

DS #: 05314

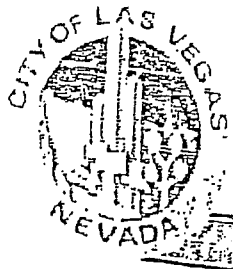
APN: 120-36-101-017

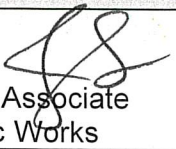
PROJECT: Epic Storage at Ann Road

SUBMITTAL: 2nd

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: November 10, 2020
TO: Land Development Services Department of Building & Safety			FROM: Jennifer Shinn, P.E.  Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:		COPIES TO:
	Epic Storage at Ann Road		Horrocks Engineers
Cross Streets:	W Hammer Ln and N Shaumber Rd		Epic Development LLC
File Number:	F:\Depot\DSMemos\DS05314.doc		Bart Anderson, P.E., DevCo
Parcel Number:	126-36-101-017		CCPW CCRFCD
Zoning Action:	SDR-78449		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES X	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	7/30/2020	8/13/2020	See Comments Below	\$400.00	3940217: \$400
2 nd Submittal	9/23/2020	10/22/2020 & 11/2/2020	Conditionally Approved	\$400.00	4002017: \$400
			TOTAL FEES (LDDRS):	\$800.00	----

REMARKS:

***** The Conditional Approval of this Drainage Study is to allow the engineer/developer to submit the Improvement Plans to City Land Development Only**

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

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

The following are comments pertaining to the subject site specific drainage study and grading plans:

- This drainage study is acceptable in concept;** however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District (CCRFCD)* has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

Please note that effective April 6, 2020, only electronic submittals to the CCRFCD will be accepted for regional concurrence. Contact cwang@regionalflood.org for direction.

- The site is also adjacent to the ongoing Clark County Beltway project. The engineer must coordinate with Clark County Public Works Department (CCPW) and incorporate any concerns for boundary conditions along the western border. CCPW concurrence is required prior to final acceptance of the study.

3. The grading plan indicates offsite grading. Secure a notarized letter of permission from the property owner allowing the grading. This letter is required prior to final acceptance of the drainage study.

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
HDR/JKS

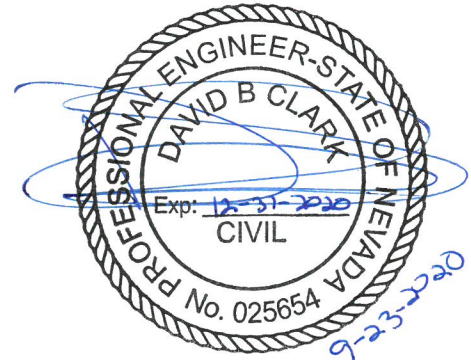
T/R/S: T19S/R59E/S36
AREA F-36

ADDENDUM #1
TO THE
TECHNICAL DRAINAGE STUDY
FOR
EPIC STORAGE AT ANN ROAD
(APN 126-36-101-017)
IN
CITY OF LAS VEGAS, NEVADA

PREPARED FOR
Epic Development LLC
6525 W. Warm Springs Rd, Suite 101
Las Vegas, NV 89118
Ph. (702) 951 5393

SUBMITTED TO
CITY OF LAS VEGAS

SEPTEMBER 2020



HORROCKS PROJECT NV-2108-1911

Horrocks Engineers
1401 N Green Valley Pkwy, Suite 160
Henderson, NV 89074
702.966.4063

HORROCKS
ENGINEERS

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL
DRAINAGE STUDY INFORMATION FORM

Name of Development: EPIC STORAGE AT ANN Date: 09-23-2020
Location of Development: a) Descriptive (Cross Streets) North/South: N Shaumber Rd
East/West: W Hammer Ln
b) Section: 36 Township: 19S Range: 59E
c) APN: 126-36-101-017

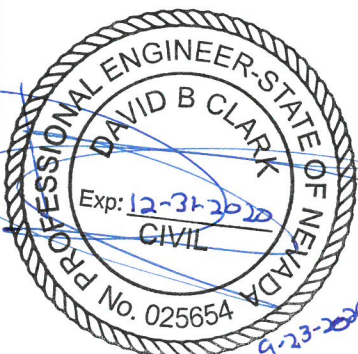
Name of Owner: EPIC DEVELOPMENT, LLC
Telephone No.: (702) 951 5395 Fax No.: _____ E-Mail Address: jthomson@epicnv.com
Address: 6525 W. Warm Springs Rd, Suite 101, Las Vegas, NV, 89118

Contact Person-Name: David B. Clark Telephone No.: 702.966.4063
* E-Mail Address: dclark@horrocks.com Fax No.: _____
Firm: Horrocks Engineers
Address: 1401 N Green Valley Pkwy, Suite 160 Henderson, NV 89014

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: 5+/- acres Being Developed/Disturbed: 5+/- 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.): Commercial - Storage Facility
5. Approximate upstream land area which drains to the subject site: 12 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: Montalado DS 5197. CCSD Northwest Transportation Satellite Facility DS 4511
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: The site discharges at existing 8' X 6' concrete channel.
8. 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.**

	Revision	Date
Local Entity File No. _____		

REFERENCE:

STANDARD FORM 1



September 23, 2020

Jennifer Shinn, P.E.
Public Works Department
City of Las Vegas
333 N. Rancho Dr. 7th Floor
Las Vegas, NV 89106

RE: Addendum #1 to Technical Drainage Study Epic Storage at Ann Road, DS 5314

Dear Mrs. Shinn,

Horrocks Engineers hereby submits Addendum #1 to the Technical Drainage Study for Epic Storage at Ann Road which responds to the City's comments dated August 18, 2020. The comments are listed below together with the associated responses.

CLV COMMENTS AND RESPONSES

1. Provide a copy of the zoning/planning conditions associated with this site with the next submittal to verify compliance with conditions. *Flood Control* will not issue conditional approval of the drainage study without the associated zoning/planning conditions (issued by the *City Council*). Any associated conditions of approval that revise the site drainage parameters will require that the drainage study be revised and resubmitted.

RESPONSE: The Notice of Final Action letters are included in Appendix A.

2. The site is adjacent to or crosses an existing or proposed Clark County Regional Flood Control District (CCRFCD) master planned facility. Therefore, CCRFCD concurrence is required prior to final approval of the drainage study.

Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

<http://gustfront.ccrfcd.org/LandDev/LandDev.aspx>

RESPONSE: The study and all addenda will be submitted to CCRFCD upon conditional approval from CLV. The new requirements for drainage study concurrence submittals are noted.

3. The site is also adjacent to the ongoing Clark County Beltway project. The engineer must coordinate with Clark County Public Works Department (CCPW) and incorporate any concerns for boundary conditions along the western border. CCPW concurrence is required prior to final acceptance of the study.

RESPONSE: Noted. The Engineer has contacted and is coordinating with the CCPW department. The CCPW concurrence submittal will be submitted upon receipt of CLV conditional approval.



4. Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the City of Las Vegas Planning and Development Department. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the City Planning Department (229-6301). The engineer must provide City Planning approval with the next submittal.

RESPONSE: Noted. A letter justifying the grade difference has been submitted and is included in Appendix A for reference. It is noted that final drainage study approval is contingent on Planning approval. The Grading Justification letter is attached in Appendix A.

5. The referenced CP2 for the interim condition is 9 cfs for the 10-year condition in the Montalado study, however, only 8 cfs in this study. Explain the discrepancy of the referenced flow, or revise the calculations.

RESPONSE: CP2 is located at the dual 24" RCP culverts at Shaumber Road. The reference basins and flow splits from the Montalado Study have been fixed in the Interim and Ultimate HEC-1 models. The errors were related to digit spacing/columns in the HEC-1 input file. The resulting peak flowrates now match the Montalado Study. The revised HEC-1 models and basin maps with basin summary tables can be found in Appendix B.

6. Provide the WSE of the flow in the existing 8' channel.

RESPONSE: The water surface elevation of the existing 8' wide concrete channel was not shown on the referenced beltway plans. However, normal depth calculations were used to calculate a normal depth in the channel for each relevant section. The interim and future HGLs have been calculated. There are significant future flows that originate in the existing pit upstream, east of the Puli Road alignment. The interim flows are significantly lower than the future conditions. The interim flows in the channel are calculated with referenced information from the Beltway Study and from the hydrologic analysis of the site. See Figure 7 for peak flowrates and locations in the existing channel. The Future flowrates are referenced from the Beltway Study Ultimate condition. See Figure 8 for the Future conditions flowrates in the existing channel.

The resulting WSE is shown on the profile sheet C.5.2, is shown on the referenced profile sheet RSD40, and is reflected in the revised WSPG model. Normal depth calculations and figures can be found in Appendix C.

The future design flows (679 cfs) HGL is shown with the referenced from the Beltway Study. It shows the WSE above the elevations of the walls at the existing 20'x4' knockouts. At the northern blockout, the proposed retaining wall along the west side of the manway includes a 3' deep cutoff wall for the section where inundation is expected. The southern blockout, the manway and swale area that is within the inundated area will be concrete lined. The proposed improvements are protected in the interim and future condition.

7. It is unclear how the onsite flows discharge the site and enter the existing channel. Provide detailed grading of the outlet locations.

RESPONSE: Per discussion with CLV, the intent is to capture the offsite runoff west of the project site and capture a portion of the onsite prorated basin OND8 at MH1 and discharge directly into the existing 8' wide concrete channel at concentration points CI2/CU2. The runoff from basins OND1, OND2, OND3, OND4, OND5, OND6, OND7, and the bypass from OND8 are conveyed to the



riprap/BMP swales at concentration point CI3/CU3 and then enter the concrete channel at the existing 20'x4' blockout. The 5' wide manway at the blockout, which is currently lined with Type 2 will be concrete lined as discussed in the response to comment 6 above. See responses to comments 6 and 8 for further discussion on the existing concrete channel

8. The increased developed onsite flows shall not sheet flow over the existing path and into the adjacent channel. Provide a direct connection to the channel.

RESPONSE: The majority of offsite and onsite runoff is being conveyed directly into the concrete channel via storm drain. The remaining runoff is conveyed into the channel over an improved manway. Per discussion with CLV, armoring the manway is acceptable. The runoff that is entering the channel at the 20'x4' blockout is lower than in the existing condition. At concentration point CE3, the 100-year peak runoff is 44 cfs, and in the developed conditions, the peak flow at concentration points CI3/CU3 is 13 cfs. The unrevised Figure 5, existing conditions basin map is included in Appendix A for convenience. Detailed grading of the blockout has been included in the details sheets.

9. The grading plan indicates offsite grading. Secure a notarized letter of permission from the property owner allowing the grading. This letter is required prior to final acceptance of the drainage study.

RESPONSE: Noted. Permission to grade has been discussed and approved by the adjacent owner; however, details of the agreement are currently in negotiation. Upon receipt of a notarized permission to grade agreement, the engineer will forward to the City. It is noted that final drainage study approval is contingent on the permission to grade or an alternate design.

10. **Figure 6/7 Interim/Developed Conditions Map:** The location of CU2 is misleading. Per the grading sheets this combination point is not where the pipe and onsite flow discharges into the channel and the location of where the flow enters the channel is the location of the concrete pad.

RESPONSE: The location of CI2/CU2 has been revised to show the correct location where runoff is discharged into the channel via the storm drain. Revised Drainage Figures 6 and 7 can be found in Appendix A.

11. **Figure 6/7 Interim/Developed Conditions Map:** Cross section 5 is showing 64.4 cfs within the onsite channel. It is unclear if that flow is outletting into the 8' channel at the location of the concrete pad, or if the flow is turning and entering into the onsite swale.

RESPONSE: The design has been revised since the original submittal to discharge from the storm drain pipe directly into the existing 8' wide concrete channel. Section 5 has been removed from the analysis and this swale is replaced with section 13. The intent is that the bypass runoff from OND8, basins OND1 and OND9 are conveyed to the southern blockout west of the proposed retaining wall. Near the existing southern 20'x4' blockout at CI3/CU3 the runoff is collected with a beehive inlet and discharged to combine with the runoff from the swale conveyed from the south and then into the existing channel through the blockout. Both BMP swales have been revised to this location. The WSPG model has been revised and is included in Appendix C. See Figures 7 and 8 for the normal depth calculations summary information, flow patterns and peak flowrates.



12. **Figure 6/7 Interim/Developed Conditions Map:** The onsite swale directing flow through the BMP at the east edge of the site near the 215 is shown to flow northwest on these exhibits, but flows southeast on the grading plans. Revise accordingly.

RESPONSE: The grading plans and revised figures now agree on the direction of the drainage swale. The site discharge at the 20'x4' blockout of the western wall of the existing 8' wide concrete channel. See Figure 8 for BMP calculations. See Appendix A and D for the revised figures and grading plans, respectively.

Both BMP swales are located near the southern blockout in two different swales. The runoff from basin BMP3 and the bypass from BMP1 are conveyed to a bmp swale north of the southern blockout on the west side of the proposed retaining wall. The runoff from basin BMP2 is conveyed to the southern blockout and passes through a bmp swale adjacent to the project site boundary. The site will treat over 75% of the parking lot. The 2- year hydrologic calculations are shown in the ultimate conditions HEC-1 model in Appendix C.

13. C.6.0 and C.6.1 show the Office building with a FF of 85.98 and 86.00, address this discrepancy.

RESPONSE: The finish floor elevation on the plans now agree on all sheets.

14. Section O near building A does not match the grading plans. Revise the hydraulic cross section.

RESPONSE: The hydraulic section, Section 11, has been revised and included on the detail sheets of the grading plans. See Figures 6 and 7 for normal depth summary tables in Appendix A and Appendix C for hydraulic calculations.

15. Sections N and J on sheets C.2.0 and C.6.0 require 3 course solid grouted wall above the flow line on top of the retaining wall to protect the building from offsite flow. Revise the note for all sections showing solid grouting for flood control to indicate "8-inch minimum solid grouted CMU block XX courses above finish grade with all joints mortared," where XX is 18-inches or twice the depth above the calculated water surface elevation.

RESPONSE: Section N and J have been revised to show the solid grouted note requested where CMU walls are located. However, the buildings require additional waterproofing above the top of the CMU wall elevations. For these areas, additional waterproofing of the walls has been called out. The buildings are protected to at least 24" (equivalent to 3 courses) above the flowline of the flow in the adjacent swale.



16. The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q100 depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

BUILDING	FL	FF	REQ FF
B	91.0	85.53	92.5
A	96.5	85.53	98.0
OFFICE	(TC) 85.81	85.98	86.31

RESPONSE: The finished floors have been revised to meet the twice the depth of flow criteria. The office and building A are protected on the south side as discussed in the response to comment 15.

17. Provide BMP calculations that meet the requirements laid out in the HCDDM. Per section 1502.2 the site is categorized as having a large parking lot

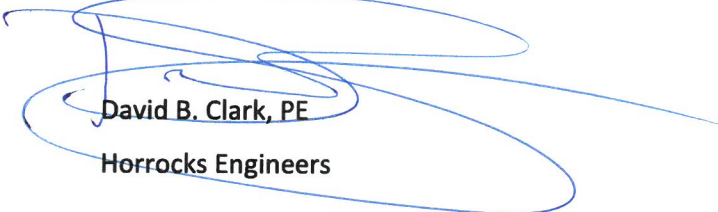
“For the Large parking lot category, treatment BMPs are required to treat stormwater runoff from at least 75 percent of the parking lot. Because typical site drainage layouts must account for application of flood control criteria, treatment BMPs may need to be sized to accommodate runoff from the contributing building area as well. BMPs are to be sized for the 85th percentile storm, and hydrology and hydraulic calculations are required to be submitted for the BMP design.”

RESPONSE: The BMP calculations are included in Appendix C to clarify and show that the site design meets the criteria of Section 1502.2 for a large parking lot. Figure 8 has been revised and shows that the site will treat over 75% of the impervious area and can be found in Appendix A. Hydraulic calculations for the BMPs swales (section 13 and 11) can be found in Appendix C.

It is anticipated that the responses above and the attached Addendum #1 fully address the City comments. We respectfully request City approval of the Technical Drainage Study. Please don't hesitate to contact us with any questions.

Sincerely,

Horrocks Engineers



David B. Clark, PE

Horrocks Engineers



Appendix A –Letters and Figures

CLV Comment Letter

Notice of Final Action

Zoning/Planning Letters

Justification Letter

Figure 5 – Existing Conditions Basin Map (Not Revised)

Figure 6 – Interim Conditions Basin Map

Figure 7 – Ultimate Conditions Basin Map

Figure 8 – BMP Figure

CITY OF LAS VEGAS			DATE:
INTER-OFFICE MEMORANDUM			August 18, 2020
TO: Land Development Services Department of Building & Safety			FROM: Jennifer Shinn, P.E. Flood Control, Engr. Associate Department of Public Works
SUBJECT:	Drainage Study for:		COPIES TO:
	Epic Storage at Ann Road		Horrocks Engineers
Cross Streets:	W Hammer Ln and N Shaumber Rd		Epic Development LLC
File Number:	F:\Depot\DSMemos\DS05314.doc		Bart Anderson, P.E., DevCo
Parcel Number:	126-36-101-017		CCPW CCRFCD
Zoning Action:			
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES X	NO	

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1 st Submittal	7/30/2020	8/13/2020	See Comments Below	\$400.00	3940217: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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	is approved subject to conformance to all City standards and the following conditions:
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Please note that effective March 15, 2019, the CCRFCD adopted new requirements for drainage study concurrence submittal. Follow the link below for specific guidance.

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16. The following finish floors do not meet the Regional Flood Control District minimum criteria of twice the Q100 depth of flow up to 18-inches above the water surface (CCRFCD Manual Section 304.4.E.1) or 6-inch minimum above the highest adjacent top of curb (CCRFCD Manual Section 1602 304.4.E.1). The following finish floors should be revised or alternate flood protection provided.

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"For the Large parking lot category, treatment BMPs are required to treat stormwater runoff from at least 75 percent of the parking lot. Because typical site drainage layouts must account for

application of flood control criteria, treatment BMPs may need to be sized to accommodate runoff from the contributing building area as well. BMPs are to be sized for the 85th percentile storm, and hydrologic and hydraulic calculations are required to be submitted for the BMP design."

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END OF REMARKS
HDR/JKS

T/R/S: T19S/R59E/S36
AREA F-36



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

MICHELE FIORE
Mayor Pro Tem

STAVROS S. ANTHONY

CEDRIC CREAR

BRIAN KNUDSEN

VICTORIA SEAMAN

OLIVIA DÍAZ

SCOTT D. ADAMS
City Manager

DEPARTMENT OF PLANNING

ROBERT SUMMERFIELD

DIRECTOR

**DEVELOPMENT
SERVICES CENTER**

333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
702.474.7463 | FAX
711 | TTY



cityoflasvegas
lasvegasnevada.gov

May 21, 2020

Mr. Jeff Thompson
Epic Mountain Edge, LLC
8912 Spanish Ridge Avenue, Suite #200
Las Vegas, Nevada 89147

**RE: GPA-77994 [PRJ-77918] - GENERAL PLAN AMENDMENT
RELATED TO ZON-77995
CITY COUNCIL MEETING OF MAY 20, 2020**

Dear Mr. Thompson:

The City Council at a regular meeting held on May 20, 2020 voted to **APPROVE** a request for a General Plan Amendment FROM: PF (PUBLIC FACILITIES) TO: **SC (SERVICE COMMERCIAL)** on 4.93 acres on the west side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), Ward 6 (Fiore) [PRJ-77918].

The Notice of Final Action was filed with the Las Vegas City Clerk on May 21, 2020.

Sincerely,

Robert Summerfield, AICP
Director
Department of Planning

RTS:PL:clb

cc: Mr. Jeff Thompson
Mountain Sunrise View II, Limited Partnership
8912 Spanish Ridge Avenue, Suite #200
Las Vegas, Nevada 89147

Mr. Larry Britton
Horrocks Engineers
1401 North Green Valley Parkway, Suite #160
Henderson, Nevada 89074



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
Mayor

MICHELE FIORE
Mayor Pro Tem

STAVROS S. ANTHONY

CEDRIC CREAR

BRIAN KNUDSEN

VICTORIA SEAMAN

OLIVIA DÍAZ

SCOTT D. ADAMS
City Manager

DEPARTMENT OF PLANNING

ROBERT SUMMERFIELD

DIRECTOR

**DEVELOPMENT
SERVICES CENTER**

333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
702.474.7463 | FAX
711 | TTY



cityoflasvegas
lasvegasnevada.gov

May 21, 2020

Mr. Jeff Thompson
Epic Mountain Edge, LLC
8912 Spanish Ridge Avenue, Suite #200
Las Vegas, Nevada 89147

**RE: ZON-77995 [PRJ-77918] - REZONING RELATED TO GPA-77994
CITY COUNCIL MEETING OF MAY 20, 2020**

Dear Mr. Thompson:

The City Council at a regular meeting held on May 20, 2020 voted to **APPROVE** a request for a Rezoning FROM: C-V (CIVIC) TO: **C-1 (LIMITED COMMERCIAL)** on 4.93 acres on the west side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), Ward 6 (Fiore) [PRJ-77918].

The Notice of Final Action was filed with the Las Vegas City Clerk on May 21, 2020.

Sincerely,

Robert Summerfield, AICP
Director
Department of Planning

RTS:PL:clb

cc: Mr. Jeff Thompson
Mountain Sunrise View II, Limited Partnership
8912 Spanish Ridge Avenue, Suite #200
Las Vegas, Nevada 891478

Mr. Larry Britton
Horrocks Engineers
1401 North Green Valley Parkway, Suite #160
Henderson, Nevada 89074



**LAS VEGAS
CITY COUNCIL**

CAROLYN G. GOODMAN
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Mayor Pro Tem

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City Manager

DEPARTMENT OF PLANNING

ROBERT SUMMERFIELD
DIRECTOR

**DEVELOPMENT
SERVICES CENTER**

333 N. RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NV 89106
702.229.6301 | VOICE
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cityoflasvegas
lasvegasnevada.gov

June 10, 2020

Mr. Jeff Thomson
EPIC Mountain Edge, LLC & Mountain Sunrise View II Ltd Partnership
8912 Spanish Ridge Avenue, Ste. 200
Las Vegas, Nevada 89148

**RE: VAR-78447 [PRJ-77918] - VARIANCE RELATED TO SUP-78539,
VAC-78448 AND SDR-78449
PLANNING COMMISSION MEETING OF JUNE 9, 2020**

Dear Applicant:

The Planning Commission at a regular meeting held on June 9, 2020 voted to **APPROVE** a request for a Variance TO ALLOW A ZERO-FOOT SIDE YARD SETBACK WHERE 10 FEET IS REQUIRED; A ZERO-FOOT REAR YARD SETBACK WHERE 20 FEET IS REQUIRED; AND A 10-FOOT TALL RETAINING WALL AND 10-FOOT TALL SCREEN WALL WHERE 12 FEET IS THE MAXIMUM COMBINED HEIGHT ALLOWED on 4.93 acres on the north side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), C-1 (Limited Commercial) Zone, Ward 6 (Fiore) [PRJ-77918].

This approval is subject to the following conditions:

Planning

1. Approval of and conformance to the Conditions of Approval for Special Use Permit (SUP-78539) and Site Development Plan Review (SDR-78449) shall be required, if approved.
2. A Variance is hereby approved to allow 10-foot tall retaining walls and 10-foot tall perimeter walls where six feet is the maximum height allowed for retaining walls and six to eight feet is the maximum height allowed for perimeter walls.
3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.

4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
6. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

This action by the Planning Commission on **June 9, 2020** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **June 22, 2020**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Sr. Management Analyst
Case Planning Division

EM:nl

cc:

Mr. Larry Bitton
Horrocks Engineers
1401 N. Green Valley Pkwy., Ste. 160
Henderson, Nevada 89074



**LAS VEGAS
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lasvegasnevada.gov

June 10, 2020

Mr. Jeff Thomson
EPIC Mountain Edge, LLC & Mountain Sunrise View II Ltd Partnership
8912 Spanish Ridge Avenue, Ste. 200
Las Vegas, Nevada 89148

**RE: SUP-78539 [PRJ-77918] - SPECIAL USE PERMIT RELATED TO
VAR-78447, VAC-78448 AND SDR-78449
PLANNING COMMISSION MEETING OF JUNE 9, 2020**

Dear Applicant:

The Planning Commission at a regular meeting held on June 9, 2020 voted to **APPROVE** a request for a Special Use Permit FOR A MINI-STORAGE FACILITY USE on the north side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), C-1 (Limited Commercial) Zone, Ward 6 (Fiore) [PRJ-77918].

This approval is subject to the following conditions:

Planning

1. Conformance to all Minimum Requirements under LVMC Title 19.12 for a Mini-Storage Facility use.
2. Approval of and conformance to the Conditions of Approval for Variance (VAR-78447), Petition to Vacate (VAC-78448) and Site Development Plan Review (SDR-78449) shall be required.
3. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
4. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
5. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit, as well as submitted as part of any business license application.

6. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

This action by the Planning Commission on **June 9, 2020** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **June 22, 2020**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Sr. Management Analyst
Case Planning Division

EM:nl

cc:

Mr. Larry Bitton
Horrocks Engineers
1401 N. Green Valley Pkwy., Ste. 160
Henderson, Nevada 89074



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June 10, 2020

Mr. Jeff Thomson
EPIC Mountain Edge, LLC & Mountain Sunrise View II Ltd Partnership
8912 Spanish Ridge Avenue, Ste. 200
Las Vegas, Nevada 89148

**RE: VAC-78448 [PRJ-77918] - VACATION RELATED TO VAR-78447,
SUP-78539 AND SDR-78449
PLANNING COMMISSION MEETING OF JUNE 9, 2020**

Dear Applicant:

The Planning Commission at a regular meeting held on June 9, 2020 voted to **APPROVE** a request for a Petition to Vacate a 30-foot wide public sewer easement generally located on the north side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), Ward 6 (Fiore) [PRJ-77918].

This approval is subject to the following conditions:

1. The limits of this Petition of Vacation shall be the eastern 40 feet of existing right-of-way grant #N-90154/A being used as a Public Sewer Easement as shown by recorded document #20141203:00948 on file at the Clark County, Nevada Recorder's Office.
2. Prior to recordation of the Order of Vacation, grant a 30-foot Public Sewer Easement at a location acceptable to the Sanitary Sewer Section of the Department of Public Works.
3. All public improvements, if any, adjacent to and in conflict with this vacation application are to be modified, as necessary, at the applicant's expense prior to the recordation of an Order of Vacation.
4. All development shall be in conformance with code requirements and design standards of all City Departments.
5. The Order of Vacation shall not be recorded until all of the conditions of approval have been met provided, however, that conditions requiring modification of public improvements may be fulfilled for purposes of recordation by providing sufficient security for the performance thereof in accordance with the Subdivision Ordinance of the City of Las Vegas.

