

DS #:

4749

APN:

138-15-612-013 & 138-15-612-014

PROJECT:

Mountain View Hospital - Medical Office Building Update

SUBMITTAL:

3rd Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS			DATE:				
INTER-OFFICE MEMORANDUM			December 14, 2015				
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:				
Mountain View Hospital – Medical Office Building Update			JPL Engineering				
Cross Streets: SEQ of Tenaya Way & Cheyenne Blvd.			Sunrise Mountain View Hospital				
File Number: F:\Depot\DSMemos\DS4749C.doc			Bart Anderson, P.E., DevCo				
Parcel Number: 138-15-612-013 & 138-15-612-014			NDOT				
Zoning Action: SDR-59940							
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	9/10/2015	9/29/2015	Not Approved	\$400.00	414070: \$400
2 nd Submittal	11/4/2015	11/17/2015	Not Approved	\$400.00	421408: \$400
3 rd Submittal	12/10/2015	12/14/2015	See Comments Below	\$400.00	426022: \$400
			TOTAL FEES (LDDRS):	\$1,200.00	----

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 the following conditions.

1. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDDCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

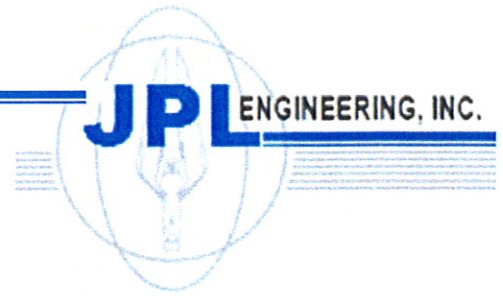
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional 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/R60E/15
AREA L-15



**ADDENDUM 2
TECHNICAL DRAINAGE STUDY**

for

MOUNTAIN VIEW HOSPITAL – MEDICAL OFFICE BUILDING UPDATE

COLV DS4749A

@

SEC Tenaya Way & Cheyenne Blvd.

December 2015

Prepared for:

Littlejohn Engineering, Inc.
1615 Edgewater Drive, Suite 180
Orlando, FL 32804

Prepared by:

JPL Engineering, Inc.
8620 South Eastern Avenue, Suite 8
Las Vegas, NV 89123

DRAINAGE STUDY INFORMATION FORM

Name of Development: Addendum 2 to Mountainview Medical Office Building Date: 10-Dec-15

Location of Development: a) Descriptive (Cross Street) North/South _____ East/West _____

b) Section: 15 Township: 20S Range: 60 E MDM

c) APN: 138-15-612-014

Name of Owner: Sunrise Hospital DBA Mountainview Hospital

Telephone No: _____ Facsimile No. _____

Address: 3100 N. Tenaya Road

Las Vegas, NV 89128

Contact Person Name: James Lopez Telephone # (702) 898-6269

Firm: JPL Engineering, Inc.

Address: 6725 S. Eastern Ave. Ste 5

Las Vegas, NV 89119

Type of Land Development/Land Disturbance Process:

Rezoning		Subdivision Map		Clearing and Grading O
Parcel Map		Planned Unit Development		Other (Please specify below)
Large Parcel Map	X	Building Permit		

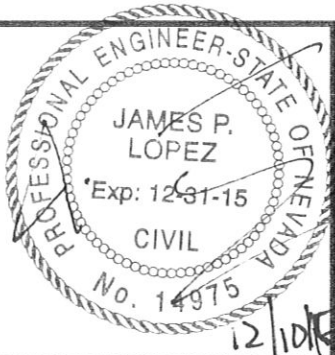
1. Total Owned Land Area: _____ At Site: _____ Being Developed/Disturbed: _____
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area ☐ YES * ☒ NO
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ YES * ☒ NO
4. Proposed type of development (Residential, Commercial, Etc.)? _____
5. Approximate upstream land area which drains to the subject site? _____
6. Has the site been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: _____

7. If known, please briefly identify the proposed discharge point's of runoff from the site: _____

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

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.

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



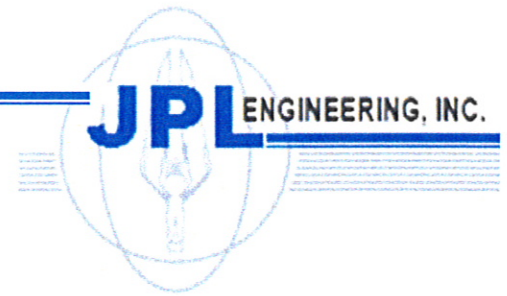
No. COLVDS4749A

Local Entity File No. _____

Revision	Date

REFERENCE:

STANDARD FORM 1



December 10, 2015

Albert Sung, P.E.
City of Las Vegas
333 N Rancho Dr
Las Vegas, NV 89106

**RE: ADDENDUM 2-UPDATE TO THE TECHNICAL DRAINAGE STUDY, MOUNTAIN VIEW
HOSPITAL – MEDICAL OFFICE BUILDING UPDATE
PERMIT NUMBER: DS4749A**

Dear Mr. Sung:

The response to comments in a letter dated November 17, 2015 from City of Las Vegas Public Works Department is included below. Please refer to **Appendix A** for a copy of the comment letter.

The engineer record Littlejohn Engineering, Inc. an SME Company has added a letter of justification for use of an underground drainage system. The letter is included herein for your review acceptance.

Comment 1: The response to the previous comment letter with a simple statement of, quote: "The 100-year outflow is calculated herein" was not appropriate. Provide a paragraph to summarize the results of calculations and the impacts between the existing and proposed conditions.

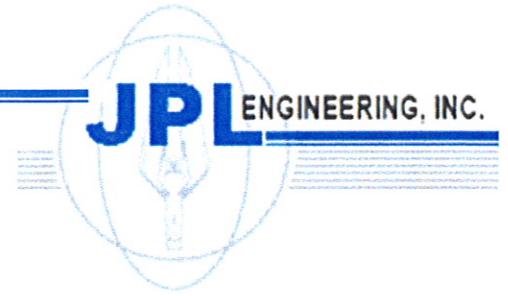
Response 1: The existing condition flow for ONX1 and ONX2 at CP1 Q100 is 10 cfs. For developed conditions before routing through detention basin the runoff is 23-cfs (arithmetically adding OND1 and OND3). Routing these basins through the detention basin (volume of 0.8 acre feet at crest elevation 4 feet with an outflow of approximately 0.1-cfs) attenuates the flow to 8-cfs. Not that the detention basin capacity is based on the two basins which are free surface interconnected with an 18" pipe.

Comment 2: Sheet C6.1: It appears that drainage facility "F2" is located in the adjacent property. Either obtain a notarized letter of permission for construction from the adjacent or property owner or relocate the inlet easterly into the subject site. Review and revise accordingly. Also, explain why the proposed inlet is so deep.

Response 2: Drainage structure F2 is not located on the adjacent property. There may have been some confusion as to where exactly the property line lies. As such, the property line has been darkened and called out to avoid any further confusion.

Comment 3: Sheet C6.1: Identify the property line of the adjacent property to the west.

Response 3: The property line has been identified on all sides of the proposed project.



Comment 4: Sheet C6.0: Provide a bleeder line at drainage facility "F1" to daylight the flow.

Response 4: The plan has been revised to eliminate construction of facilities in NDOT ROW. Per your conversation with George Huddleston (of Littlejohn) on 12/7/15, a bleeder line is not feasible due to the unavailability of a daylight location/elevation. As such, drawdown in structure F1 will be achieved via an exfiltration pipe/trench. The pipe between structures F2 and F1 will be perforated pipe to allow exfiltration, and the attached drainage memo has been included (Appendix B) to demonstrate that the volume is drawn-down within 24 hours (within 6 hours, in fact).

Comment 5: Second request: Sheet C6.0: Identify and existing 24"-RCP culvert crossing US95 located at about the middle point of the east boundary of the project site. Label with recorded drawing number on the plan. Address in the addendum of the study whether this culvert is accepting any flow of the proposed development.

Response 5: Per your discussion with George Huddleston (of Littlejohn) at the 11/24 Civil Express Review, this drawing number information was not included in our project survey. However, all storm water discharge is routed to an on-site manhole and no infrastructure is proposed within the NDOT right-of-way. As such, the information has not been provided on the plan.

Comment 6: A lot of lineworks in the improvement plans are too light and not legible. Some text sizes are too small and not readable. Please QC the plans before submitting to the City of Las Vegas for review.

Response 6: The line work in the civil sheets has been darkened and made bigger to increase readability.

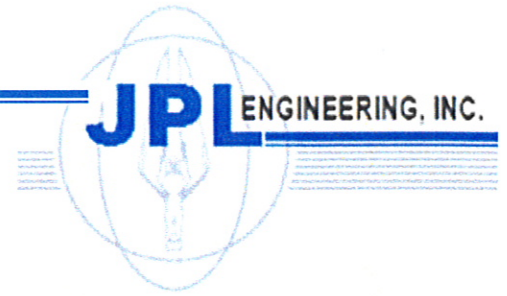
Comment 7: Add a note in all pertinent sheets for the construction of all storm drain inlets per a newly adopted USDCCA Drawing No. 421 (Stormwater Quality Management Stamp and Sign Detail).

Response 7: This note has been added to sheets C6.0 and C6.1.

Please Contact JPL Engineering Inc. if you should have any further questions.

Sincerely,

JPL Engineering Inc.



APPENDIX A

City of Las Vegas Comment Letter

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		November 17, 2015
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:	
	Mountain View Hospital – Medical Office Building Update	
Cross Streets:	SEQ of Tenaya Way & Cheyenne Blvd.	
File Number:	F:\Depot\DSMemos\DS4749B.doc	
Parcel Number:	138-15-612-013 & 138-15-612-014	
Zoning Action:	SDR-59940	
FEMA Flood Zone	YES	NO X
Proposed Storm Drain	YES	NO X
COPIES TO:		
JPL Engineering		
Sunrise Mountain View Hospital		
Bart Anderson, P.E., DevCo		
NDOT		

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
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TOTAL FEES (LDDRS):				\$800.00	----

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	is approved subject to conformance to all City standards and the following conditions:
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X	is conditionally approved subject to the following conditions.

1. The response to previous Comment #8 with a simple statement of, quote: "The 100-year outflow is calculated herein" was not appropriate. Provide a paragraph to summarize the results of calculations and the impacts between the existing and proposed conditions.
2. **Sheet C6.1:** It appears that drainage facility "F2" is located in the adjacent property. Either obtain a notarized letter of permission for construction from the adjacent property owner or relocate the inlet easterly into the subject site. Review and revise accordingly. Also, explain why the proposed inlet is so deep.
3. **Sheet C6.1:** Identify the property line of the adjacent property to the west.
4. **Sheet C6.0:** Provide a bleeder line at drainage facility "F1" to daylight the flow.
5. **Second request: Sheet C6.0:** Identify an existing 24"-RCP culvert crossing **US95** located at about the middle point of the east boundary of the project site. Label with recorded drawing number on the plan.

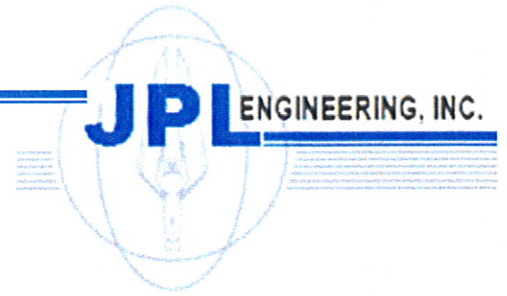
Address in the addendum of the study whether this culvert is accepting any flow of the proposed development.

