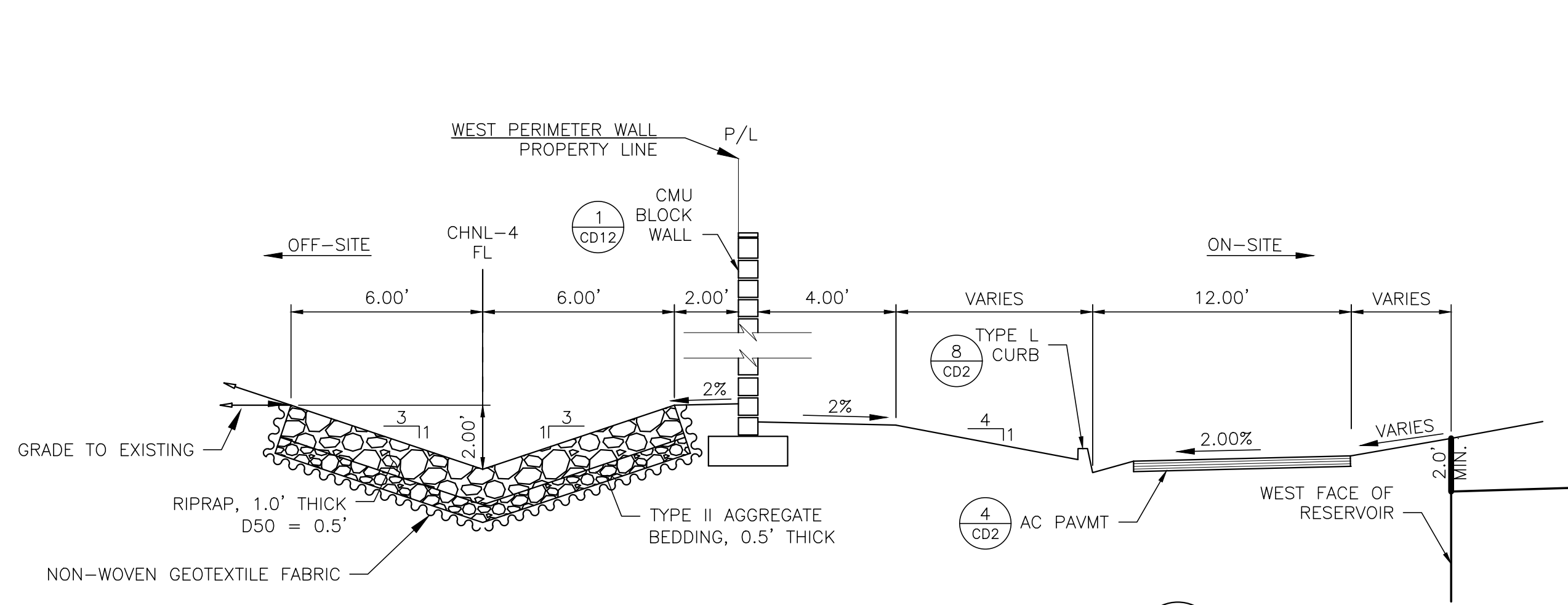
DISINFECTION BUILDING
GRADING PLAN
SCALE 1" = 4'

NOTE: REFER TO FULL SITE GRADING PLAN ON
SHEETS C1 AND C2



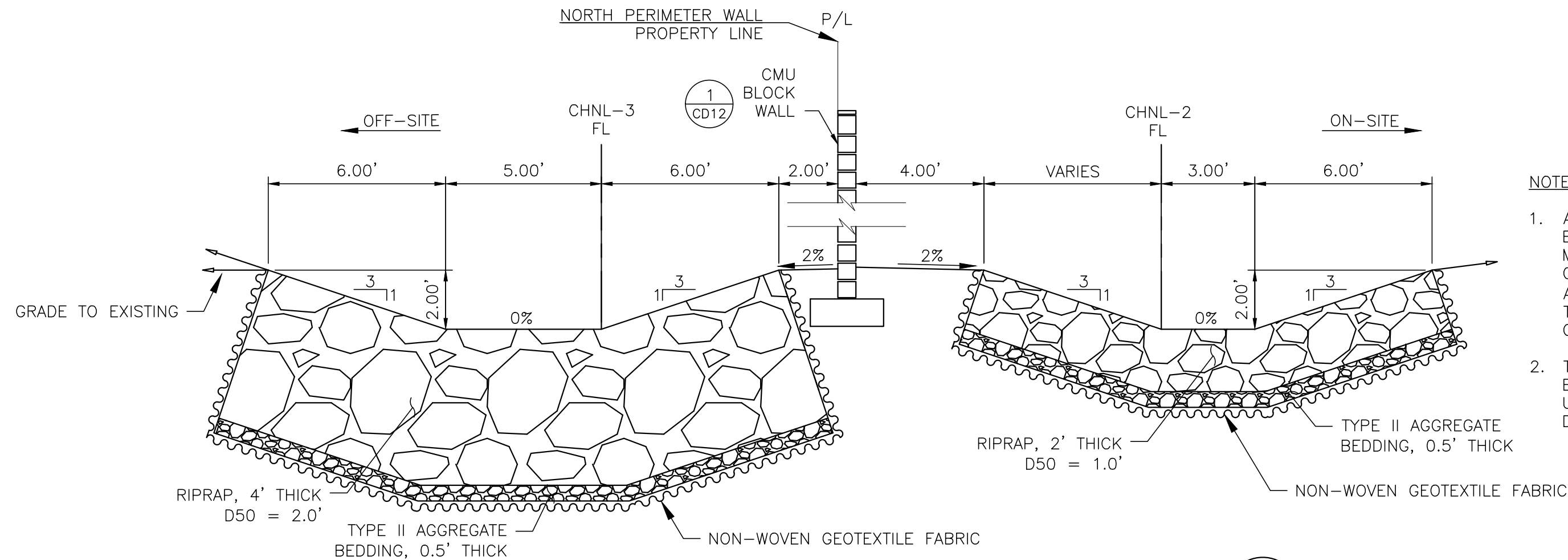
CLV DWG # _____

LAS VEGAS VALLEY WATER DISTRICT		2270 Corporate Circle, Suite 200 Las Vegas, NV 89162 Telephone: +1.702.263.7775 Fax: +1.702.263.7200	
VERIFY	SCALE		
4125 ZONE NORTH RESERVOIR		DISINFECTION BUILDING GRADING PLAN	
DRAWN BY: _____		DATE: _____	
CHECKED BY: _____		DATE: _____	
RECOMMENDED BY: _____		DATE: _____	
ACCEPTED BY: _____		DATE: _____	
L. STEVEN ANDERSON		RYAN C. PEARSON	
PROFESSIONAL ENGINEER-STATE OF NEVADA		NO. 015313	
Exp. 6/22		1/13/20	
CONTRACT NUMBER		C1548	
DRAWING NUMBER		C12	
SHEET		25 OF 159	



SECTION A
SCALE: NONE

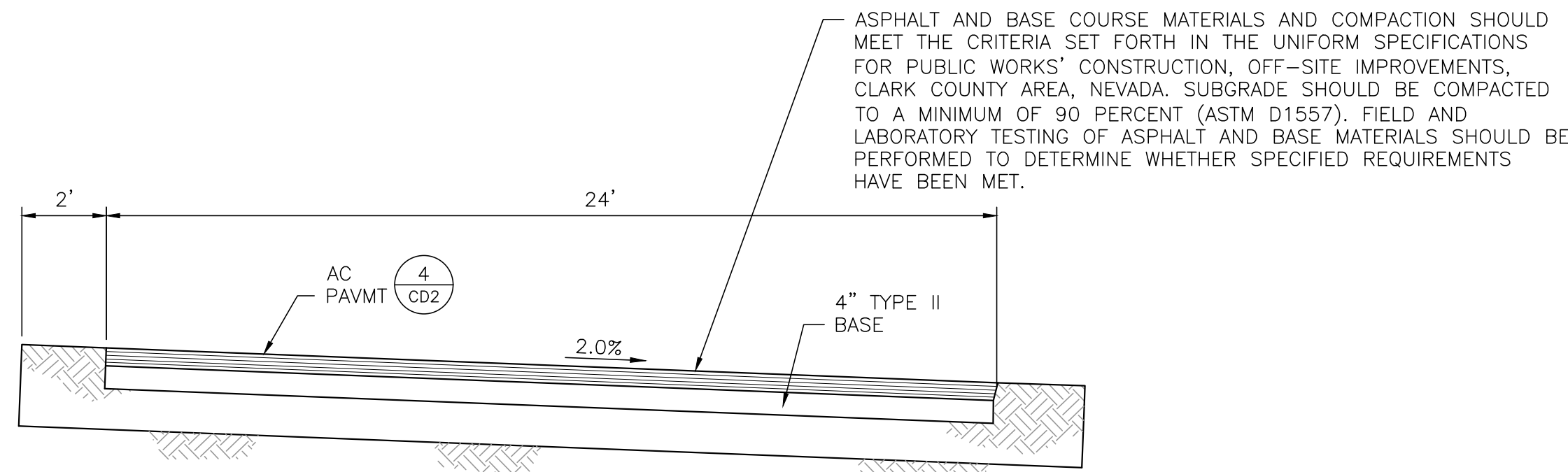
A
CD1
C1, C2



SECTION B
SCALE: NONE

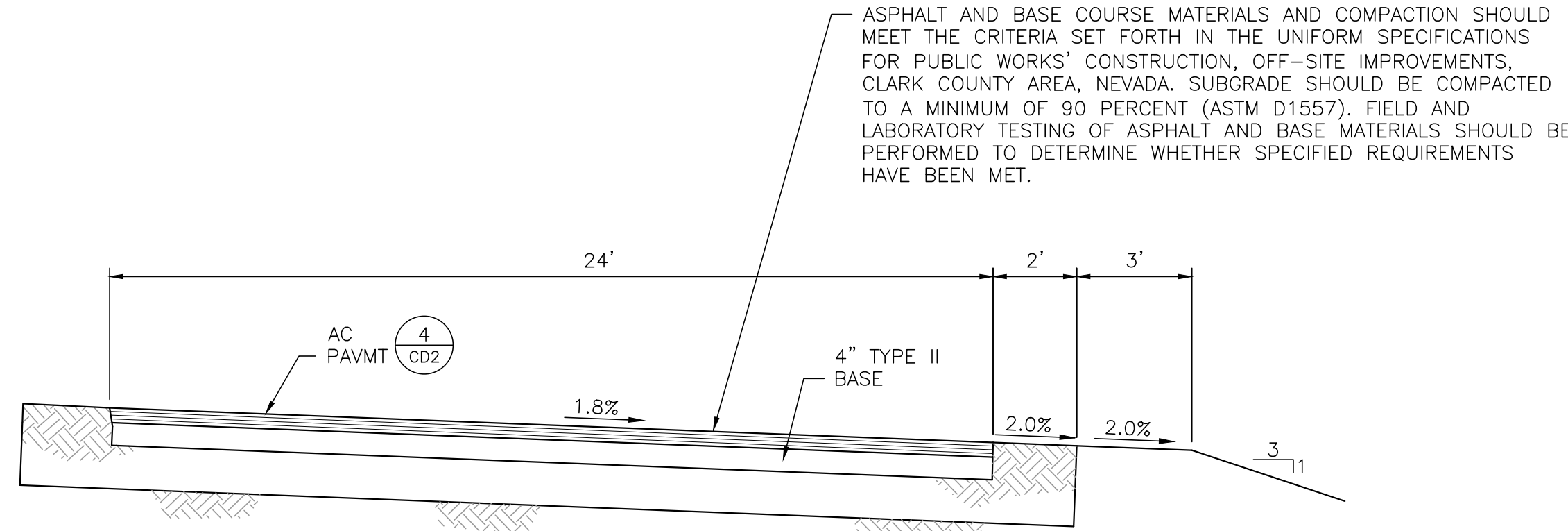
B
CD1
C1

- NOTES:
1. ALL OFFSITE BERMS AND SWALES TO BE OWNED AND PRIVATELY MAINTAINED BY HOWARD HUGHES CORPORATION. DRAINAGE CHANNELS ALONGSIDE LVWD PROPERTY/WALLS TO BE CONSTRUCTED BY C-1548 CONTRACTOR.
 2. THE REQUIRED SIZE OF RIPRAP FOR EACH CHANNEL WAS DETERMINED USING CLARK COUNTY DRAINAGE DESIGN MANUAL EQ. 734.