City Staff is empowered to modify this application if necessary because of technical concerns or because of other related review actions as long as current City right-of-way requirements are still complied with and the intent of the vacation application is not changed. If applicable, a five foot wide easement for public streetlight and fire hydrant purposes shall be retained on all vacation actions abutting public street corridors that will remain dedicated and available for public use. Also, if applicable and where needed, public easement corridors and sight visibility or other easements that would/should cross any right-of-way or easement being vacated must be retained.

6. If the Order of Vacation is not recorded within one (1) year after approval by the City of Las Vegas or an Extension of Time is not granted by the Planning Director, then approval will terminate and a new petition must be submitted.

This action by the Planning Commission on **June 9, 2020** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **June 22, 2020**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Sr. Management Analyst
Case Planning Division

EM:nl

cc:

Mr. Larry Bitton
Horrocks Engineers
1401 N. Green Valley Pkwy., Ste. 160
Henderson, Nevada 89074



**LAS VEGAS
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DEPARTMENT OF PLANNING
ROBERT SUMMERFIELD
DIRECTOR

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3RD FLOOR
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lasvegasnevada.gov

June 10, 2020

Mr. Jeff Thomson
EPIC Mountain Edge, LLC & Mountain Sunrise View II Ltd Partnership
8912 Spanish Ridge Avenue, Ste. 200
Las Vegas, Nevada 89148

**RE: SDR-78449 [PRJ-77918] - SITE DEVELOPMENT PLAN REVIEW
RELATED TO VAR-78447, SUP-78539 AND VAC-78448
PLANNING COMMISSION MEETING OF JUNE 9, 2020**

Dear Applicant:

The Planning Commission at a regular meeting held on June 9, 2020 voted to **APPROVE** a request for a Site Development Plan Review FOR A PROPOSED 647-UNIT, 107,829 SQUARE-FOOT MINI-STORAGE FACILITY WITH A WAIVER OF THE PERIMETER LANDSCAPE BUFFER REQUIREMENTS on 4.93 acres on the north side of Hammer Lane, approximately 338 feet east of Shaumber Road (APN 126-36-101-017), C-1 (Limited Commercial) Zone, Ward 6 (Fiore) [PRJ-77918].

This approval is subject to the following amended conditions:

Planning

1. Approval of and conformance to the Conditions of Approval for Variance (VAR-78447), Special Use Permit (SUP-78539) and Petition to Vacate (VAC-78448) shall be required, if approved.
2. This approval shall be void two years from the date of final approval, unless exercised pursuant to the provisions of LVMC Title 19.16. An Extension of Time may be filed for consideration by the City of Las Vegas.
3. All development shall be in conformance with the site plan date stamped 06/09/20; and the landscape plan and building elevations date stamped 03/11/20, except as amended by conditions herein.
4. A Waiver from Title 19.08 is hereby approved, to allow a zero-foot landscape buffer adjacent to a portion of the northern property line.
5. A Waiver from Title 19.08 is hereby approved, to allow a seven-foot wide landscape buffer adjacent to a portion of the eastern property line.

6. A Waiver from Title 19.08 is hereby approved, to allow a zero-foot wide landscape 6.buffer adjacent to a portion of the western property line where eight feet is required.
7. All necessary building permits shall be obtained and final inspections shall be completed in compliance with Title 19 and all codes as required by the Department of Building and Safety.
8. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
9. A technical landscape plan, signed and sealed by a Registered Architect, Landscape Architect, Residential Designer or Civil Engineer, must be submitted prior to or at the same time application is made for a building permit. A permanent underground sprinkler system is required, which shall be permanently maintained in a satisfactory manner; the landscape plan shall include irrigation specifications. Installed landscaping shall not impede visibility of any traffic control device. The technical landscape plan shall include the following changes from the conceptual landscape plan:
 - All planting materials must be selected from the Water Smart Landscapes Program Plant List available through the Southern Nevada Water Authority.
 - All trees shall be 36-inch box size.
 - 36-inch box shade trees shall be planted every 20 linear feet within the northern landscape buffer adjacent to CC 215.
 - Four, five-gallon shrubs shall be planted for every required tree.
10. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and shall be functioning prior to construction of any combustible structures.
11. All City Code requirements and design standards of all City Departments must be satisfied, except as modified herein.

Public Works

12. A Petition of Vacation, such as VAC-78448, shall record prior to the issuance of any building permits.
13. Dedicate 30 feet of right-of-way adjacent to this site for Hammer Lane prior to the issuance of any permits.
14. Concurrent with development of this site, construct all half street improvements on Hammer Lane adjacent to this site including appropriate pavement transitions both to the east and west of this site.

15. Concurrent with development, extend an 8-inch sanitary sewer line in Hammer Lane to the west edge of the site.
16. Obtain a new **30-ft** public sewer easement along an alignment acceptable to the Sanitary Sewer Planning Section of the Department of Public Works and vacate the existing public sewer easement prior to issuance of permits (see also VAC-78448).
17. Maintain paved drivable access for city maintenance vehicles to all public sewer manholes within the Public Sewer Easement. No trees or vegetation over 3 feet tall is allowed within the Public Sewer Easement. No structures, other than the proposed covered parking awnings, are allowed within the public sewer easement.
18. Coordinate with the Sanitary Sewer Section of the Department of Public Works for an acceptable sewer connection point.
19. All landscaping and private improvements installed with this project shall be situated and maintained so as to not create sight visibility obstructions for vehicular traffic at all development access drives and abutting street intersections.
20. A Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works prior to the issuance of any building or grading permits or submittal of any construction drawings, whichever may occur first. Provide and improve all drainageways recommended in the approved drainage plan/study. The developer of this site shall be responsible to construct such neighborhood or local drainage facility improvements as are recommended by the City of Las Vegas Neighborhood Drainage Studies and approved Drainage Plan/Study concurrent with development of this site.

This action by the Planning Commission on **June 9, 2020** is final unless a written appeal is filed with the City Clerk within ten days of the date of the Planning Commission's decision as allowed by code or there is a review action filed by the City Council within the same time period. For additional information on appeals or review requests submitted please access <https://www.lasvegasnevada.gov/Business/Permits-Licenses/Building-Permits/Permit-Application-Status>, or contact the Department of Planning and Development at 702.229.6301 after **June 22, 2020**. No building permits or business licenses related to these items shall be issued prior to the expiration of the required ten day waiting period, or until any filed appeal is resolved pursuant to LVMC Title 19.18.

Sincerely,



Eric McCammond
Sr. Management Analyst
Case Planning Division

SDR-78449 [PRJ-77918] - Page Four
June 10, 2020

EM:nl

cc:

Mr. Larry Bitton
Horrocks Engineers
1401 N. Green Valley Pkwy., Ste. 160
Henderson, Nevada 89074



September 22, 2020

Linda Hartman
Department of Planning
333 N. Rancho Drive, 3rd Floor
Las Vegas, NV 89106

RE: Justification Letter for Grading Exceeding 2-ft
DS5314 / PRJ-77918 / SUP-78539 / VAR-78447 / VAR-78448 / ZON-77995 / SDR 78449
APN 126-25-201-010

Dear Ms. Hartman:

On behalf of Epic Development, LLC we hereby request City of Las Vegas approval satisfying the requirement of CLV Flood Control Comment 4 in August 18 Drainage Study Review Letter (attached). Accompanying this request are copies of the Grading/Drainage plans and Details.

The development was approved under the above-referenced land use applications. Note that the variances included waivers for wall height along the site perimeter necessary to accommodate the grade change across the site.

It is necessary to grade the parcel with adjustments of more than 2' of lowering or raising due to steep topography and in order to maintain a drainage pattern that protects adjacent properties. In addition, two drainage washes traverse the site creating areas of fill greater than two feet.

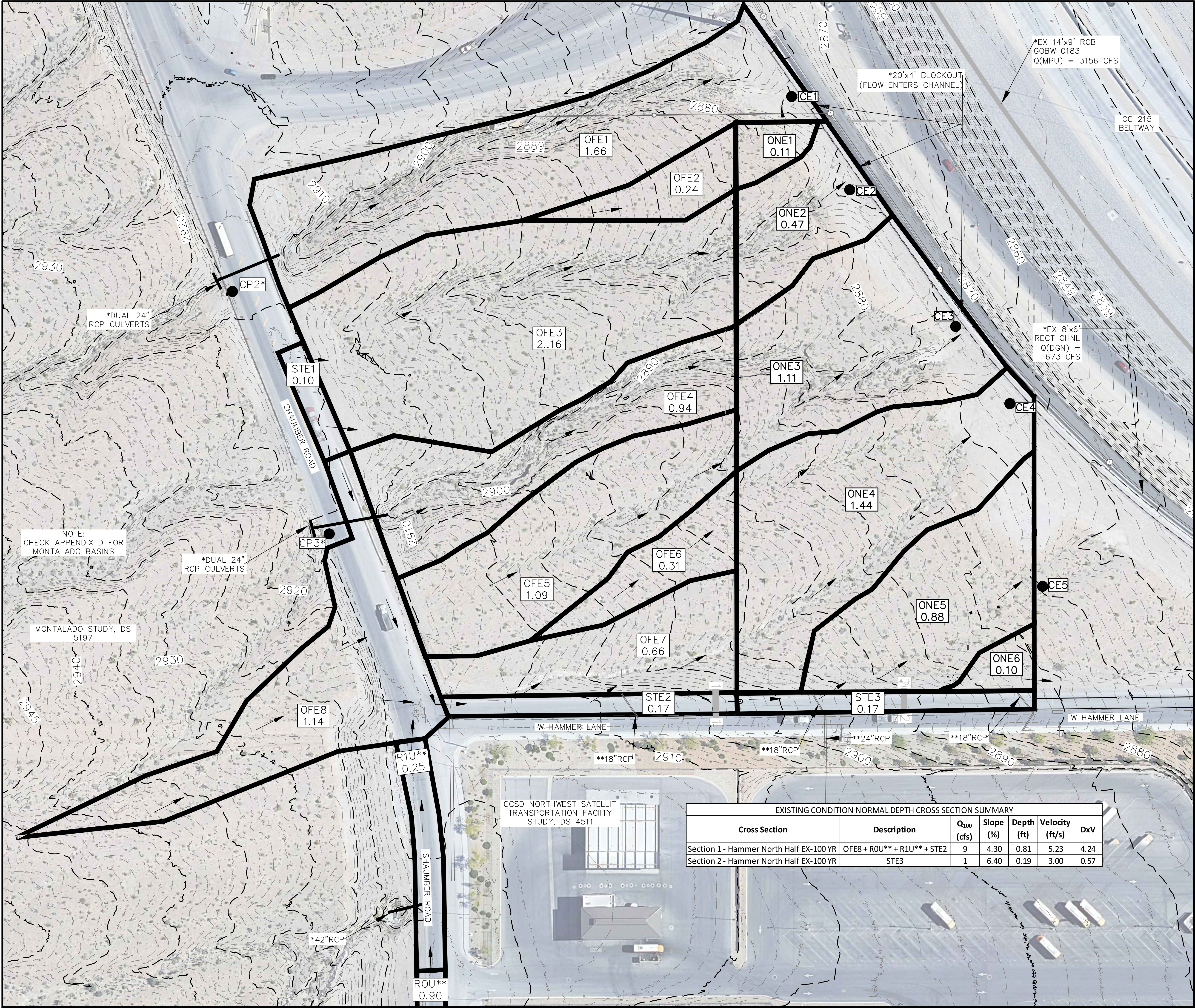
We appreciate your approval of this condition and subsequent notifying of Albert Sung in CLV Flood Control so the technical drainage study can be approved.

Please do not hesitate to contact me with any questions or if additional information is needed to justify this application.

Sincerely,
Horrocks Engineers

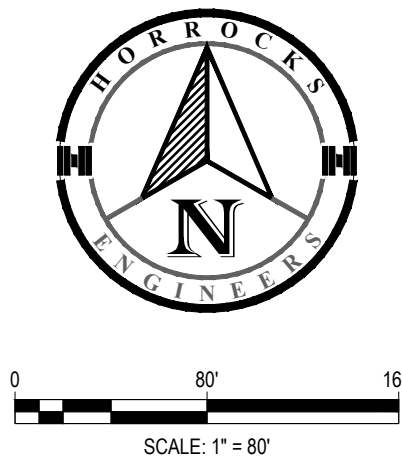
Anthony C. DeLeon Jr., PE
Project Manager

Attachments



EXISTING CONDITION NORMAL DEPTH CROSS SECTION SUMMARY						
Cross Section	Description	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
Section 1 - Hammer North Half EX-100 YR	OFE8 + ROU** + R1U** + STE2	9	4.30	0.81	5.23	4.24
Section 2 - Hammer North Half EX-100 YR	STE3	1	6.40	0.19	3.00	0.57

EXISTING CONDITION HYDROLOGIC SUMMARY			
Basin	Area (acres)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
CP2*	-	6	15
CP3*	-	14	36
ROU**	-	2	4
R1U**	-	1	1
CE1	-	8	20
CE2	-	3	8
CE3	-	18	44
CE4	-	7	16
CE5	-	1	3
OFE1	1.66	2	5
OFE2	0.24	<1	1
OFE3	2.16	2	6
OFE4	0.94	1	3
OFE5	1.09	1	3
OFE6	0.31	<1	1
OFE7	0.66	1	2
OFE8	1.14	2	3
ONE1	0.11	<1	<1
ONE2	0.47	<1	1
ONE3	1.11	1	3
ONE4	1.44	2	4
ONE5	0.88	1	2
ONE6	0.10	<1	<1
STE1	0.10	<1	1
STE2	0.17	<1	1
STE3	0.17	<1	1
CE1= CP2* + OFE1 + OFE2 + ONE1			
CE2= STE1 + OFE3 + ONE2			
CE3= CP3* + OFE4 + OFE5+ ONE3			
CE4= OFE8 + ROU** + R1U** + OFE7 + OFE6 + STE2 + ONE4			
CE5 = STE3 + ONE5			
Note:			
1) *Referenced from the Montalado Study			
2) **Referenced from the CCSD Study			



- KEY:**
- ONE4 1.44 BASIN NAME/AREA
 - CE5 CONCENTRATION POINT
 - FLOW DIRECTION
 - 2 2 CROSS SECTION
 - BASIN BOUNDARY
 - - - PRORATE BASIN BOUNDARY
 - EXISTING REGIONAL FACILITY

HORROCKS

ENGINEERS

1401 N. Green Valley Pkwy., Suite 160
Henderson, NV 89074
(702) 966-4063
www.horrock.com

WARNING

0 1 2

IF THIS BAR DOES NOT MEASURE 2" THEN DRAWING IS NOT TO SCALE

REVISIONS

REV # DATE

03/27/2018

DESIGNED: MDP

DRAWN: SS

CHECKED: LMB

PROJECT: NV-1023-1801

PRELIMINARY

NOT FOR CONSTRUCTION

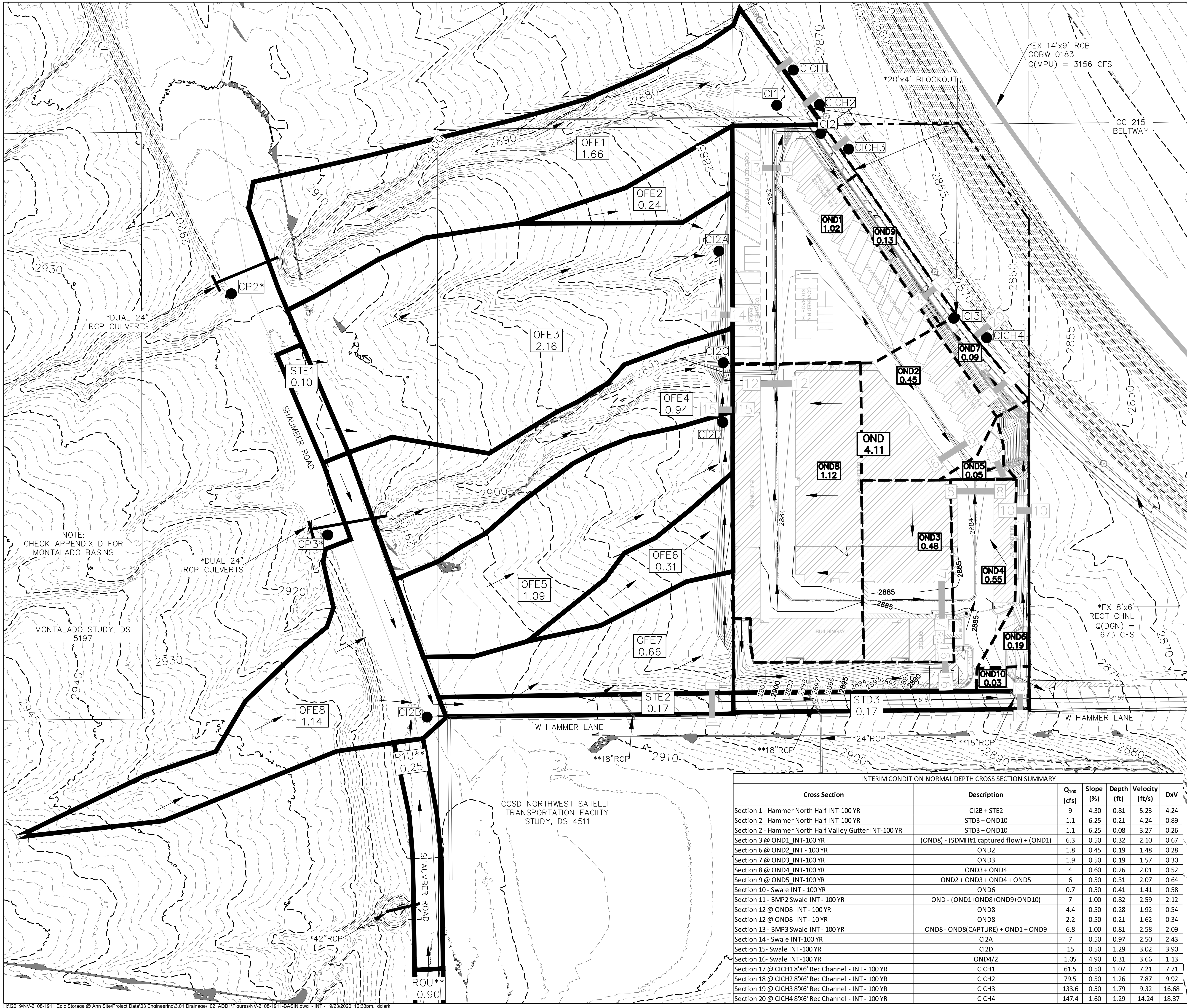
EPIC STORAGE AT ANN ROAD

HARMONY HOMES LLC

CITY OF LAS VEGAS, NEVADA

EXISTING CONDITIONS BASIN MAP

APN# 126-36-101-017



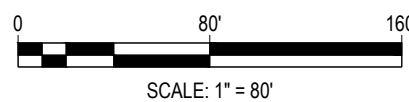
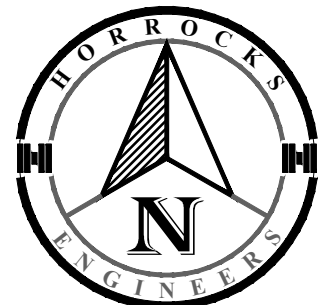
INTERIM CONDITION HYDROLOGIC SUMMARY			
Basin	Area (acres)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)
C11	-	10	18
C12	-	24.3	54.1
C12A	-	3	7
C12B	-	4	8
C12C	-	23	52
C12D	-	7	15
C13	-	6.6	13.8
C1CH1***	-	-	61.5
C1CH2	-	-	79.5
C1CH3	-	-	133.6
C1CH4	-	-	147.4
CP2*	-	9	13
CP3*	-	13	28
OFE1	1.66	2	5
OFE2	0.24	<1	1
OFE3	2.16	2	6
OFE4	0.94	1	3
OFE5	1.09	1	3
OFE6	0.31	<1	1
OFE7	0.66	1	2
OFE8	1.14	2	3
OND	4.11	8	16
ROU**	-	2	4
R1U**	-	1	1
STD3	0.17	<1	1
STE1	0.10	<1	1
STE2	0.17	<1	1

C11 = CP2* + OFE1
C12A = STE1 + OFE3 + OFE2
C12B = OFE8 + ROU** + R1U**
C12C = CP3* + C12A + C12D + OFE4
C12D = C12B + OFE5 + OFE6 + OFE7 + STE2
C12 = C12C + OND8 (CAPTURE)
C13 = OND - (OND8 (CAPTURE) + OND10)
C1CH2 = C1CH1 + C11
C1CH3 = C1CH2 + C12
C1CH4 = C1CH3 + C13

Note:
*Referenced from the Montalado Study
**Referenced from the CCSD Study
***Referenced from the Beltway Study, CH2MHill/G.C. Wallace

PRORATE SUMMARY TABLE					
BASIN ID	AREA (acre)	Q100		Q10	
		FLOW (CFS)	FLOWRA TE	FLOW (CFS)	FLOWRA TE
OND	4.11	16	3.9	8.0	1.9
OND1	1.02	4.0	3.9	2.0	1.9
OND2	0.45	1.8	3.9	0.9	1.9
OND3	0.48	1.9	3.9	0.9	1.9
OND4	0.55	2.1	3.9	1.1	1.9
OND5	0.05	0.2	3.9	0.1	1.9
OND6	0.19	0.7	3.9	0.4	1.9
OND7	0.09	0.4	3.9	0.2	1.9
OND8	1.12	4.4	3.9	2.2	1.9
OND9	0.13	0.5	3.9	0.3	1.9
OND10	0.03	0.1	3.9	0.1	1.9
SUM	4.11	16.0	3.9	8.0	1.9

DRAINAGE FACILITY SUMMARY TABLE			
FACILITY ID	FACILITY DESCRIPTION	Q100 (CFS)	NOTES
P1	36" RCP	56	CUZC flow
P2	36" RCP	58.1	CUZC + SDMMH#1 Captured Flow
P3	30" RCP	58.1	CUZC + SDMMH#1 Captured Flow
SDMMH#1	Grated Manhole	2.1	Neehah # R-1792
SDDI2	Area Inlet	6.8	Neehah # R-4358



KEY:

OFE4
0.94

BASIN NAME/AREA

OND2
0.40

PRORATE BASIN NAME/AREA

C11

CONCENTRATION POINT

Flow direction arrow

FLOW DIRECTION

2

CROSS SECTION

Thick solid line

BASIN BOUNDARY

Dashed line

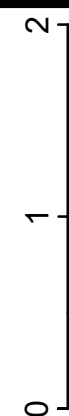
PRORATE BASIN BOUNDARY

Thin solid line

EXISTING REGIONAL FACILITY

INTERIM CONDITION NORMAL DEPTH CROSS SECTION SUMMARY						
Cross Section	Description	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV
Section 1 - Hammer North Half INT-100 YR	C12B + STE2	9	4.30	0.81	5.23	4.24
Section 2 - Hammer North Half INT-100 YR	STD3 + OND10	1.1	6.25	0.21	4.24	0.89
Section 2 - Hammer North Half Valley Gutter INT-100 YR	STD3 + OND10	1.1	6.25	0.08	3.27	0.26
Section 3 @ OND1 INT-100 YR	(OND8) - (SDMH#1 captured flow) + (OND1)	6.3	0.50	0.32	2.10	0.67
Section 6 @ OND2 INT - 100 YR	OND2	1.8	0.45	0.19	1.48	0.28
Section 7 @ OND3 INT-100 YR	OND3	1.9	0.50	0.19	1.57	0.30
Section 8 @ OND4 INT-100 YR	OND3 + OND4	4	0.60	0.26	2.01	0.52
Section 9 @ OND5 INT-100 YR	OND2 + OND3 + OND4 + OND5	6	0.50	0.31	2.07	0.64
Section 10 - Swale INT - 100 YR	OND6	0.7	0.50	0.41	1.41	0.58
Section 11 - BMP2 Swale INT - 100 YR	OND - (OND1+OND8+OND9+OND10)	7	1.00	0.82	2.59	2.12
Section 12 @ OND8 INT - 100 YR	OND8	4.4	0.50	0.28	1.92	0.54
Section 12 @ OND8 INT - 10 YR	OND8	2.2	0.50	0.21	1.62	0.34
Section 13 - BMP3 Swale INT - 100 YR	OND8 - OND8(CAPTURE) + OND1 + OND9	6.8	1.00	0.81	2.58	2.09
Section 14 - Swale INT-100 YR	C12A	7	0.50	0.97	2.50	2.43
Section 15- Swale INT-100 YR	C12D	15	0.50	1.29	3.02	3.90
Section 16- Swale INT-100 YR	OND4/2	1.05	4.90	0.31	3.66	1.13
Section 17 @ C1CH1 8'X6' Rec Channel - INT - 100 YR	C1CH1	61.5	0.50	1.07	7.21	7.71
Section 18 @ C1CH2 8'X6' Rec Channel - INT - 100 YR	C1CH2	79.5	0.50	1.26	7.87	9.92
Section 19 @ C1CH3 8'X6' Rec Channel - INT - 100 YR	C1CH3	133.6	0.50	1.79	9.32	16.68
Section 20 @ C1CH4 8'X6' Rec Channel - INT - 100 YR	C1CH4	147.4	1.60	1.29	14.24	18.37