6. A lot of lineworks in the improvement plans are too light and not legible. Some text sizes are too small and not readable. Please QC the plans before submitting to the *City of Las Vegas* for review.
7. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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/R60E/15
AREA L-15



APPENDIX B

Easement Conveyance Memo



November 2, 2015

Revised 12/8/15

Albert Sung
City of Las Vegas
495 S. Main Street
Las Vegas, NV 89101

**RE: MountainView Hospital Medical Office Building
Easement Conveyance Memo
Las Vegas, Nevada**

Dear Mr. Sung:

Please consider this submittal as a formal justification for the use of an underground drainage system to convey offsite flows across our project site. As you know, we are proposing a parking lot across an existing 10' drainage easement, and therefore must provide a means for the offsite flows to cross our site. The offsite flows are understood to be 8 cubic feet per second (CFS).

The capacity of an inlet was analyzed using the table in Figure 1 for a Type C (ret) inlet, which is equivalent to an NDOT Type 2 structure. Referencing [Figure 1](#), a Type C (ret) inlet requires 0.6± ft. of head to drive 8 cfs through the structure's opening. Therefore the 0.6-ft hydraulic gradient above the top of the grate must be provided for. Please be aware that Note 2 of [Figure 1](#) indicates that the grate is considered 50% blocked, thus providing factor of safety in flow across the grate.

Further, the system capacity may control the flow through the grate. In this situation, the loss across the grate can be calculated from the following equation:

$$\text{Head Loss [ft]} = K \frac{V^2}{2g}$$

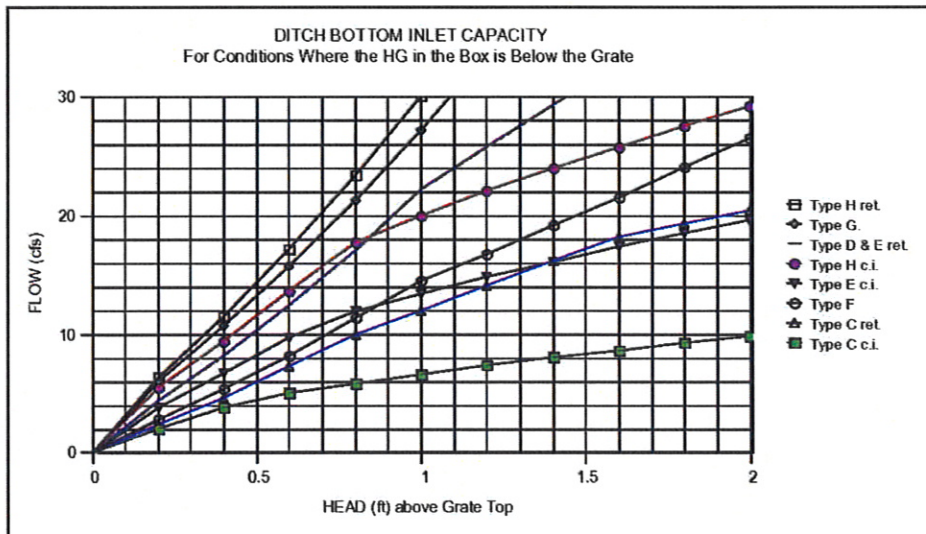
Where: K = 0.46 for reticuline grates
 V = velocity [feet per second] across the grate
 g = acceleration of gravity

If $V = Q/A$, then for our scenario, $V = 8 \text{ CFS}/6 \text{ sq. ft.} = 1.3 \text{ feet per second}$.

When you solve the equation for Head Loss = $(.46) \frac{(1.3)^2}{2(32.2)} = 0.012 \text{ ft of loss}$. There are two proposed grates, one at each end of the pipe; therefore the total head loss is approximately 0.02 ft. which must also

be allowed for at the grate opening. To allow for this, the minimum depth of the conveyance swale must exceed $0.6 \text{ ft} + 0.02 \text{ ft} = 0.62 \text{ ft}$ ($7.5 \pm \text{ in}$), which we are proposing to exceed.

Figure 1



1. The above graph should be used where the hydraulic gradient in the inlet box is below the top of the grate. For other conditions, see the discussion below.
2. The above is based on 50% debris blockage and inlets without slots.
3. The symbols on the curves do not represent-measured data points. They are calculated points from the equation and coefficients in the research report by the University of South Florida titled "Investigation of Discharge through Grated Inlets", February 1993, WPI No. 0510611. Contact the FDOT Research Center at 850-414-4615 to obtain a copy. The grate flow areas used in the equations are from U.S. Foundry & Mfg. Corp.

The next step is to analyze the flow through the pipe to ensure that the pipe is sized adequately to handle the 8 CFS of stormwater. The calculations were done in the following Excel table (Figure 2). With an 18" RCP pipe, flowing 75% full at a slope of 1%, the peak flow capacity is 9.6 CFS. This is more than adequate to handle the proposed 8 CFS.

Figure 2

Mountainview MOB			11/11/2015
20150277			
% Pipe Slope to Maintain Required Velocity for Drainage Pipe			
Input	n	0.013	
	Pipe Dia. (in)	18	
	Pipe Area Full	75%	
	Required Vel. (FPS)	2	
Output	Flow Depth (ft)	1.125	
	Flow Area (sq-ft)	1.422	
	Wetted Perimeter (ft)	3.142	
	Hydraulic Radius	0.453	
	Required % Slope	0.088	
			MANNING'S EQUATION
			$V = 1.49 / n [(R^{0.667}) * (S^{0.5})]$
Input	Actual Slope %	Proposed 1.00	
Output	Actual Velocity (ft/s)	6.74	
	Peak Flow Capacity (gpm)	4,299	
	Peak Flow Capacity (CFS)	9.6	
	Peaking Factor	1.0	

For draw-down within the pipe system, a bleeder line was not feasible due to no available daylight location/elevation. Therefore, to facilitate the full drawdown of the system within 24 hours, an exfiltration pipe/trench is proposed between Structures F2 and F1. The connecting pipe will be an 18" slotted RCP, surrounded on all sides by 8" of No. 57 stone. This gives an effective area of 991.7 square feet with a depth of 17" (1.42') to the center of the pipe (see calculations below).

$$\text{Effective Area [ft}^2\text{]} = \frac{[8''(\text{gravel}) + 18''(\text{pipe}) + 8''(\text{gravel})]}{12 \frac{\text{inches}}{\text{foot}}} \times 350 \text{LF of pipe} = 991.7 \text{ ft}^2$$

$$\text{Effective Height[ft]} = 9'' (\text{radius of pipe}) + 8'' (\text{gravel}) = 17'' = 1.42 \text{ ft}$$

$$\text{Volume of Structure F1} = 5 \text{ ft}^2 (\text{area of structure}) \times 4.95 \text{ ft} (\text{height of structure}) = 24.75 \text{ ft}^3$$

$$\text{Volume of Structure F2} = 5 \text{ ft}^2 (\text{area of structure}) \times 1.45 \text{ ft} (\text{height of water in structure}) = 7.5 \text{ ft}^3$$

$$\text{Volume of Pipe from F2 to F1} = \pi(9/12)^2 (\text{area of pipe}) \times 350 \text{ ft} (\text{length of pipe}) = 618 \text{ ft}^3$$

$$\text{Total Volume of System} = 24.75 + 7.5 + 618 = 650.25 \text{ ft}^3$$

The total volume of 650.25 cubic feet was used to create a model in Ponds 3.3 modeling software to show that the full system recovers within the allotted 24 hours. The system volume was calculated assuming the system was holding water up to the rim elevation of Structure F1 at 2322.70', which is the controlling point. In modeling the drawdown, an infiltration rate of 3 feet per day was used (from the geotechnical report

prepared by Western Technologies Inc. dated 5/27/15), and was the limiting factor in our design. The results of the model can be seen below.

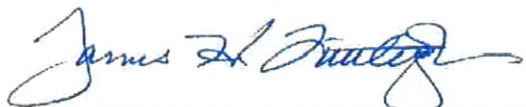
Detailed Results - Scenario 1, 650.25 ft ³ slug load											
	Elapsed Time (hours)	Instantaneous Inflow Rate (ft ³ /s)	Outside Recharge (ft/day)	Stage Elevation (ft datum)	Infiltration Rate (ft ³ /s)	Combined Instantaneous Discharge Rate (ft ³ /s)	Cumulative Inflow Volume (ft ³)	Cumulative Infiltration Volume (ft ³)	Combined Cumulative Discharge (ft ³)	Water Budget Error (%)	Flow Type
1	0.000	108.3750	0.00000	2271.00000	0.00000	0	0.000	0.00000	0	—	N/A
2	0.002	108.3750	0.00000	2318.65600	0.02296	0	650.250	0.13774	0	0	U/P
3	2.400	0.00000	0.00000	2318.45600	0.02296	0	650.250	198.34000	0	0	U/P
4	6.000	0.00000	0.00000	2318.15600	0.01435	0	650.250	495.85000	0	0	U/P
5	12.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
6	24.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
7	36.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
8	48.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
9	60.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
10	72.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
11	84.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry
12	96.000	0.00000	0.00000	—	—	—	650.250	650.25000	0	—	dry

As can be seen in the table above, the system is fully drawn-down in approximately 6 hours, thus meeting the minimum requirement of a full recovery in 24 hours.

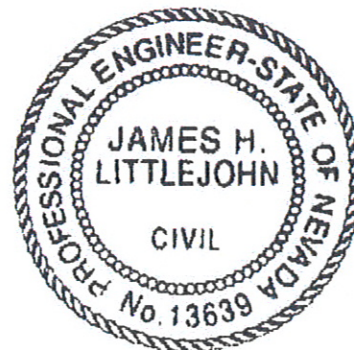
In conclusion, the proposed system has been adequately designed to reasonably handle the existing offsite flows of 8 CFS. The flows will be wholly contained in the drainage easement, with no adverse effects to the surrounding properties, and the system will fully recover well within 24 hours.

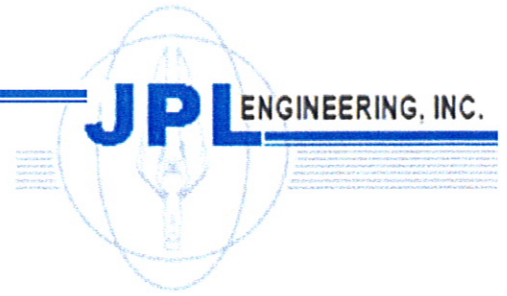
Sincerely,

LITTLEJOHN ENGINEERING ASSOCIATES, INC.