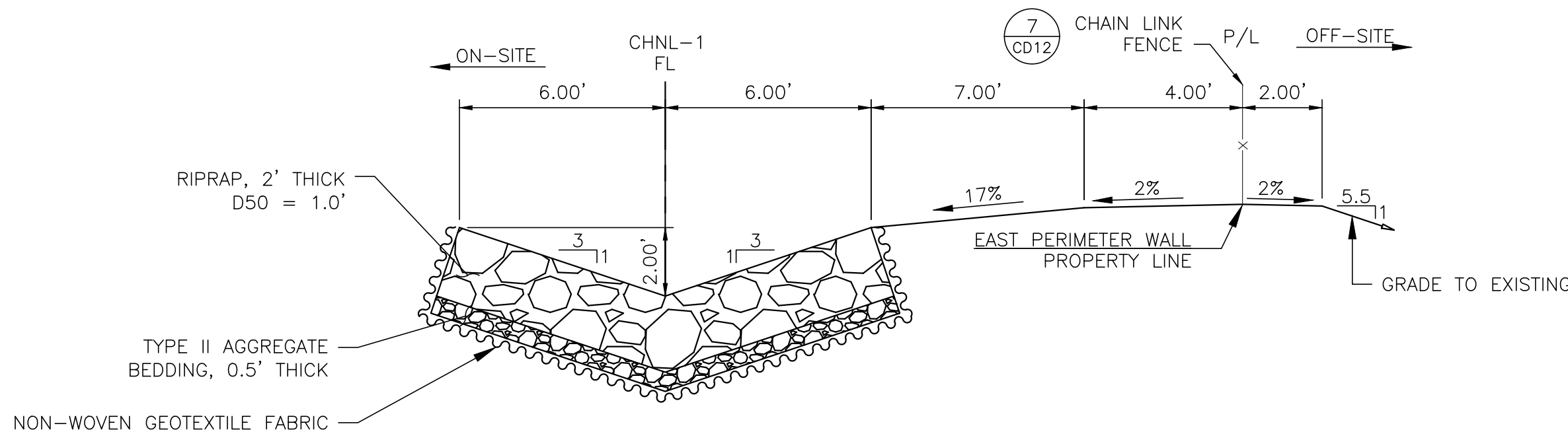
SECTION C
SCALE: NONE

C
CD1
C1



SECTION D
SCALE: NONE

D
CD1
C1



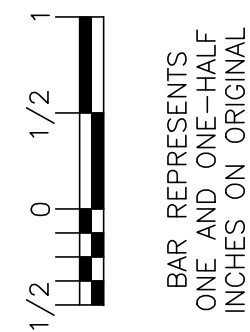
SECTION E
SCALE: NONE

E
CD1
C1

CLV DWG # _____

LAS VEGAS VALLEY WATER DISTRICT

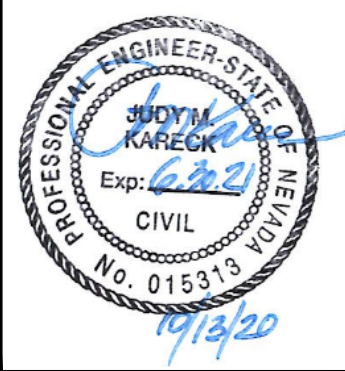
VERIFY SCALE



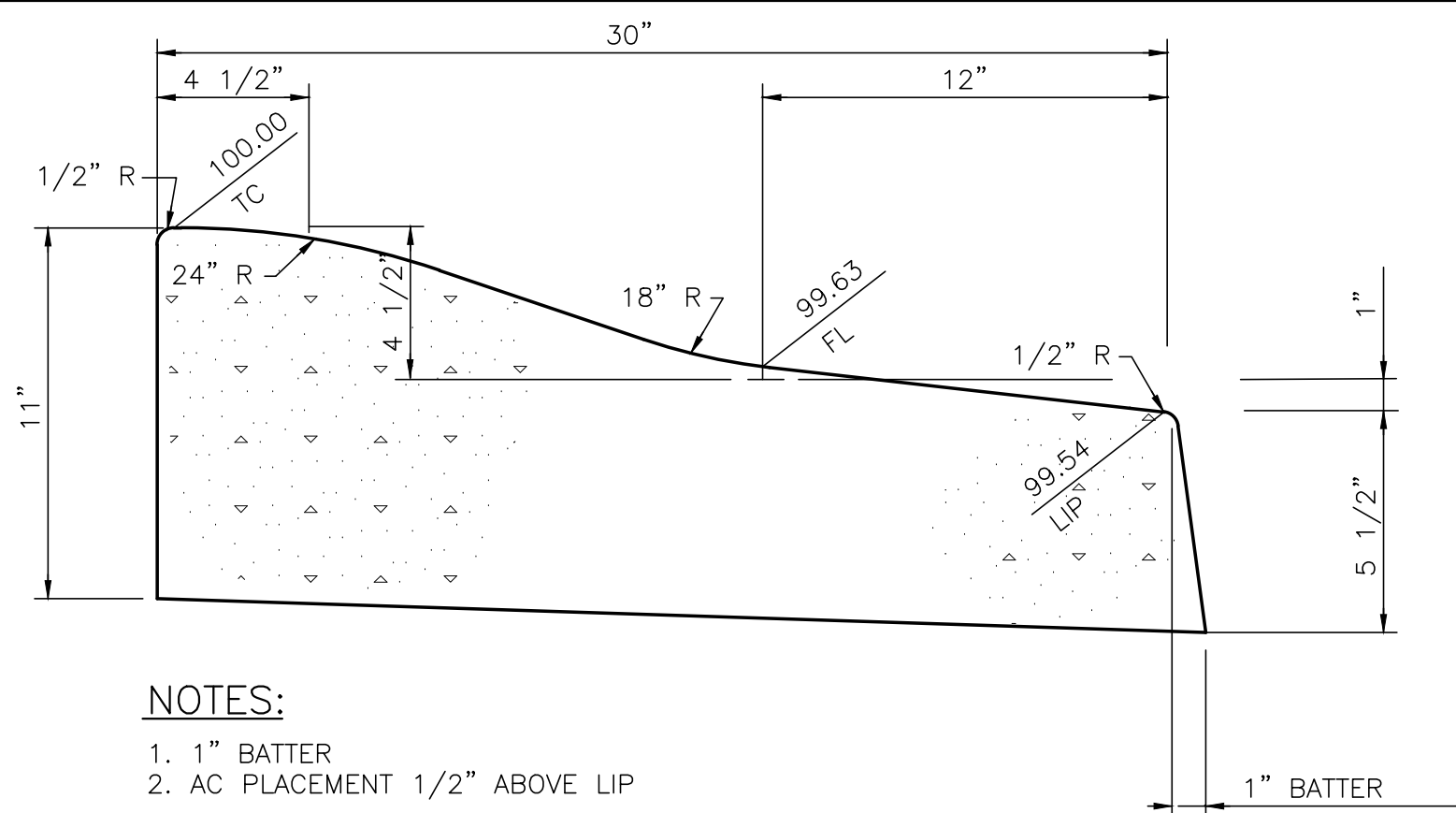
4125 ZONE NORTH RESERVOIR

GRADING SECTIONS AND DETAILS

DRAWN BY:	09/25/2020	DATE
CHECKED BY:	09/25/2020	DATE
RECOMMENDED BY:	L. STEVEN ANDERSON	DATE
ACCEPTED BY:	RYAN C. PEARSON	DATE



CONTRACT NUMBER
C1548
DRAWING NUMBER CD1
SHEET 26 OF 159



NOTES:

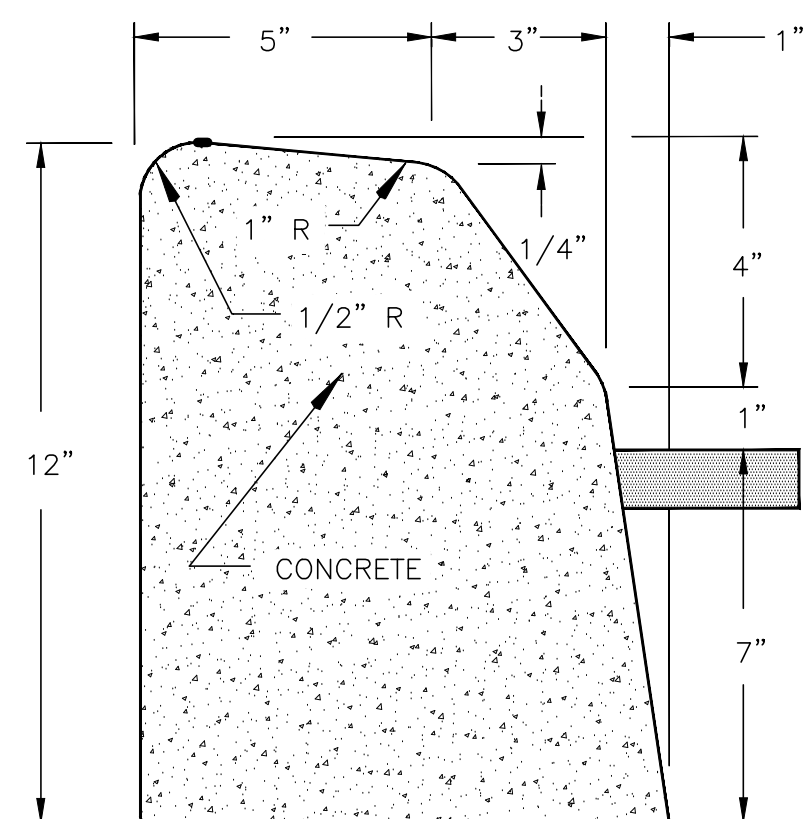
- 1" BATTER
- AC PLACEMENT 1/2" ABOVE LIP

30" MODIFIED ROLL TYPE CURB DETAIL

SCALE : 3/16" = 1'-0"

1
CD2

C1, C2



NOTES:

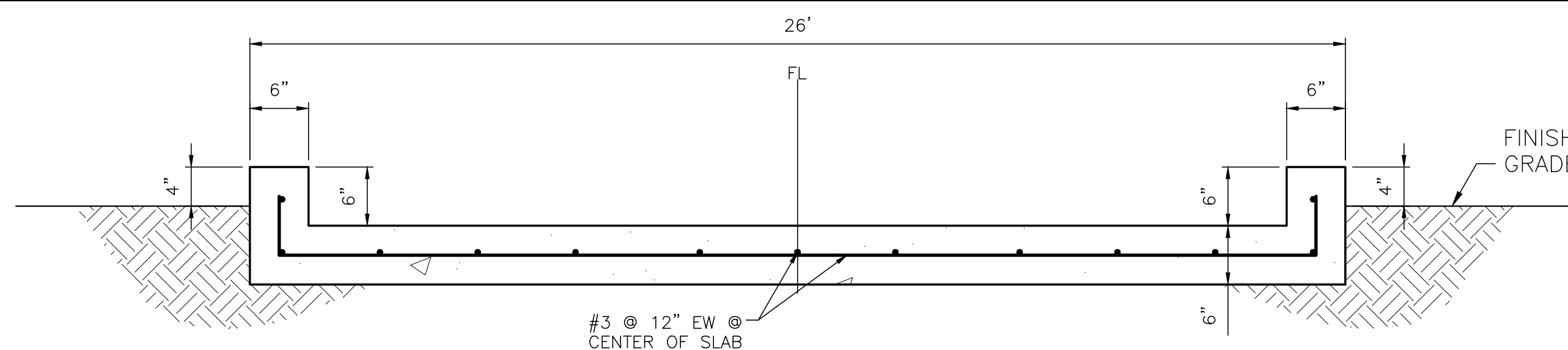
- 1" BATTER
- AC PLACEMENT 1/2" ABOVE LIP