WARNING



IF THIS BAR DOES NOT MEASURE 2" THEN DRAWING IS NOT TO SCALE

REVISIONS
REV # DATE

DRAWING INFO
DATE: 03/27/2018
DESIGNED: MDP
DRAWN: SS
CHECKED: LMB
PROJECT: NV-1029-1801

PRELIMINARY
NOT
FOR
CONSTRUCTION

EPIC STORAGE AT ANN ROAD

HARMONY HOMES LLC
CITY OF LAS VEGAS, NEVADA

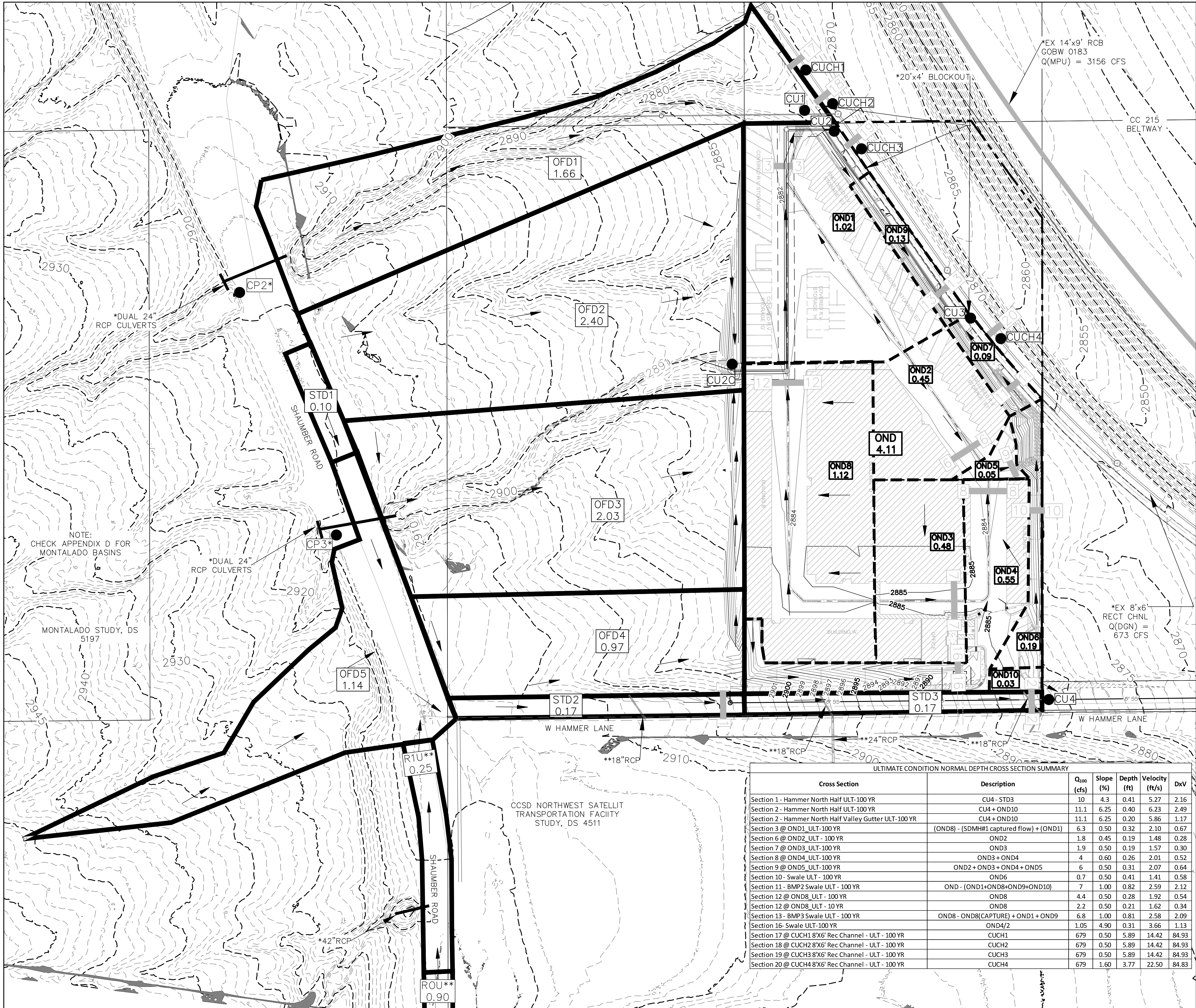
INTERIM CONDITIONS BASIN MAP

APN# 126-36-101-017



6

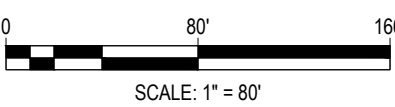
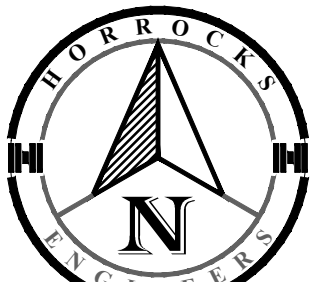
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ULTIMATE CONDITION HYDROLOGIC SUMMARY			
Basin	Area (acres)	Q ₁₀₀ (cfs)	Q ₁₀₀ (cfs)
CP2*	-	9	16
CP3*	-	21	35
ROU**	-	2	4
R1U**	-	1	1
CU1	-	12	22
CU2C	-	31	56
CU2	-	32.3	58.1
CU3	-	6.6	13.8
CU4	-	6	11
CUCH1***	-	-	679
CUCH2***	-	-	679
CUCH3***	-	-	679
CUCH4***	-	-	679
OFD1	1.66	3	6
OFD2	2.40	5	10
OFD3	2.03	4	8
OFD4	0.97	2	4
OFD5	1.14	2	5
OND	4.11	8	16
STD1	0.10	<1	1
STD2	0.17	<1	1
STD3	0.17	<1	1
CU1= CP2* + OFD1			
CU2C = CP3* + OFD2 + OFD3 + OFD4			
CU2 = CU2C + OND8 (CAPTURE)			
CU3 = OND - (OND8 (CAPTURE) + OND10)			
CU4 = STD1 + OFD5 + ROU** + R1U** + STD2 + STD3			
*Referenced from the Montalado Study			
**Referenced from the CCSD Study			
*** Referenced from the future conditions of the Beltway Study, CH2MHill and G.C. Wallace			

PRORATE SUMMARY TABLE					
BASIN ID	AREA (acre)	Q100		Q10	
		FLOW (CFS)	FLOWRA TE	FLOW (CFS)	FLOWRA TE
OND	4.11	16	3.9	8.0	1.9
OND1	1.02	4.0	3.9	2.0	1.9
OND2	0.45	1.8	3.9	0.9	1.9
OND3	0.48	1.9	3.9	0.9	1.9
OND4	0.55	2.1	3.9	1.1	1.9
OND5	0.05	0.2	3.9	0.1	1.9
OND6	0.19	0.7	3.9	0.4	1.9
OND7	0.09	0.4	3.9	0.2	1.9
OND8	1.12	4.4	3.9	2.2	1.9
OND9	0.13	0.5	3.9	0.3	1.9
OND10	0.03	0.1	3.9	0.1	1.9
SUM	4.11	16.0	3.9	8.0	1.9

DRAINAGE FACILITY SUMMARY TABLE			
FACILITY ID	FACILITY DESCRIPTION	Q100 (CFS)	NOTES
P1	36" RCP	56	CU2C Flow
P2	36" RCP	58.1	CU2C + SDMH#1 Captured Flow
P3	30" RCP	58.1	CU2C + SDMH#1 Captured Flow
SDMH#1	Grated Manhole	2.1	Neehah # R-1792
SDI#2	Area Inlet	6.8	Neehah # R-4358



KEY:

OFD1
1.92

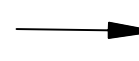
BASIN NAME/AREA

OND2
0.40

PRORATE BASIN
NAME/AREA

CU1

CONCENTRATION POINT



FLOW DIRECTION

2

CROSS SECTION



BASIN BOUNDARY



PRORATE BASIN
BOUNDARY



EXISTING REGIONAL
FACILITY

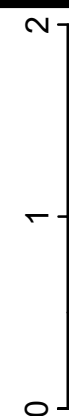
ULTIMATE CONDITION NORMAL DEPTH CROSS SECTION SUMMARY					
Cross Section	Description	Q ₁₀₀ (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)
Section 1 - Hammer North Half ULT-100 YR	CU4 - STD3	10	4.3	0.41	5.27
Section 2 - Hammer North Half ULT-100 YR	CU4 + OND10	11.1	6.25	0.40	6.23
Section 2 - Hammer North Half Valley Gutter ULT-100 YR	CU4 + OND10	11.1	6.25	0.20	5.86
Section 3 @ OND1 ULT-100 YR	(OND8) - (SDMH#1 captured flow) + (OND1)	6.3	0.50	0.32	2.10
Section 6 @ OND2 ULT- 100 YR	OND2	1.8	0.45	0.19	1.48
Section 7 @ OND3 ULT-100 YR	OND3	1.9	0.50	0.19	1.57
Section 8 @ OND4 ULT-100 YR	OND3 + OND4	4	0.60	0.26	2.01
Section 9 @ OND5 ULT-100 YR	OND2 + OND3 + OND4 + OND5	6	0.50	0.31	2.07
Section 10 - Swale ULT - 100 YR	OND6	0.7	0.50	0.41	1.41
Section 11 - BMP2 Swale ULT - 100 YR	OND - (OND1+OND8+OND9+OND10)	7	1.00	0.82	2.59
Section 12 @ OND8 ULT - 100 YR	OND8	4.4	0.50	0.28	1.92
Section 12 @ OND8 ULT - 10 YR	OND8	2.2	0.50	0.21	1.62
Section 13 - BMP3 Swale ULT - 100 YR	OND8 - OND8(CAPTURE) + OND1 + OND9	6.8	1.00	0.81	2.58
Section 16 - Swale ULT-100 YR	OND4/2	1.05	4.90	0.31	3.66
Section 17 @ CUCH1 8'X6' Rec Channel - ULT - 100 YR	CUCH1	679	0.50	5.89	14.42
Section 18 @ CUCH2 8'X6' Rec Channel - ULT - 100 YR	CUCH2	679	0.50	5.89	14.42
Section 19 @ CUCH3 8'X6' Rec Channel - ULT - 100 YR	CUCH3	679	0.50	5.89	14.42
Section 20 @ CUCH4 8'X6' Rec Channel - ULT - 100 YR	CUCH4	679	1.60	3.77	22.50

HORROCKS
ENGINEERS

1401 N. Green Valley Pkwy., Suite 160
Henderson, NV 89074

(702) 966-4063
www.horrock.com

WARNING



IF THIS BAR DOES NOT
MEASURE 2" THEN
DRAWING IS NOT TO SCALE

REVISIONS

REV #

DATE

DRAWING INFO

DATE 03/27/2018

DESIGNED

MDP

DRAWN

SS

CHECKED

LMB

PROJECT

NV-1029-1801

PRELIMINARY
NOT
FOR
CONSTRUCTION

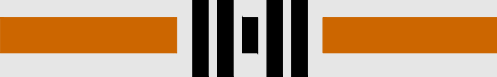
EPIC STORAGE AT ANN ROAD

HARMONY HOMES LLC

CITY OF LAS VEGAS, NEVADA

DEVELOPED CONDITIONS BASIN MAP

APN# 126-36-101-017



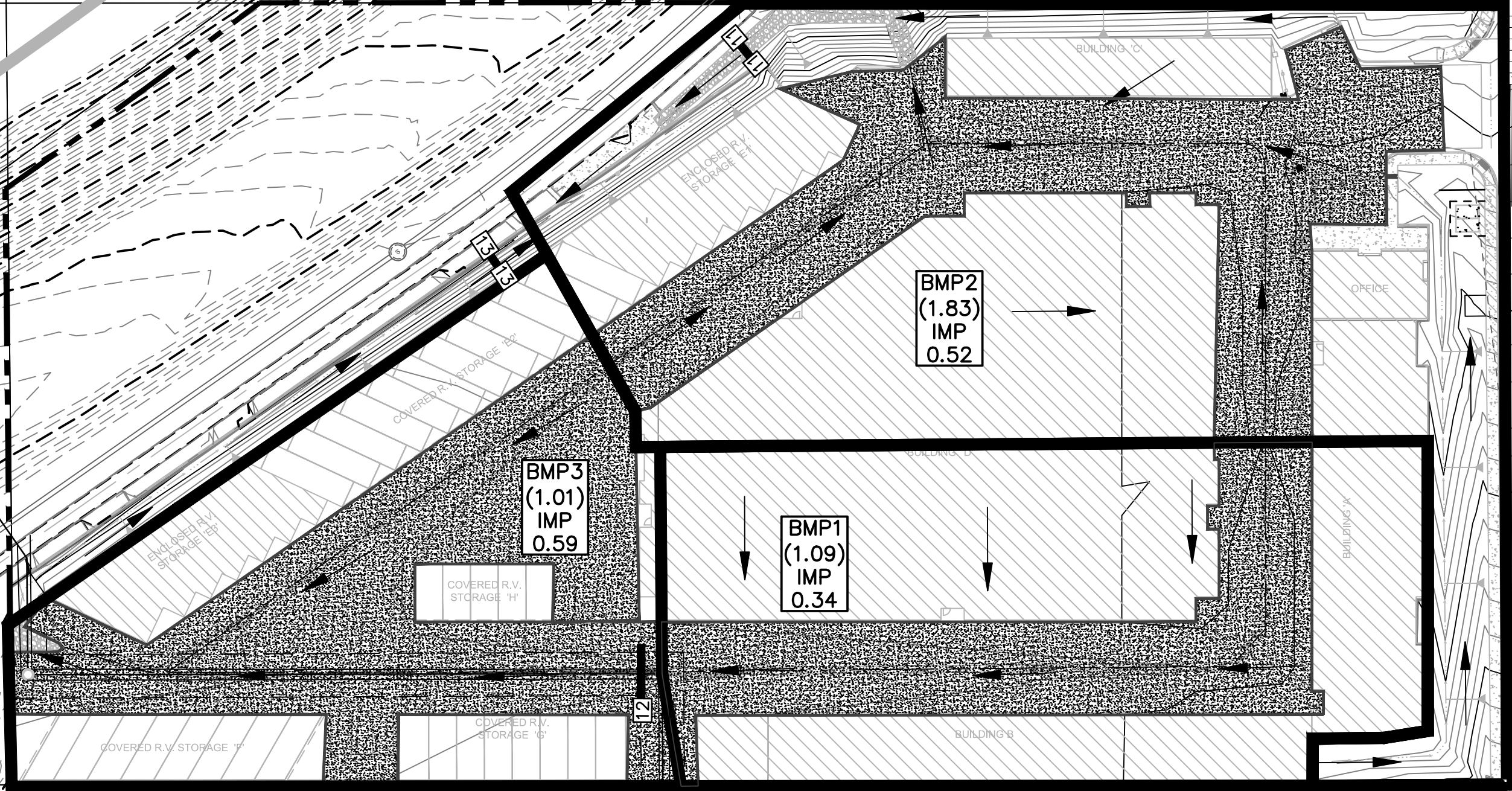
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PAGE

H:\2019\NV-2108-1011 Epic Storage @ Ann Site\Project Data\03 Engineering\3.01 Drainage\02_ADD\1\Figures\NV-2108-1011-BASIN.dwg David Clark 9/23/2020 12:45 PM

BMP Swale Summary for 2-Year							
Cross Section	Description	Q2 (cfs)	Slope (%)	Depth (ft)	Velocity (ft/s)	DxV	Notes
Section 13 - BMP3 Swale INT & ULT - 2 YR	BMP3 IMPVIOUS TREATED	0.80	1.00	0.36	1.51	0.54	BMP3 Flow + SDMH#1 Bypass
Section 11 - BMP2 Swale INT & ULT - 2 YR	BMP2 IMPVIOUS TREATED	1.30	1.00	0.44	1.70	0.75	BMP2 Flow
Section 12 - BMP1 INT & ULT - 2 YR	BMP 1 UNTREATED	0.8	0.50	0.13	1.27	0.17	BMP1 Flow

BMP BASIN				
BASIN	AREA (AC)	Q2 (CFS)	FLOWRATE (CFS/AC)	Note
OND	4.11	3	0.7	
TOTAL BMP	3.93	2.8	0.7	
BMP1	1.09	0.8	0.7	Section 12 - Untreated
BMP2	1.83	1.3	0.7	Section 11
BMP3	1.01	0.7	0.7	Section 13
Treated: (BMP2 + BMP3 IMP)/(TOTAL IMP) = 1.11/1.45* 100 = 76% <---Above 75%. Criteria Met.				



KEY:

OFD1
1.92

BASIN NAME/AREA

BASIN BOUNDARY

IMPERVIOUS AREA

11-11

CROSS SECTION

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Pleasant Grove, UT 84062

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WARNING

0 1/2 1

IF THIS BAR DOES NOT
MEASURE 1" THEN DRAWING
IS NOT TO SCALE

EPIC STORAGE AT ANN ROAD

BMP FIGURE

DRAWING INFO	
DATE	09/23/20
SCALE	1" = 50'
REV #	DATE
*SEE 2nd SHEET FOR LISTING	
PROJ. NO:	

8

PAGE 01



Appendix B – Hydrologic Calculations

Normal Depth Calculations

Drop Inlet Calculations – Weir/Orifice

WSPG Model

Ex Concrete Channel Normal Depth Calculations

INTERIM MODEL

```

1*****
*                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
*           JUN  1998             *
*           VERSION 4.1           *
*                                     *
* RUN DATE   22SEP20  TIME  23:18:14 *
*                                     *
*****

```

INTERIM100

```

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

```

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

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
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

[illegible]

1

HEC-1 INPUT

PAGE 2

```

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

46      KK      CP3A*
47      KM      COMBINES PON3, EXOFF7, AND EXOFF8.
48      HC      3
        *

49      KK      D3AN
50      KM      DIVERSION (PROVIDE DISCRIPTION HERE, THIS IS A TYP. DIVERSION CARD)
51      KM      ('DT' IS NAME OF WHAT YOU ARE DIVERTING;'DI' IS THE TOTAL FLOW; THE 'DQ' CARD
52      KM      IS THE AMOUNT DIVERTED)
53      DT      DIV3
54      DI      14      31
55      DQ      6      12
        *

56      KK      PON4
57      KM      MONTALADO REFERENCE STUDY ONSITE BASIN INPUT PARAMETERS
58      BA      .0013
59      LS      0      95.0
60      UD      0.050
        *

61      KK      CP2A*
62      KM      COMBINES D3AN AND PON4.
63      HC      2
        *

64      KK      D2AN
65      KM      DIVERSION (PROVIDE DISCRIPTION HERE, THIS IS A TYP. DIVERSION CARD)
66      KM      ('DT' IS NAME OF WHAT YOU ARE DIVERTING;'DI' IS THE TOTAL FLOW; THE 'DQ' CARD
67      KM      IS THE AMOUNT DIVERTED)
68      KM      DIV2 FLOWS TOWARD EXISTING DUAL 24" RCP CULVERTS (X2)
69      KM      D2AN FLOWS NORTH ALONG PICO VIEJO ST
70      DT      DIV2
71      DI      10      22
72      DQ      8      12
        *

73      KK      DIV2
74      KM      RETRIEVE DIV2 - (THIS CARD RETRIEVES THE DIVERTED FLOW)
75      DR      DIV2
        *

76      KK      EXOFF4
77      KM      MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS
78      BA      .0007
79      LS      0      89.2
80      UD      0.100
        *

```

1

HEC-1 INPUT

PAGE 3

```

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

81      KK      CP2*
82      KM      COMBINES DIV2 AND EXOFF4.
83      HC      2
        *

84      KK      OFE1
85      BA      .0026
86      LS      0      88.0
87      UD      0.100
        *

88      KK      CI1
89      KM      COMBINES CP2* AND OFE1.
90      HC      2
        *

91      KK      STE1
92      BA      .0002
93      LS      0      98.0
94      UD      0.050
        *

95      KK      OFE3
96      BA      .0034
97      LS      0      88.0
98      UD      0.100
        *

99      KK      OFE2
100     BA      .0004
101     LS      0      88.0

```

INTERIM100

102	UD	0.100	
	*		
103	KK	CI2A	
104	KM	COMBINES STE1, OFE3, AND OFE2.	
105	HC	3	
	*		
106	KK	EXOFF6	
107	KM	MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS	
108	BA	.0065	
109	LS	0	88.0
110	UD	0.100	
	*		
111	KK	EXOFF5	
112	KM	MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS	
113	BA	.0027	
114	LS	0	88.7
115	UD	0.100	
	*		

1

HEC-1 INPUT

PAGE 4

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

116	KK	DIV3	
117	KM	RETRIEVE DIV3 - (THIS CARD RETRIEVES THE DIVERTED FLOW)	
118	KM	DIV3 FLOWS TOWARD EXISTING DUAL 24" RCP CULVERTS (X1)	
119	DR	DIV3	
	*		
120	KK	CP3*	
121	KM	COMBINES EXOFF6, EXOFF5, AND DIV3.	
122	HC	3	
	*		
123	KK	OFE8	
124	BA	.0018	
125	LS	0	91.0
126	UD	0.100	
	*		
127	KK	R0U**	
128	BA	.0014	
129	LS	0	98.0
130	UD	0.050	
	*		
131	KK	R1U**	
132	BA	.0004	
133	LS	0	98.0
134	UD	0.050	
	*		
135	KK	CI2B	
136	KM	COMBINES OFE8, R0U** AND R1U**	
137	HC	3	
	*		
138	KK	OFE5	
139	BA	.0017	
140	LS	0	88.0
141	UD	0.100	
	*		
142	KK	OFE6	
143	BA	.0005	
144	LS	0	88.0
145	UD	0.100	
	*		
146	KK	OFE7	
147	BA	.0010	
148	LS	0	88.0
149	UD	0.100	
	*		

1

HEC-1 INPUT

PAGE 5

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

150	KK	STE2	
151	BA	.0003	
152	LS	0	98.0
153	UD	0.050	
	*		
154	KK	CI2D	
155	KM	COMBINES CI2B, OFE5, OFE6, OFE7, STE2.	

156	HC	5	
	*		
	*		
157	KK	OFE4	
158	BA	.0015	
159	LS	0	88.0
160	UD	0.100	
	*		
161	KK	CI2C	
162	KM	COMBINES CI2A, CP3*, CI2D, AND OFE4	
163	HC	4	
	*		
164	KK	OND	
165	BA	.0064	
166	LS	0	95.0
167	UD	0.050	
	*		
168	KK	STD3	
169	BA	.0003	
170	LS	0	98.0
171	UD	0.050	
	*		
	*		
	*		
172	ZZ		

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
22	PON3	
	.	
36	EXOFF7	
	.	
41	EXOFF8	
	.	
46	CP3A*.....	
	.	
53	-----> DIV3	
49	D3AN	
	.	
56	PON4	
	.	
61	CP2A*.....	
	.	
70	-----> DIV2	
64	D2AN	
	.	
75	<----- DIV2	
73	DIV2	
	.	
76	EXOFF4	
	.	
81	CP2*.....	
	.	
84	OFE1	
	.	
88	CI1.....	
	.	
91	STE1	
	.	
95	OFE3	
	.	
99	OFE2	
	.	
103	CI2A.....	
	.	
	.	

INTERIM100

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 .55

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 1.00	RATIO 2 .55
HYDROGRAPH AT					
+	PON3	.01	1 FLOW	18.	9.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	EXOFF7	.01	1 FLOW	12.	5.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	EXOFF8	.00	1 FLOW	1.	0.
			TIME	3.50	3.50
3 COMBINED AT					
+	CP3A*	.01	1 FLOW	31.	14.
			TIME	3.50	3.50
DIVERSION TO					
+	DIV3	.01	1 FLOW	12.	6.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	D3AN	.01	1 FLOW	19.	8.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	PON4	.00	1 FLOW	3.	2.
			TIME	3.50	3.50
2 COMBINED AT					
+	CP2A*	.02	1 FLOW	22.	10.
			TIME	3.50	3.50
DIVERSION TO					
+	DIV2	.02	1 FLOW	12.	8.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	D2AN	.02	1 FLOW	10.	2.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	DIV2	.00	1 FLOW	12.	8.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	EXOFF4	.00	1 FLOW	1.	1.
			TIME	3.50	3.50
2 COMBINED AT					
+	CP2*	.00	1 FLOW	13.	9.
			TIME	3.50	3.50
HYDROGRAPH AT					

						INTERIM100
+	OFE1	.00	1	FLOW TIME	5. 3.50	2. 3.50
2 COMBINED AT						
+	CI1	.00	1	FLOW TIME	18. 3.50	10. 3.50
HYDROGRAPH AT						
+	STE1	.00	1	FLOW TIME	1. 3.50	0. 3.50
HYDROGRAPH AT						
+	OFE3	.00	1	FLOW TIME	6. 3.50	2. 3.50
HYDROGRAPH AT						
+	OFE2	.00	1	FLOW TIME	1. 3.50	0. 3.50
3 COMBINED AT						
+	CI2A	.00	1	FLOW TIME	7. 3.50	3. 3.50
HYDROGRAPH AT						
+	EXOFF6	.01	1	FLOW TIME	11. 3.50	5. 3.50
HYDROGRAPH AT						
+	EXOFF5	.00	1	FLOW TIME	5. 3.50	2. 3.50
HYDROGRAPH AT						
+	DIV3	.00	1	FLOW TIME	12. 3.50	6. 3.50
3 COMBINED AT						
+	CP3*	.01	1	FLOW TIME	28. 3.50	13. 3.50
HYDROGRAPH AT						
+	OFE8	.00	1	FLOW TIME	3. 3.50	2. 3.50
HYDROGRAPH AT						
+	R0U**	.00	1	FLOW TIME	4. 3.50	2. 3.50
HYDROGRAPH AT						
+	R1U**	.00	1	FLOW TIME	1. 3.50	1. 3.50
3 COMBINED AT						
+	CI2B	.00	1	FLOW TIME	8. 3.50	4. 3.50
HYDROGRAPH AT						
+	OFE5	.00	1	FLOW TIME	3. 3.50	1. 3.50
HYDROGRAPH AT						
+	OFE6	.00	1	FLOW TIME	1. 3.50	0. 3.50
HYDROGRAPH AT						
+	OFE7	.00	1	FLOW TIME	2. 3.50	1. 3.50
HYDROGRAPH AT						
+	STE2	.00	1	FLOW TIME	1. 3.50	0. 3.50
5 COMBINED AT						
+	CI2D	.01	1	FLOW TIME	15. 3.50	7. 3.50
HYDROGRAPH AT						
+	OFE4	.00	1	FLOW TIME	3. 3.50	1. 3.50
4 COMBINED AT						
+	CI2C	.02	1	FLOW TIME	53. 3.50	23. 3.50
HYDROGRAPH AT						
+	OND	.01	1	FLOW TIME	16. 3.50	8. 3.50
HYDROGRAPH AT						
+	STD3	.00	1	FLOW TIME	1. 3.50	0. 3.50

INTERIM100

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

ULTIMATE MODEL

```

1 *****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*      JUN 1998 *
*      VERSION 4.1 *
* RUN DATE 20SEP20 TIME 16:37:05 *
* *****
*****

ULTIMATE100

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

```

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

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

```

1      ID
2      ID
3      ID
4      ID
5      ID
6      ID
7      ID
8      ID
9      ID
10     ID
11     ID
12     ID
13     ID
14     ID
15     ID
16     ID
17     ID
18     IT
19     IO
20     IN
21     JR
      *

```

[illegible]

```

36      KK      UOFF7
37      KM      MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS
38      BA      .0067
39      LS      0      95
40      UD      0.057
      *

```

41	KK	UOFF8	
42	KM	MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS	
43	BA	.0007	
44	LS	0	95.0
45	UD	0.050	

1

HEC-1 INPUT

PAGE 2

```

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

46      KK      CP3A*
47      KM      COMBINES PON3, UOFF7, AND UOFF8.
48      HC      3
        *

49      KK      D3AN
50      KM      DIVERSION (PROVIDE DISCRIPTION HERE, THIS IS A TYP. DIVERSION CARD)
51      KM      ('DT' IS NAME OF WHAT YOU ARE DIVERTING;'DI' IS THE TOTAL FLOW; THE 'DQ' CARD
52      KM      IS THE AMOUNT DIVERTED)
53      KM      DIV3 FLOWS TOWARD EXISTING DUAL 24" RCP CULVERTS (X1)
54      KM      D3AN FLOWS NORTH ALONG PICO VIEJO ST
55      DT      DIV3
56      DI      18      36
57      DQ      9      12
        *

58      KK      PON4
59      KM      MONTALADO REFERENCE STUDY ONSITE BASIN INPUT PARAMETERS
60      BA      .0013
61      LS      0      95.0
62      UD      0.050
        *

63      KK      CP2A*
64      KM      COMBINES D3AN AND PON4.
65      HC      2
        *

66      KK      D2AN
67      KM      DIVERSION (PROVIDE DISCRIPTION HERE, THIS IS A TYP. DIVERSION CARD)
68      KM      ('DT' IS NAME OF WHAT YOU ARE DIVERTING;'DI' IS THE TOTAL FLOW; THE 'DQ' CARD
69      KM      IS THE AMOUNT DIVERTED)
70      KM      DIV2 FLOWS TOWARD EXISTING DUAL 24" RCP CULVERTS (X2)
71      KM      D2AN FLOWS NORTH ALONG PICO VIEJO ST
72      DT      DIV2
73      DI      11      28
74      DQ      3      14
        *

75      KK      UOFF4
76      KM      MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS
77      BA      .0007
78      LS      0      95.3
79      UD      0.050
        *

80      KK      CP2*
81      KM      COMBINES DIV2 AND UOFF4.
82      HC      2
        *