Jim Littlejohn, PE

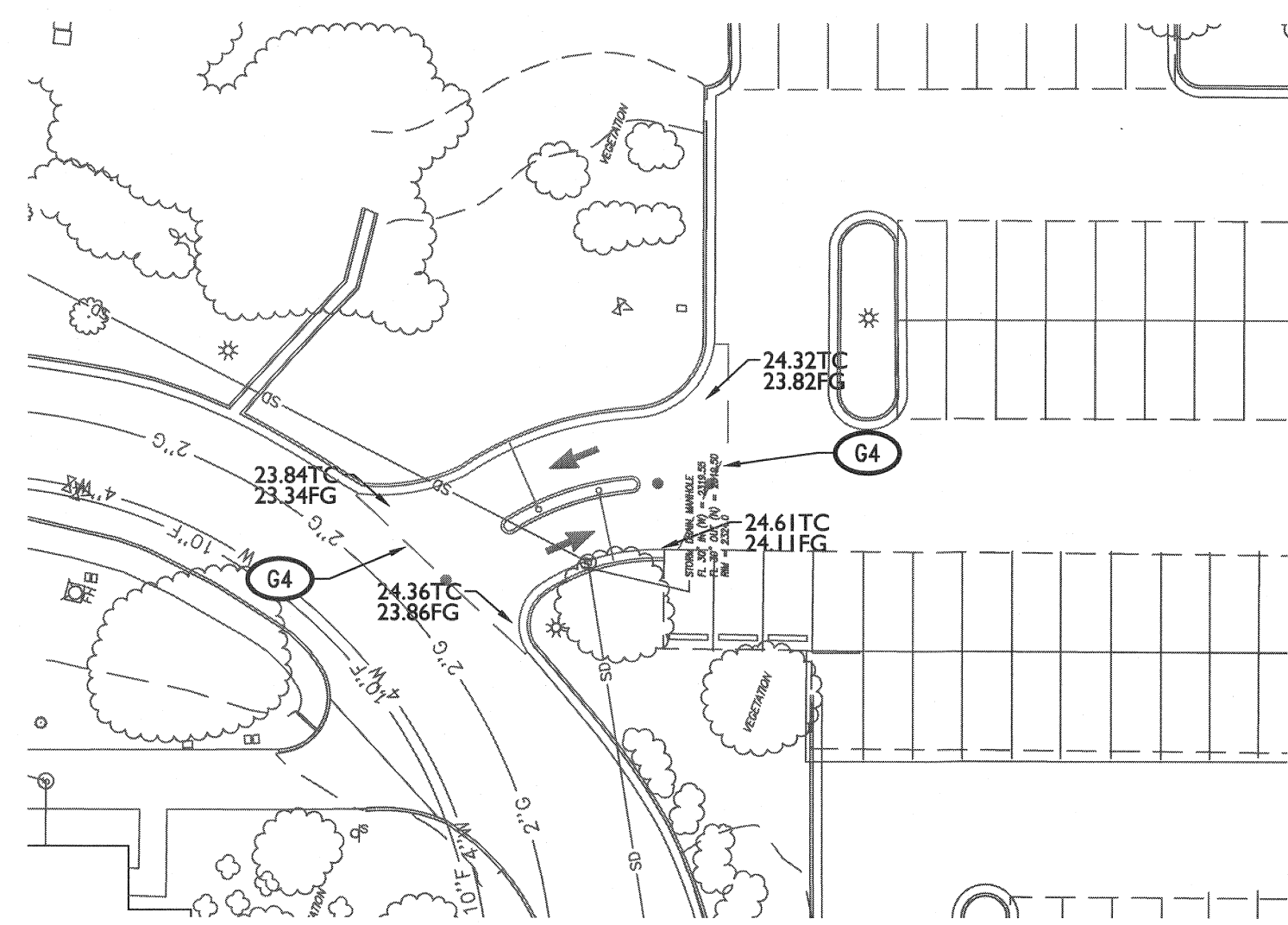




APPENDIX C

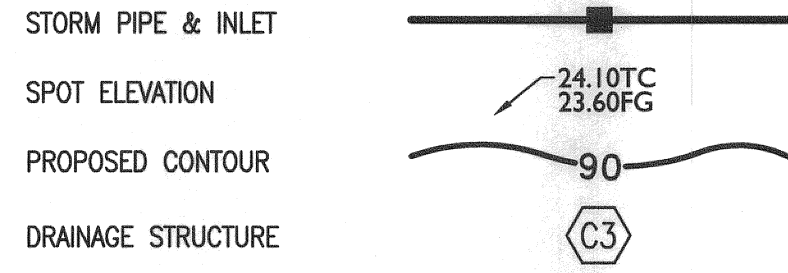
Revised Grading Plans

C:\Projects\2015\20150227\wg\Construction\20150227_C6.0_050.dwg-C6.0 Grading & Drainage Plan Dec 08, 2015 - 446pm ggeorge
THIS DRAWING IS THE PROPERTY OF HEREFORD DOOLEY ARCHITECTS. IT IS NOT TO BE REPRODUCED IN WHOLE OR IN PART. IT IS NOT TO BE USED ON ANY OTHER PROJECT. COPYRIGHT AS DATED HEREFORD DOOLEY ARCHITECTS. NOT VALID UNLESS SIGNED AND SEALED.



GRADING & DRAINAGE KEY NOTE		
CODE	DESCRIPTION	DTL #/SHT #
G1	EXFILTRATION TRENCH	3 / C8.3
G4	MATCH EXISTING GRADE	
G8	CONCRETE FLUME	10 / C8.2
G11	CURB CUT	8 / C8.2
G12	SIDEWALK DRAIN	9 / C8.2
G15	TRANSITION FROM FLUSH CONDITIONS TO 6" CURB OVER 15 FEET	

PROPOSED FEATURES LEGEND



NOTES

- ALL ONSITE STORM DRAINS AND THE ASSOCIATED FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.
- ALL STORM DRAIN INLETS TO BE CONSTRUCTED PER USDOCA DRAWING NO. 421.

BASIS OF BEARINGS

NORTH 89°59'07" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS DELINEATED BY MAP ON FILE IN BOOK 62, PAGE 44 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE.

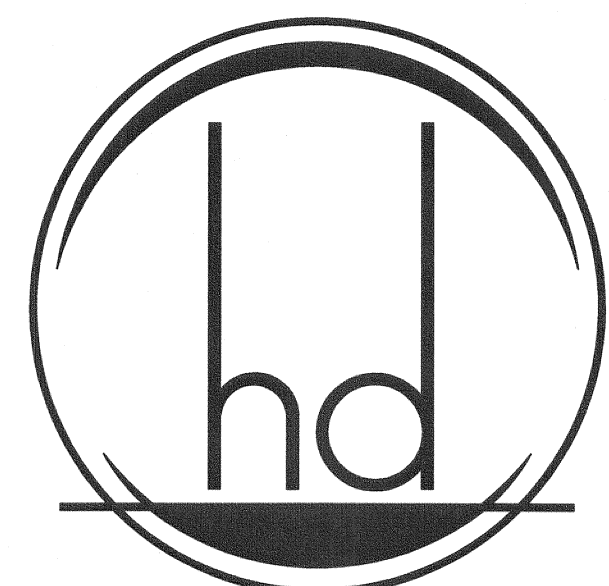
BENCHMARK
CITY OF LAS VEGAS BENCHMARK QUAD 15M, BEING A RING & PLATE IN THE TOP OF CURB, LOCATED IN THE TOP OF CURB ON THE SOUTH SIDE OF CHEYENNE AVENUE, APPROX. 800' WEST OF TENAYA DRIVE. ELEVATION = 2335.79 FEET (711.950 METERS) NAVD. 1988.

I CERTIFY THIS GRADING PLAN IS IN CONFORMANCE TO THE APPROVED DRAINAGE STUDY ON FILE WITH CITY OF LAS VEGAS FOR THIS PROJECT. (CLV# D54749)

James H. Littlejohn 12/7/2015
JAMES H. LITTLEJOHN PE NO. 13639 DATE

PROPOSED DRAINAGE STRUCTURES				
CODE	STRUCTURE		DEPTH	ELEVATION
	DESCRIPTION	DETAIL		TOP OF GRATE INVERT
A1	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A
A2	CURB INLET	NDOT INDEX R-4.2.3	4.40	26.00
A3	CURB INLET	NDOT INDEX R-4.2.3	4.90	27.20
A4	CURB INLET	NDOT INDEX R-4.2.3	5.19	29.50
A5	CATCH BASIN	NDOT INDEX R-4.2.1	4.76	29.75
A6	CURB INLET	NDOT INDEX R-4.2.3	3.76	29.50
A7	CURB INLET	NDOT INDEX R-4.2.3	3.46	29.90
B1	CURB INLET	NDOT INDEX R-4.2.3	4.68	29.25
B2	CURB INLET	NDOT INDEX R-4.2.3	3.58	29.25
B3	CURB INLET	NDOT INDEX R-4.2.3	2.19	29.25
C1	CLEANOUT	11 / C8.0	5.03	30.95
C2	CLEANOUT	11 / C8.0	2.30	30.30
D1	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A
D2	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A
E1	CORE CONNECTION	5 / C8.2	N/A	N/A
E2	JUNCTION MANHOLE	6 / C8.2	3.22	23.00
E3	OUTFALL STRUCTURE	7 / C8.2	N/A	N/A
F1	BUBBLE-UP	4 / C8.2	4.95	22.70
F2	CATCH BASIN	NDOT INDEX R-4.2.1	5.75	27.00

PROPOSED STORM SEWER PIPE						
FROM		TO		GRADE	DIAMETER (IN)	LENGTH (L.F.)
CODE	INV.	CODE	INV.			
A2	21.60	A1	19.80	0.69%	30	RCP 260
A3	22.30	A2	21.70	1.00%	30	RCP 60
A4	24.31	A3	22.40	1.00%	24	RCP 191
A5	24.99	A4	24.41	1.00%	24	RCP 58
A6	25.74	A5	25.09	1.00%	18	RCP 65
A7	26.44	A6	25.84	1.00%	18	RCP 60
B1	24.57	A3	22.40	1.00%	18	RCP 217
B2	25.67	B1	24.67	1.00%	18	RCP 100
B3	27.06	B2	25.77	1.50%	18	PVC 86
C1	25.92	A5	25.15	2.20%	12	RCP 35
C2	28.00	C1	26.02	2.00%	8	PVC 99
D2	21.00	D1	20.00	0.23%	18	PVC 438
E2	19.78	E1	19.25	0.15%	24	RCP 351
E3	19.80	E2	19.78	0.15%	24	RCP 20
F2	21.25	F1	17.75	1.00%	18	RCP 350



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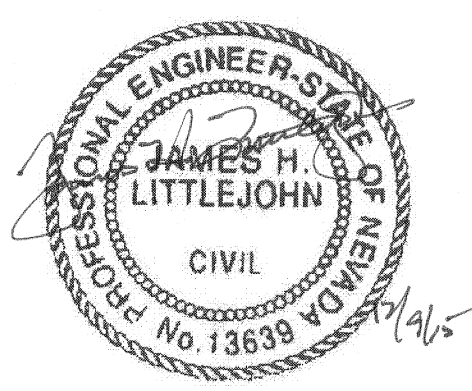
PROJECT
215004.00