TYPE A CURB DETAIL

SCALE : NONE

2
CD2

C1, C2, C3, C4, CD1

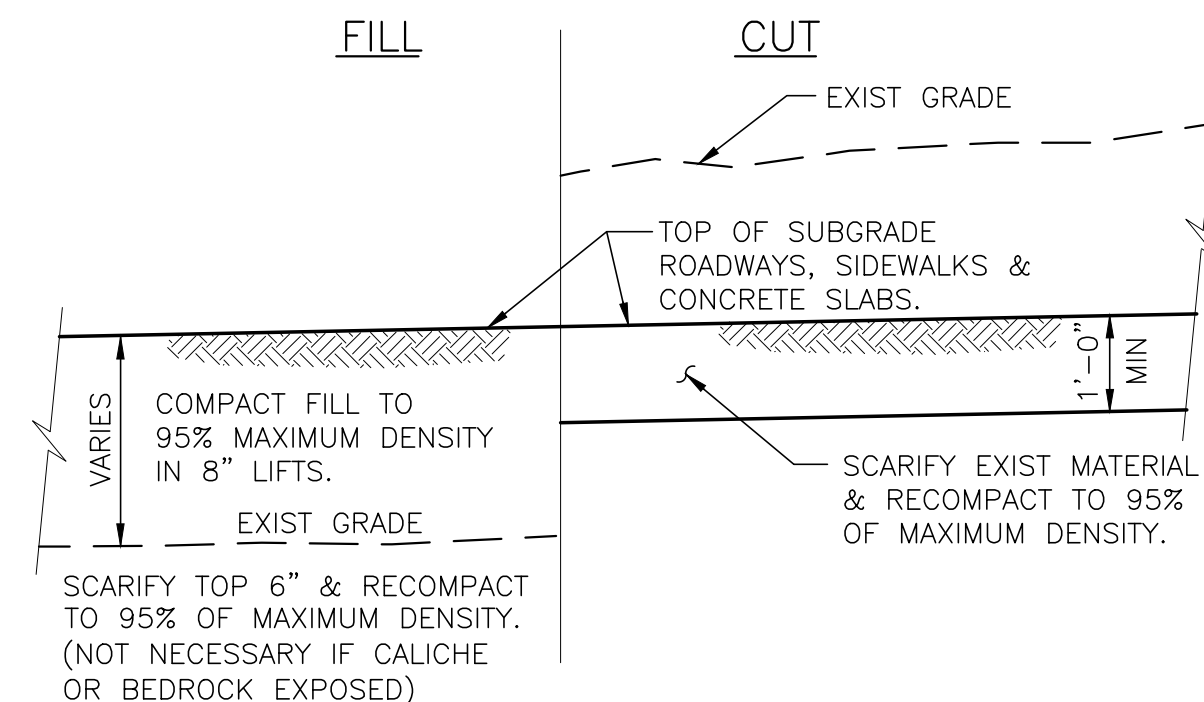


DRAINAGE CHANNEL

NOT TO SCALE

3
CD2

C1, C2



NOTES

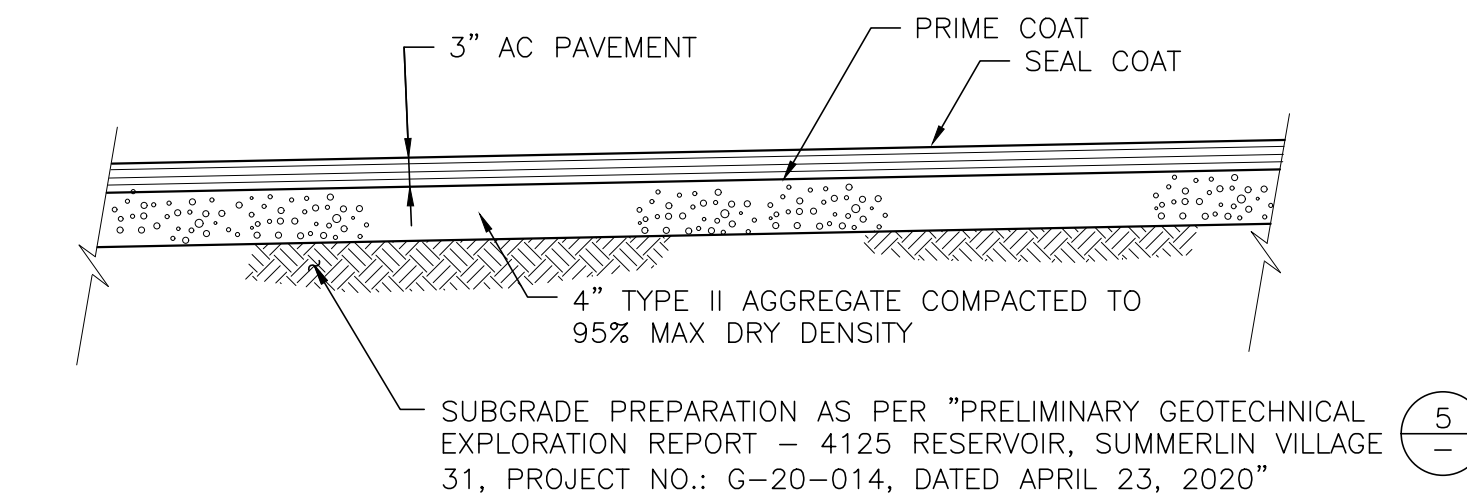
1. PROVIDE MIN. 1'-0" OF COMPACTED MATERIAL IN CUT TO FILL TRANSITION.
2. THIS DETAIL APPLIES UNDER ALL ROADWAY, SIDEWALKS & CONCRETE SLABS.
3. FOUNDATIONS SHALL BE ESTABLISHED ON UNDISTURBED NATURAL SOILS HAVING A CONSISTENCY OF AT LEAST MEDIUM DENSE AND/OR PROPERLY COMPACTED FILL AND/OR CALICHE.
4. FILL PLACED ON TOP OF THE RESERVOIR AND IMMEDIATELY BEHIND RETAINING WALLS SHOULD BE COMPACTED TO BETWEEN 90 AND 95 PERCENT.
5. STREET/PAVEMENT SUBGRADE ONLY NEEDS TO BE COMPACTED TO A MINIMUM OF 90 PERCENT.

SUB GRADE PREPARATION - SECTION

SCALE: NONE

5
CD2

C1, CD1

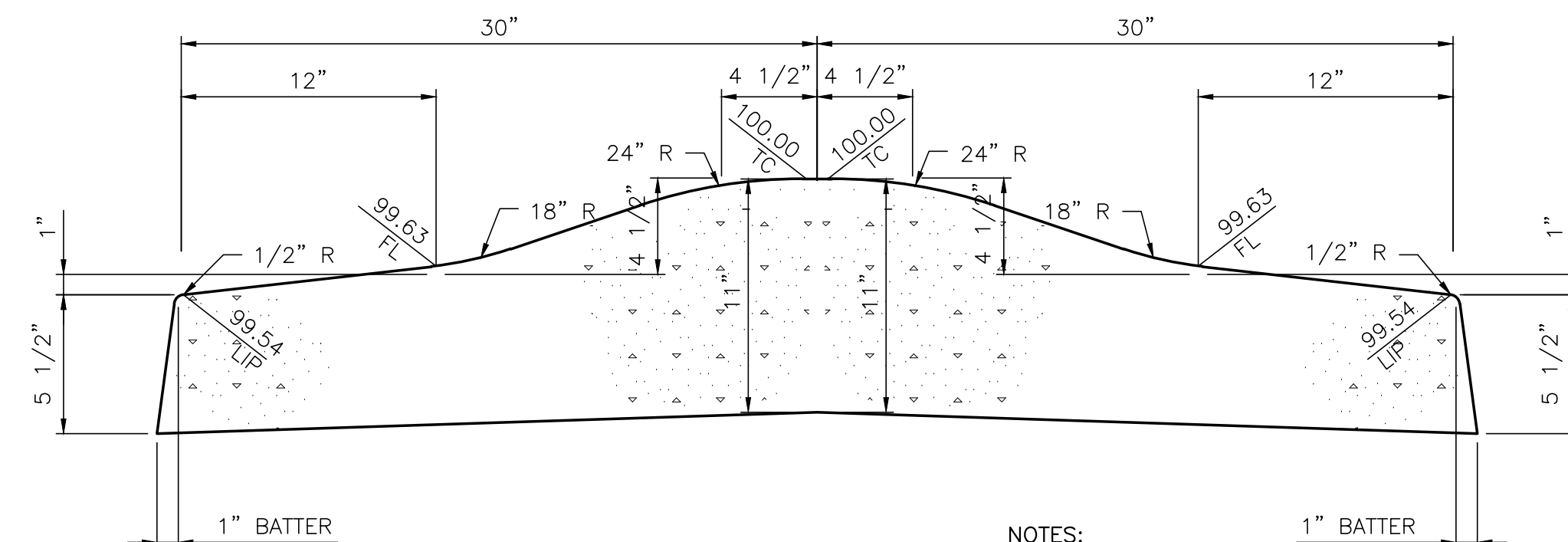


ASPHALTIC CONCRETE PAVEMENT - SECTION

SCALE: NONE

4
CD2

C1, C2, C3, C4, C9, C10, C11, C12, CD13



NOTES:

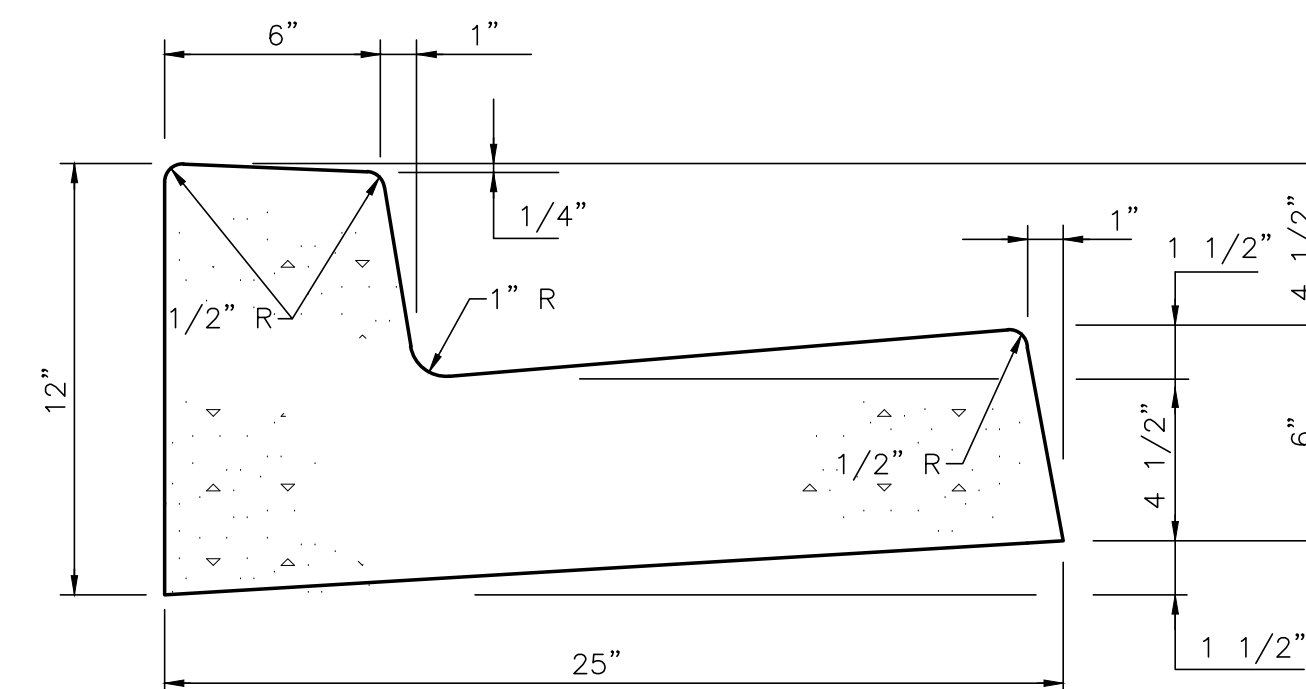
- 1" BATTER
- AC PLACEMENT 1/2" ABOVE LIP
- REFERENCE ELEVATIONS ONLY. SEE GRADING PLANS FOR CONSTRUCTION ELEVATIONS.