```

1

HEC-1 INPUT

PAGE 3

```

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

83      KK      OFD1
84      BA      .0026
85      LS      0      95.0
86      UD      0.059
        *

87      KK      CU1
88      KM      COMBINES CP2* AND OFD1.
89      HC      2
        *

90      KK      UOFF6
91      KM      MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS
92      BA      .0064
93      LS      0      95.0
94      UD      0.057
        *

95      KK      UOFF5
96      KM      MONTALADO REFERENCE STUDY OFFSITE BASIN INPUT PARAMETERS
97      BA      .0027
98      LS      0      95.2
99      UD      0.050
        *

100     KK      RTDIV3
101     KM      RETRIEVE DIV3 - (THIS CARD RETRIEVES THE DIVERTED FLOW)
102     KM      DIV3 FLOWS TOWARD EXISTING DUAL 24" RCP CULVERTS (X1)
103     DR      DIV3

```

```

*
104      KK      CP3*
105      KM      COMBINES UOFF6, UOFF5, AND DIV3.
106      HC      3
*

107      KK      OFD2
108      BA      .0038
109      LS      0      95.0
110      UD      0.052
*

111      KK      OFD3
112      BA      .0032
113      LS      0      95.0
114      UD      0.050
*

115      KK      OFD4
116      BA      .0015
117      LS      0      95.0
118      UD      0.050
*

```

1

HEC-1 INPUT

PAGE 4

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

```

119      KK      CU2C
120      KM      COMBINES CP3*, OFD2, OFD3, AND OFD4.
121      HC      4
*

122      KK      STD1
123      BA      .0002
124      LS      0      98.0
125      UD      0.050
*

126      KK      OFD5
127      BA      .0018
128      LS      0      95.0
129      UD      0.050
*

130      KK      R0U**
131      BA      .0014
132      LS      0      98.0
133      UD      0.050
*

134      KK      R1U**
135      BA      .0004
136      LS      0      98.0
137      UD      0.050
*

138      KK      STD2
139      BA      .0003
140      LS      0      98.0
141      UD      0.050
*

142      KK      STD3
143      BA      .0003
144      LS      0      98.0
145      UD      0.050
*

146      KK      CU4
147      HC      6
*

148      KK      OND
149      BA      .0064
150      LS      0      95.0
151      UD      0.050
*
*
*
152      ZZ

```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW
NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW
22 PON3

[illegible]

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*                                           *
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)   *
*           JUN   1998           *

```