LOCATION
3050 North Tenaya Way
Las Vegas, NV 89128

CLIENT
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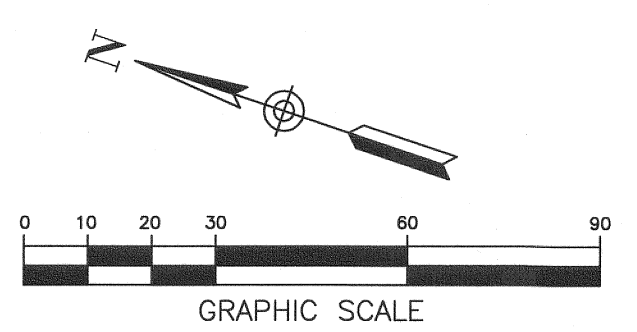
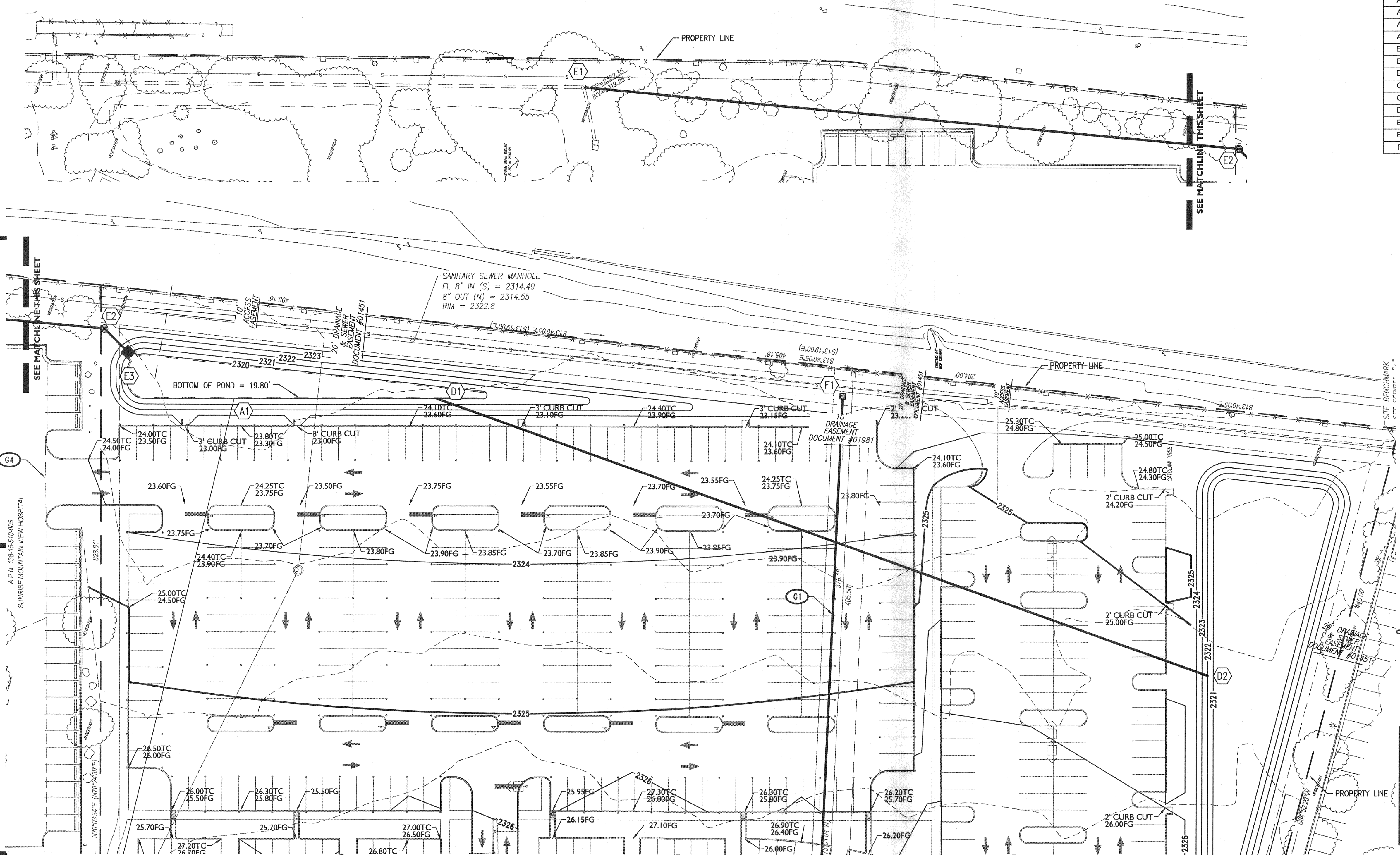


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11-25-15

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3
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TITLE
SHEET
GRADING &
DRAINAGE PLAN

C6.0

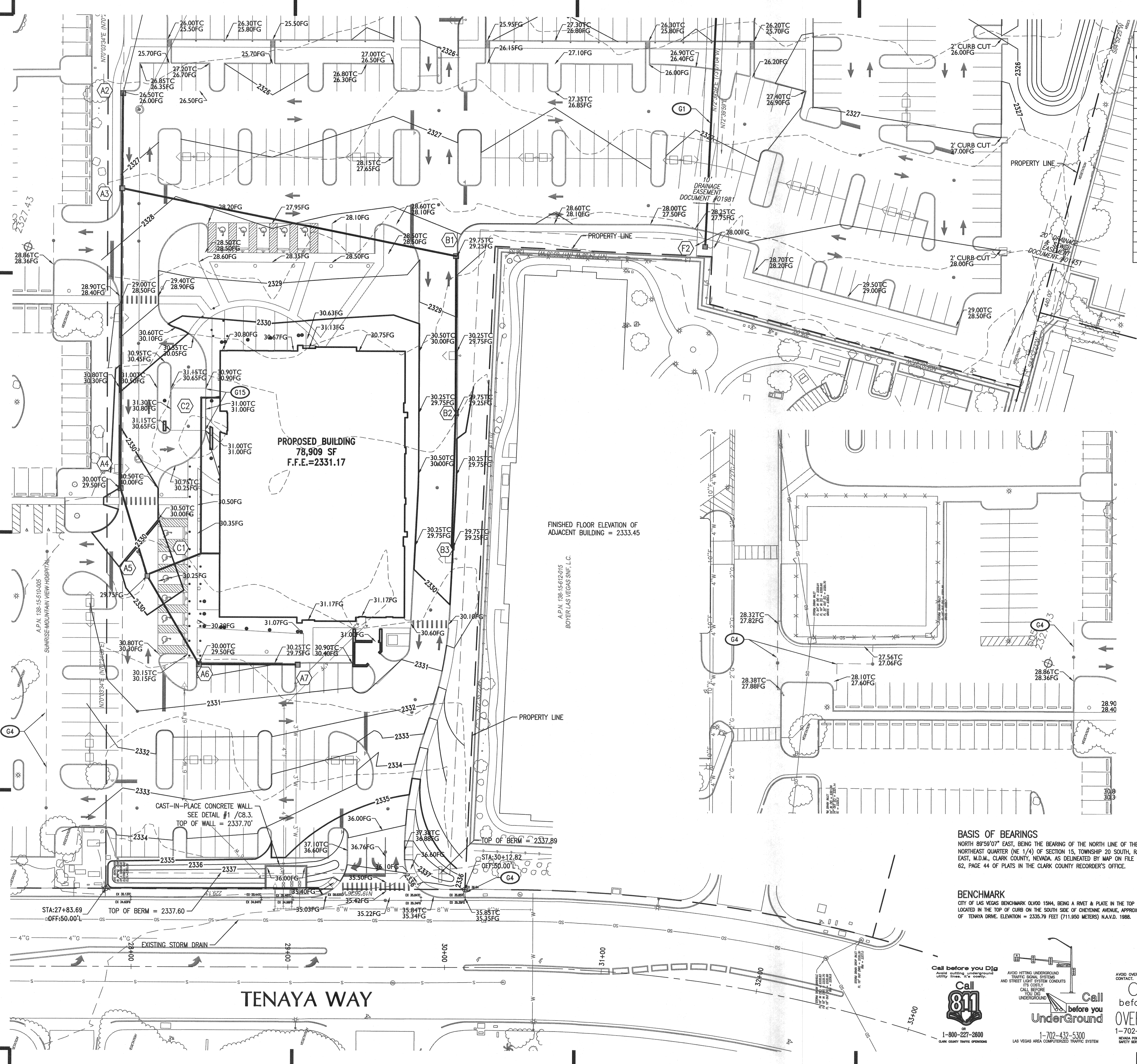


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PROPOSED DRAINAGE STRUCTURES					
CODE	STRUCTURE		DEPTH	ELEVATION	
	DESCRIPTION	DETAIL		TOP OF GRATE	INVERT
A1	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A	19.80
A2	CURB INLET	NDOT INDEX R-4.2.3	4.40	26.00	21.60
A3	CURB INLET	NDOT INDEX R-4.2.3	4.90	27.20	22.30
A4	CURB INLET	NDOT INDEX R-4.2.3	5.19	29.50	24.31
A5	CATCH BASIN	NDOT INDEX R-4.2.1	4.76	29.75	24.99
A6	CURB INLET	NDOT INDEX R-4.2.3	3.76	29.50	25.74
A7	CURB INLET	NDOT INDEX R-4.2.3	3.46	29.90	26.44
B1	CURB INLET	NDOT INDEX R-4.2.3	4.68	29.25	24.57
B2	CURB INLET	NDOT INDEX R-4.2.3	3.58	29.25	25.67
B3	CURB INLET	NDOT INDEX R-4.2.3	2.19	29.25	27.06
C1	CLEANOUT	11 / C8.0	5.03	30.95	25.92
C2	CLEANOUT	11 / C8.0	2.30	30.30	28.00
D1	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A	20.00
D2	HEADWALL	NDOT INDEX R-2.5.1	N/A	N/A	21.00
E1	CORE CONNECTION	5 / C8.2	N/A	N/A	19.25
E2	JUNCTION MANHOLE	6 / C8.2	3.22	23.00	19.78
E3	OUTFALL STRUCTURE	7 / C8.2	N/A	N/A	19.80
F1	BUBBLE-UP	4 / C8.2	4.95	22.70	17.75
F2	CATCH BASIN	NDOT INDEX R-4.2.1	5.75	27.00	21.25

PROPOSED STORM SEWER PIPE							
FROM		TO		GRADE	DIAMETER (IN)	TYPE	LENGTH (L.F.)
CODE	INV.	CODE	INV.				
A2	21.60	A1	19.80	0.69%	30	RCP	260
A3	22.30	A2	21.70	1.00%	30	RCP	60
A4	24.31	A3	22.40	1.00%	24	RCP	191
A5	24.99	A4	24.41	1.00%	24	RCP	58
A6	25.74	A5	25.09	1.00%	18	RCP	65
A7	26.44	A6	25.84	1.00%	18	RCP	60
B1	24.57	A3	22.40	1.00%	18	RCP	217
B2	25.67	B1	24.67	1.00%	18	RCP	100
B3	27.06	B2	25.77	1.50%	18	PVC	86
C1	25.92	A5	25.15	2.20%	12	RCP	35
C2	28.00	C1	26.02	2.00%	8	PVC	99
D2	21.00	D1	20.00	0.23%	18	PVC	438
E2	19.78	E1	19.25	0.15%	24	RCP	351
E3	19.80	E2	19.78	0.15%	24	RCP	20
F2	21.25	F1	17.75	1.00%	18	RCP	350

GRADING & DRAINAGE KEY NOTE		
CODE	DESCRIPTION	DTL #/SHT #
G1	EXFILTRATION TRENCH	3 / C8.3
G4	MATCH EXISTING GRADE	
G8	CONCRETE FLUME	10 / C8.2
G11	CURB CUT	8 / C8.2
G12	SIDEWALK DRAIN	9 / C8.2
G15	TRANSITION FROM FLUSH CONDITIONS TO 6" CURB OVER 15 FEET	

PROPOSED FEATURES LEGEND

- STORM PIPE & INLET
- SPOT ELEVATION
- PROPOSED CONTOUR
- DRAINAGE STRUCTURE

NOTES

- ALL ON-SITE STORM DRAINS AND THE ASSOCIATED FACILITIES ARE PRIVATELY OWNED AND TO BE MAINTAINED BY THE PROPERTY OWNER.
- ALL STORM DRAIN INLETS TO BE CONSTRUCTED PER USDOCA DRAWING NO. 421.