60" DOUBLE-WIDTH MODIFIED ROLL TYPE CURB

SCALE: NONE

6
CD2

C2, C12



NOTE:

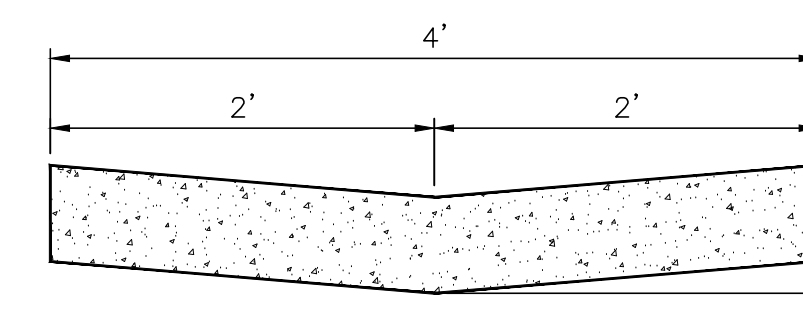
- 1" BATTER
- AC PLACEMENT 1/2" ABOVE LIP

25" "L" TYPE CURB DETAIL

SCALE : 3/16" = 1'-0"

8
CD2

C1, C2



4' VALLEY GUTTER

SCALE: NONE

9
CD2

C1, C2

NOTES:

1. REFER TO SPECIFICATIONS SECTION 32.31.13 FOR ALL FENCING MATERIALS.
2. ANCHOR BOLT TO INSIDE OF FENCE TOWARDS PROPERTY.
3. GATE AND FENCE TO BE POWDER COATED.

DOUBLE LEAF GATE

SCALE: NONE

7
CD2

C1

CHAIN LINK FENCE
WITH BARBED WIRE

7
CD12

DIAGONAL TENSION CABLE
W/ TOGGLE

1-1/2" DIA
PIPE x 6" LG.
GUIDE TUBE FOR
DOWN ROD (TYP
4 PLACES)

SIDE RAIL TYP

BOTTOM RAIL TYP

EXIST GRADE (TYP)

DOWN ROD SLEEVE
1-1/2" DIA PIPE x 6" LONG,
GALV (TYP)

STEEL PIPE 5
STD.(TYP)

CONC (TYP)

LAS VEGAS VALLEY WATER DISTRICT

VERIFY SCALE

4125 ZONE NORTH RESERVOIR

DRAWN BY: 09/25/2020
CHECKED BY: 09/25/2020
RECOMMENDED BY:
L. STEVEN ANDERSON
ACCEPTED BY:
RYAN C. PEARSON



CONTRACT NUMBER
C1548
DRAWING NUMBER CD2
SHEET 27 OF 159

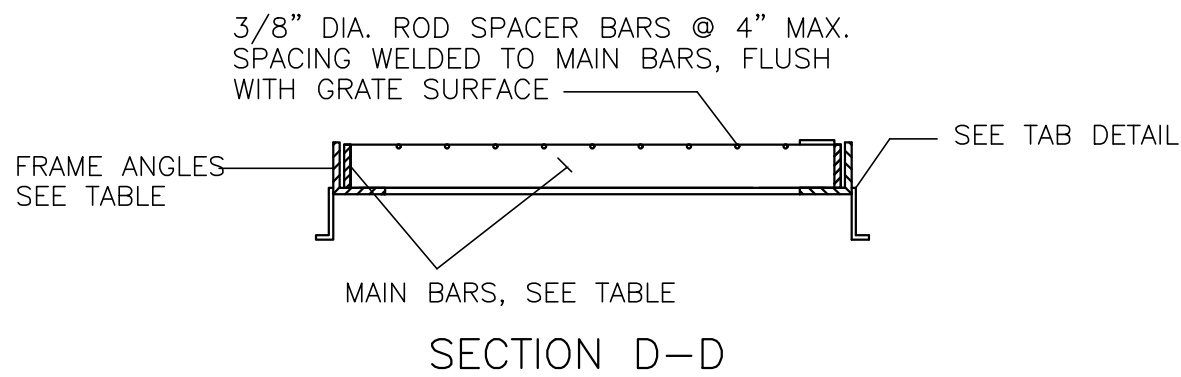
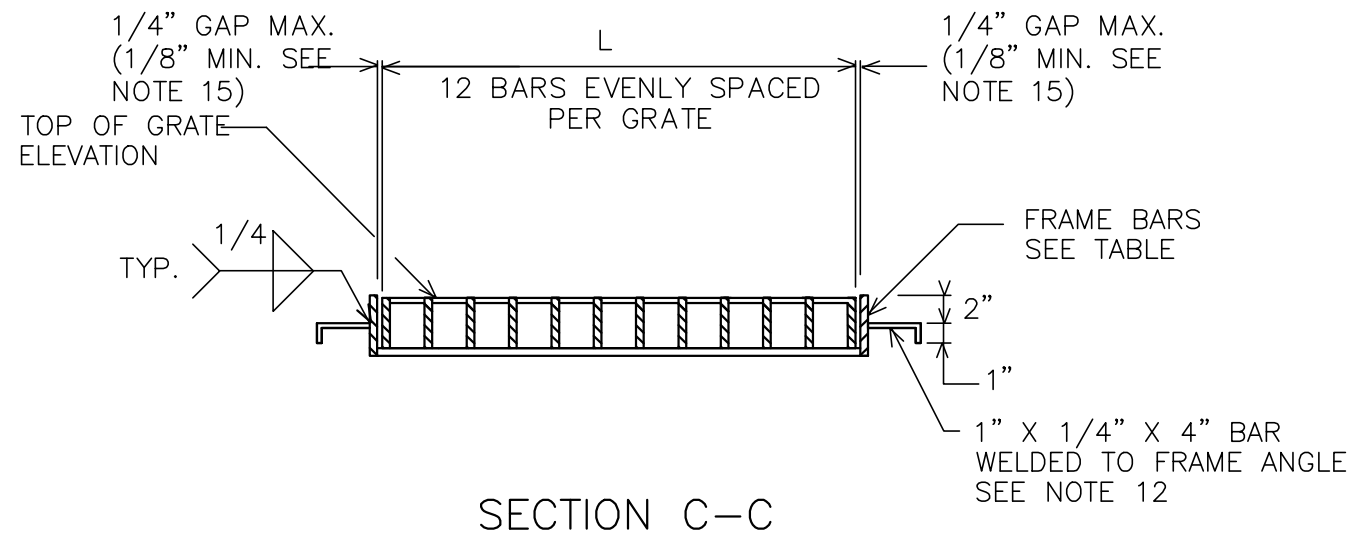
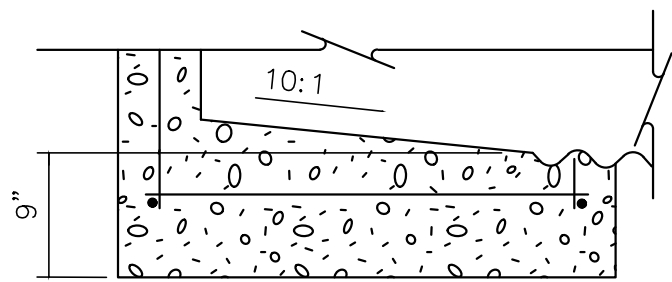
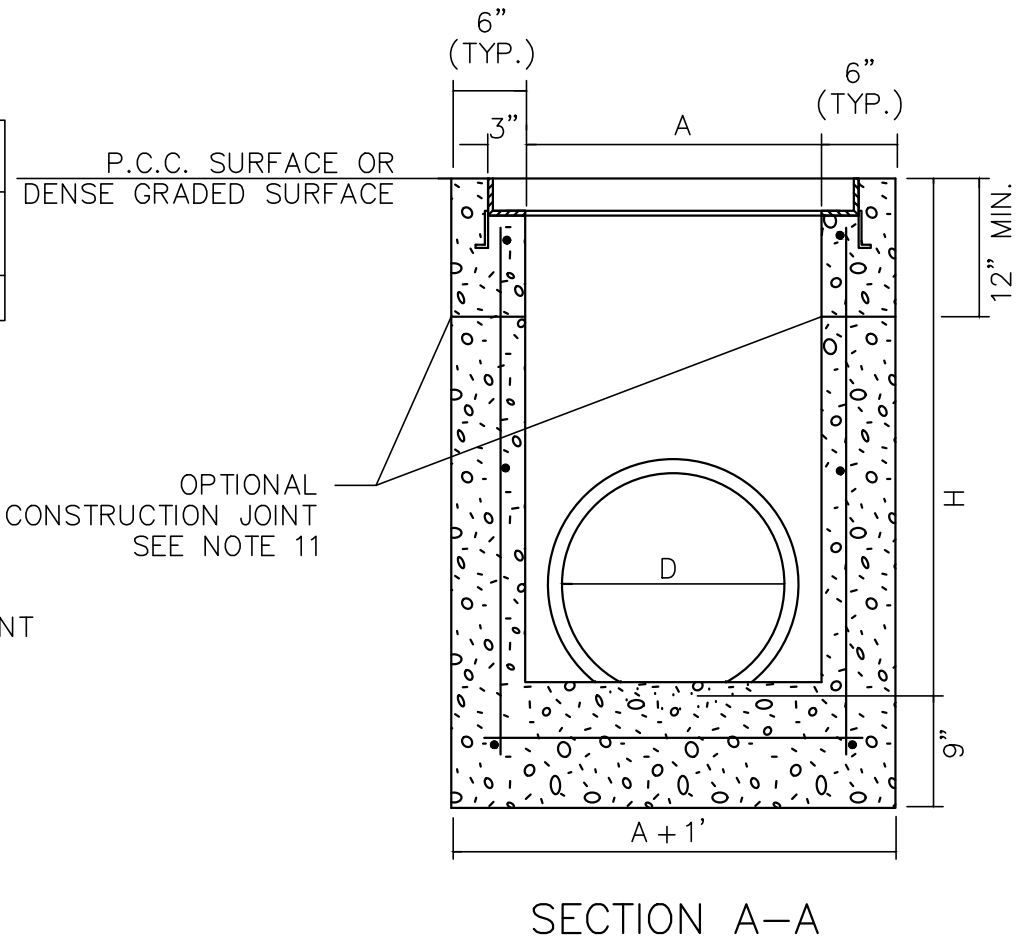
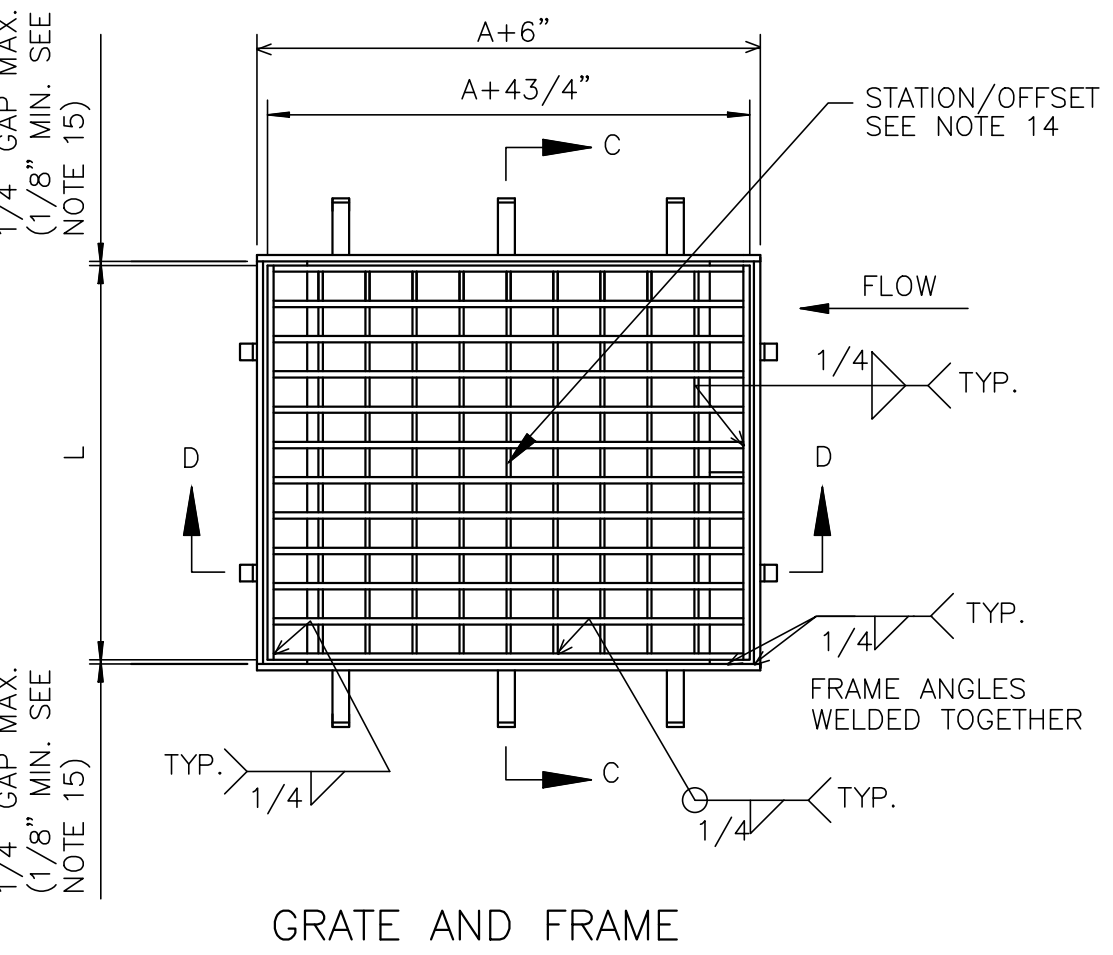
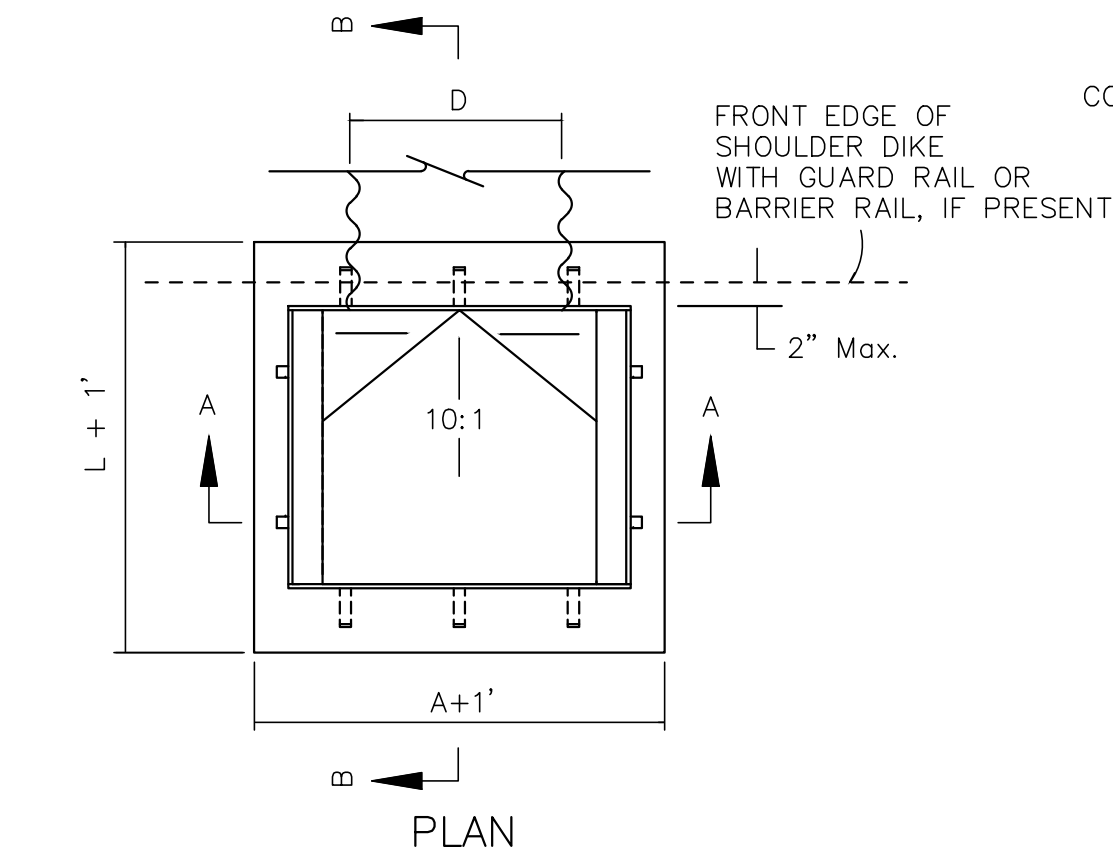
REVISIONS:

2270 Corporate Circle Suite 200
Las Vegas, NV 89119
Telephone: +1 702.263.7775
Fax: +1 702.263.7200

SCALE
HORIZ. SCALE
VERT. SCALE
ONE AND ONE-HALF
INCHES ON ORIGINAL

SITE WORK DETAILS I

TABLE OF DIMENSIONS (RCP)						
PIPE SIZE (INCH)	A	H (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT)
24	3'	3.50	4-1/2 X 3/8	5 X 3 X 3/8	5 X 3/8	4'
						DOUBLE GRATE



NOTES:

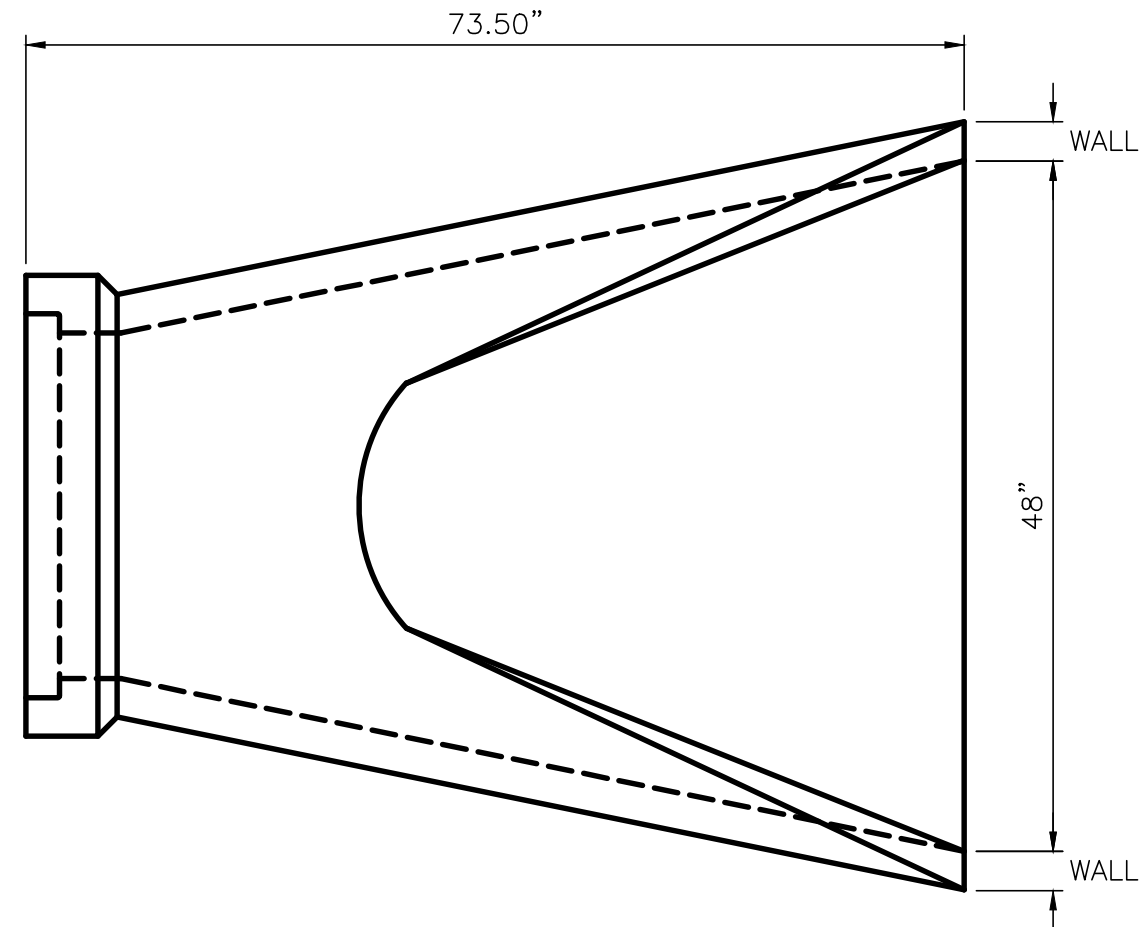
- ALL CONCRETE SHALL BE CLASS A OR AA.
- REINFORCING STEEL SHALL BE NO.4 BARS WITH MAXIMUM SPACING AT 18 INCHES CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED 2 INCHES CLEAR OF ALL CONCRETE SURFACES.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1 INCH.
- DIMENSIONS MAY BE VARIED TO FIT LOCAL CONDITIONS IF ORDERED BY THE ENGINEER.
- COMMERCIAL PREFABRICATED GRATINGS APPROVED BY THE BRIDGE DIVISION MAY BE USED IN LIEU OF THE FIELD-WELDED GRATING SHOWN.
- EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY HYDRAULICS ENGINEER.
- SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
- SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING HDPE PIPE.
- A SINGLE TYPE 2 DROP INLET SHALL BE CONSTRUCTED UNLESS A DOUBLE OR TRIPLE IS SPECIFIED.
- SINGLE GRATE CONFIGURATION SHOWN FOR CLARITY. OUTSIDE DIMENSIONS OF EACH GRATE SHALL MEASURE 2 FEET BY A+43/4\".
- RUN REBAR CONTINUOUS THRU CONSTRUCTION JOINT. JOINT MUST BE A MINIMUM OF 3 INCHES FROM HORIZONTAL BARS.
- WELD ONE TAB ON > OF GRATE AND REMAINING TWO TABS 6 INCHES FROM EDGE OF FRAME. SIX TABS PER INLET, THREE TABS ON EACH SIDE
- WELD TABS 6 INCHES FROM EDGE OF FRAME. FOUR TABS PER GRATE, TWO ON EACH SIDE.
- FOR MULTIPLE GRATE INSTALLATIONS, THE STATION/OFFSET IS TO THE CENTER OF THE CONCRETE DROP INLET STRUCTURE.
- GRATE IS TO FIT IN THE FRAME AND BE EASILY REMOVED. IF THE GAP BETWEEN THE GRATE AND FRAME IS GREATER THAN 1/4\"/>