```
*****
*
*   U.S. ARMY CORPS OF ENGINEERS
*   HYDROLOGIC ENGINEERING CENTER
*
```

```
*          609 SECOND STREET          *
*      DAVIS, CALIFORNIA 95616      *
*      (916) 756-1104                *
*                                     *
*****
```

---> 6-HOUR / SDN 3 <---

JR	MULTI-RATIO OPTION		
	RATIOS OF PRECIPITATION		
	1.00	.55	.28

Page 5

ULTIMATE100

HYDROGRAPH AT +	D3AN	.01	1	FLOW TIME	24. 3.50	9. 3.50	0. .00
HYDROGRAPH AT +	PON4	.00	1	FLOW TIME	3. 3.50	2. 3.50	1. 3.50
2 COMBINED AT +	CP2A*	.02	1	FLOW TIME	28. 3.50	11. 3.50	1. 3.50
DIVERSION TO +	DIV2	.02	1	FLOW TIME	14. 3.50	3. 3.33	1. 3.50
HYDROGRAPH AT +	D2AN	.02	1	FLOW TIME	14. 3.50	8. 3.50	0. .00
HYDROGRAPH AT +	UOFF4	.00	1	FLOW TIME	2. 3.50	1. 3.50	0. 3.50
2 COMBINED AT +	CP2*	.02	1	FLOW TIME	16. 3.50	9. 3.50	0. 3.50
HYDROGRAPH AT +	OFD1	.00	1	FLOW TIME	6. 3.50	3. 3.50	1. 3.50
2 COMBINED AT +	CU1	.02	1	FLOW TIME	22. 3.50	12. 3.50	2. 3.50
HYDROGRAPH AT +	UOFF6	.01	1	FLOW TIME	16. 3.50	8. 3.50	3. 3.50
HYDROGRAPH AT +	UOFF5	.00	1	FLOW TIME	7. 3.50	3. 3.50	1. 3.50
HYDROGRAPH AT +	RTDIV3	.00	1	FLOW TIME	12. 3.50	9. 3.50	7. 3.50
3 COMBINED AT +	CP3*	.01	1	FLOW TIME	35. 3.50	21. 3.50	12. 3.50
HYDROGRAPH AT +	OFD2	.00	1	FLOW TIME	10. 3.50	5. 3.50	2. 3.50
HYDROGRAPH AT +	OFD3	.00	1	FLOW TIME	8. 3.50	4. 3.50	2. 3.50
HYDROGRAPH AT +	OFD4	.00	1	FLOW TIME	4. 3.50	2. 3.50	1. 3.50
4 COMBINED AT +	CU2C	.02	1	FLOW TIME	56. 3.50	31. 3.50	17. 3.50
HYDROGRAPH AT +	STD1	.00	1	FLOW TIME	1. 3.50	0. 3.50	0. 3.50
HYDROGRAPH AT +	OFD5	.00	1	FLOW TIME	5. 3.50	2. 3.50	1. 3.50
HYDROGRAPH AT +	R0U**	.00	1	FLOW TIME	4. 3.50	2. 3.50	1. 3.50
HYDROGRAPH AT +	R1U**	.00	1	FLOW TIME	1. 3.50	1. 3.50	0. 3.50
HYDROGRAPH AT +	STD2	.00	1	FLOW TIME	1. 3.50	0. 3.50	0. 3.50
HYDROGRAPH AT							

					ULTIMATE100		
+	STD3	.00	1	FLOW TIME	1. 3.50	0. 3.50	0. 3.50
6 COMBINED AT							
+	CU4	.00	1	FLOW TIME	11. 3.50	6. 3.50	3. 3.50
HYDROGRAPH AT							
+	OND	.01	1	FLOW TIME	16. 3.50	8. 3.50	3. 3.50

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



Appendix B – Hydrologic Calculations

Normal Depth Calculations

Riprap Calculations

Drop Inlet Calculations – Weir/Orifice

WSPG Model

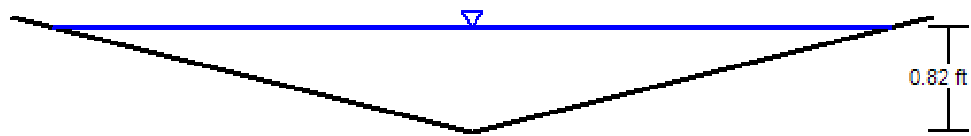
Ex Concrete Channel Normal Depth Calculations

Section 11 - BMP2 Swale INT_ULT- 100 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	7.00 cfs
Results	
Normal Depth	0.82 ft
Flow Area	2.7 ft ²
Wetted Perimeter	6.77 ft
Hydraulic Radius	0.40 ft
Top Width	6.57 ft
Critical Depth	0.72 ft
Critical Slope	2.05 %
Velocity	2.59 ft/s
Velocity Head	0.10 ft
Specific Energy	0.93 ft
Froude Number	0.714
Flow Type	Subcritical
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.82 ft
Critical Depth	0.72 ft
Channel Slope	1.00 %
Critical Slope	2.05 %

Cross Section for Section 11 - BMP2 Swale INT_ULT- 100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Normal Depth	0.82 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	7.00 cfs



V: 1
H: 1

Section 12 - @ OND8_INT_ULT-10 YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.50 %
Discharge	2.20 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.77
0+18.50	0.03
0+20.00	0.00
0+21.50	0.03
0+40.00	0.77

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.77)	(0+18.50, 0.03)	0.016
(0+18.50, 0.03)	(0+21.50, 0.03)	0.013
(0+21.50, 0.03)	(0+40.00, 0.77)	0.016

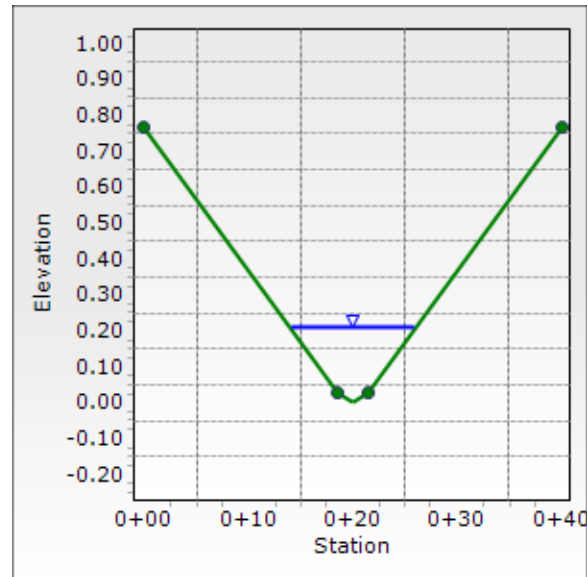
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.21 ft
Elevation Range	0.00 to 0.77 ft
Flow Area	1.4 ft ²
Wetted Perimeter	11.86 ft
Hydraulic Radius	0.11 ft
Top Width	11.86 ft
Normal Depth	0.21 ft
Critical Depth	0.19 ft
Critical Slope	0.72 %
Velocity	1.62 ft/s
Velocity Head	0.04 ft
Specific Energy	0.25 ft
Froude Number	0.841
Flow Type	Subcritical

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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.21 ft
Critical Depth	0.19 ft
Channel Slope	0.50 %
Critical Slope	0.72 %

Cross Section for Section 12 - @ OND8_INT_ULT-10 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.50 %
Normal Depth	0.21 ft
Discharge	2.20 cfs

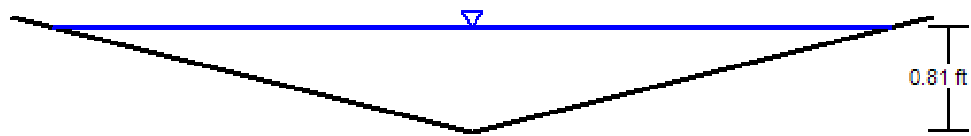


Section 13 - BMP3 Swale INT_ULT- 100 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	6.80 cfs
Results	
Normal Depth	0.81 ft
Flow Area	2.6 ft ²
Wetted Perimeter	6.70 ft
Hydraulic Radius	0.39 ft
Top Width	6.50 ft
Critical Depth	0.71 ft
Critical Slope	2.06 %
Velocity	2.58 ft/s
Velocity Head	0.10 ft
Specific Energy	0.92 ft
Froude Number	0.713
Flow Type	Subcritical
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.81 ft
Critical Depth	0.71 ft
Channel Slope	1.00 %
Critical Slope	2.06 %

Cross Section for Section 13 - BMP3 Swale INT_ULT- 100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Normal Depth	0.81 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	6.80 cfs



V: 1 
H: 1

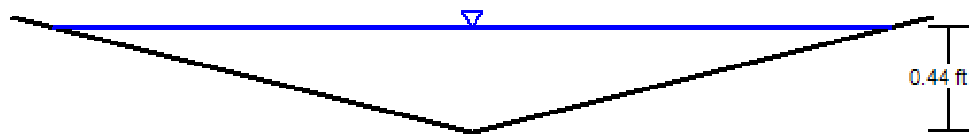
BMP Calculations

Section 11 - BMP2 Swale INT & ULT - 2 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	1.30 cfs
Results	
Normal Depth	0.44 ft
Flow Area	0.8 ft ²
Wetted Perimeter	3.60 ft
Hydraulic Radius	0.21 ft
Top Width	3.49 ft
Critical Depth	0.37 ft
Critical Slope	2.57 %
Velocity	1.70 ft/s
Velocity Head	0.05 ft
Specific Energy	0.48 ft
Froude Number	0.643
Flow Type	Subcritical
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.44 ft
Critical Depth	0.37 ft
Channel Slope	1.00 %
Critical Slope	2.57 %

Cross Section for Section 11 - BMP2 Swale INT & ULT - 2 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Normal Depth	0.44 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Discharge	1.30 cfs



V: 1 
H: 1

Section 12 - BMP1 INT & ULT - 2 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.50 %
Discharge	0.80 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.77
0+18.50	0.03
0+20.00	0.00
0+21.50	0.03
0+40.00	0.77

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.77)	(0+18.50, 0.03)	0.016
(0+18.50, 0.03)	(0+21.50, 0.03)	0.013
(0+21.50, 0.03)	(0+40.00, 0.77)	0.016

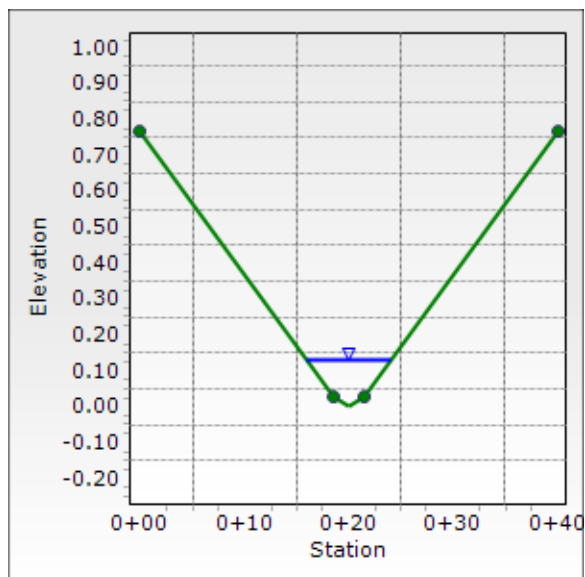
Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	0.13 ft
Elevation Range	0.00 to 0.77 ft
Flow Area	0.6 ft ²
Wetted Perimeter	8.22 ft
Hydraulic Radius	0.08 ft
Top Width	8.21 ft
Normal Depth	0.13 ft
Critical Depth	0.12 ft
Critical Slope	0.79 %
Velocity	1.27 ft/s
Velocity Head	0.03 ft
Specific Energy	0.16 ft
Froude Number	0.809
Flow Type	Subcritical

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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.13 ft
Critical Depth	0.12 ft
Channel Slope	0.50 %
Critical Slope	0.79 %

Cross Section for Section 12 - BMP1 INT & ULT - 2 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.50 %
Normal Depth	0.13 ft
Discharge	0.80 cfs

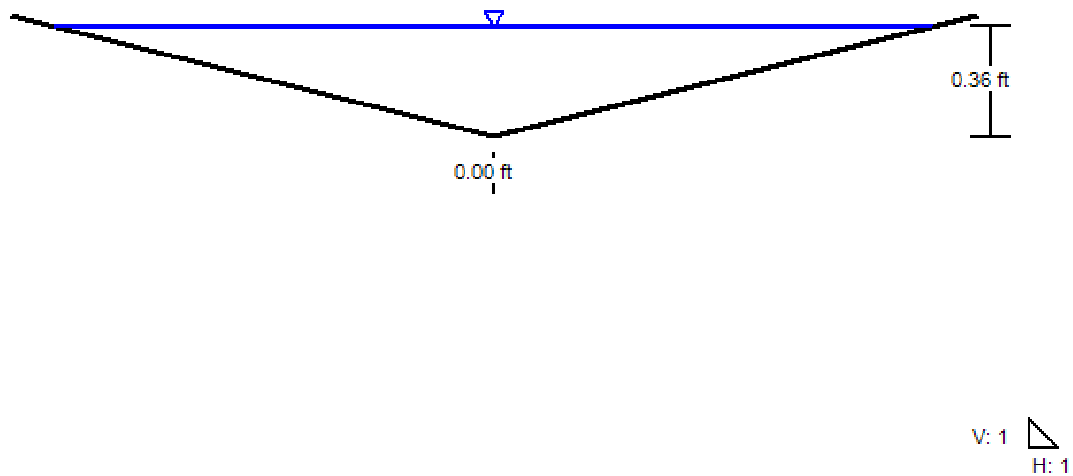


Section 13- BMP3 Swale INT & ULT - 2 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Bottom Width	0.00 ft
Discharge	0.80 cfs
Results	
Normal Depth	0.36 ft
Flow Area	0.5 ft ²
Wetted Perimeter	3.00 ft
Hydraulic Radius	0.18 ft
Top Width	2.91 ft
Critical Depth	0.30 ft
Critical Slope	2.74 %
Velocity	1.51 ft/s
Velocity Head	0.04 ft
Specific Energy	0.40 ft
Froude Number	0.623
Flow Type	Subcritical
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.36 ft
Critical Depth	0.30 ft
Channel Slope	1.00 %
Critical Slope	2.74 %

Cross Section for Section 13- BMP3 Swale INT & ULT - 2 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.031
Channel Slope	1.00 %
Normal Depth	0.36 ft
Left Side Slope	4.00 H:V
Right Side Slope	4.00 H:V
Bottom Width	0.00 ft
Discharge	0.80 cfs



HORROCKS



ENGINEERS

Rip Rap Calculations for Open Channels

Project Name: Epic Storage at Ann Road
Proj. Number: NV-2108-1911
Designed By: DBC/SBL
Date: 9/23/2020
Description BMP2 swale designed for 100 YR flow at Section 11

Input Data

Velocity (ft/s) = 2.59
Slope (ft/ft) = 0.01
Spec. Gravity = 2.5
(2.5 min)

Rip Rap Size

d_{50} (in) = 0.83
Use d_{50} (in) = 1*
Thickness (in) = 2

Mannings Coefficient

$n = 0.026$

$$V = 3 (d_{50})^{0.5} (S_f - 1) / S^{0.17}$$

$$n = 0.0395 (d_{50})^{1/6}$$

Reference:

Hydrologic Criteria and Drainage Design Manual, CCRFCD, Aug. 1999
Section 705.4.6 and equations 732 and 734

*According to HCDDM section 1503.4.5 the minimum rock size (D50) is 3 inch. Therefore, D50 = 3" rock of 40' swale length is considered for BMP2 Swale design.

HORROCKS



ENGINEERS

Rip Rap Calculations for Open Channels

Project Name: Epic Storage at Ann Road
Proj. Number: NV-2108-1911
Designed By: DBC/SBL
Date: 9/23/2020
Description BMP3 swale designed for 100 YR flow at Section 13

Input Data

Velocity (ft/s) = 2.58
Slope (ft/ft) = 0.01
Spec. Gravity = 2.5
(2.5 min)

Rip Rap Size

d_{50} (in) = 0.82
Use d_{50} (in) = 1*
Thickness (in) = 2

Mannings Coefficient

$n = 0.026$

$$V = 3 (d_{50})^{0.5} (S_f - 1) / S^{0.17}$$

$$n = 0.0395 (d_{50})^{1/6}$$

Reference:

Hydrologic Criteria and Drainage Design Manual, CCRFCD, Aug. 1999
Section 705.4.6 and equations 732 and 734

*According to HCDDM section 1503.4.5 the minimum rock size (D50) is 3 inch. Therefore, D50 = 3" rock of 40' swale length is considered for BMP3 Swale design.

Orifice Equation

Description: R-1792-HL (MH1) - 100 YEAR FLOW

Project: Epic Storgae at Ann Road

Reference:

Date: 9/21/2020

Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

Q = 100-year event discharge = 2.7

C = discharge coefficient = 0.6

A = Effective area (ft²) = 2.10 ft²

Clogging Factor = 50%

= 1.05 ft²

g = gravitational constant = 32.2 ft/s²

h = Head, ponding depth (ft), (measured from centerline of orifice)

Solving for h, $h = \frac{(Q/cA)^2}{2g} = \frac{[2.66\text{cfs} / (0.6*1.05\text{ft}^2)]^2}{2*32.2\text{ft/s}^2} = 0.28 \text{ ft}$

Weir Equation: $Q = CLh^{1.5}$

where:

Q = 100-year event discharge = 2.1

C = broad crest weir coefficient = 3

L = perimeter = 9.00 ft

36" Round Grate Inlet

Clogging Factor = 50%

= 4.50 ft

Solving for h, $h = [Q/(CL)]^{1.5} = [4\text{cfs} / (3.0*3.14\text{ft})]^{0.67} = 0.28 \text{ ft}$

Orifice Equation

Description: R-1792-HL (MH1) 10-YEAR FLOW

Project: Epic Storgae at Ann Road

Reference:

Date: 9/21/2020

Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

Q = 100-year event discharge = 2.3

C = discharge coefficient = 0.6

A = Effective area (ft²) = 2.10 ft²

Clogging Factor = 50%

= 1.05 ft²

g = gravitational constant = 32.2 ft/s²

h = Head, ponding depth (ft), (measured from centerline of orifice)

Solving for h, $h = \frac{(Q/cA)^2}{2g} = \frac{[2.29\text{cfs} / (0.6 \cdot 1.05\text{ft}^2)]^2}{2 \cdot 32.2\text{ft/s}^2} = 0.21 \text{ ft}$

Weir Equation: $Q = CLh^{1.5}$

where:

Q = 100-year event discharge = 1.3

C = broad crest weir coefficient = 3

L = perimeter = 9.00 ft

36" Round Grate Inlet

Clogging Factor = 50%

= 4.50 ft

Solving for h, $h = [Q/(CL)]^{1.5} = [4\text{cfs} / (3.0 \cdot 3.14\text{ft})]^{0.67} = 0.21 \text{ ft}$

Weir Orifice Equation

Description: R-1792-HL - 2 Year collection for BMP calculations

Project:

Reference:

Date: 9/2/2020

Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

Q = 2-year event discharge = 1.3
 C = discharge coefficient = 0.6
 A = Effective area (ft²) = 2.10 ft²

Clogging Factor = 50%
 = 1.05 ft²

g = gravitational constant = 32.2 ft/s²

h = Head, ponding depth (ft), (measured from centerline of orifice)

Solving for h, $h = \frac{(Q/cA)^2}{2g} = \frac{[1.3\text{cfs} / (0.6*1.05\text{ft}^2)]^2}{2*32.2\text{ft/s}^2} = 0.07\text{ ft}$

Solve for Y = 0.13 ft

Weir Equation: $Q = CLh^{1.5}$

where:

Q = 2-year event discharge = 0.7
 C = broad crest weir coefficient = 3
 L = perimeter = 9.42 ft

36" Round Grate Inlet
 Clogging Factor = 50%
 = 4.71 ft

Solving for h, $h = [Q/(CL)]^{1.5} = [0.7\text{ cfs} / (3.0*3.14\text{ft})]^{0.67} = 0.13\text{ ft}$

For the 2-year storm, the inlet collects 0.7 cfs of BMP1. For purposes of calculated stormwater treatment, assume that no runoff from BMP1 is treated since it is captured and conveyed to the channel.

Note: See "Section 12 BMP1 INT - ULT 2 Year" calculation for normal depth calc.

WEIR- Orifice Equation

Description:	Neenah 4353 Drop Inlet at CI3-CU3
---------------------	-----------------------------------

Project: Epic Storgae at Ann Road

Reference:

Date: 9/23/2020

Orifice Equation: $Q = CA(2gh)^{1/2}$

where:

Q = 100-year event discharge = 6.8

C = discharge coefficient = 0.6

$$A = \text{Effective area (ft}^2\text{)} = 1.80 \text{ ft}^2$$

Clogging Factor = = **50%**

$$= 0.90 \text{ ft}^2$$
$$g = \text{gravitational constant} = 32.2 \text{ ft/s}^2$$

h = Head, ponding depth (ft), (measured from centerline of orifice)

Solving for h,
$$h = \frac{(Q/cA)^2}{2g} = \frac{[6.8\text{cfs} / (0.6 \cdot 0.9\text{ft}^2)]^2}{2 \cdot 32.2\text{ft/s}^2} = 2.46\text{ ft}$$

Weir Equation: $Q = CLh^{1.5}$

where:

Q = 100-year event discharge = 6.8

C = broad crest weir coefficient = 3

L = perimeter = 6.70 ft

36" Round Grate Inlet

Clogging Factor = $\frac{0.5}{1} = 50\%$

$$= 3.35 \text{ ft}$$

Solving for h, $h = [Q/(CL)]^{1.5} = [4\text{cfs} / (3.0 \cdot 3.14\text{ft})]^{0.67} = 0.77\text{ ft}$

0.77 ft

SD

T1 EPIC STORAGE AT ANN ROAD
T2 PROPOSED STORM DRAIN (100 ULTIMATE)
T3 HORROCKS ENGINEERS SEPTEMBER 2020

SO	1000.000	2871.000	2			2875.850				
R	1047.830	2871.960	2	.013				+0.0000	+0.0000	0
R	1052.830	2872.210	1	.013				+0.0000	-90.0000	0
R	1321.480	2875.880	1	.013				+0.0000	+0.0000	0
JX	1326.980	2876.080	1	3	.013	2.100	2875.980		90.0	90.000
R	1382.260	2877.770	1	.013				+0.0000	+0.0000	0
SH	1382.260	2877.770	1	.013				+0.0000	+0.0000	0
CD	1	4	1	.000	3.0000	00.000	0.000	0.000	.000	.000
CD	2	4	1	.000	2.5000	00.000	0.000	0.000	.000	.000
CD	3	4	1	.000	1.5000	07.500	0.000	0.000	.000	.000
Q		056.000	1.0							

EPIC STORAGE AT ANN ROAD
PROPOSED STORM DRAIN (100 ULTIMATE)
HORROCKS ENGINEERS SEPTEMBER 2020

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
1000.000	2871.000	4.850	2875.850	58.10	11.84	2.18	2878.03	.00	2.38	.00	2.500	.000	.00	1 .0
47.830	.0201					.0201	.96	4.85	.00	2.05	.013	.00	.00	PIPE
1047.830	2871.960	4.850	2876.810	58.10	8.22	1.05	2877.86	.00	2.47	.00	3.000	.000	.00	1 .0
5.000	.0500					.0076	.04	4.85	.00	1.30	.013	.00	.00	PIPE
1052.830	2872.210	4.949	2877.159	58.10	8.22	1.05	2878.21	.00	2.47	.00	3.000	.000	.00	1 .0