I CERTIFY THIS GRADING PLAN IS IN CONFORMANCE TO THE APPROVED DRAINAGE STUDY ON FILE WITH CITY OF LAS VEGAS FOR THIS PROJECT. (CLV #254749)

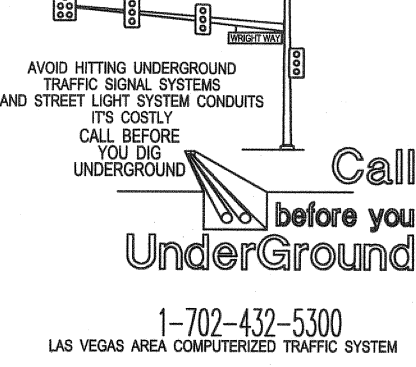
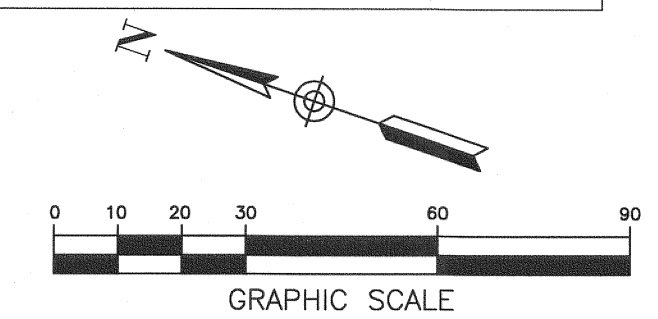
JAMES H. LITTLEJOHN PE NO. 13609 DATE 12/7/2015

BASIS OF BEARINGS

NORTH 89°59'07" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 15, TOWNSHIP 20 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA, AS DELINEATED BY MAP ON FILE IN BOOK 62, PAGE 44 OF PLATS IN THE CLARK COUNTY RECORDER'S OFFICE.

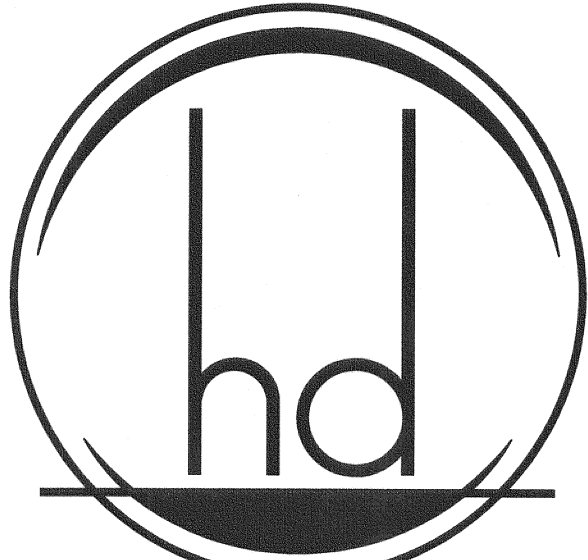
BENCHMARK

CITY OF LAS VEGAS BENCHMARK GLVD 1584, BEING A RIVET & PLATE IN THE TOP OF CURB, LOCATED IN THE TOP OF CURB ON THE SOUTH SIDE OF CHEYENNE AVENUE, APPROX. 600' WEST OF TENAYA DRIVE. ELEVATION = 2335.79 FEET (711.950 METERS) N.A.S.D. 1988.



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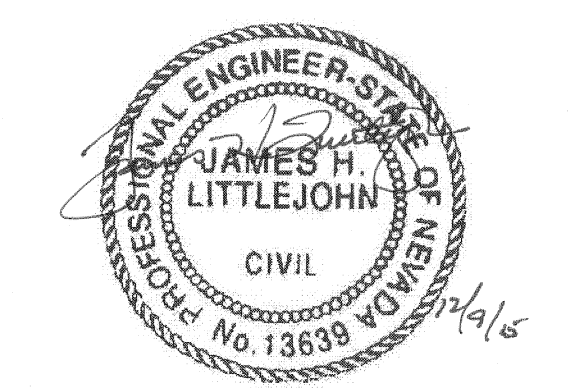
PROJECT
215004.00

LOCATION
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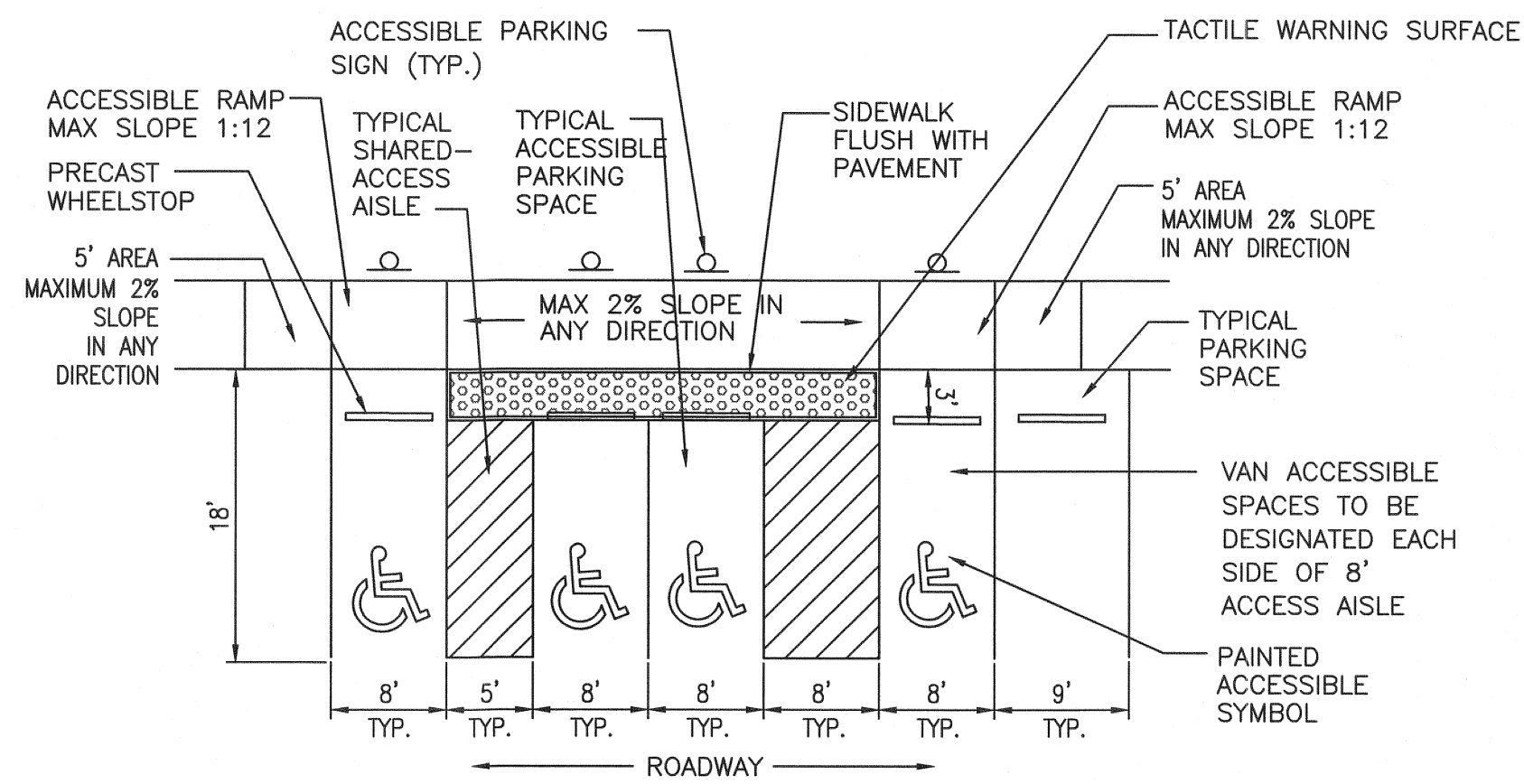
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GRADING &
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SHEET
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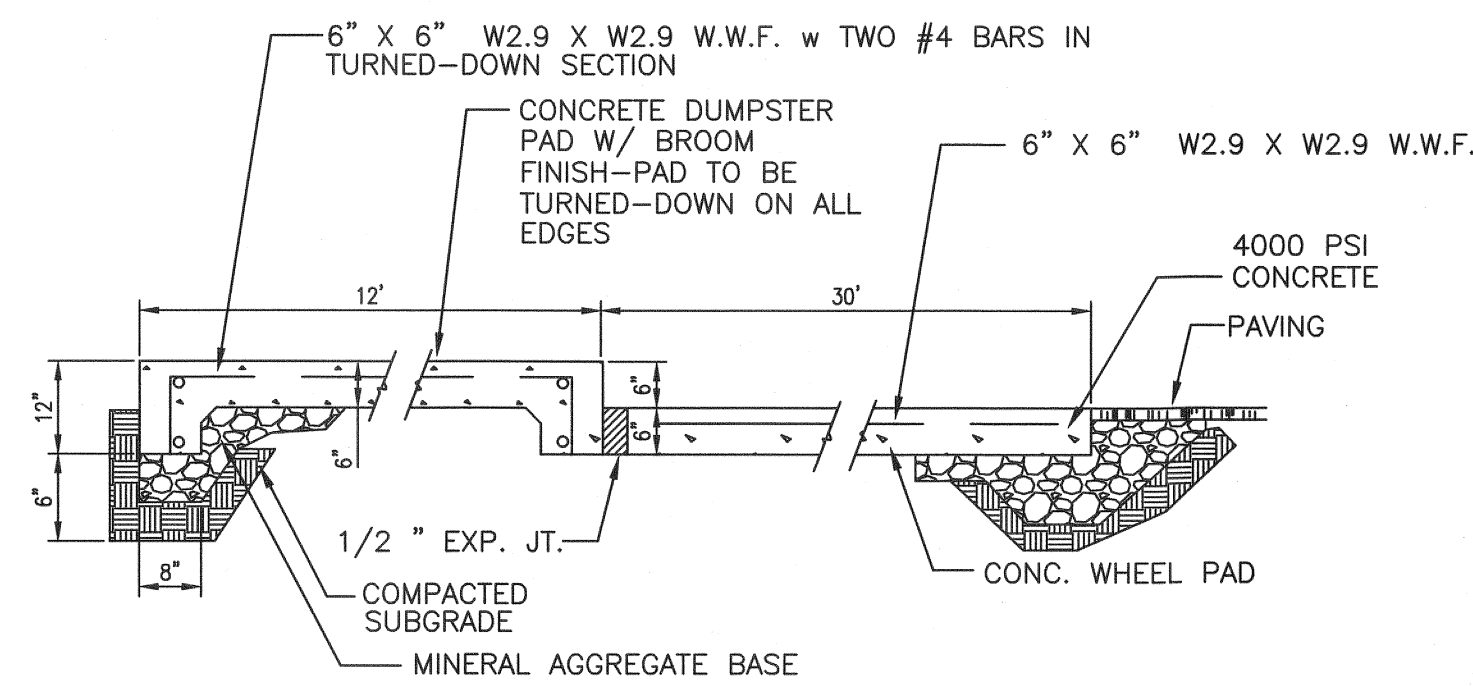