NDOT TYPE 2 DROP INLET

SCALE: NONE

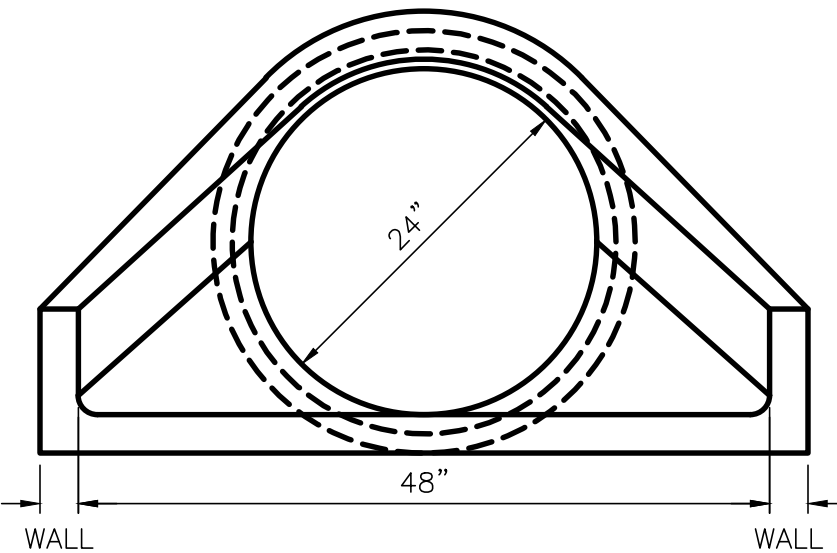
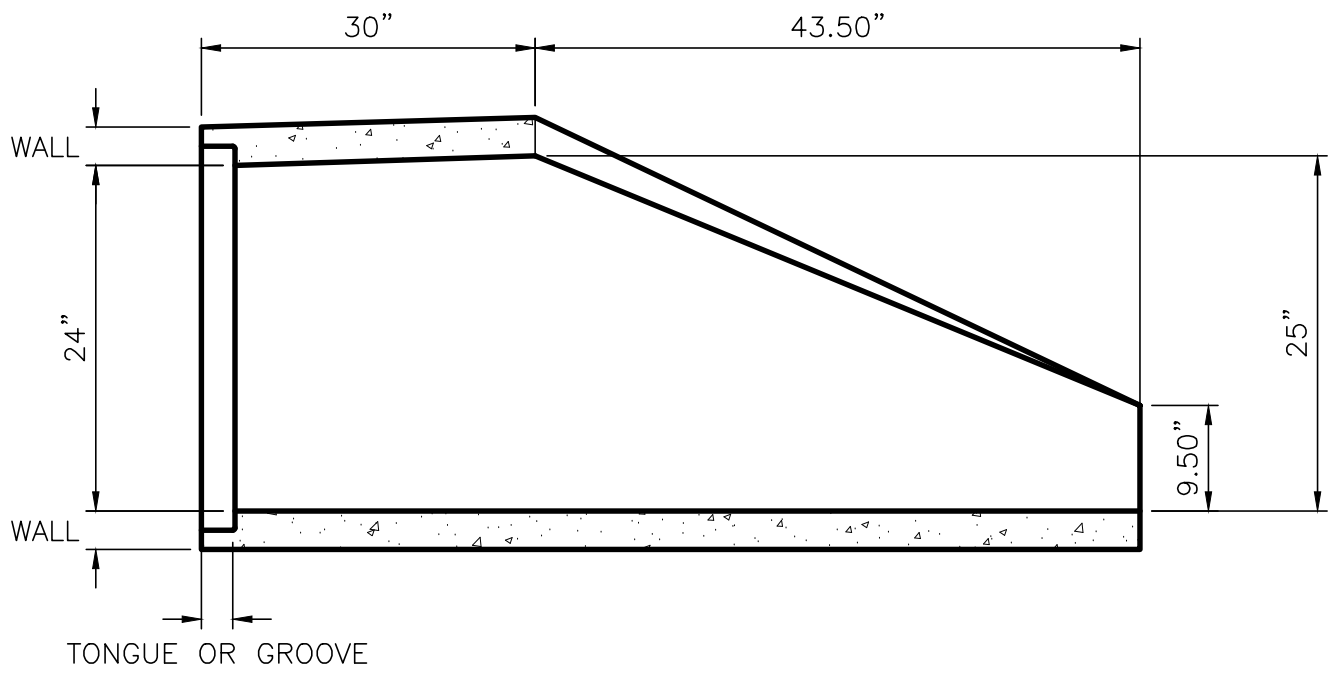
1
CD8

C1, C2, C7, C11



24\"/>

SCALE: NONE



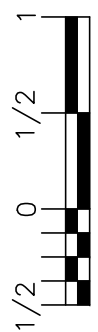
2
CD8

C11

CLV DWG # _____

4125 ZONE NORTH RESERVOIR

VERIFY SCALE



BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

SITE WORK DETAILS VII

SCALE
HORIZ. SCALE
VERT. SCALE
NONE

DRAWN BY: _____ 10/02/2020
CHECKED BY: _____ 10/02/2020

RECOMMENDED BY: _____ DATE: _____

ACCEPTED BY: _____ DATE: _____



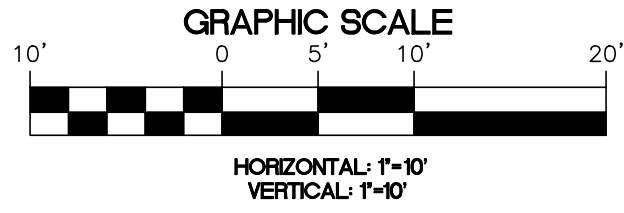
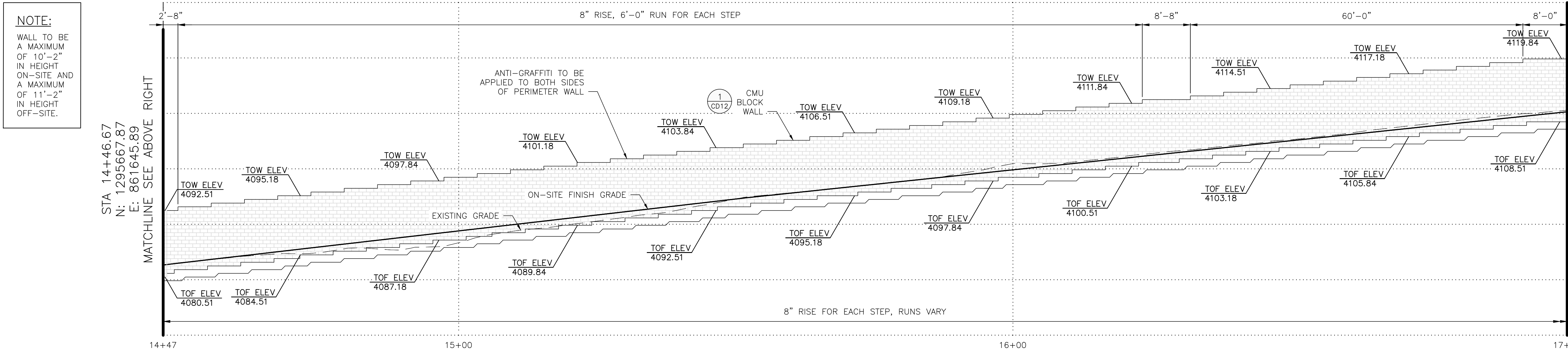
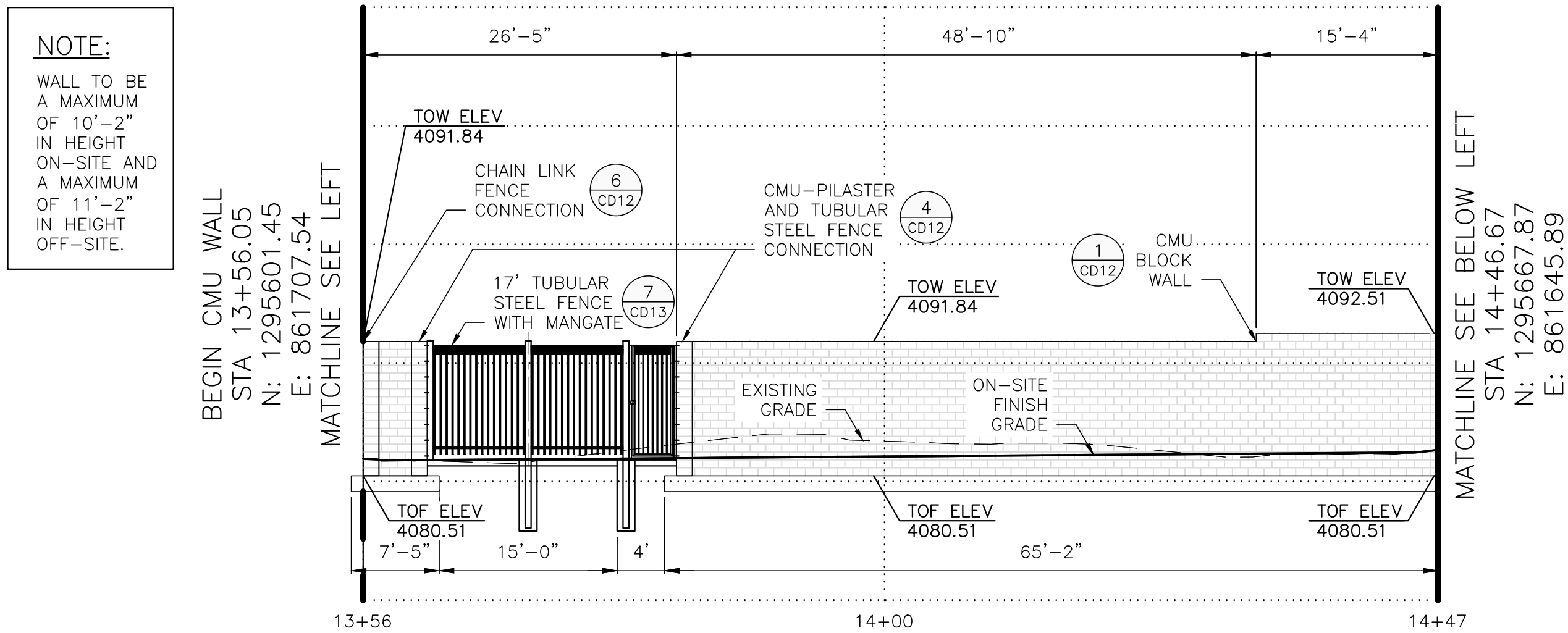
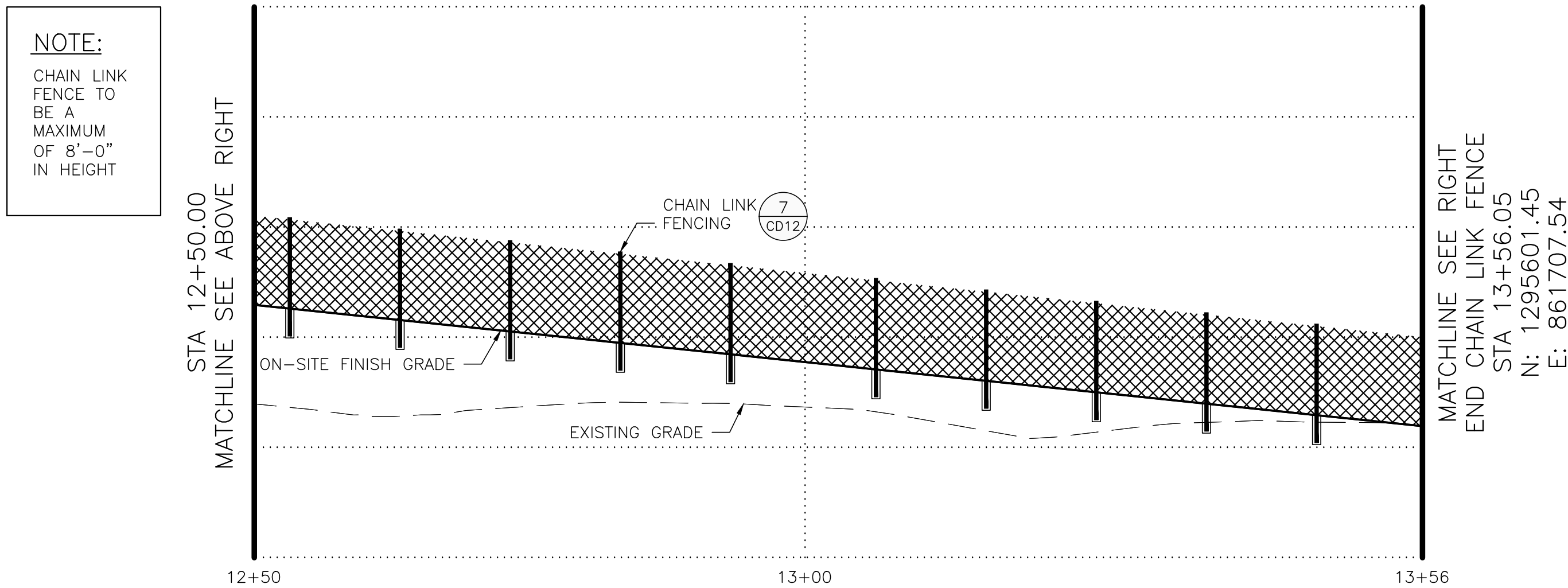
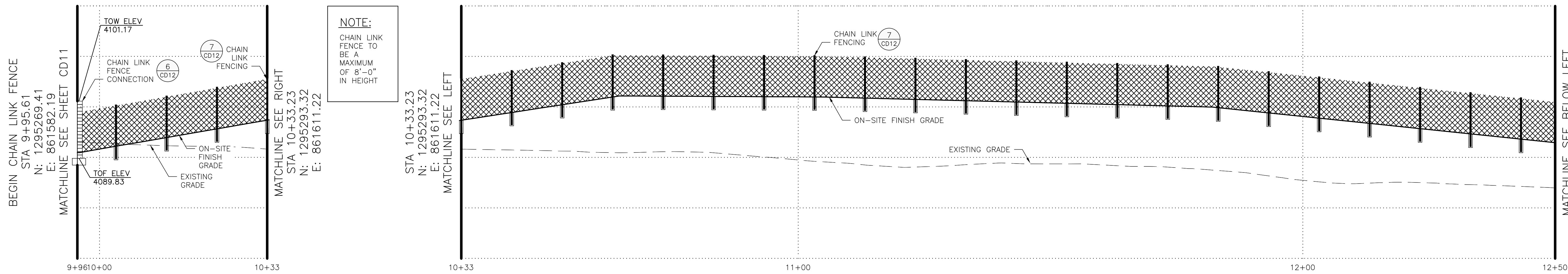
CONTRACT NUMBER