268.650	.0137					.0076	2.04	4.95	.00	1.93	.013	.00	.00	PIPE
1321.480	2875.880	3.318	2879.198	58.10	8.22	1.05	2880.25	.00	2.47	.00	3.000	.000	.00	1 .0
JUNCT STR	.0364							.00	.00		.013	.00	.00	PIPE
1326.980	2876.080	1.683	2877.763	56.00	13.72	2.92	2880.68	.00	2.43	2.98	3.000	.000	.00	1 .0
8.678	.0306					.0187	.16	1.68	2.06	1.46	.013	.00	.00	PIPE
1335.658	2876.345	1.716	2878.062	56.00	13.39	2.79	2880.85	.00	2.43	2.97	3.000	.000	.00	1 .0
13.636	.0306					.0171	.23	1.72	1.99	1.46	.013	.00	.00	PIPE
1349.293	2876.762	1.785	2878.548	56.00	12.77	2.53	2881.08	.00	2.43	2.95	3.000	.000	.00	1 .0
10.152	.0306					.0151	.15	1.79	1.84	1.46	.013	.00	.00	PIPE
1359.445	2877.073	1.858	2878.931	56.00	12.18	2.30	2881.23	.00	2.43	2.91	3.000	.000	.00	1 .0
7.658	.0306					.0134	.10	1.86	1.71	1.46	.013	.00	.00	PIPE
1367.103	2877.307	1.936	2879.243	56.00	11.61	2.09	2881.34	.00	2.43	2.87	3.000	.000	.00	1 .0
5.748	.0306					.0119	.07	1.94	1.58	1.46	.013	.00	.00	PIPE

EPIC STORAGE AT ANN ROAD
 PROPOSED STORM DRAIN (100 ULTIMATE)
 HORROCKS ENGINEERS SEPTEMBER 2020

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt/or I.D.	ZL	No Wth Prs/Pip	
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch	

1372.851	2877.482	2.019	2879.501	56.00	11.07	1.90	2881.40	.00	2.43	2.81	3.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.207	.0306					.0106	.04	2.02	1.45	1.46	.013	.00	.00	PIPE	
1377.058	2877.611	2.108	2879.719	56.00	10.55	1.73	2881.45	.00	2.43	2.74	3.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.892	.0306					.0094	.03	2.11	1.34	1.46	.013	.00	.00	PIPE	
1379.950	2877.699	2.204	2879.903	56.00	10.06	1.57	2881.48	.00	2.43	2.65	3.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1.724	.0306					.0085	.01	2.20	1.22	1.46	.013	.00	.00	PIPE	
1381.675	2877.752	2.309	2880.061	56.00	9.59	1.43	2881.49	.00	2.43	2.53	3.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.585	.0306					.0076	.00	2.31	1.11	1.46	.013	.00	.00	PIPE	
1382.260	2877.770	2.426	2880.196	56.00	9.14	1.30	2881.49	.00	2.43	2.36	3.000	.000	.00	1	.0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

▲

Section 17 @ CICH1 8'X6' Rec Channel - INT-100 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Bottom Width	8.00 ft
Discharge	61.50 cfs
Results	
Normal Depth	1.07 ft
Flow Area	8.5 ft ²
Wetted Perimeter	10.13 ft
Hydraulic Radius	0.84 ft
Top Width	8.00 ft
Critical Depth	1.22 ft
Critical Slope	0.33 %
Velocity	7.21 ft/s
Velocity Head	0.81 ft
Specific Energy	1.87 ft
Froude Number	1.231
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.07 ft
Critical Depth	1.22 ft
Channel Slope	0.50 %
Critical Slope	0.33 %

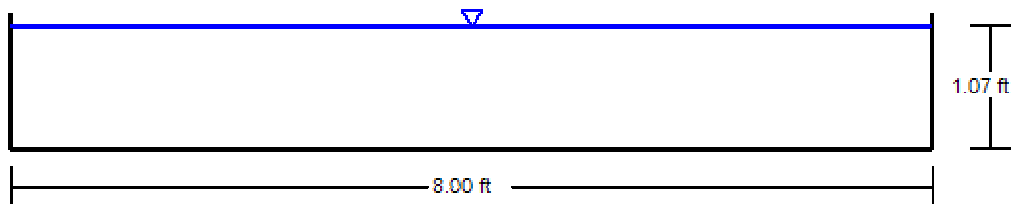
Cross Section for Section 17 @ CICH1 8'X6' Rec Channel - INT-100 YR

Project Description

Friction Method	Manning
	Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.50 %
Normal Depth	1.07 ft
Bottom Width	8.00 ft
Discharge	61.50 cfs



V: 1
H: 1

Section 18 @ CICH2 8'X6' Rec Channel - INT-100 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Bottom Width	8.00 ft
Discharge	79.50 cfs
Results	
Normal Depth	1.26 ft
Flow Area	10.1 ft ²
Wetted Perimeter	10.53 ft
Hydraulic Radius	0.96 ft
Top Width	8.00 ft
Critical Depth	1.45 ft
Critical Slope	0.33 %
Velocity	7.87 ft/s
Velocity Head	0.96 ft
Specific Energy	2.23 ft
Froude Number	1.234
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.26 ft
Critical Depth	1.45 ft
Channel Slope	0.50 %
Critical Slope	0.33 %

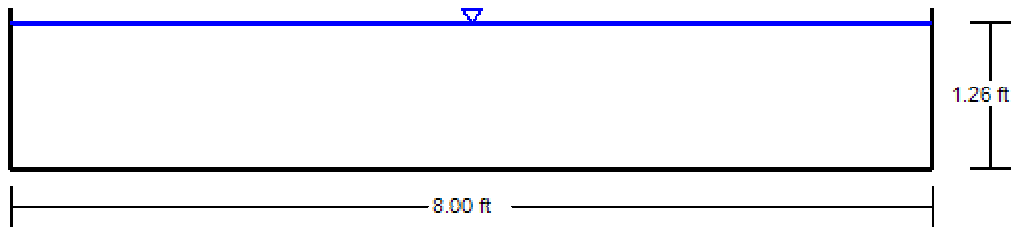
Cross Section for Section 18 @ CICH2 8'X6' Rec Channel - INT-100 YR

Project Description

Friction Method	Manning
	Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	0.50 %
Normal Depth	1.26 ft
Bottom Width	8.00 ft
Discharge	79.50 cfs



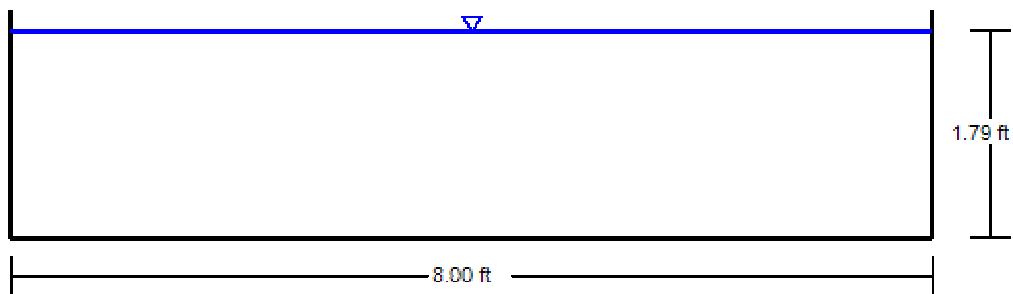
V: 1
H: 1

Section 19 @ CICH3 8'X6' Rec Channel - INT-100 YR

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Bottom Width	8.00 ft
Discharge	133.60 cfs
Results	
Normal Depth	1.79 ft
Flow Area	14.3 ft ²
Wetted Perimeter	11.58 ft
Hydraulic Radius	1.24 ft
Top Width	8.00 ft
Critical Depth	2.05 ft
Critical Slope	0.34 %
Velocity	9.32 ft/s
Velocity Head	1.35 ft
Specific Energy	3.14 ft
Froude Number	1.227
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.79 ft
Critical Depth	2.05 ft
Channel Slope	0.50 %
Critical Slope	0.34 %

Cross Section for Section 19 @ CICH3 8'X6' Rec Channel - INT-100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Normal Depth	1.79 ft
Bottom Width	8.00 ft
Discharge	133.60 cfs



V: 1
H: 1

Section 20 @ CICH4 8'X6' Rec Channel - INT-100 YR

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	1.60 %
Bottom Width	8.00 ft
Discharge	147.40 cfs
Results	
Normal Depth	1.29 ft
Flow Area	10.3 ft ²
Wetted Perimeter	10.59 ft
Hydraulic Radius	0.98 ft
Top Width	8.00 ft
Critical Depth	2.19 ft
Critical Slope	0.34 %
Velocity	14.24 ft/s
Velocity Head	3.15 ft
Specific Energy	4.45 ft
Froude Number	2.208
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.29 ft
Critical Depth	2.19 ft
Channel Slope	1.60 %
Critical Slope	0.34 %

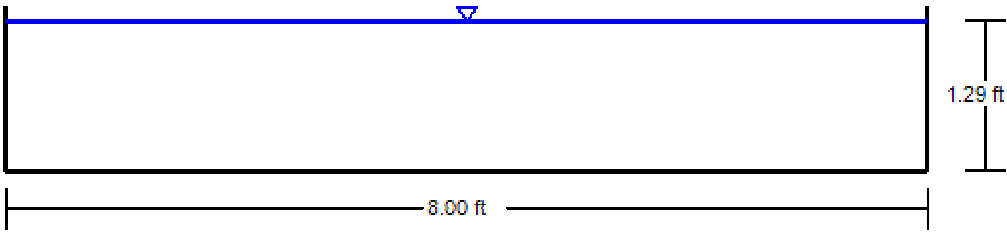
Cross Section for Section 20 @ CICH4 8'X6' Rec Channel - INT-100 YR

Project Description

Friction Method	Manning
	Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013
Channel Slope	1.60 %
Normal Depth	1.29 ft
Bottom Width	8.00 ft
Discharge	147.40 cfs



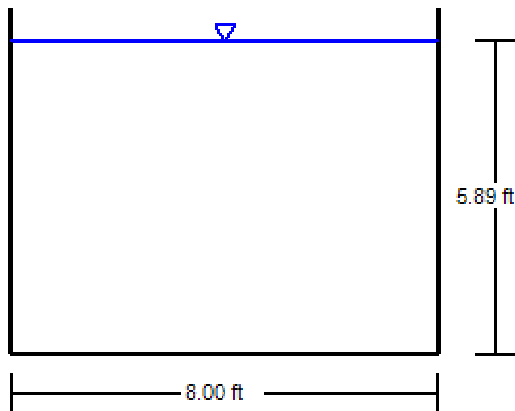
V: 1
H: 1

Sections 17_18_&_19 @ CUCH1_CUCH2_& CUCH3 8'X6' Rec Channel - ULT-100 YR

Project Description	
Friction Method	Manning
Solve For	Formula Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Bottom Width	8.00 ft
Discharge	679.00 cfs
Results	
Normal Depth	5.89 ft
Flow Area	47.1 ft ²
Wetted Perimeter	19.78 ft
Hydraulic Radius	2.38 ft
Top Width	8.00 ft
Critical Depth	6.07 ft
Critical Slope	0.46 %
Velocity	14.42 ft/s
Velocity Head	3.23 ft
Specific Energy	9.12 ft
Froude Number	1.047
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.89 ft
Critical Depth	6.07 ft
Channel Slope	0.50 %
Critical Slope	0.46 %

Cross Section for Sections 17_18_&_19 @ CUCH1_CUCH2_& CUCH3 8'X6' Rec Channel - ULT-100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	0.50 %
Normal Depth	5.89 ft
Bottom Width	8.00 ft
Discharge	679.00 cfs



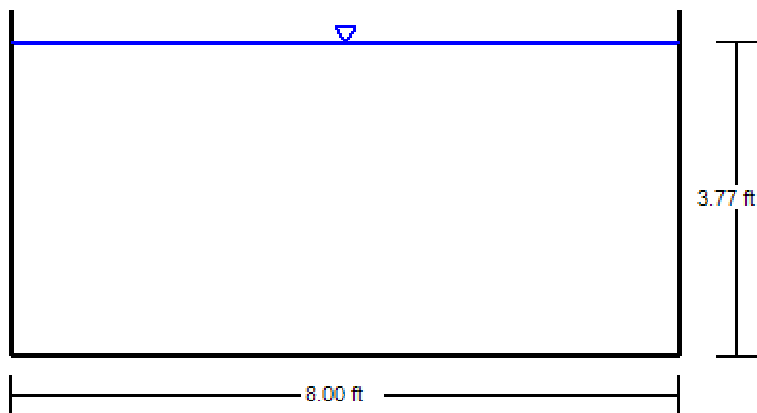
V: 1 
H: 1

Section 20 @ CUCH4 8'X6' Rec Channel - ULT-100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	1.60 %
Bottom Width	8.00 ft
Discharge	679.00 cfs
Results	
Normal Depth	3.77 ft
Flow Area	30.2 ft ²
Wetted Perimeter	15.54 ft
Hydraulic Radius	1.94 ft
Top Width	8.00 ft
Critical Depth	6.07 ft
Critical Slope	0.46 %
Velocity	22.50 ft/s
Velocity Head	7.87 ft
Specific Energy	11.64 ft
Froude Number	2.042
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	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	3.77 ft
Critical Depth	6.07 ft
Channel Slope	1.60 %
Critical Slope	0.46 %

Cross Section for Section 20 @ CUCH4 8'X6' Rec Channel - ULT-100 YR

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.013
Channel Slope	1.60 %
Normal Depth	3.77 ft
Bottom Width	8.00 ft
Discharge	679.00 cfs



V: 1
H: 1



Appendix D – Referenced Information

Pre-Final Submittal for Western Clark County 215 Bruce Woodbury Beltway – Craig Road to Hualapai Way

Improvement Plans for Western Clark County 215 – Bruce Woodbury Beltway – Craig Road to Hualapai Way (L-1803)

451-002-001

February 26, 2013

(702) 804-2015

Mona Stammetti, PE – Project Manager
Clark County Public Works
500 South Grand Central Parkway
Las Vegas, Nevada 89106

Re: Pre-Final Submittal for Western Clark County 215 Bruce Woodbury Beltway – Craig Road to Hualapai Way

Dear Ms. Stammetti:

The purpose of this letter is to address comments from Clark County Public Works (CCPW), and Clark County Regional Flood Control District (CCRFCD), on the 90% submittal regarding the above-referenced project. The redlined comments have been individually addressed in the comment matrices included with this submittal. Additionally a summary of major items that have been added or revised between the 90% design and this Pre-Final submittal contract documents are included below:

- Replacement of the Shaumber Road street improvements with a trail corridor for future trail improvements along the Shaumber Road alignment.
- Revised flood control facilities at Ann Road and south of Ann Road to accommodate improvements on an existing Clark County School District (CCSD) Northwest Satellite Transportation Facility (hereinafter referred to as the CCSD Site) constructed after the 90% submittal.

Shaumber Trail

Since the time of the last submittal in August 2008, the ultimate alignment for the Shaumber Road street improvements has been shifted to the west. As a result, we have been directed with this project to replace the proposed street improvements along the original Shaumber alignment adjacent to the Beltway with a minimum 12-foot wide corridor for trail improvements and facilities to protect the Beltway from offsite flows. The east half of the centerline will be reserved for the trail corridor and slopes at a 2% cross slope towards the original Shaumber Road centerline alignment. Rip rap or gravel mulch slope protection and berm/channel on the west side of the Shaumber Trail intercepts offsite flows from the west and conveys them to storm drain laterals placed at major inflow locations along the trail corridor. The storm drain laterals are in a sump condition and lined with rip rap to bring the flows into the proposed RCB facility in the Beltway.

Under this Shaumber Trail scenario, the interim condition remains the same as the 90% submittal, assuming the Shaumber Road street improvements along the new alignment are not constructed. The berm/channel and sump condition storm drain laterals are designed to convey this interim condition flows as depicted in the following table and on Figure 8. The ultimate condition flow patterns are also assumed to remain unchanged per the 2008 MPU with future development perpetuating ultimate flows to the storm drain laterals and proposed RCB mainline.

RIP RAP SUMP SUMMARY						
Rip Rap Sump Location	Facility Size	Interim Conditions		Ultimate Conditions*		Headwater (ft)
		Q100 (cfs)	Tributary Basins	Q100 (cfs)	Tributary Basins	
INT1	36" RCP	40	INT1	N/A	EFP0A1	3.6
INT2	54" RCP	113	INT2	N/A		5.5
INT3 - Azure Dr.	60" RCP	88	INT3	264		4.2
INT4	30" RCP	23	INT4	N/A	EFP0A2	2.8
INT5	30" RCP	20	INT5	N/A		2.5
CTROP - Tropical Pkwy.	72" RCP	339	CTROP	239		11.2
INT7	60" RCP	158	INT7	116	EFP0B1	6.4
INT8	48" RCP	43	INT8	88	CP1 (626 cfs)	3.0
INT9 - La Mancha Ave	78" RCP	84	INT9	538		3.5
W3	8x6 RCB	453	W3	423	W3B-U	8.3

* - See Figure 5R Ultimate Conditions Basin Map

Bold - Values used for rip rap sump headwater calculations

Basins INT1, INT2, and INT3 assume interim flow conditions for the rip rap sump headwater calculations to intercept flows at major wash locations. The storm drain at Azure Drive continues to be oversized in the interim condition to account for ultimate conditions, where it is assumed that the storm drain in Azure is extended west and upstream build-out conveys the entire Basin EFP0A1 to Azure and the Azure storm drain lateral is extended west to intercept this flow.

Basins INT4, INT5, and INT6 assume interim flow conditions for the rip rap sump headwater calculations to intercept flows at major wash locations. Under ultimate conditions, it is assumed that the storm drain in Tropical Parkway is extended west and upstream build-out conveys the entire Basin EFP0A2 to Tropical Parkway and the Tropical Parkway storm drain lateral is extended west to intercept this flow.

Basin INT7 assumes interim flow conditions for the rip rap sump headwater calculation to intercept flows at the major wash inflow point. Since ultimate condition flow from Basin EFP0B1 is lower than the interim condition, the facility is sufficiently sized for both interim and ultimate conditions.

Basin INT8 assumes ultimate flow conditions for the rip rap sump headwater calculation since ultimate condition flow from Basin EFP0B1 are higher than the interim condition and this rip rap sump facility may remain under ultimate conditions since it is not located at a major intersection.

Basin INT9 assumes interim flow conditions for the rip rap sump headwater calculations to intercept the flow at the major wash inflow point. The storm drain at LaMancha Avenue continues to be oversized in the interim condition to account for ultimate conditions, where it is assumed that the storm drain in La Mancha Avenue is extended west during and upstream build-out.

Normal depth calculations and rip rap sizing calculations were performed along the protection berm. Based on the results of the calculations, the berm is proposed to be 3 feet high between Centennial Parkway and Tropical Parkway, and 4 feet high south of Tropical Parkway. The bank of the berm will be lined with the 3-inch minus gravel mulch also used for slope lining within the Beltway since velocities along some sections reach 5.4 fps. A reach of approximately 500 feet near Tropical Parkway experiences average velocities slightly higher than 6 fps. This reach shall have rip rap protection with a d50 of 6-inches since this section experiences significant flow rates for an extended period of time from the outfall of the existing upstream Ann Road Detention Basin.

BERM CALCULATIONS						
Berm Location*	Slope %	Discharge (cfs)	Depth (ft)	Velocity (fps)	Berm Height (ft)	Slope Protection
INT1	2.22	40	0.82	5.4	3.0	Gravel Mulch
INT2	0.85	113	1.39	5.3	3.0	Gravel Mulch
INT3	0.85	88	1.35	4.9	3.0	Gravel Mulch
INT4	1.32	23	0.74	4.0	3.0	Gravel Mulch
INT5	1.32	20	0.70	3.8	3.0	Gravel Mulch
CTROP	0.54	339	3.21	6.1	4.5	Rip rap D50 = 6-inch
INT7	0.47	158	2.20	5.1	4.0	Gravel Mulch
INT8	0.56	43	1.16	3.7	4.0	Gravel Mulch
INT9	0.47	84	1.64	4.2	4.0	Gravel Mulch
W3A	1.00	7	0.51	2.4	4.0	Gravel Mulch
W3B	2.19	3	0.32	2.6	4.0	Gravel Mulch

* See Figure 8

CCSD Northwest Satellite Transportation Facility