ALL PAINTED SPACE LIMIT LINES SHOULD BE SOLID WHITE LINES 4" WIDE.
MAXIMUM 2% SLOPE IN ANY DIRECTION FOR PARKING SPACES & ACCESS ISLES

7 ACCESSIBLE PARKING SPACE DELINEATION

NOT TO SCALE

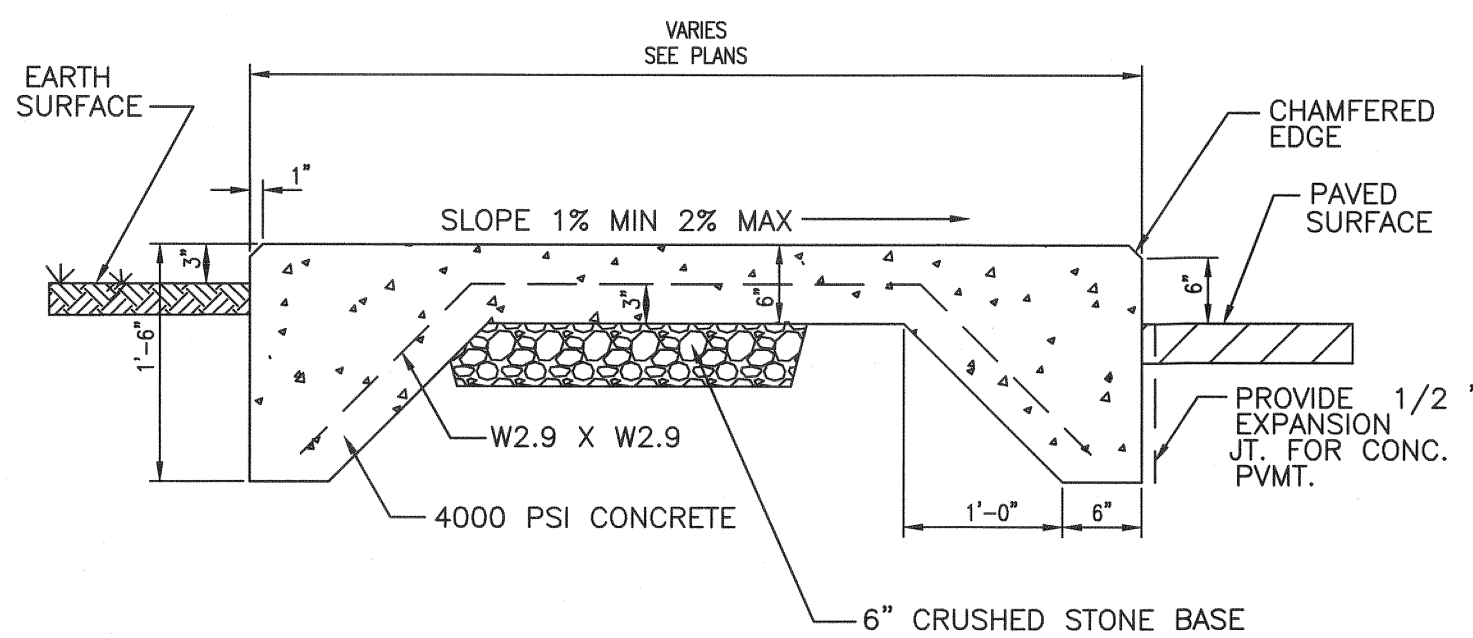
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9 DUMPSTER PAD

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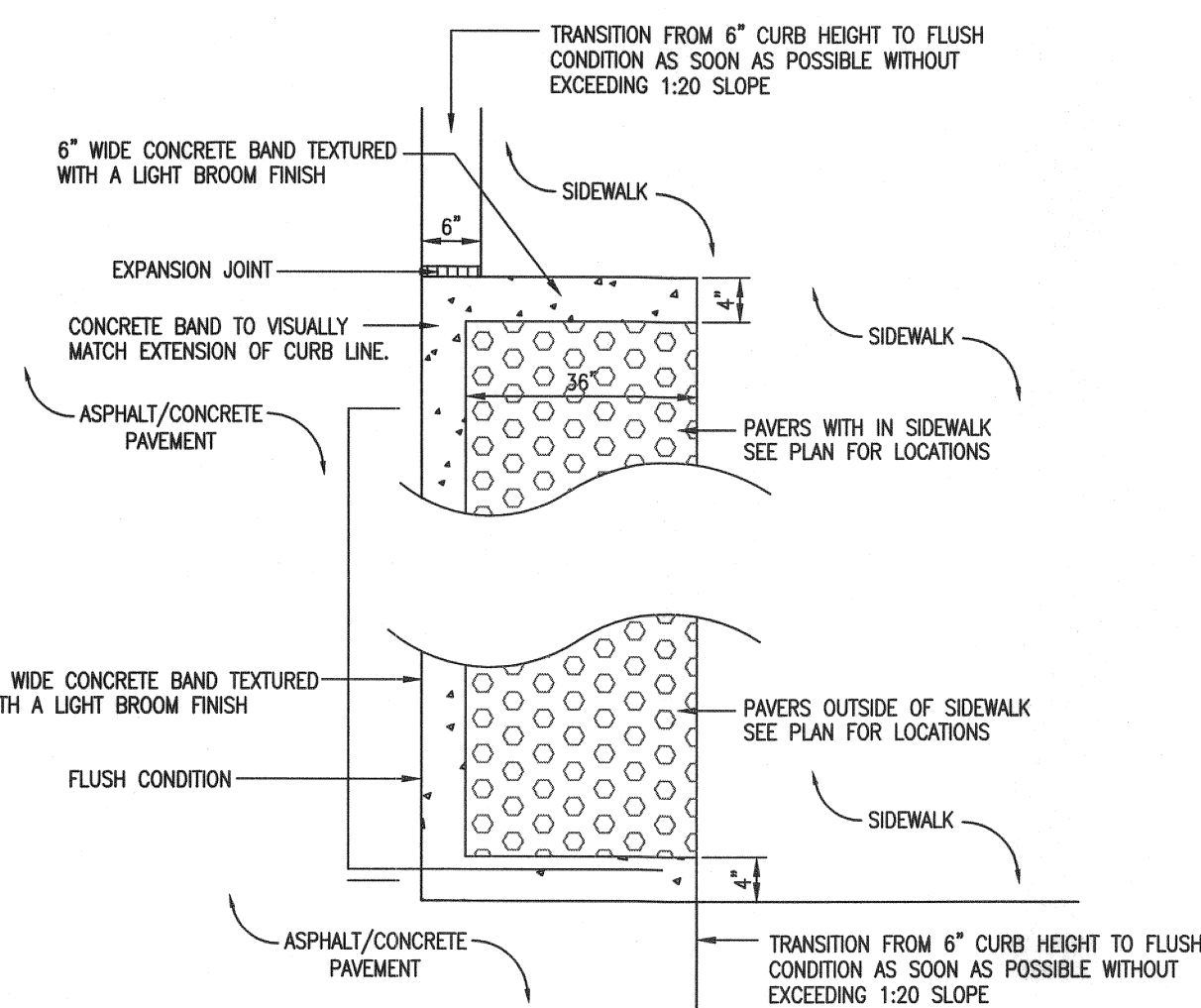
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10 UTILITY PAD

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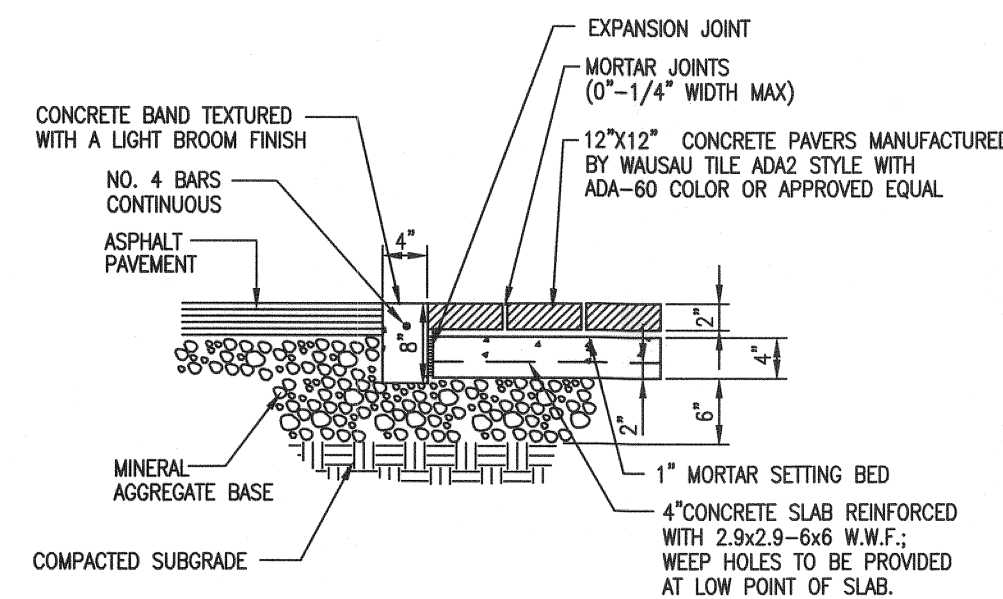
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8 TACTILE WARNING SURFACE

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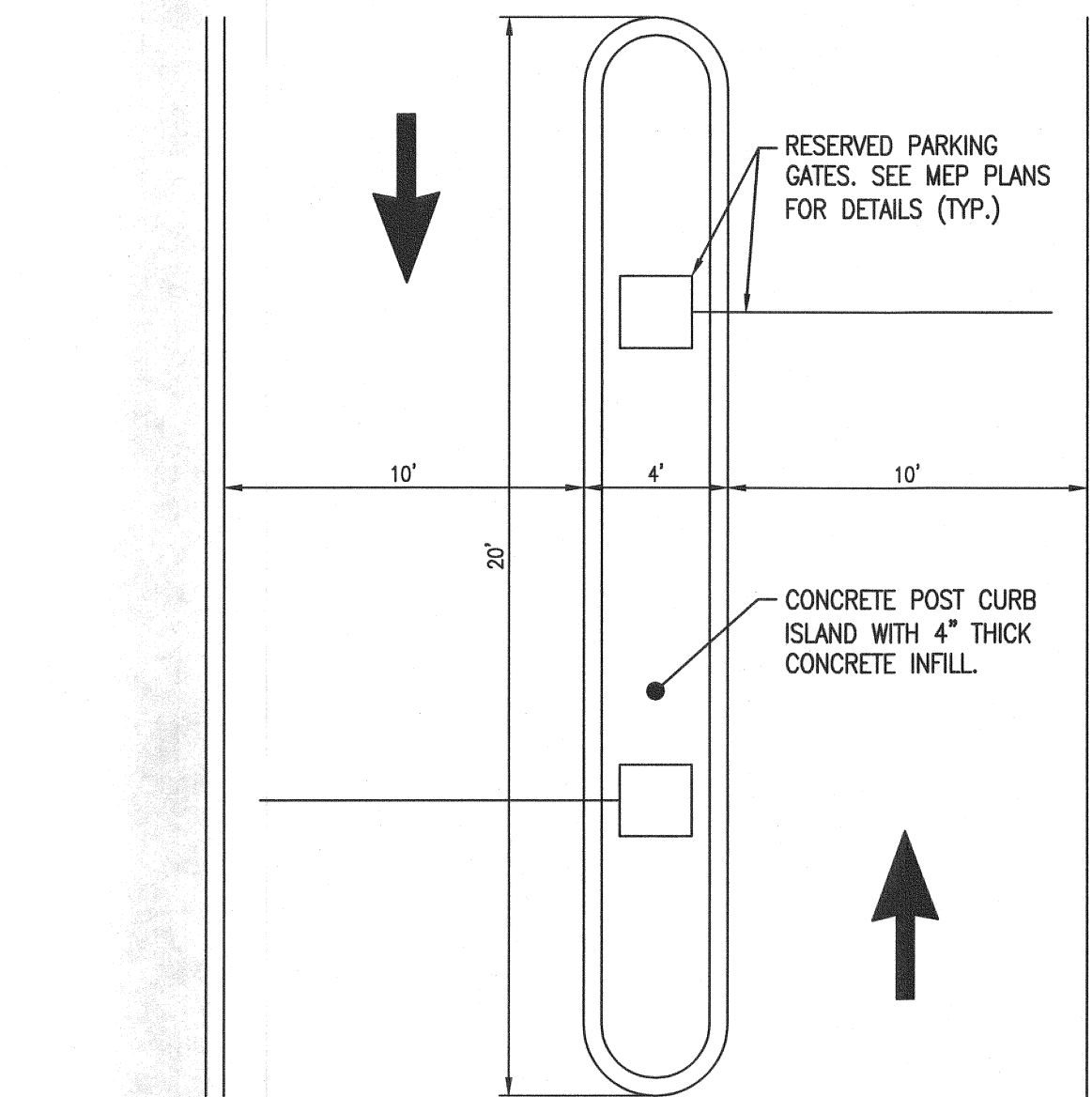
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6 PAINTED STOP BAR