C1548
DRAWING NUMBER CD8
SHEET 33 OF 159

LAS VEGAS VALLEY WATER DISTRICT

2270 Corporate Circle, Suite 200
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Telephone: +1.702.263.7775
Fax: +1.702.263.7200

ATKINS



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Call before you UnderGround
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CLARK COUNTY TRAFFIC OPERATIONS AND LAS VEGAS AREA COMPUTERIZED TRAFFIC SYSTEM

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Las Vegas, NV 89162
Telephone: +1 702 263 7775
Fax: +1 702 263 7200

PERIMETER WALL ELEVATIONS I

4125 ZONE NORTH RESERVOIR

DRAWN BY: M. CARR
CHECKED BY: L. STEVEN ANDERSON
DATE: 09/25/2020

RECOMMENDED BY: RYAN C. PEARSON
DATE: 09/25/2020

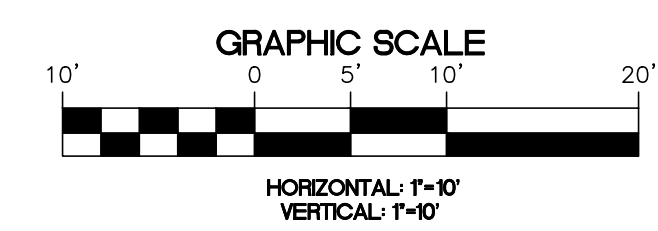
PROFESSIONAL ENGINEER-STATE OF NEVADA
No. 015313
Exp. 12/31/2020

CONTRACT NUMBER
C1548

DRAWING NUMBER CD9
SHEET 34 **OF** 159

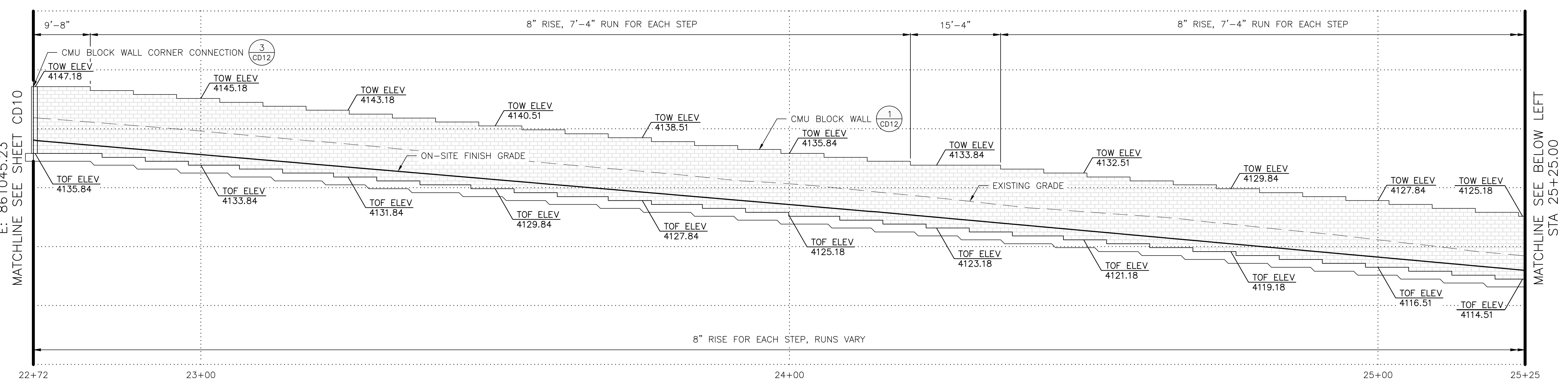
REVISIONS:

CLV DWG #



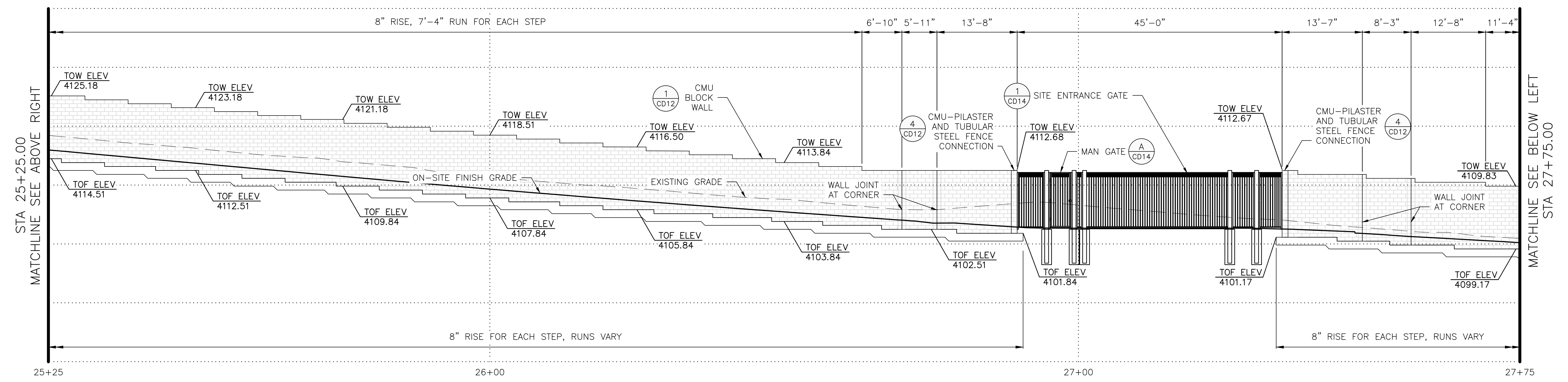
NOTE:
WALL TO BE
A MAXIMUM
OF 10'-2"
IN HEIGHT
ON-SITE AND
A MAXIMUM
OF 11'-2"
IN HEIGHT
OFF-SITE.

BEGIN RETAINING BLOCK WALL
STA 22+71.55
N: 1295482.98
E: 861045.23
MATCHLINE SEE SHEET CD10



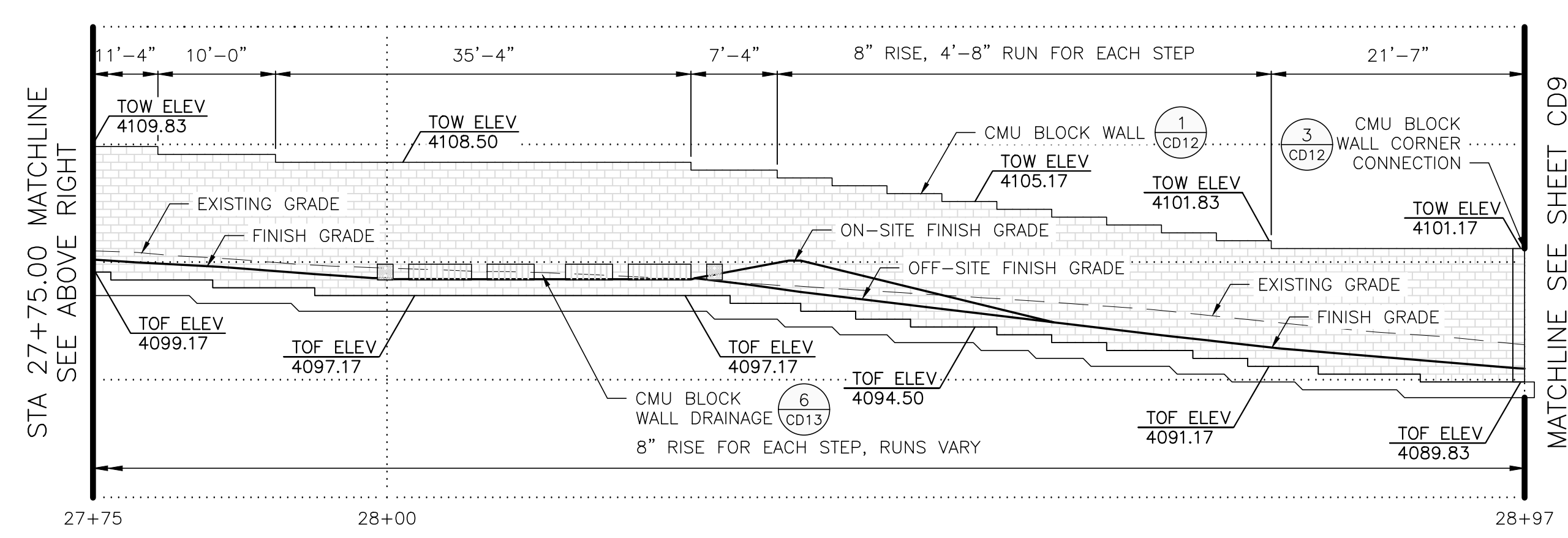
WALL ELEVATION 'G'
SCALE: 1" = 10'

NOTE:
WALL TO BE
A MAXIMUM
OF 10'-2"
IN HEIGHT
ON-SITE AND
A MAXIMUM
OF 11'-2"
IN HEIGHT
OFF-SITE.

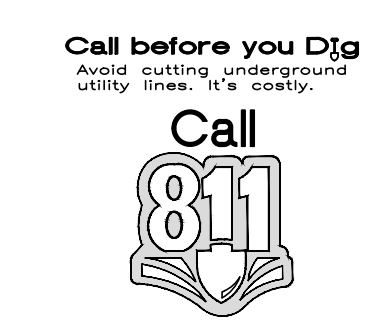


WALL ELEVATION 'G'
SCALE: 1" = 10'

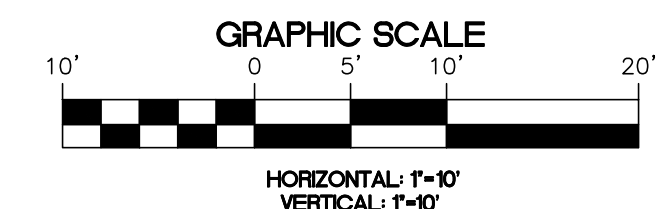
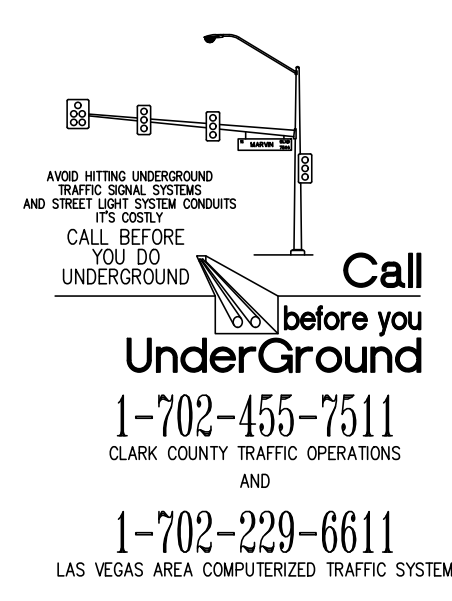
NOTE:
WALL TO BE
A MAXIMUM
OF 10'-2"
IN HEIGHT
ON-SITE AND
A MAXIMUM
OF 11'-2"
IN HEIGHT
OFF-SITE.