Since the time of the last submittal in August 2008, the CCSD developed their site on the east side of Shaumber Road between Hammer Lane and Washburn Road. This CCSD Site constructed storm drain facilities that collected offsite runoff and conveyed the flows to its northeast corner where it discharges a 100-year peak flow of 263 cfs to the Beltway via dual 38x60-inch elliptical RCP (48-inch RCP equivalent) storm drains. The original design specified a 3-foot wide by 2-foot deep concrete rectangular channel at the Beltway right-of-way along this front assuming offsite flows entering the channel as sheet flow. Since the offsite flow in this area is now a single-point discharge, the conveyance facilities required revision in this area to pick up the 263 cfs and convey it into the proposed mainline facility. To accomplish this, a junction is proposed at the outlet of the dual storm drains and a 60-inch RCP is extended to bring the flows into the 8-foot wide by 6-foot high RCB, which ties into the mainline RCB. The single point discharge from the CCSD Site into the 8-foot wide by 6-foot high RCB increases the flow in the 8-foot wide by 6-foot high RCB from 673 cfs to 828 cfs, by adding 155 cfs from Subbasin CB1-U into the 8-foot wide by 6-foot high RCB downstream of the CCSD lateral inflow. Due to the steep slope of the 8-foot wide by 6-foot high RCB, the increase in flow does not affect the capacity of the RCB. Depth of flow increases from 2.2-foot to 2.5-foot and velocity increases from 38 fps to 41 fps. Normal depth calculation is included in the Appendix. The channel slab and RCB floor slab is already intended to be designed with 6000 psi concrete and sacrificial 1-inch extra of cover over the floor slab for abrasion resistance.

Due to excessive normal depth velocities within this 60-inch RCP, energy dissipater rings are proposed in this reach. The velocity in the storm drain is reduced from 53 fps without the rings to 18 fps with the energy dissipater rings. Calculations based on design procedure from the ACPA Concrete Pipe Handbook are included in the Appendix. The upstream element shall consist of an 8-inch high dissipater ring, and induces the hydraulic jump within the pipe. Fifteen-feet downstream of the upstream element, a series of three (3) 4-inch high dissipater rings are proposed to maintain full flow conditions.

As previously mentioned, flows from the CCSD site enters the 8-foot wide by 6-foot high RCB facility instead of the 3-foot wide by 2-foot high channel as previously assumed. As a result, the flows impacting the 3-foot wide by 3-foot high U-channel north of Washburn Road is significantly reduced from 222 cfs (Subbasin HLBW1-CB) north of Washburn to 67 cfs (prorated Basin CB2-U). See Figures 5R and 7R. The proposed parallel storm drain laterals connecting the 3-foot wide by 3-foot high U-Channel to the mainline RCB is reduced accordingly. The 3-foot wide by 3-foot high U-

channel near the CCSD Site lateral and the 48-inch storm drain lateral near Station 761+00 has been eliminated. Four (4) 36-inch RCP storm drain laterals between Washburn Road and the CCSD Site have been reduced to a two (2) barrel 36-inch RCP lateral. Revised normal depth calculations, headwater calculations, and storm drain calculations are included in the Appendix.

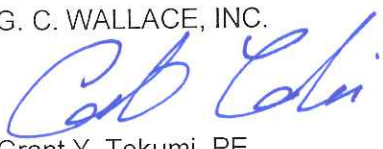
The 3-foot wide by 3-foot high U-channel south of Washburn Road has been eliminated due to conflicts with the proposed trail improvements. 119 cfs (Figure 6R - basin W1B-I) impacting the area south of Washburn under interim conditions is directed south to a 48-inch RCP storm drain provided near Station 739+00. Storm drain hydraulic calculation for the 48-inch RCP storm drain is located in the Appendix. Under ultimate condition the proposed 54-inch RCP storm drain stub provided in Washburn to convey the ultimate flow of 298 cfs from basins CB2-U + W1A-U in Figure 5R.

In addition, the alignment of Ann Road west of the Beltway interchange has been revised to accommodate the roadway to the CCSD Site.

If you have any questions or require additional information, please do not hesitate to contact me at 804-2015.

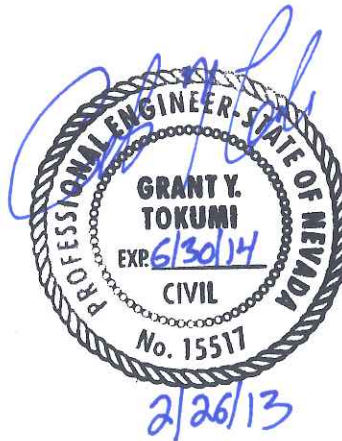
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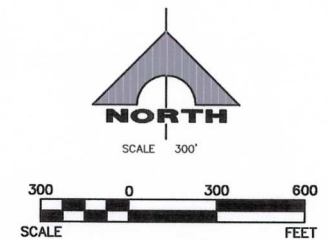
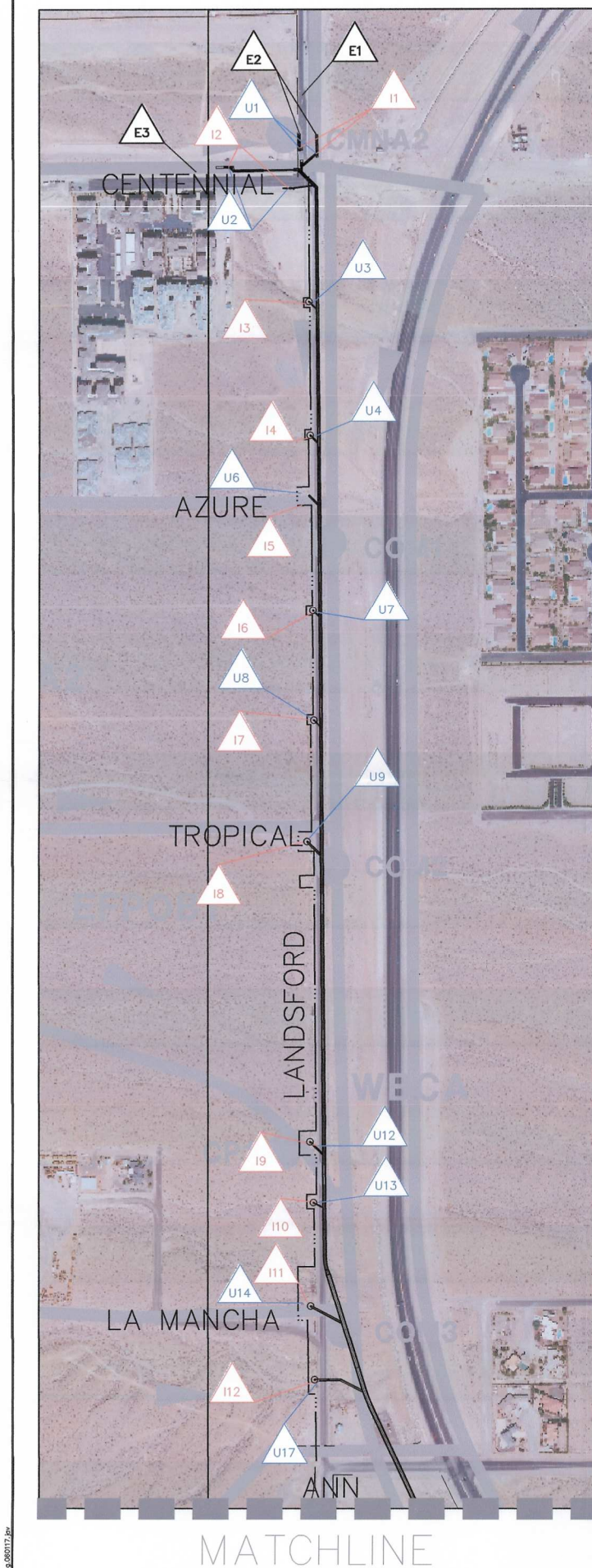
G. C. WALLACE, INC.

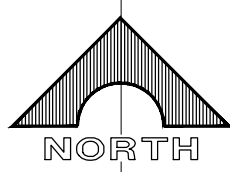
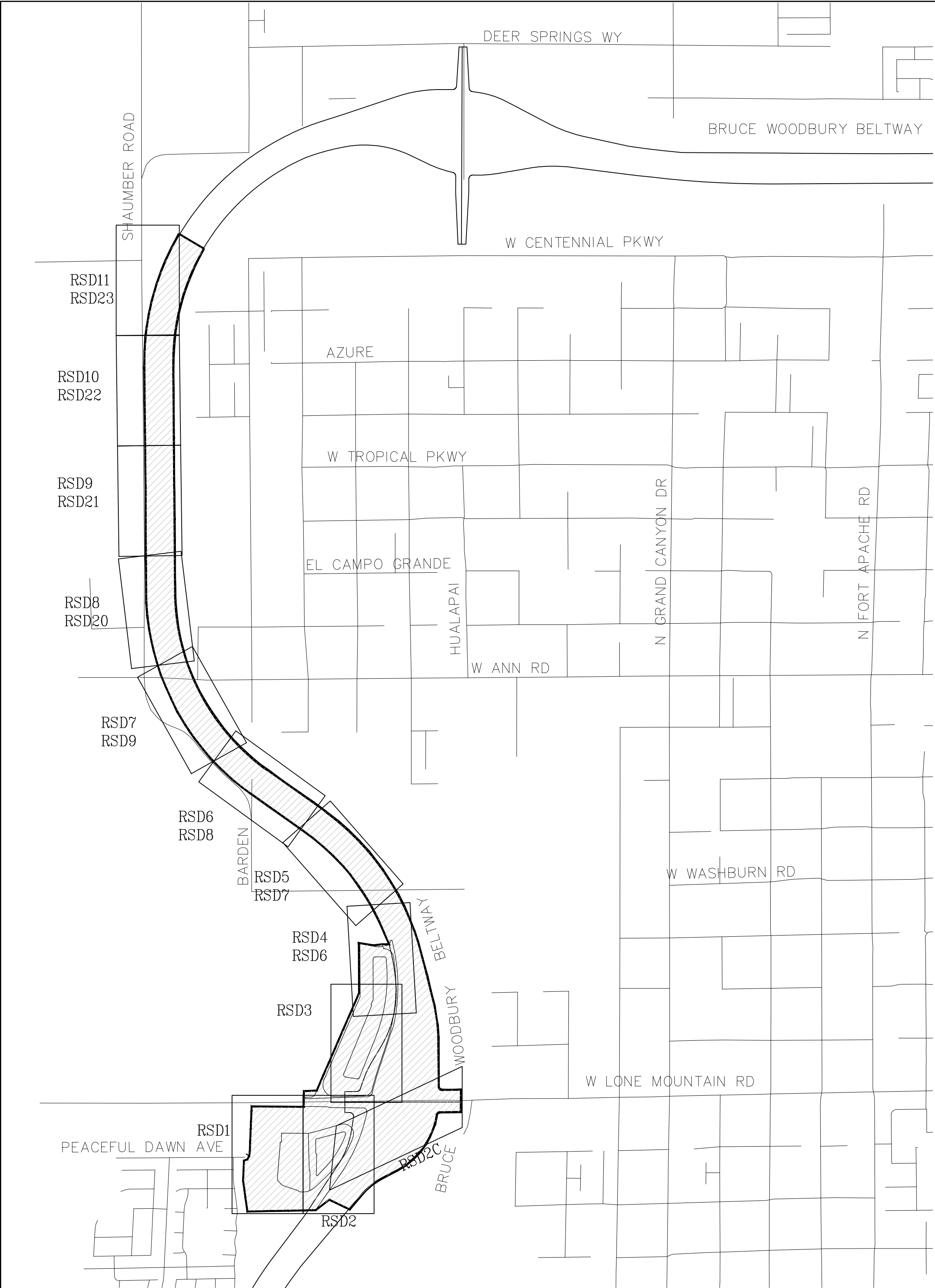

Grant Y. Tokumi, PE
Project Manager
Flood Control Division

Enclosures

c: Joseph Damiani, CCRFCD
Jerry Pruitt, GCW







Key Map
SCALE: 1" = 1000'

INDEX OF SHEETS

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- RG3 WATERSHED BOUNDARY MAP
- RG4 DETENTION BASIN STAGE RELATIONSHIPS
- RG5 HORIZONTAL CONTROL DATA
- RG6 GRADING COORDINATE DATA

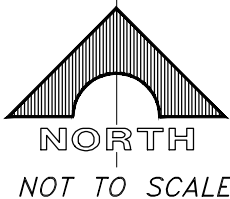
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- RSD1B PROJECT CONTROL PLAN - SOUTH DETENTION BASIN
- RSD2A GRADING PLAN - SOUTH DETENTION BASIN
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- RS32 CONCRETE RETAINING WALL DETAILS

PROJECT
SITE



Location Map
NOT TO SCALE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT LVVWD PROJECT #107164 DATE

REV.	NO.	DATE	DESCRIPTION	APPROVED

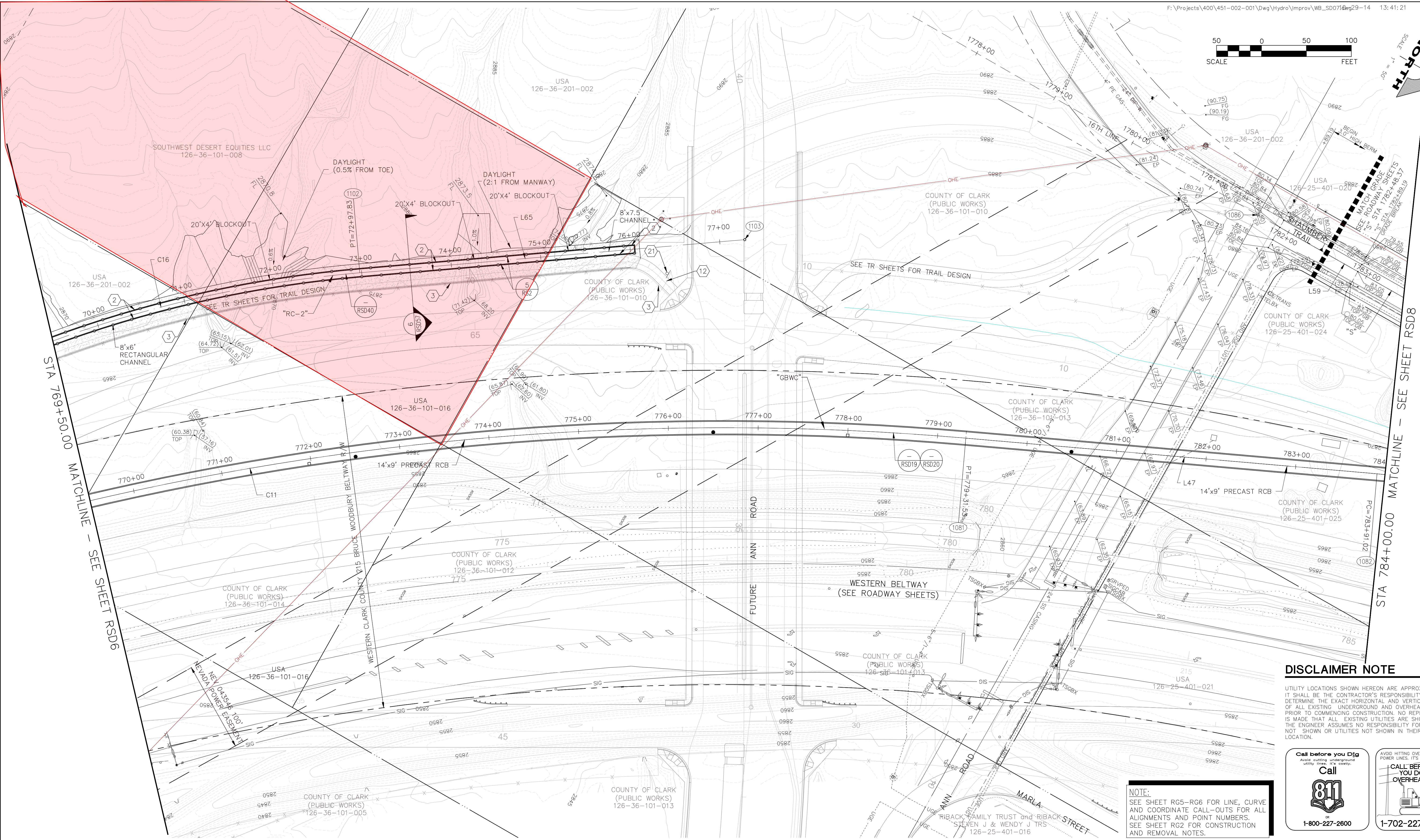


WESTERN CLARK COUNTY 215 BRUCE WOODBURY BELTWAY - CRAIG ROAD TO HUALAPAI WAY
REGIONAL FLOOD CONTROL IMPROVEMENTS
INDEX OF DRAWINGS, KEY MAP AND LOCATION MAP
CLARK COUNTY, NEVADA, DEPARTMENT OF PUBLIC WORKS



PROJECT No: 451.002.001 DRAWN BY: _____
DESIGNED BY: _____ CHECKED BY: _____
APPROVED BY: _____
G. C. WALLACE COMPANIES
ENGINEERS | PLANNERS | SURVEYORS
1555 S. RAINBOW BOULEVARD • LAS VEGAS, NV 89146
T: 702.804.2000 • F: 702.804.2299 • GCWALLACE.COM

SCALE		DRAWING NO. RG1
HORIZ:	NONE	
VERT:	NONE	
FIELD BOOK		
SHT.	OF	



DISCLAIMER NOTE

UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UNDERGROUND AND OVERHEAD UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

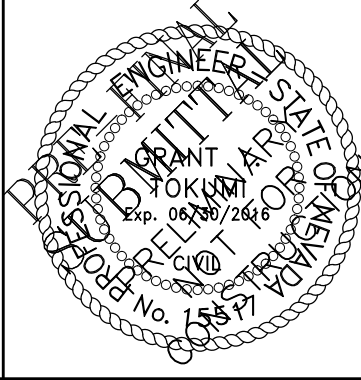


NOTE:
SEE SHEET RG5-RG6 FOR LINE, CURVE AND COORDINATE CALL-OUTS FOR ALL ALIGNMENTS AND POINT NUMBERS.
SEE SHEET RG2 FOR CONSTRUCTION AND REMOVAL NOTES.

REV.	NO.	DATE	DESCRIPTION	APPROVED



WESTERN CLARK COUNTY 215 BRUCE WOODBURY BELTWAY - CRAIG ROAD TO HUALAPAI WAY
GRADING AND DRAINAGE PLAN
STA 769+50.00 TO STA 784+00.00
CLARK COUNTY, NEVADA, DEPARTMENT OF PUBLIC WORKS



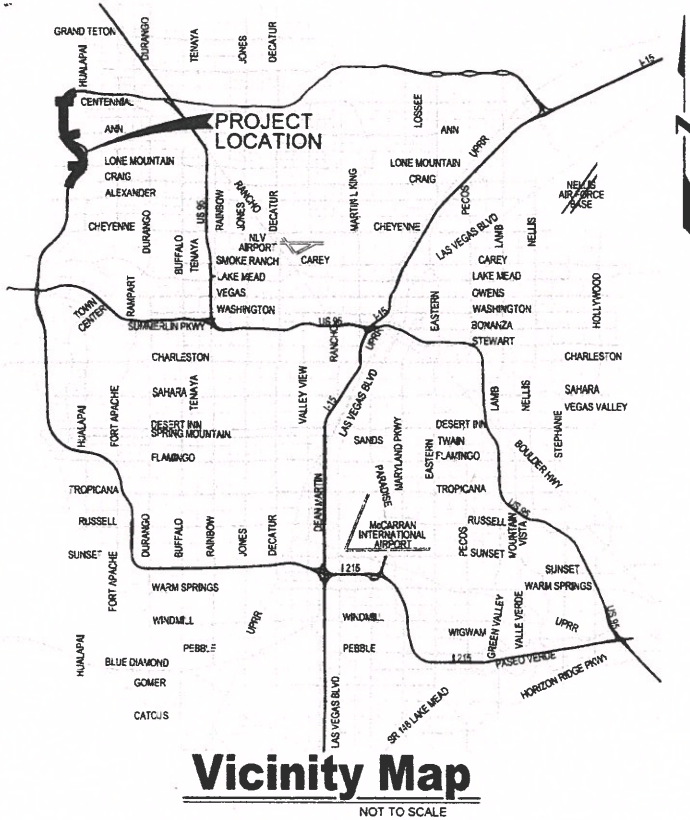
PROJECT No: 451.002.001 DRAWN BY: _____
DESIGNED BY: _____ CHECKED BY: _____
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RSD7	
SHT.	OF

DEPARTMENT OF PUBLIC WORKS

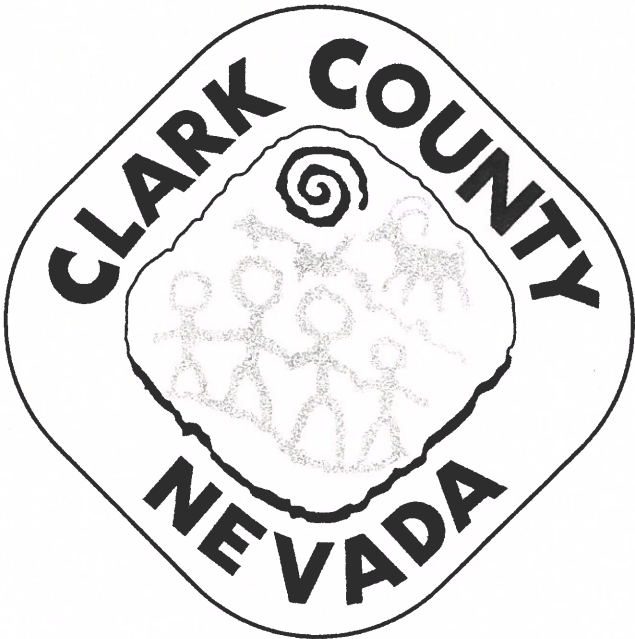


Vicinity Map

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County Commissioners

Steve Sisolak, Chairman
Lawrence Brown III, Vice Chairman
Susan Brager
Tom Collins
Chris Giunchigliani
Mary Beth Scow
Lawrence Weekly



2015

IMPROVEMENT PLANS FOR WESTERN CLARK COUNTY 215 BRUCE WOODBURY BELTWAY CRAIG ROAD TO HUALAPAI WAY Volume 1 of 2

FUNDED BY
CLARK COUNTY MASTER TRANSPORTATION IMPROVEMENT FUNDS

County Manager

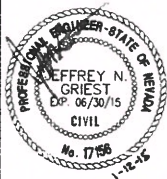
Donald G Burnette

Director of Public Works

Approved:

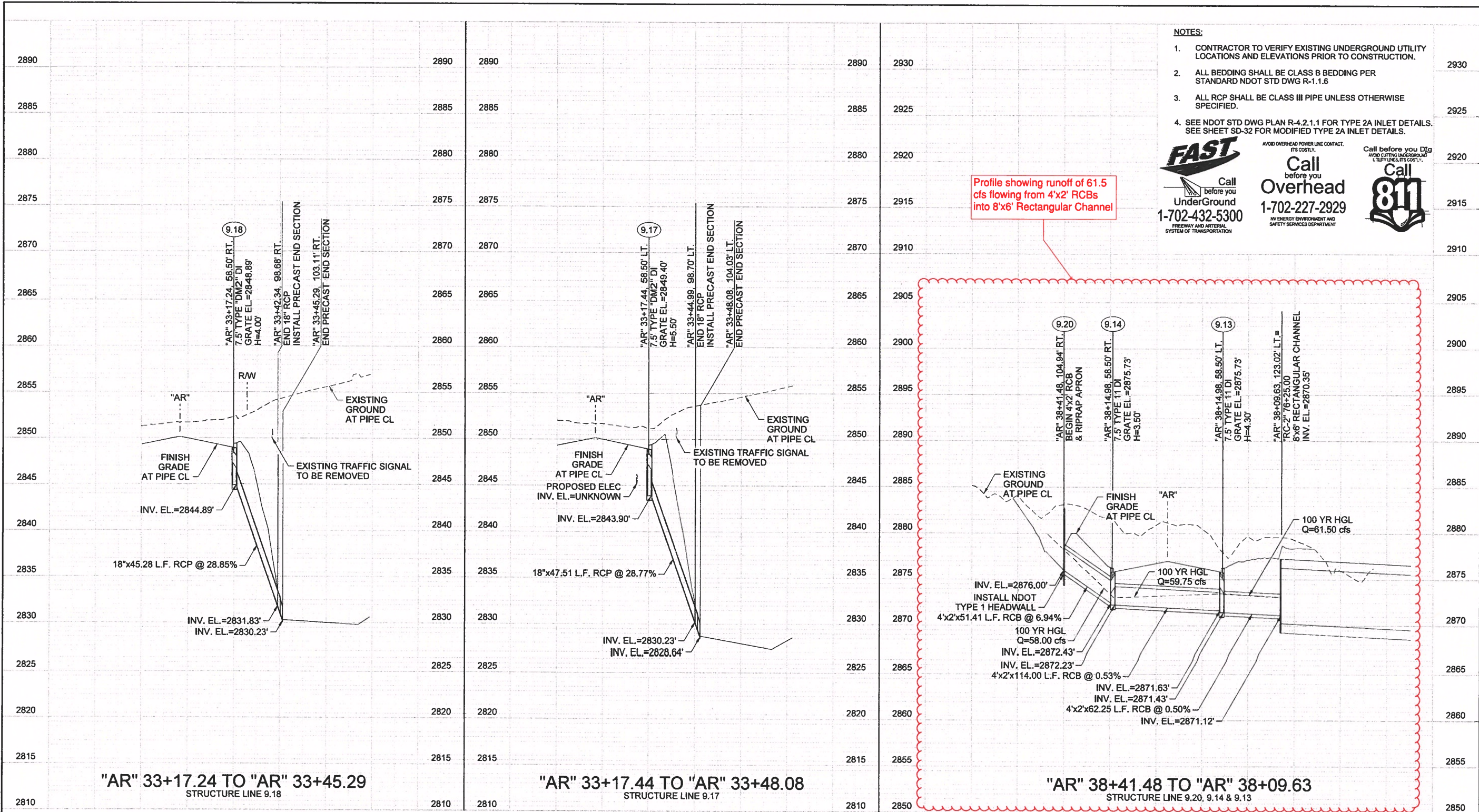
Denis Cederburg

AGENCY	PLANS REVIEWED BY	DATE	DEPARTMENT OF PUBLIC WORKS	BY	DATE	NUMBER	REVISIONS DESCRIPTION	DATE	DESIGN ENGINEERING DIVISION
CITY OF LAS VEGAS ENGINEERING PLANNING DIVISION CENTRAL TELEPHONE COMPANY DBA CENTURYLINK LAS VEGAS VALLEY WATER DISTRICT SOUTHWEST GAS CORPORATION NV ENERGY COMPANY (TRANSMISSION) NV ENERGY COMPANY (DISTRIBUTION) COX COMMUNICATIONS LAS VEGAS, INC FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION	<i>Jeffrey N. Griest</i> <i>Jeffrey N. Griest</i>	1-23-15	DESIGN ENGINEERING DIVISION CONSTRUCTION MANAGEMENT DIVISION ROAD DIVISION TRAFFIC MANAGEMENT DIVISION COUNTY SURVEYOR'S OFFICE DEVELOPMENT REVIEW DIVISION						DESIGN ENGINEERING DIVISION
									COVER SHEET
									L-1803



BID No.:

WESTERN CLARK COUNTY 215 BRUCE WOODBURY BELTWAY - CRAIG ROAD TO HUALAPAI WAY



NOTES:

- CONTRACTOR TO VERIFY EXISTING UNDERGROUND UTILITY LOCATIONS AND ELEVATIONS PRIOR TO CONSTRUCTION.
- ALL BEDDING SHALL BE CLASS B BEDDING PER STANDARD NDOT STD DWG R-1.1.6
- ALL RCP SHALL BE CLASS III PIPE UNLESS OTHERWISE SPECIFIED.
- SEE NDOT STD DWG PLAN R-4.2.1.1 FOR TYPE 2A INLET DETAILS. SEE SHEET SD-32 FOR MODIFIED TYPE 2A INLET DETAILS.

Call before you Dig
UnderGround
1-702-432-5300
FREIGHTWAY AND ARTERIAL
SYSTEMS OF TRANSPORTATION

Call before you Dig
Overhead
1-702-227-2929
HV ENERGY ENVIRONMENT AND
SAFETY SERVICES DEPARTMENT

Call before you Dig
Call 811
Call before you Dig
Call before you Dig
Call before you Dig

		WESTERN CLARK COUNTY 215 BRUCE WOODBURY BELTWAY CRAIG ROAD TO HUALAPAI WAY DRAINAGE PROFILES				CH2MHILL PROJECT NO.: 362810 DESIGNED: B. MAHAN DRAWN: S. BOURQUE APPROVED: J. GRIEST CHECKED: B. DEMITROPOULOS		SCALE HORIZ: 1"=50' VERT: 1"=5'		L - 1803	
						CH2MHILL. 2485 VILLAGE VIEW DRIVE, SUITE 350 HENDERSON, NEVADA 89074 PHONE 702-389-6175, FAX 702-389-1107		FIELD BOOK CCPW PROJECT #B033311		DRAWING NO. SD-56	
NO. DATE DESCRIPTION		APVD		CLARK COUNTY, NEVADA, DEPARTMENT OF PUBLIC WORKS				W.O. #: 2008-62		SHT 223 OF 600	



Grading Plans

EPIC STORAGE AT ANN ROAD

located in
CITY OF LAS VEGAS
APN # 126-36-101-017

OWNERS

EPIC MOUNTAINS EDGE, LLC &
MOUNTAIN SUNRISE VIEW II LTD
PARTNERSHIP
6525 W. WARM SPRINGS ROAD, STE 101
LAS VEGAS, NV 89118
PHONE: (702)951-5395
CONTACT: JEFF THOMSON
EMAIL: JTHOMSON@EPICNV.COM

DEVELOPER

EPIC DEVELOPMENT, LLC
6525 W. WARM SPRINGS ROAD, STE 101
LAS VEGAS, NV 89118
PHONE: (702)951-5395
CONTACT: JEFF THOMSON
EMAIL: JTHOMSON@EPICNV.COM

ENGINEER:

HORROCKS ENGINEERS
1401 N. GREEN VALLEY PKWY., STE 160
HENDERSON, NV 89074
PHONE: (702)966-4063
CONTACT: ANTHONY DELEON JR., P.E.
EMAIL: ANTHONY.DELEON@HORROCKS.COM

HORROCKS
ENGINEERS

1401 N. Green Valley Pkwy., Suite 160
Henderson, NV 89074
(702) 966-4063
www.horrocks.com

WARNING

IF THIS BAR DOES NOT
MEASURE 2" THEN
DRAWING IS NOT TO SCALE

REVISIONS

DRAWING INFO

DESIGNED: SS
DRAWN: PPHD
CHECKED: ACD
PROJECT: NV2108-1911

9/23/2020

EPIC STORAGE AT ANN ROAD

CITY OF LAS VEGAS, NEVADA

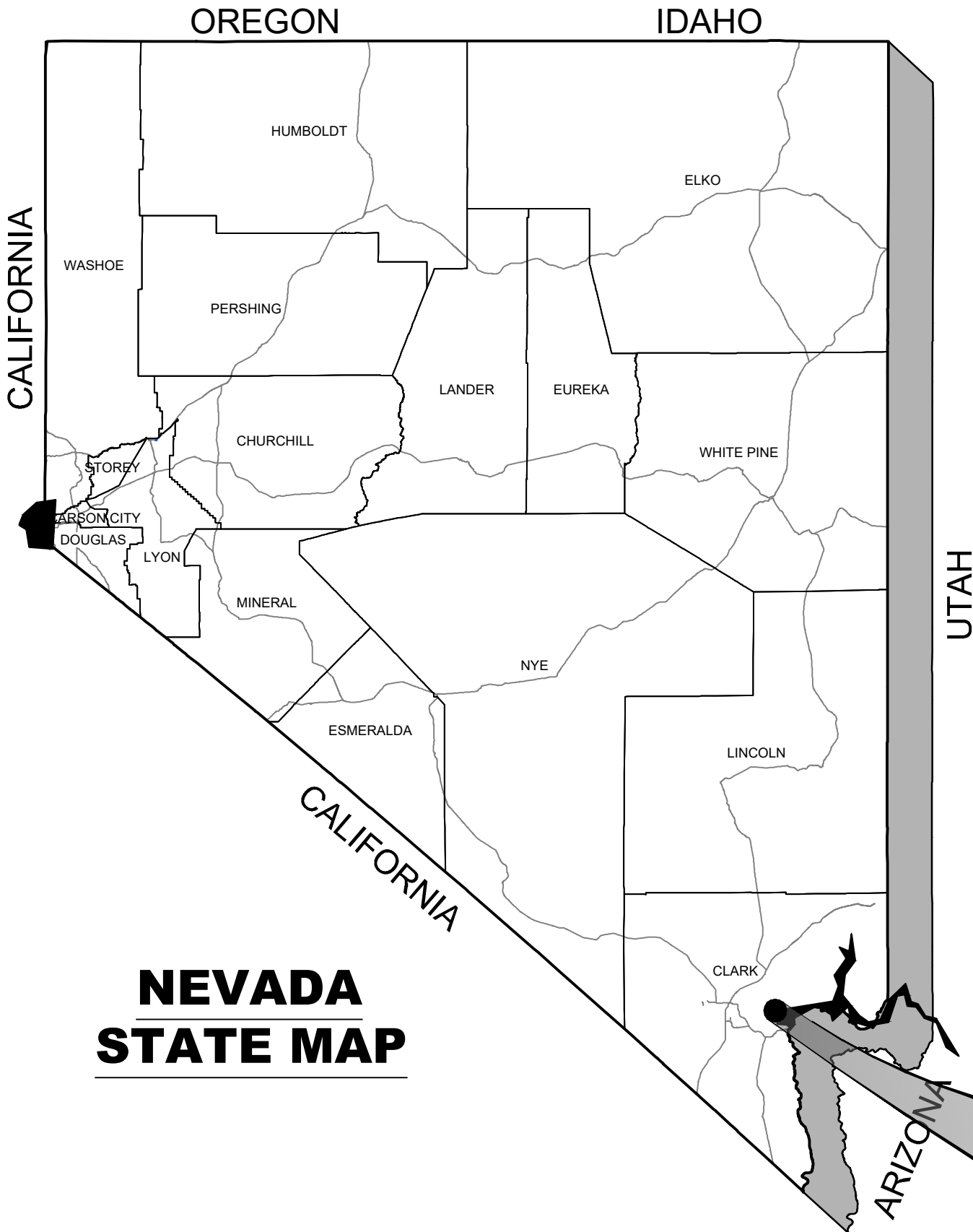
COVER SHEET

APN# 126-86-101-017



C.O.O

PAGE 1



NEVADA STATE MAP

UTILITY CONTACTS

WATER
LAS VEGAS VALLEY
WATER DISTRICT
1001 S. VALLEY VIEW BLVD.
LAS VEGAS, NV 89107
(702) 870-2011

POWER
NEVADA ENERGY
7155 LINDELL RD.
LAS VEGAS, NV 89118
(702) 402-8400

NATURAL GAS
SOUTHWEST GAS CORPORATION
6355 SHATZ ST.
LAS VEGAS, NV 89115
(877) 860-6020

SEWER
CITY OF LAS VEGAS
333 N. RANCHO DR.
LAS VEGAS, NV 89108
(702) 229-6301

TELEPHONE
CENTURY LINK
2340 E. TROPICANA AVE.
LAS VEGAS, NV 89119
(877) 862-9343

CATV SERVICE
COX COMMUNICATIONS
819 E. OGDEN AVE.
LAS VEGAS, NV 89010
(702) 883-4000

FLOOD ZONE:

THIS SITE IS LOCATED IN A ZONE "X"; AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AND PARTIALLY IN A SHADED ZONE "X"; AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE OF FLOOD PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C1750E, CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011, REVISED TO REFLECT LOMR DATED OCTOBER 18, 2018.

BENCHMARK

CITY OF LAS VEGAS
BENCHMARK ID NO. 5L V99265ES
BLM BC AT MAINWAL BLVD. & ANN ROAD (CLV TAG ATTACHED)
ELEVATION: METERS: 897.69
FEET: 2,945.16

BASIS OF BEARING

N 00°37'29" W, BEING THE WEST LINE OF THE NW 1/4 OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON THE PLAT OF CONSTELLATION ESTATES, RECORDED IN BOOK 102, PAGE 92, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

LEGAL DESCRIPTION:

A PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4), SECTION 36 TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CLARK COUNTY, NEVADA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THE EAST HALF (E 1/2) OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36.

Call before you dig
HAVE YOUR DIGGING STOPPED
CALL 811

1-800-227-2600

ALWAYS HITTING OVERHEAD
POWER LINES, ITS DANGEROUS!
CALL BEFORE YOU DIG
UNDERGROUND

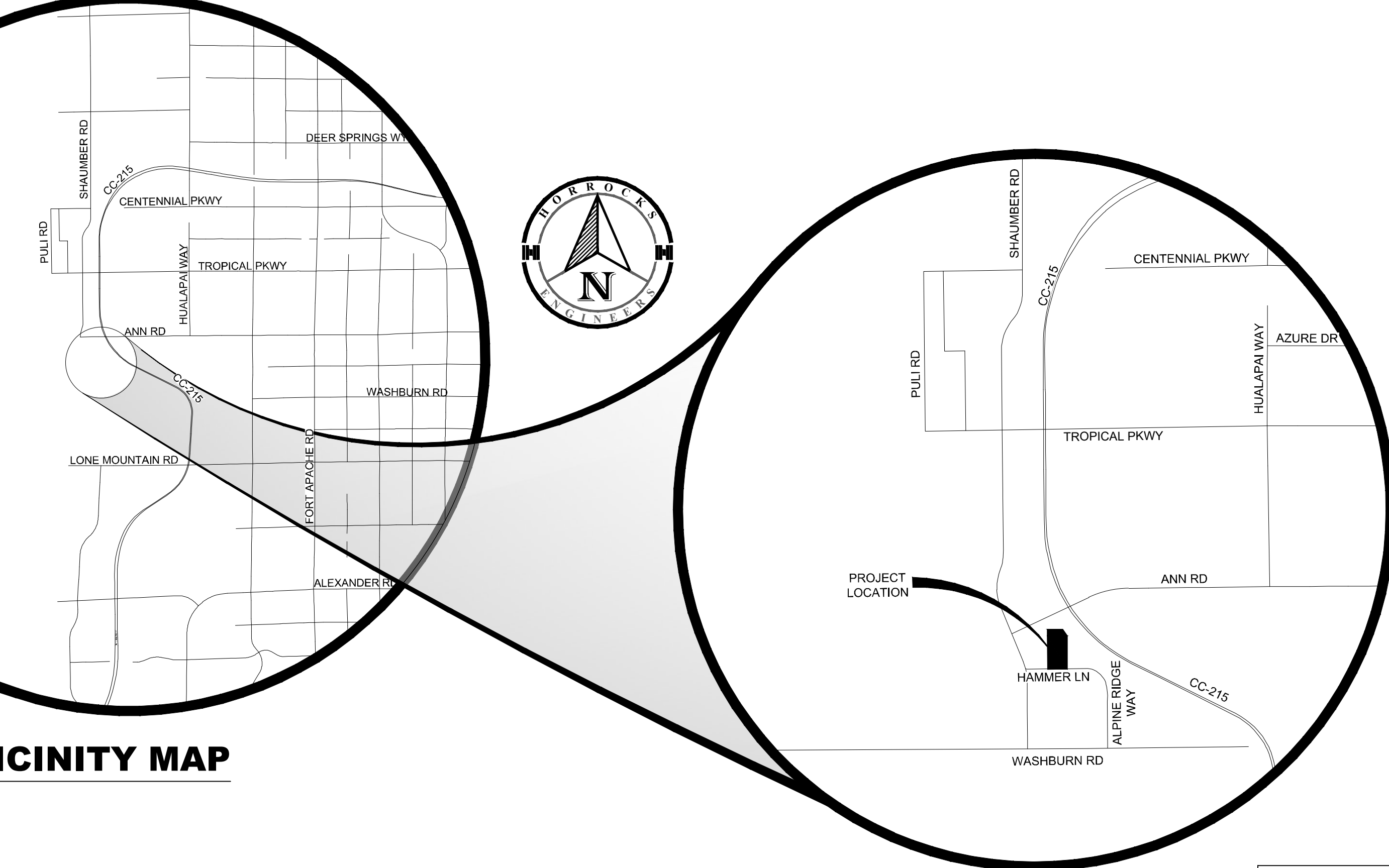
1-702-227-2929

FAST
Call before you
UnderGround

1-702-432-5300

SHEET INDEX		
PAGE #	SHEET #	SHEET TITLE
1	C.0.0	COVER SHEET
2	C.0.1	GENERAL NOTES
3	C.0.2	LEGEND & ABBREVIATIONS
4	C.2.0	GRADING PLAN 1
5	C.5.0	HAMMER PNP STA 9+00 - 13+50
6	C.5.1	HAMMER PNP STA 12+50 - 17+50
7	C.5.2	MAIN STORM DRAIN PNP
8	C.6.0	DETAILS

VICINITY MAP



PROJECT SITE

SITE DATA

APN NUMBER: 126-36-101-017
GROSS AREA: 5.0 ± ACRES
ZONING: C-2

UTILITY DISCLAIMER NOTE:

EXISTING UTILITY LOCATIONS SHOWN HEREIN ARE APPROXIMATE ONLY. IT SHALL BE AT THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATIONS.

NOTE:

FOR ALL REFERENCES TO FINAL MAP # SHOWN THROUGHOUT THIS SET OF PLANS, SEE PLAT BOOK ____ PAGE ____.

EARTHWORKS

CUT: 8,461 CY
FILL: 18,811 CY
NET: 10,349 CY (FILL)

ESTIMATED QUANTITY FROM EXISTING TO FINISHED GRADES. PER SOILS REPORT BY ____ PROJECT # ____ DATED ____.

AREA OF DISTURBANCE:

+/- 3.95 AC. ONSITE (PRIVATE)
+/- 0.20 AC. OFFSITE (PUBLIC)

APPROVALS

MIKE JANSEN _____ DATE _____
CITY ENGINEER - CITY OF LAS VEGAS
APPROVAL OF THESE PLANS BY THE CITY ENGINEER IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHT-OF-WAY, AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE 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 STANDARD IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS, CLARK COUNTY AREA, NEVADA.

CITY OF LAS VEGAS FIRE & RESCUE _____ DATE _____

SOUTHWEST GAS CORPORATION _____ DATE _____

COX COMMUNICATIONS LAS VEGAS, INC _____ DATE _____

CENTRAL TELEPHONE COMPANY DBA CENTURY LINK _____ DATE _____
THE CENTURY LINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY _____ DATE _____
NEVADA ENERGY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NEVADA POWER COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. _____ FIRST APPROVAL DATE: _____

SHEETS: C.0.0, C.0.1, C.0.2, & C.5.0



G1	CONSTRUCT "1" TYPE CURB PER CCAUSD #216
G2	CONSTRUCT "4" TYPE CURB PER CCAUSD #219
G3	CONSTRUCT DEPRESSED CURB PER DETAIL "0" ON SHEET C.6.0
G4	CONSTRUCT 2" AG PAVEMENT OVER 4" TYPE II AGG BASE REFERENCE GEOTECHNICAL REPORT
G5	CONSTRUCT SIDEWALK RAMP "CASE 1" PER CCAUSD #235
G6	CONSTRUCT 4" AC PAVEMENT OVER 4" TYPE II AGG BASE
G7	CONSTRUCT 8" CROSS GUTTER PER CCAUSD #228