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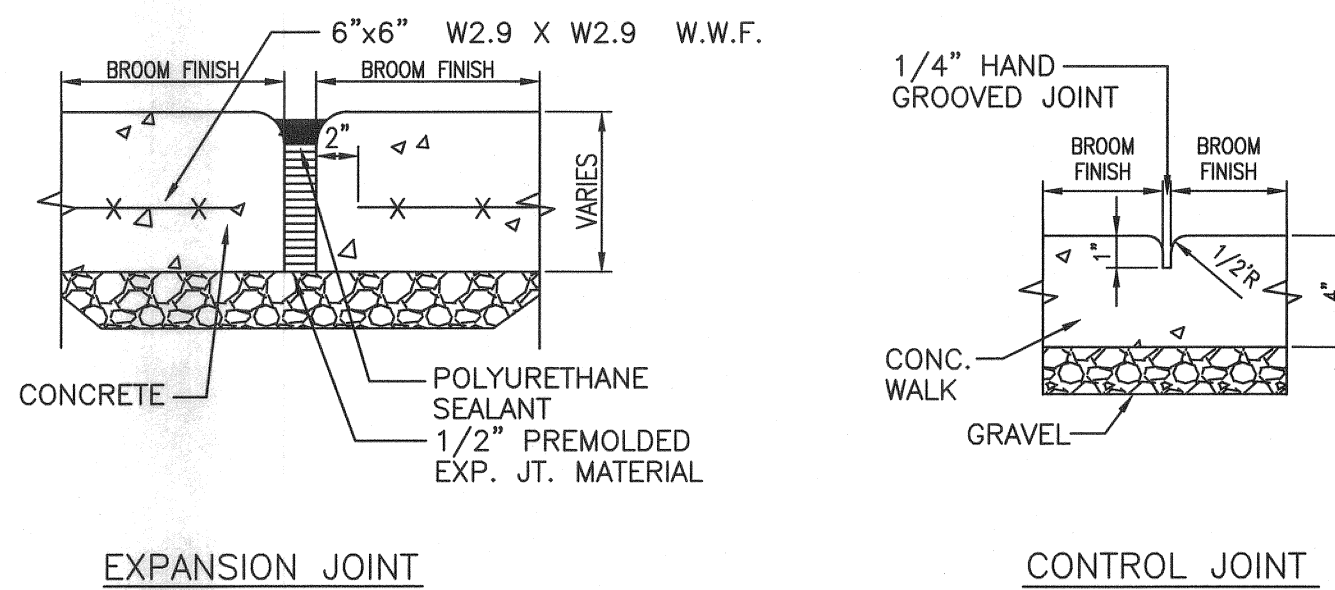
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5 RESERVED PARKING GATE ISLAND

NOT TO SCALE

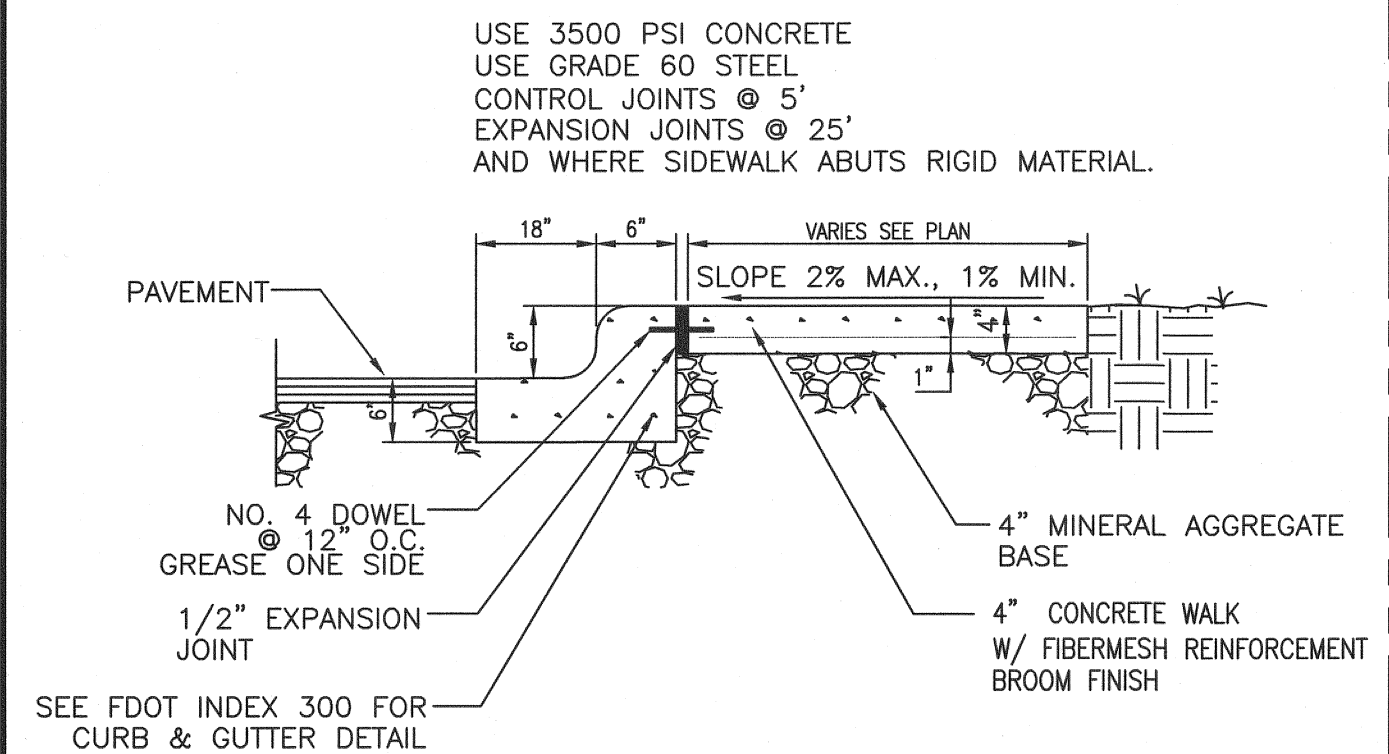
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4 SIDEWALK JOINTS

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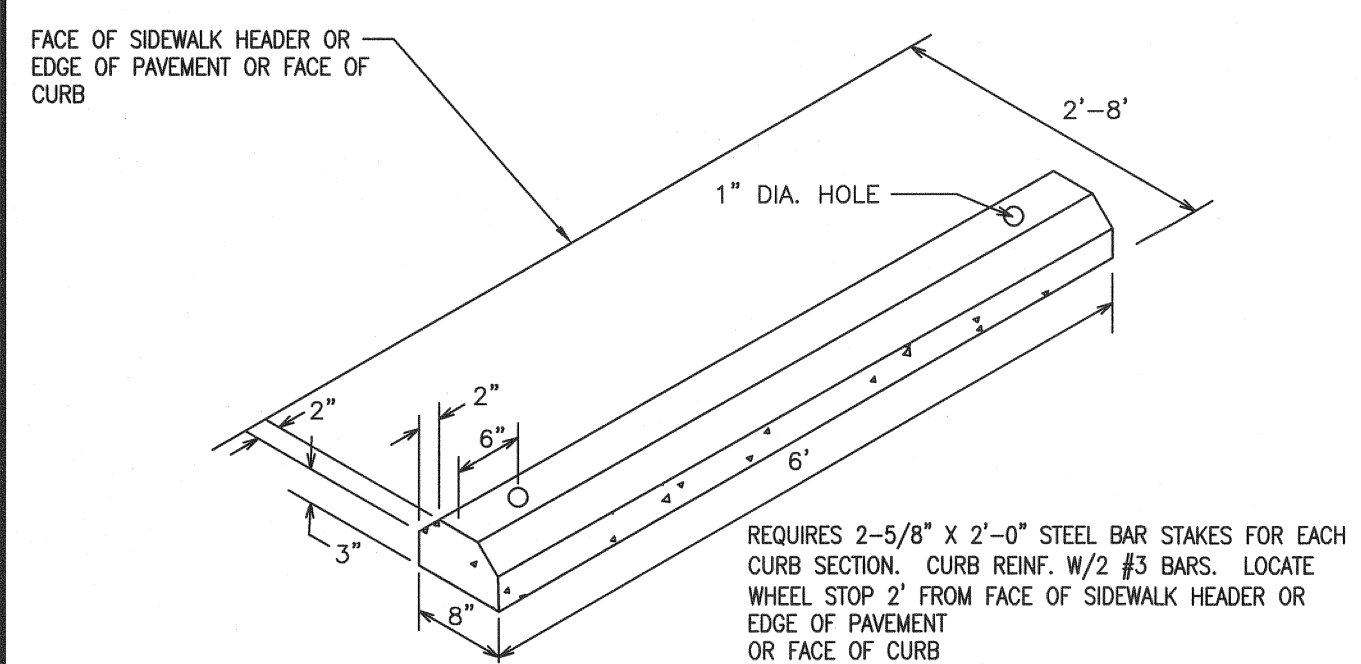
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1 SIDEWALK AT CURB & GUTTER