WALL ELEVATION 'G'
SCALE: 1" = 10'



Call before you
OVERHEAD
1-702-593-6111



CLV DWG #

LAS VEGAS VALLEY WATER DISTRICT

2270 Corporate Circle Suite 200
Las Vegas, NV 89162
Telephone: +1.702.263.7775
Fax: +1.702.263.7200

ATKINS

VERIFY SCALE

1/2 0 1/2 1

BAR REPRESENTS
ONE AND ONE-HALF
INCHES ON ORIGINAL

4125 ZONE NORTH RESERVOIR

PERIMETER WALL ELEVATIONS III

SCALE
HORIZ. SCALE
VERT. SCALE
1"=10'

DRAWN BY: 09/25/2020

CHECKED BY: 09/25/2020

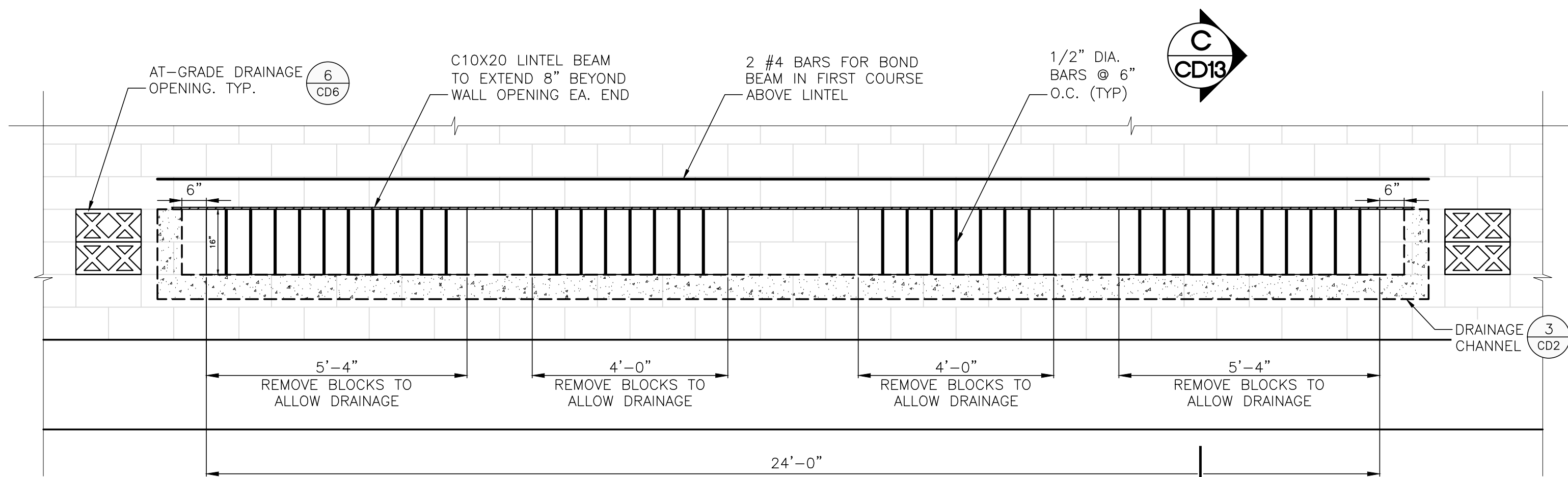
RECOMMENDED BY: DATE

ACCEPTED BY: DATE

STEVEN ANDERSON
Exp: 6/22
10/19/20

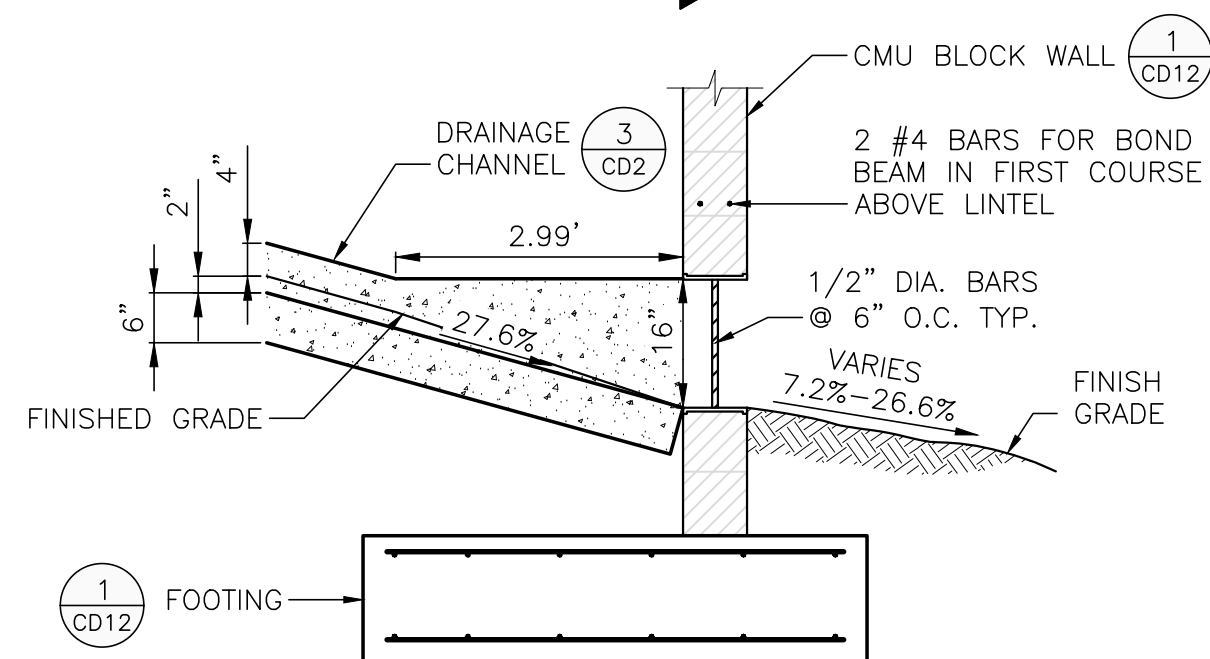
CONTRACT NUMBER
C1548

DRAWING NUMBER CD11
SHEET 36 OF 159



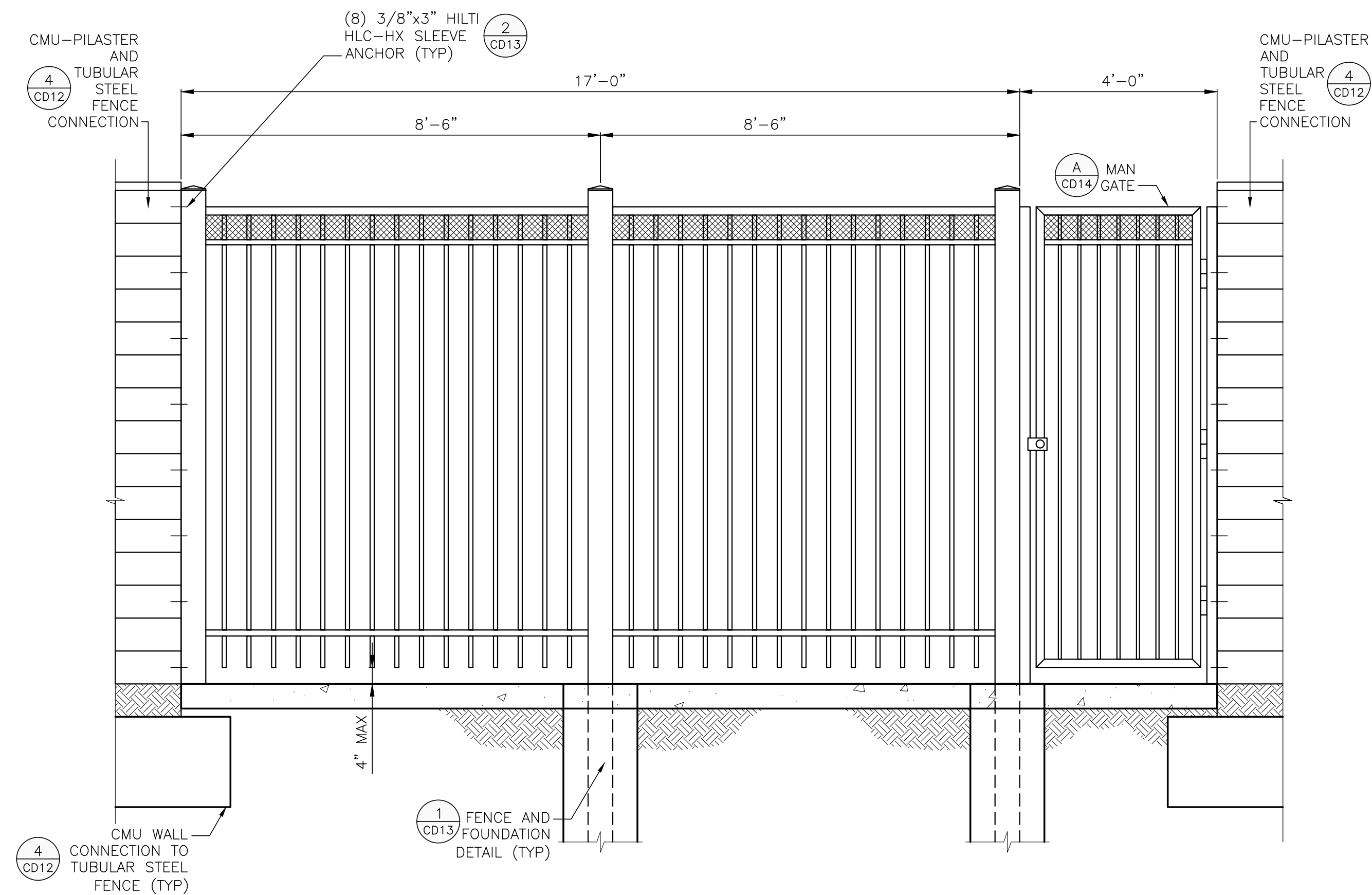
NOTES:

1. AT 50% CLOGGED, THE FOUR BLOCK WALL OPENINGS HAVE A COMBINED CAPACITY OF 30CF/S.



SECTION C
NOT TO SCALE
CD13

CMU BLOCK WALL DRAINAGE (6 CD13)
NOT TO SCALE
C1, C2



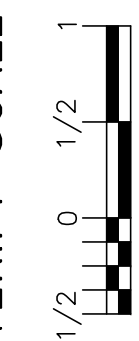
17' TUBULAR STEEL FENCE WITH MAN GATE (7 CD13)
NOT TO SCALE
C1, CD10, CD12

LAS VEGAS VALLEY WATER DISTRICT

2270 Corporate Circle, Suite 200
Las Vegas, NV 89162
Telephone: +1.702.263.7775
Fax: +1.702.263.7200

ATKINS

VERIFY SCALE



BAR REPRESENTS ONE AND ONE-HALF INCHES ON ORIGINAL

4125 ZONE NORTH RESERVOIR

PERIMETER WALL DETAILS II

SCALE
HORIZ. SCALE
VERT. SCALE
NONE

DRAWN BY: 10/02/2020
CHECKED BY: M. CARR 10/02/2020

RECOMMENDED BY: L. STEVEN ANDERSON DATE
ACCEPTED BY: RYAN C. PEARSON DATE



CONTRACT NUMBER
C1548
DRAWING NUMBER CD13
SHEET 38 OF 159

REVISIONS:

CLV DWG #

Vance Skidmore, PE

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2270 Corporate Circle
Suite 200
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vance.skidmore@atkinsglobal.com
702-551-0309

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