NOT TO SCALE

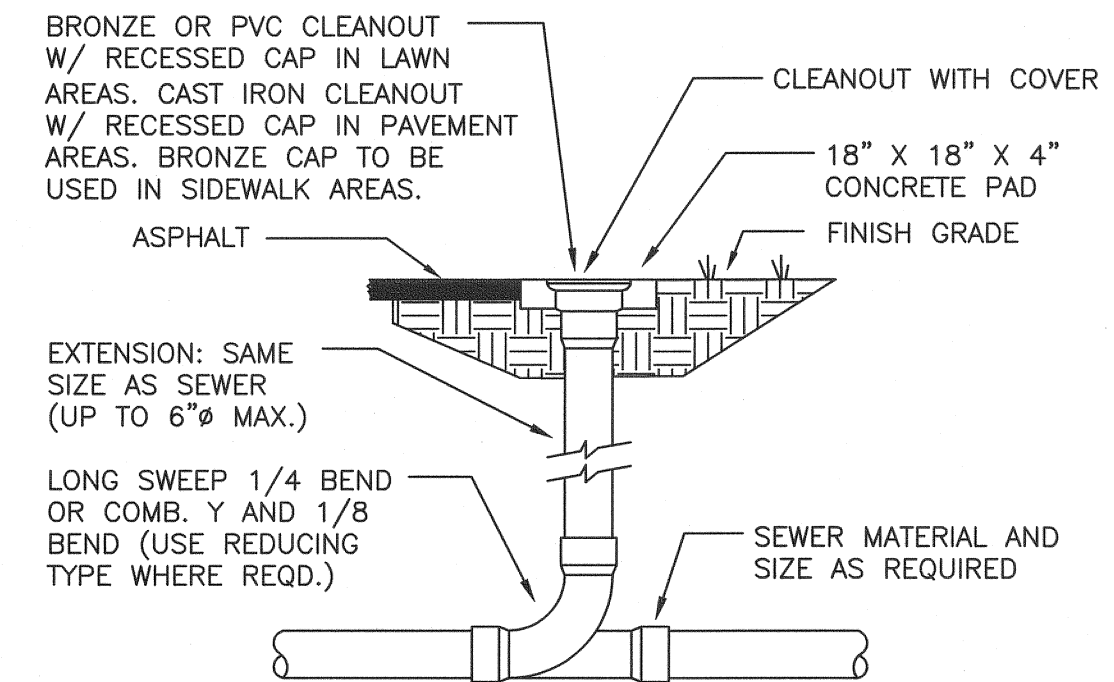
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2 PRECAST CONCRETE WHEEL STOP

NOT TO SCALE

2



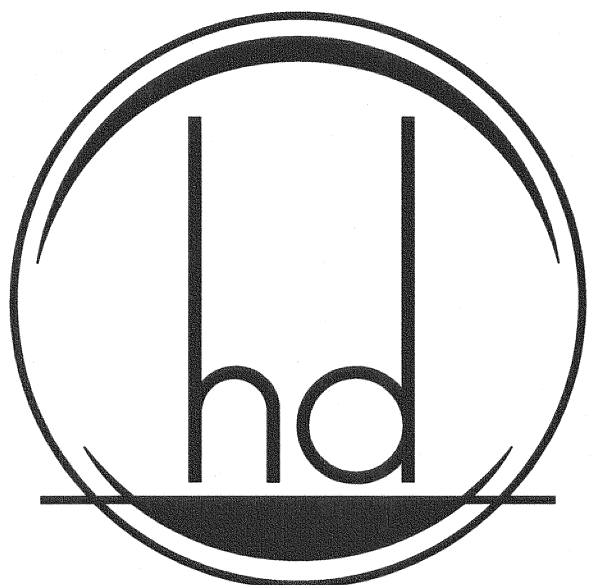
3 CLEANOUT

NOT TO SCALE

3

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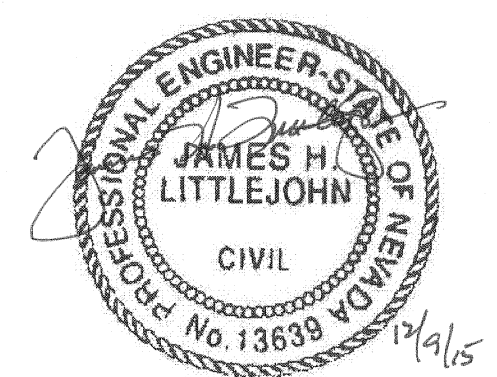
PROJECT
215004.00

LOCATION
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Las Vegas, NV 89128

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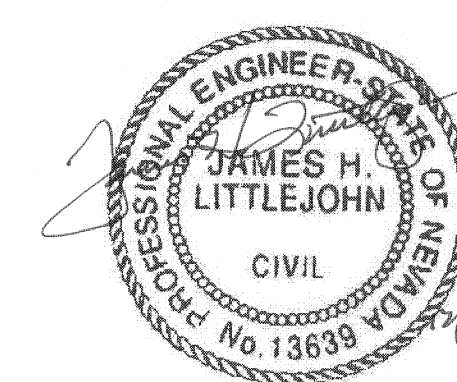
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C8.3 - SITE DETAILS

C8.3

CONCRETE RETAINING WALLS

GENERAL NOTES

1. The minimum concrete compressive strength at 28 days shall be 3,500 PSI and shall comply with ACI 318.
2. Reinforcing steel shall comply with ASTM A615 and shall have a yield strength of 60,000 PSI.
3. Backfilling against reinforced concrete retaining walls shall not be permitted until the concrete has reached its 28 day strength. Heavy equipment shall maintain a distance away from the wall equal to the wall's height. Care shall also be taken to avoid exerting large impact forces on the wall.

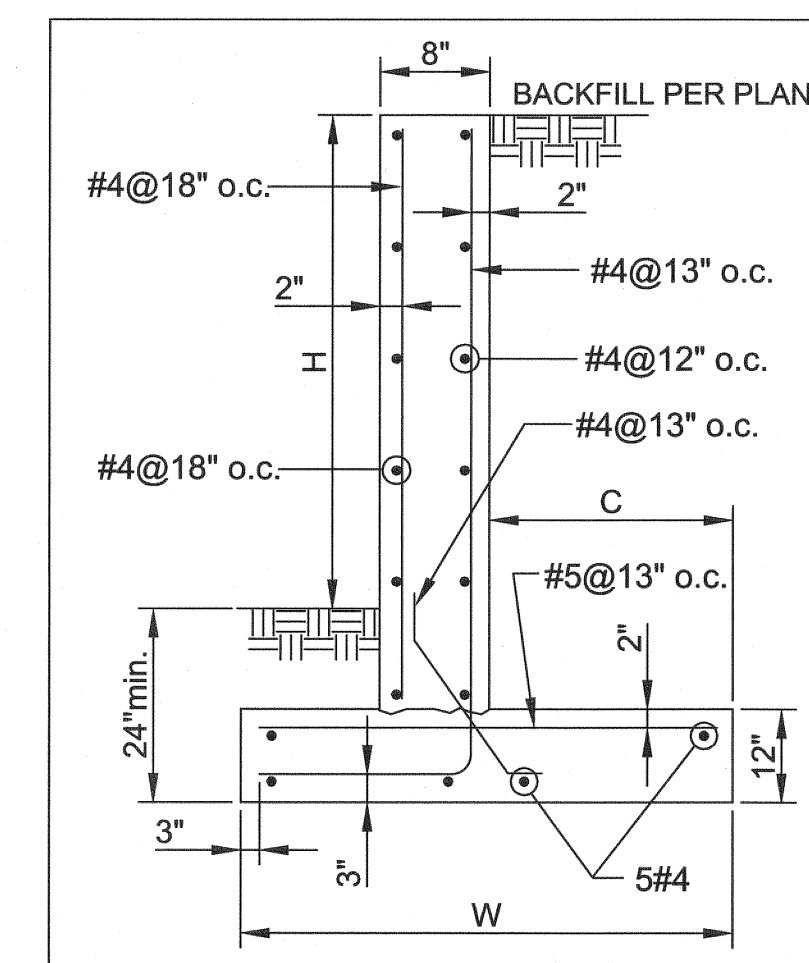


FIGURE 11: TYPICAL CONCRETE WALL SECTION

TABLE 2: TYPICAL CONCRETE WALL DIMENSIONS*

H	C	W
2'-0"	11"	2'-1"
3'-0"	1'-3"	2'-7"
4'-0"	1'-8"	3'-1"
5'-0"	2'-10"	3'-7"

*Reference: Concrete Reinforcing Steel Institute

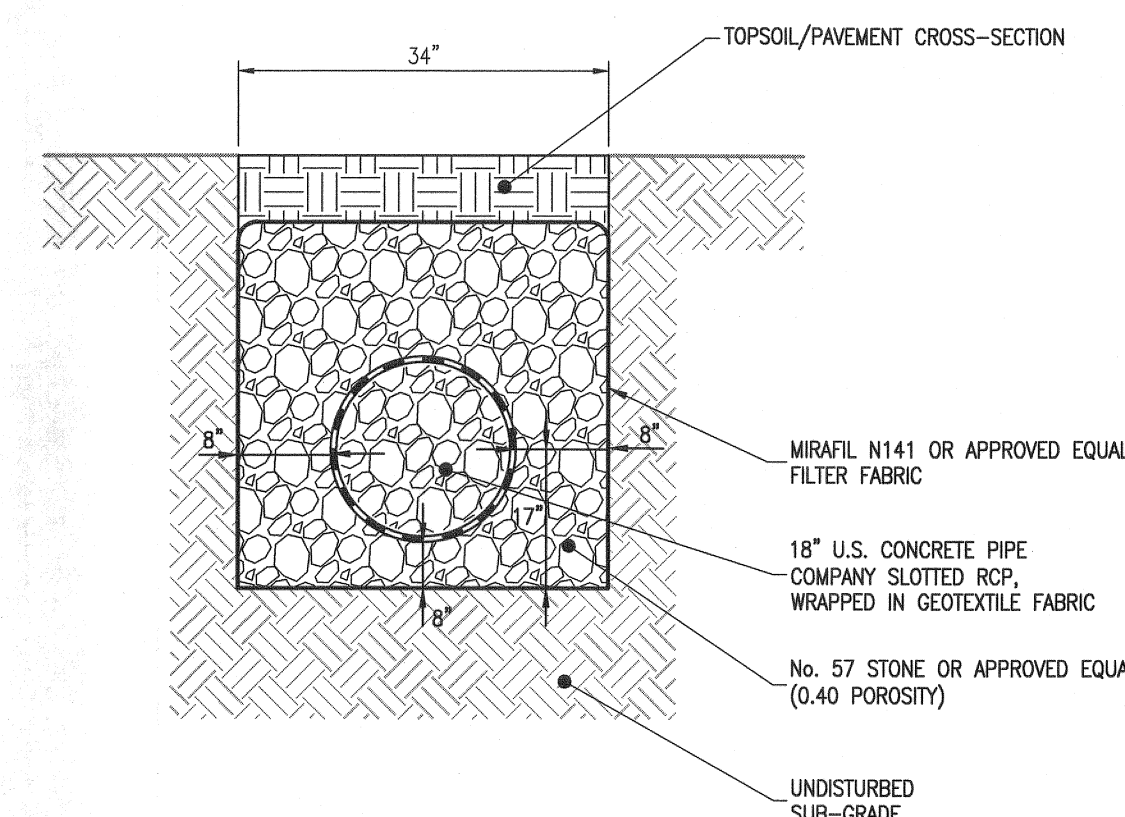
CONCRETE RETAINING WALL

NOT TO SCALE

RESERVED
NOT TO SCALE

EXFILTRATION TRENCH

NOT TO SCALE



RESERVED
NOT TO SCALE

RESERVED
NOT TO SCALE

RESERVED
NOT TO SCALE

RESERVED
NOT TO SCALE

RESERVED
NOT TO SCALE

RESERVED
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RESERVED
NOT TO SCALE



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