G8	SAWCUT, TRENCH, BACKFILL, AND ASPHALT PATCH PER CCAUSD 500.1, 500.4, 500.5 & 503 (PATCH DIMENSIONS TO BE DETERMINED IN THE FIELD) PROPOSED SAWCUT TO BE AT LANE LINE
G9	INSTALL WROUGHT IRON GATE
G10	CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
G11	CONSTRUCT HEADWALL PER NDOT STANDARDS SEE DETAIL "5" ON C.6.1
G12	EXISTING TO REMAIN, PROTECT IN PLACE.
G13	CONSTRUCT 3" CONCRETE VALLEY GUTTER PER CCAUSD #228
G14	CONSTRUCT 6" THICK CONCRETE SLAB OVER 4" TYPE II PER DETAIL "1" ON SHEET C.6.0
G15	CONSTRUCT 2" WIDE CURB OPENING PER DETAIL "1" ON SHEET C.6.1
G16	CONSTRUCT 5" WIDE CONCRETE SIDEWALK PER CCAUSD #234
G17	INSTALL BLOCK WALL OPENING WITH CONCRETE OVERFLOW PATH PER DETAIL "3"
G18	INSTALL RIP-RAP D50=6", T=12" SUBGRADE @ 90% COMPACTION
G19	INSTALL 60" TYPE II-SD STORM DRAIN MANHOLE PER CCAUSD #401 & 405.2
G20	INSTALL LANDSCAPING PER LANDSCAPE PLAN BY OTHERS

- 1 RIGHT OF WAY GRANT N-90784 FOR ROAD, DRAINAGE, AND SEWER FACILITIES TO CLV TO BE VACATED PER DOC# _____
- 2 30' R/W TO BE DEDICATED PER DOC# _____
- 3 40' SEWER EASEMENT TO BE VACATED PER DOC# _____
- 4 15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY OWNER PER DOC# _____

1. CONTRACTOR IS RESPONSIBLE FOR EROSION AND DUST CONTROL AND STORMWATER MANAGEMENT DURING CONSTRUCTION.
2. SEE CITY OF CHICAGO PLAN AND EROSION CONTROL PROPERTY LINE DIMENSIONS.
3. ENGINEER TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THESE PLANS AND THE CITY OF CHICAGO RECORD PLANS.
4. THESE PLANS SHALL NOT IN PART OR IN WHOLE BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY GOVERNING AGENCIES.
5. ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
6. DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL EXISTING AND PROPOSED GRADING IS IN ACCORDANCE WITH THE SAME. UTILIZE AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPS.
7. SOILS REPORT NOTE:
 GRADING SHALL BE IN ACCORDANCE WITH SOILS REPORT
 PREPARED BY: IN PROGRESS
 PROJECT NO:
 DATE:
 CUT/FILL ESTIMATES (PUBLIC AND PRIVATE):
 FROM EXISTING TO FINISH GRADE SAME
 NET CUT: CY
 NET FILL: CY
 (CY FILL)
8. TOTAL: 0.00
9. FLOOR SECTION ASSUMES 3" SLAB OVER 8" TYPE I CONCRETE TO VERIFY WITH STRUCTURAL PLANS AND GEOTECHNICAL REPORT.

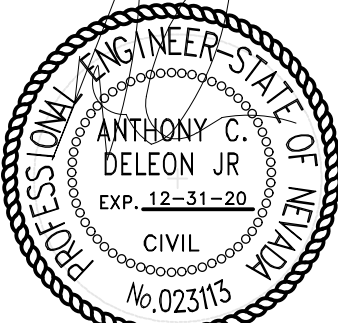
THIS SET OF IMPROVEMENT PLANS IS CERTIFIED TO CONFORM TO
THE REQUIREMENTS OF THE APPROVED DRAINAGE STUDY.
DS# _____.

ANTHONY DELEON, P.E. NO. 023113 DATE

SIGHT VISIBILITY ZONE NOTE:

NO WALLS, FENCES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES, FIRE HYDRANTS, TREES, AND STREET LIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT, MEASURED FROM TOP OF CURB, OR WHERE NO CURB EXISTS, A HEIGHT OF 27 INCHES MEASURED FROM THE TOP OF ADJACENT ASPHALT, GRAVEL OR PAVEMENT STREET SURFACE. THIS RESTRICTION EXTENDS ALONG THE SIGHT VISIBILITY LINE THROUGH LANDSCAPED MEDIANS.

FAST
Call
before you
UnderGround
1-702-432-5300



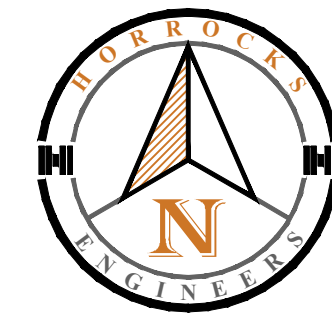
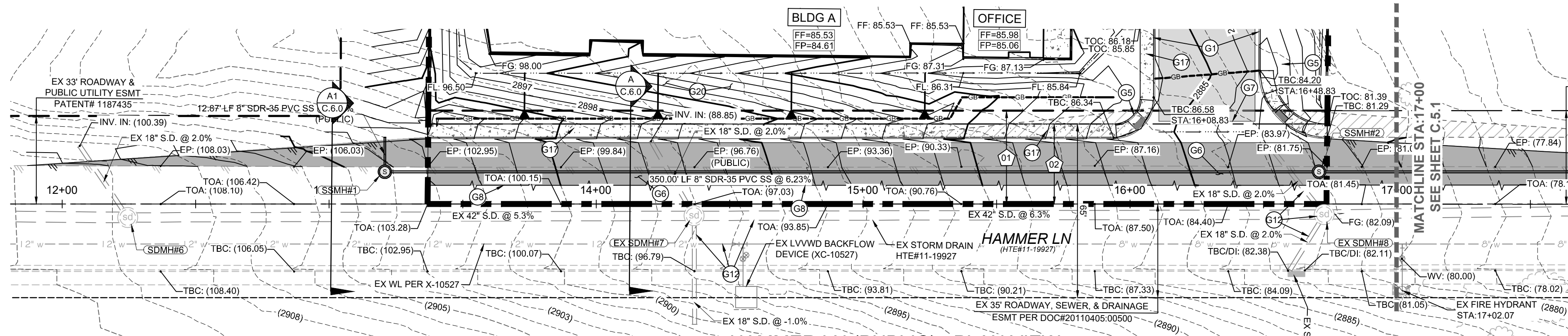
1

2

3

4

5



GRADING KEY NOTES:

- (G1) CONSTRUCT "L" TYPE CURB PER CCAUSD #216
- (G2) CONSTRUCT "A" TYPE CURB PER CCAUSD #219
- (G3) CONSTRUCT DEPRESSED CURB PER DETAIL "4" ON SHEET C.6.0
- (G4) CONSTRUCT 2" AC PAVEMENT OVER 4" TYPE II AGG BASE REFERENCE GEOTECHNICAL REPORT
- (G5) CONSTRUCT SIDEWALK RAMP "CASE I" PER CCAUSD #235
- (G6) CONSTRUCT 4" AC PAVEMENT OVER 4" TYPE II AGG BASE
- (G7) CONSTRUCT 8" CROSS GUTTER PER CCAUSD #228
- (G8) SAWCUT, TRENCH, BACKFILL, AND ASPHALT PATCH PER CCAUSD 500.3, 500.4, 500.5 & 503 (PATCH DIMENSIONS TO BE DETERMINED IN THE FIELD) PROPOSED SAWCUT TO BE AT LANE LINE
- (G9) INSTALL WROUGHT IRON GATE
- (G10) CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
- (G11) CONSTRUCT HEADWALL PER NDOT STANDARDS SEE DETAIL "5" ON C.6.0
- (G12) EXISTING TO REMAIN. PROTECT IN PLACE.
- (G13) CONSTRUCT 3" CONCRETE VALLEY GUTTER PER CCAUSD #228
- (G14) CONSTRUCT 6" THICK CONCRETE SLAB OVER 4" TYPE II PER DETAIL "2" ON SHEET C.6.0
- (G15) CONSTRUCT 2" WIDE CURB OPENING PER DETAIL "1" ON SHEET C.6.1
- (G16) CONSTRUCT 5' WIDE CONCRETE SIDEWALK PER CCAUSD #234
- (G17) INSTALL BLOCK WALL OPENING WITH CONCRETE OVERFLOW PATH PER DETAIL "3"
- (G18) INSTALL RIP-RAP D50=6", T=12" SUBGRADE @ 90% COMPACTION
- (G19) INSTALL 60" TYPE II-SD STORM DRAIN MANHOLE PER CCAUSD #401 & 405.2
- (G20) INSTALL LANDSCAPING PER LANDSCAPE PLAN BY OTHERS

EASEMENT KEY NOTES:

- 1 RIGHT OF WAY GRANT N-90784 FOR ROAD, DRAINAGE, AND SEWER FACILITIES TO CLV TO BE VACATED PER DOC#
- 2 30' R/W TO BE DEDICATED PER DOC#
- 3 40' SEWER EASEMENT TO BE VACATED PER DOC#
- 4 15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY OWNER PER DOC#

ENGINEER'S NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR EROSION AND DUST CONTROL, AND STORMWATER MANAGEMENT DURING CONSTRUCTION.
2. SEE HORIZONTAL CONTROL PLAN FOR EXACT PROPERTY LINE DIMENSIONS.
3. ENGINEER TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THESE PLANS AND FIELD CONDITIONS.
4. THESE PLANS SHALL NOT IN PART, OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY GOVERNING AGENCIES.
5. ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
6. DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL STREETS AND LOTS HAVE POSITIVE DRAINAGE. SAME MUST UTILIZE AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPES.
7. FLOOR SECTION ASSUMES 5" SLAB OVER MIN. 6" TYPE II. CONTRACTOR TO VERIFY WITH STRUCTURAL PLANS AND GEOTECHNICAL ENGINEER.

APPROVED FOR CONSTRUCTION

SOUTHWEST GAS CORPORATION

DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. FIRST APPROVAL DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDENTIAL

HAMMER LN (PUBLIC) PLAN VIEW (STA. 12+50 TO 17+50)

SCALE: 1" = 30' H
SCALE: 1" = 3' V

BENCHMARK CITY OF LAS VEGAS

BENCHMARK ID NO. 5L V99265E5
BLM BC AT MAINWAL BLVD. & ANN ROAD (CLV TAG ATTACHED)
ELEVATION: METERS: 897.69
FEET: 2,945.16

BASIS OF BEARING

N 00°37'29" W, BEING THE WEST LINE OF THE NW 1/4 OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CLARK COUNTY, NEVADA, AS SHOWN ON THE PLAT OF CONSTELLATION ESTATES, RECORDED IN BOOK 102, PAGE 92, OFFICIAL RECORDS, CLARK COUNTY, NEVADA.

NOTE:

ALL LOCATIONS OF EXISTING UTILITIES ARE APPROXIMATE. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE EXISTING UTILITIES PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY CONFLICTS.

DEPTH OF COVER DURING CONSTRUCTION:

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

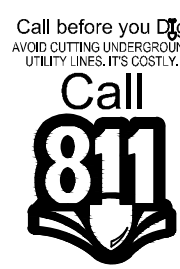
FLOOD ZONE:

THIS SITE IS LOCATED IN A ZONE "X", AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AND PARTIALLY IN A SHADED ZONE "X", AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE OF FLOOD PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C1750E, CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011, REVISED TO REFLECT LOMR DATED OCTOBER 18, 2018.

LEGAL DESCRIPTION:

A PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4), SECTION 36 TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CLARK COUNTY, NEVADA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THE EAST HALF (E 1/2) OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36.



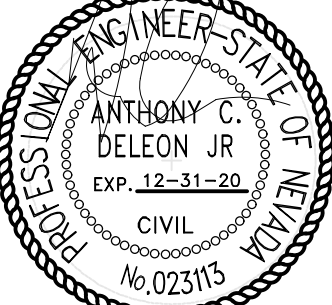
1-800-227-2600



1-702-227-2929



1-702-432-5300

HORROCKS
ENGINEERS1401 N. Green Valley Pkwy., Suite 160
Henderson, NV 89074(702) 966-4063
www.horrock.com**WARNING**REVISIONS
REV # DATEDRAWING INFO
DATE 9/23/20
DESIGNED SS
DRAWN PPHD
CHECKED ACD
PROJECT NV2108-1911

9/23/2020

EPIC STORAGE AT ANN ROADCITY OF LAS VEGAS, NEVADA
HAMMER PNP STA 9+00 - 13+50

APN# 126-36-101-017

**C.5.0**

PAGE 5



SCALE: 1" = 30' H
SCALE: 1" = 3' V

DEPTH OF COVER DURING CONSTRUCTION:

MAINTAIN MINIMUM TWENTY-FOUR (24) INCH COVER PER UDACS SECTION 2.08.04. GRADING MUST BE COMPLETED PRIOR TO WATERLINE INSTALLATION.

- 61 CONSTRUCT "L" TYPE CURB PER CCAUSD #216
- 62 CONSTRUCT "A" TYPE CURB PER CCAUSD #219
- 63 CONSTRUCT DEPRESSED CURB PER DETAIL "1" ON SHEET C.6.0
- 64 CONSTRUCT 2" AG PAVEMENT OVER 4" TYPE II AGG BASE REFERENCE GEOTECHNICAL REPORT
- 65 CONSTRUCT SIDEWALK RAMP "CASE 1" PER CCAUSD #235
- 66 CONSTRUCT 4" AG PAVEMENT OVER 4" TYPE II AGG BASE
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- 69 INSTALL WROUGHT IRON GATE
- 70 CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
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- 79 INSTALL 60" TYPE II-SD STORM DRAIN MANHOLE PER CCAUSD #401 & 405.2
- 80 INSTALL LANDSCAPING PER LANDSCAPE PLAN BY OTHERS

- 1 RIGHT OF WAY GRANT N-90784 FOR ROAD, DRAINAGE, AND SEWER FACILITIES TO CLV TO BE VACATED PER DOC# _____
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5. ALL CHANGING SHALL BE NOTED AND APPROVED BY THE FOUNDATIONS.
6. DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL STREETS AND LOTS HAVE POSITIVE DRAINAGE. SAME MUST VERIFY AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPES.
7. THIS SECTION ASSUMES THE CONTRACTOR SHALL VERIFY THE CONTRACTOR TO VERIFY WITH STRUCTURAL PLANS AND GEOTECHNICAL ENGINEER.

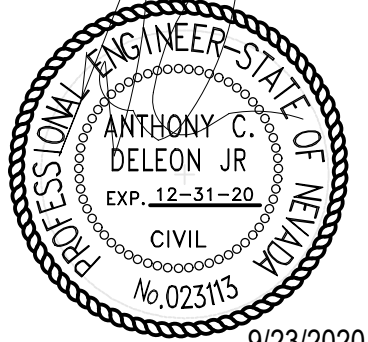
PROJECT NO. _____ FIRST APPROVAL DATE: _____
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDENTIAL

(702) 966-4063
www.horrocks.com

WARNING

IF THIS BAR DOES NOT
MEASURE 2" THEN
DRAWING IS NOT TO SCALE

DRAWING INFO		REVISIONS	
DATE	9/23/20	REV #	DATE
DESIGNED	SS		
DRAWN	PP/HD		
CHECKED	ACD		
PROJECT	NV-2/08-1911	*SEE GENERAL NOTES SHEET	



9/23/2020

EPIC STORAGE AT ANN ROAD

CITY OF LAS VEGAS, NEVADA

HAMMER PNP STA 12+50 - 17+50

APN# 126-36-101-017



C.5.1



THIS SITE IS LOCATED IN A ZONE 'X', AREAS OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN AND PARTIALLY IN A SHADED ZONE 'X', AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE OF FLOOD PER THE FLOOD INSURANCE RATE MAP COMMUNITY PANEL 32003C1750E, CLARK COUNTY, NEVADA DATED NOVEMBER 16, 2011, REVISED TO REFLECT LOMR DATED OCTOBER 18, 2018.

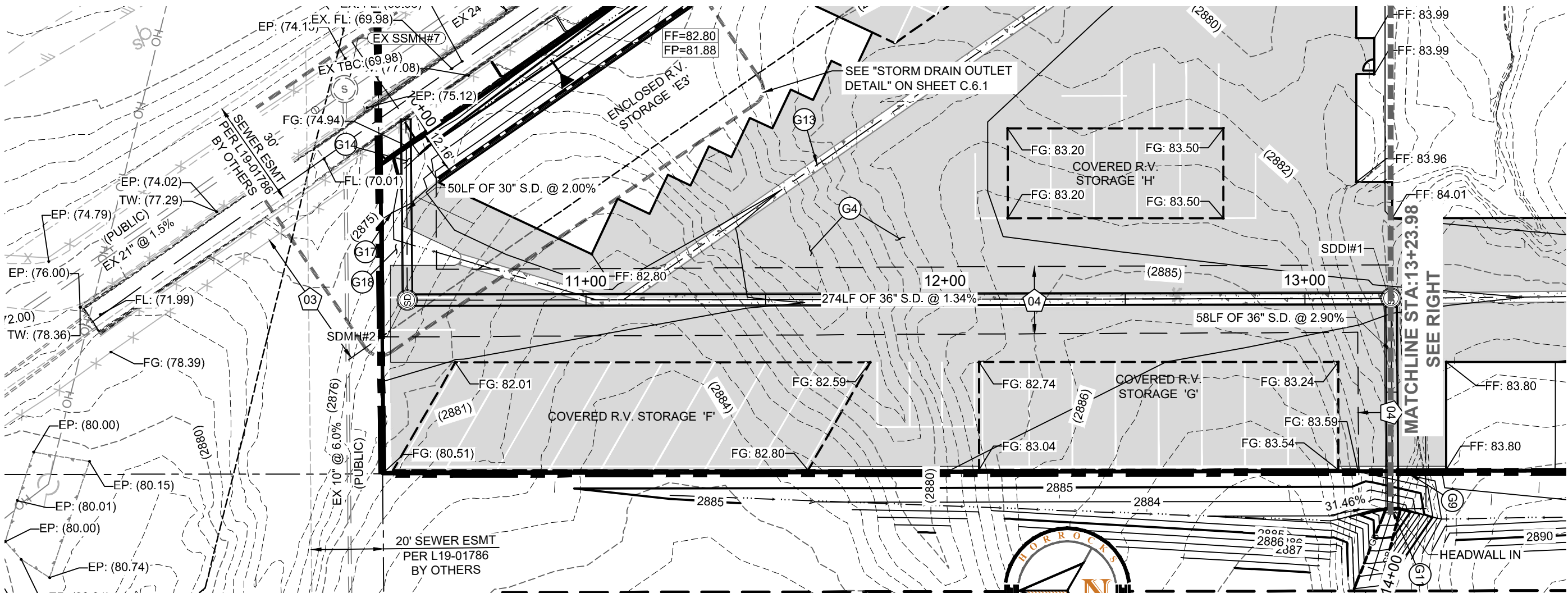
A PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4), SECTION 36 TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M., CLARK COUNTY, NEVADA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THE EAST HALF (E 1/2) OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SAID SECTION 36.

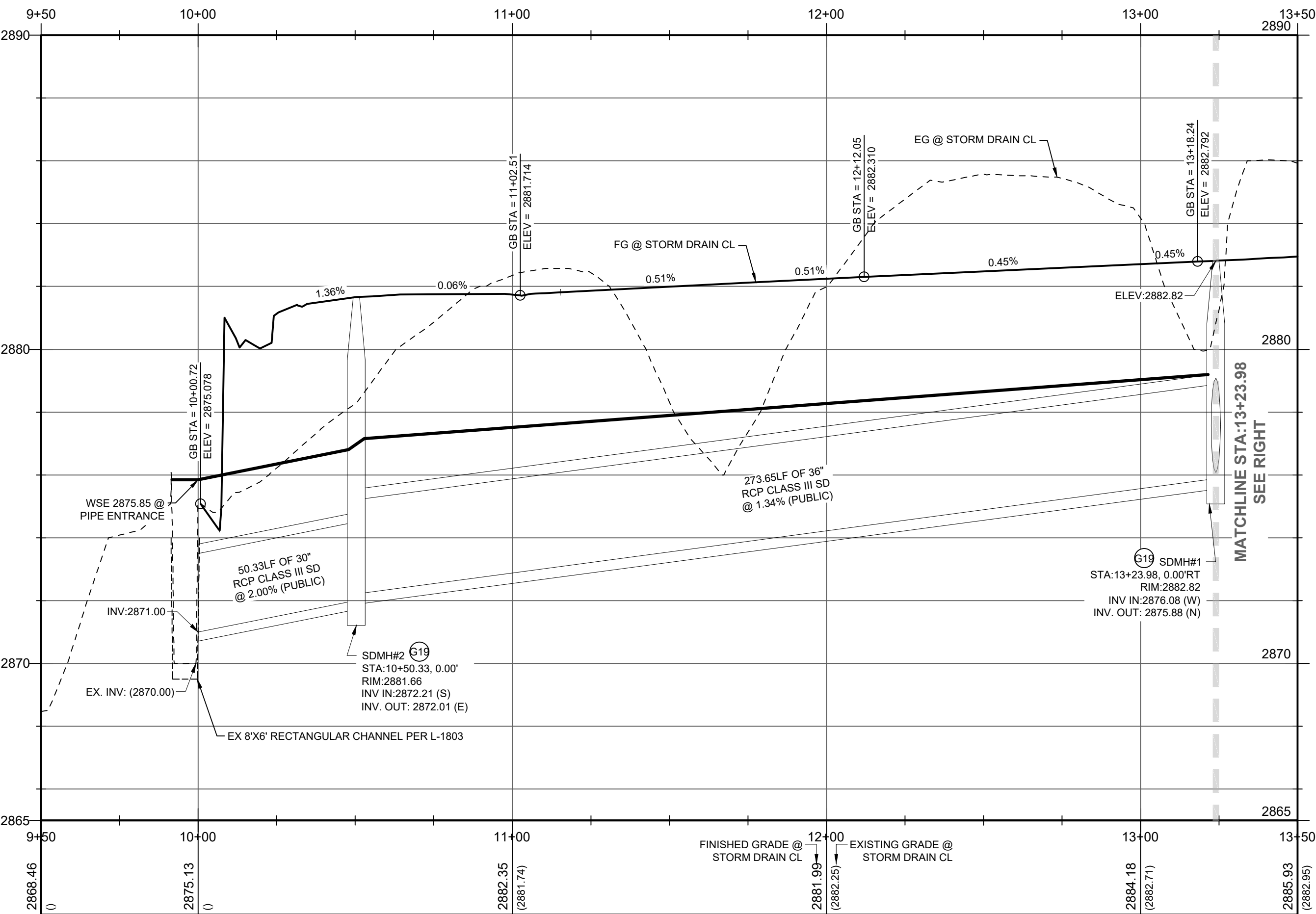
CITY OF LAS VEGAS

BENCHMARK ID NO. 5L V99265ES
BLM BC AT MAINWAL BLVD. & ANN ROAD (CLV TAG ATTACHED)
ELEVATION: METERS: 897.69
FEET: 2,945.16

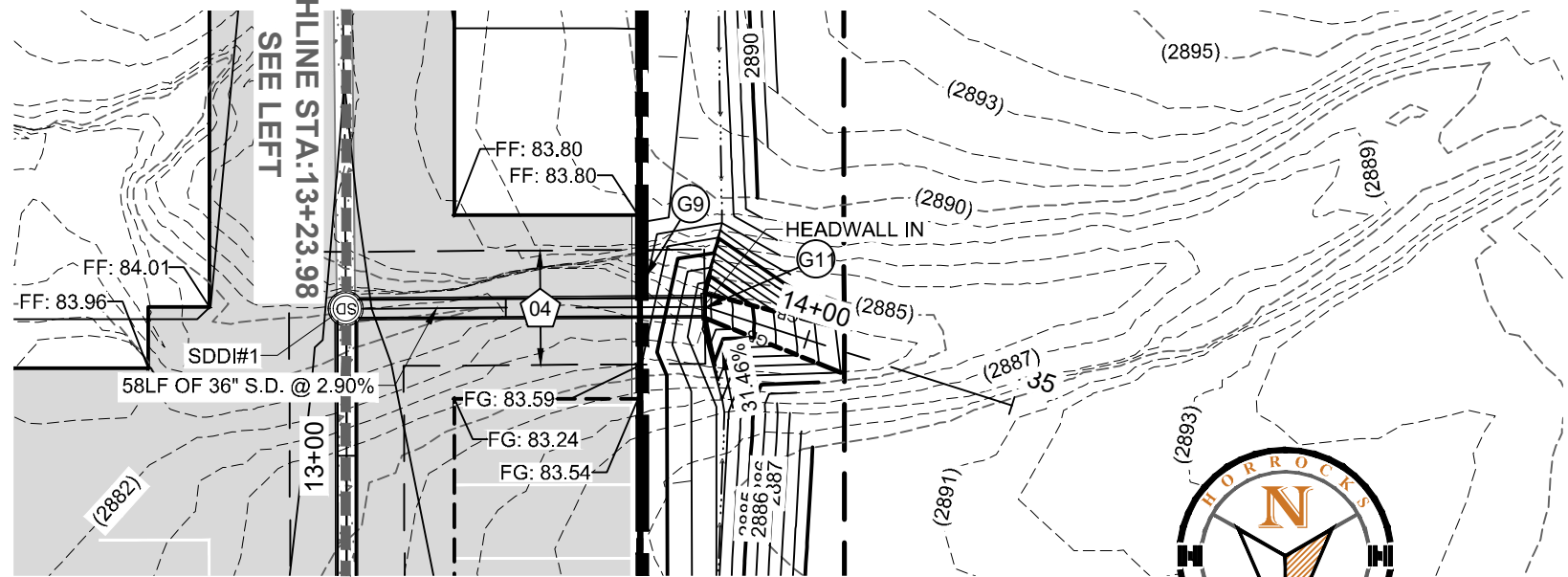
N 00°37'29" W, BEING THE WEST LINE OF THE NW 1/4 OF SECTION 25, TOWNSHIP 19 SOUTH, RANGE 59 EAST, M.D.M. CLARK COUNTY, NEVADA, AS SHOWN ON THE PLAT OF CONSTELLATION ESTATES, RECORDED IN BOOK 102, PAGE 92 OFFICIAL RECORDS, CLARK COUNTY, NEVADA.



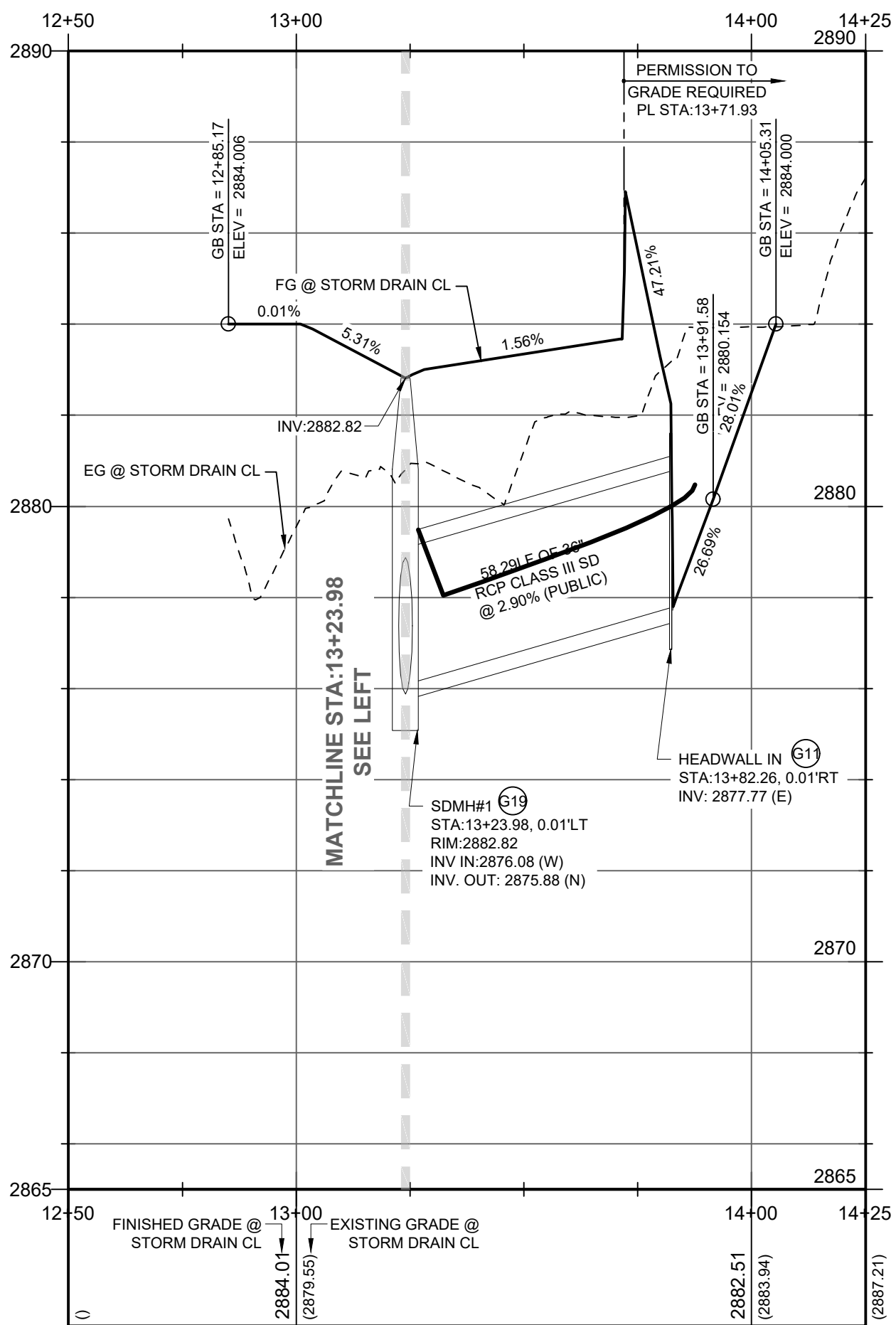
ON-SITE STORM DRAIN
PLAN VIEW
(STA. 9+50 TO 12+82.40)



ON-SITE STORM DRAIN
PROFILE VIEW
(STA. 9+50 TO 12+82.40)



ON-SITE STORM DRAIN
PLAN VIEW
(STA. 12+82.40 TO 14+25)



ON-SITE STORM DRAIN
PROFILE VIEW
(STA. 12+82.40 TO 14+25)

GRADING KEY NOTES:

- CONSTRUCT "L" TYPE CURB PER CCAUSD #216
- CONSTRUCT "A" TYPE CURB PER CCAUSD #219
- CONSTRUCT DEPRESSED CURB PER DETAIL "4" ON SHEET C.6.0
- CONSTRUCT 2" AC PAVEMENT OVER 4" TYPE II AGG BASE REFERENCE GEOTECHNICAL REPORT
- CONSTRUCT SIDEWALK RAMP "CASE I" PER CCAUSD #235
- CONSTRUCT 4" AC PAVEMENT OVER 4" TYPE II AGG BASE
- CONSTRUCT 8" CROSS GUTTER PER CCAUSD #228
- SAWCUT, TRENCH, BACKFILL, AND ASPHALT PATCH PER CCAUSD 500.3, 500.4, 500.5 & 503 (PATCH DIMENSIONS TO BE DETERMINED IN THE FIELD) PROPOSED SAWCUT TO BE AT LANE LINE
- INSTALL WROUGHT IRON GATE
- CONSTRUCT SIDEWALK DRAIN PER CCAUSD #236
- CONSTRUCT HEADWALL PER NDOT STANDARDS SEE DETAIL "5" ON C.6.0
- EXISTING TO REMAIN. PROTECT IN PLACE.
- CONSTRUCT 3" CONCRETE VALLEY GUTTER PER CCAUSD #228
- CONSTRUCT 6" THICK CONCRETE SLAB OVER 4" TYPE II PER DETAIL "2" ON SHEET C.6.0
- CONSTRUCT 2" WIDE CURB OPENING PER DETAIL "1" ON SHEET C.6.1
- CONSTRUCT 5" WIDE CONCRETE SIDEWALK PER CCAUSD #234
- INSTALL BLOCK WALL OPENING WITH CONCRETE OVERFLOW PATH PER DETAIL "3"
- INSTALL RIP-RAP D50=6", T=12" SUBGRADE @ 90% COMPACTION
- INSTALL 60" TYPE II-SD STORM DRAIN MANHOLE PER CCAUSD #401 & 405.2
- INSTALL LANDSCAPING PER LANDSCAPE PLAN BY OTHERS

EASEMENT KEY NOTES:

- RIGHT OF WAY GRANT N-90784 FOR ROAD, DRAINAGE, AND SEWER FACILITIES TO CLV TO BE VACATED PER DOC#
- 30' R/W TO BE DEDICATED PER DOC#
- 40' SEWER EASEMENT TO BE VACATED PER DOC#
- 15' PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY OWNER PER DOC#

ENGINEER'S NOTES:

- CONTRACTOR IS RESPONSIBLE FOR EROSION AND DUST CONTROL, AND STORMWATER MANAGEMENT DURING CONSTRUCTION.
- SEE HORIZONTAL CONTROL PLAN FOR EXACT PROPERTY LINE DIMENSIONS.
- ENGINEER TO BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCIES BETWEEN THESE PLANS AND FIELD CONDITIONS.
- THESE PLANS SHALL NOT IN PART, OR IN WHOLE, BE USED FOR CONSTRUCTION UNTIL APPROVED AND SIGNED BY GOVERNING AGENCIES.
- ALL GRADING SHALL CONFORM TO SOILS REPORT RECOMMENDATIONS.
- DURING CONSTRUCTION, SURVEYORS AND CONTRACTORS MUST VERIFY THAT ALL STREETS AND LOTS HAVE POSITIVE DRAINAGE. SAME MUST UTILIZE AT LEAST THREE GRADES ON VERTICAL TANGENTS TO VERIFY SLOPES.
- FLOOR SECTION ASSUMES 5" SLAB OVER MIN. 6" TYPE II. CONTRACTOR TO VERIFY WITH STRUCTURAL PLANS AND GEOTECHNICAL ENGINEER.

APPROVED FOR CONSTRUCTION

SOUTHWEST GAS CORPORATION

DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES

PROJECT NO. FIRST APPROVAL DATE:
LVVWD APPROVED FIRE FLOW 1500 GPM AT 20 PSI RESIDENTIAL

HORROCKS
ENGINEERS

1401 N. Green Valley Pkwy., Suite 160
Henderson, NV 89074
(702) 966-4063
www.horrock.com

WARNING

REVISIONS

DRAWING INFO

DATE

DESIGNED

DRAWN

CHECKED

PROJECT

DATE

DESIGNED

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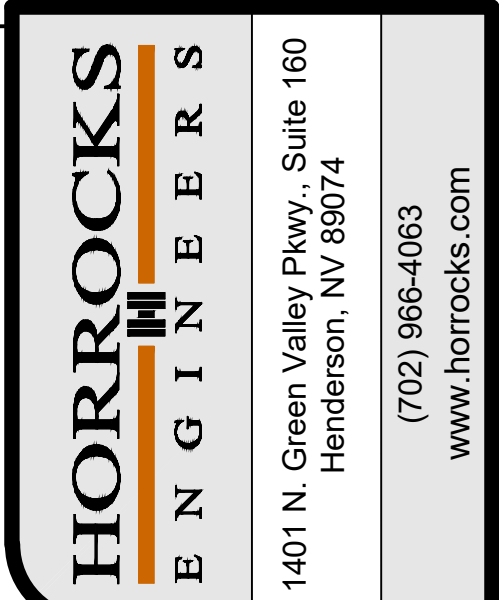
DATE

DESIGNED

DRAWN

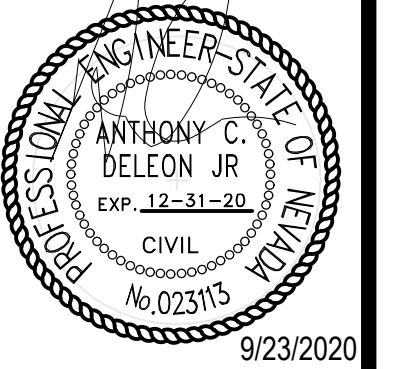
CHECKED

PROJECT



IF THIS BAR DOES NOT
MEASURE 2" THEN
DRAWING IS NOT TO SCALE

DRAWING INFO		REV #		REVISIONS	
DATE				Δ	DATE
9/23/20					
DESIGNED	SS				
DRAWN	PPHD				
CHECKED	ACD				
PROJECT					
NW-2/08-1911					
*SEE GENERAL NOTES SHEET					



9/23/2020

EPIC STORAGE AT ANN ROAD

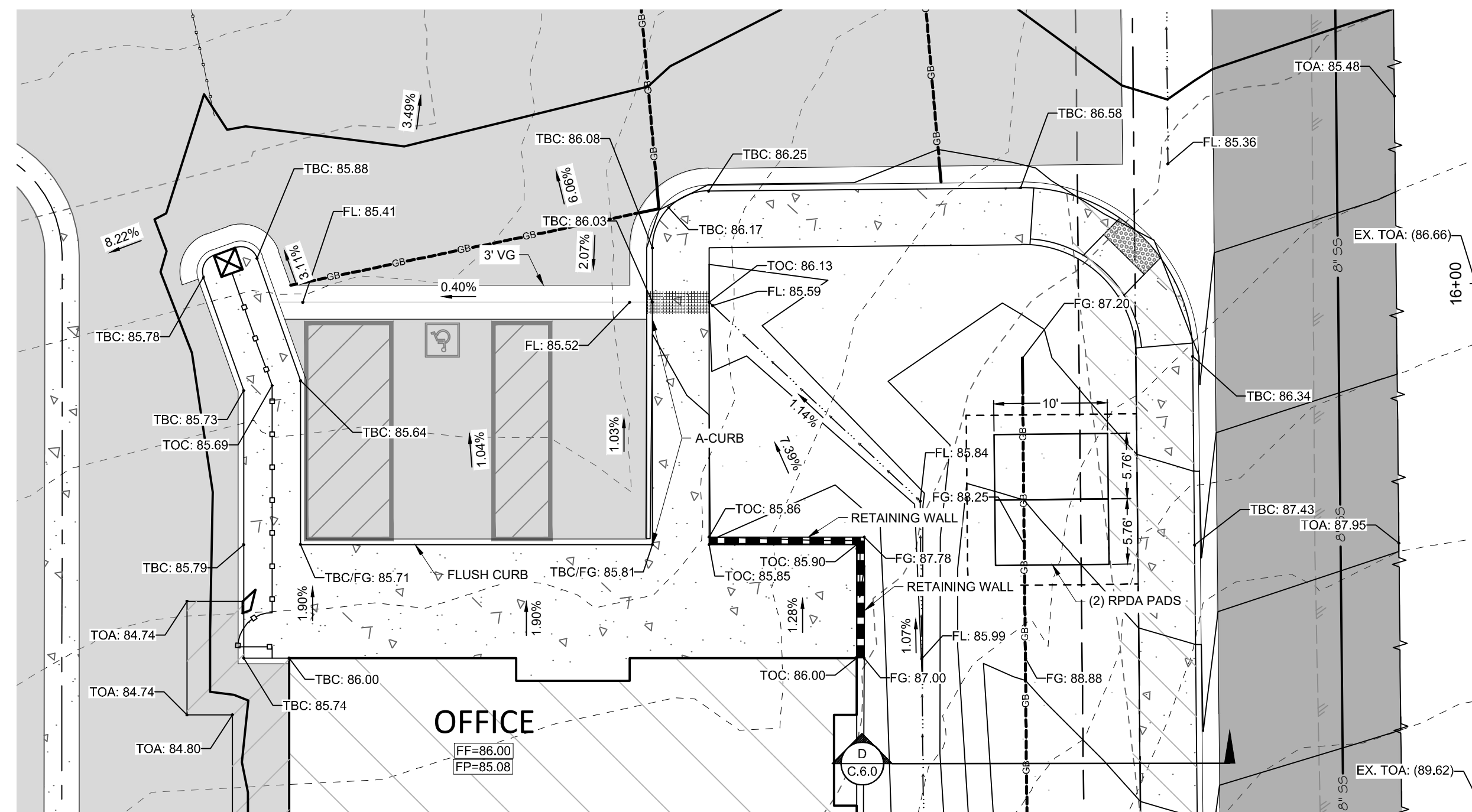
DETAILS

APN# 126-36-101-017



C.6.0

PAGE 8

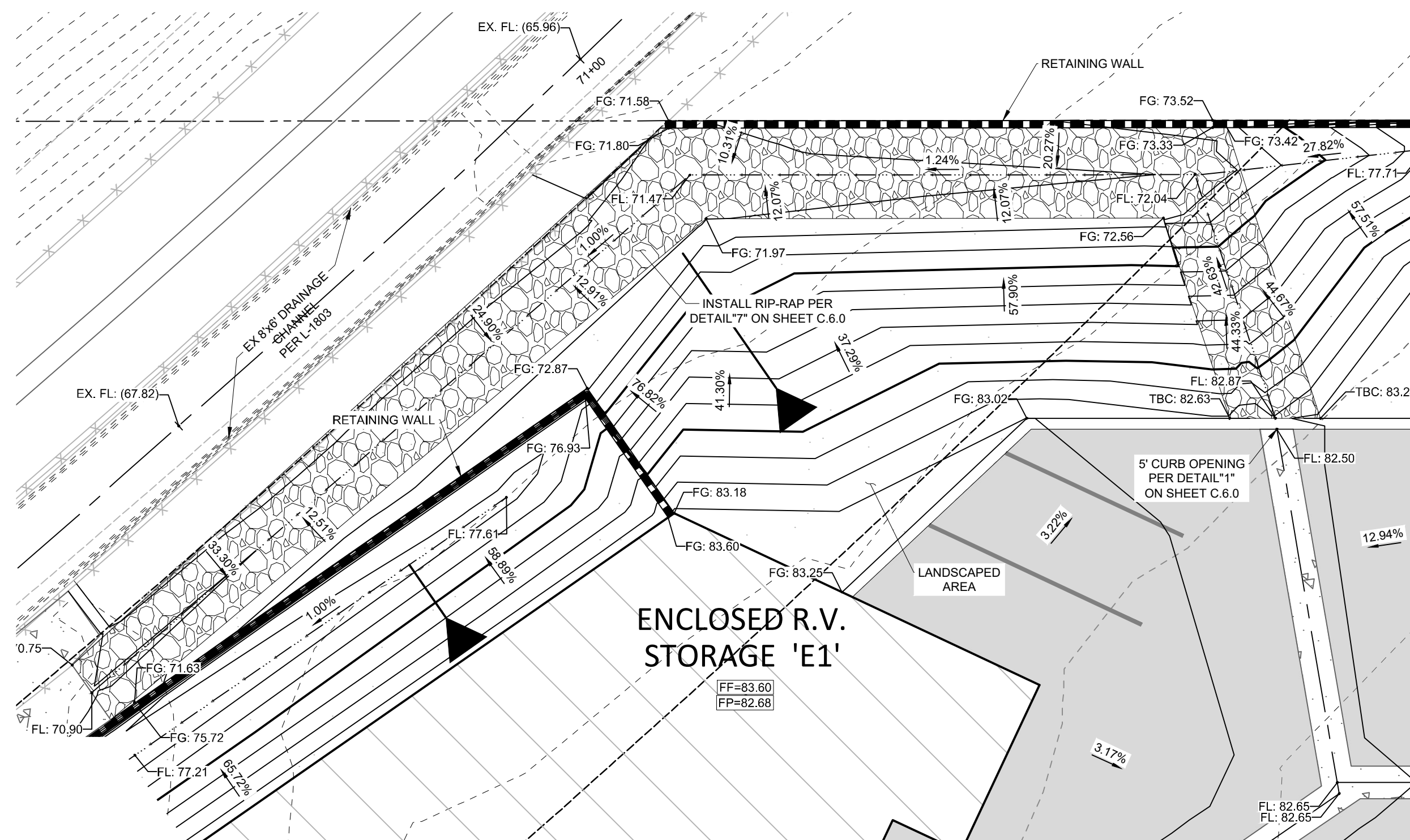


OFFICE DETAIL

SCALE: 1" = 10'

1

-

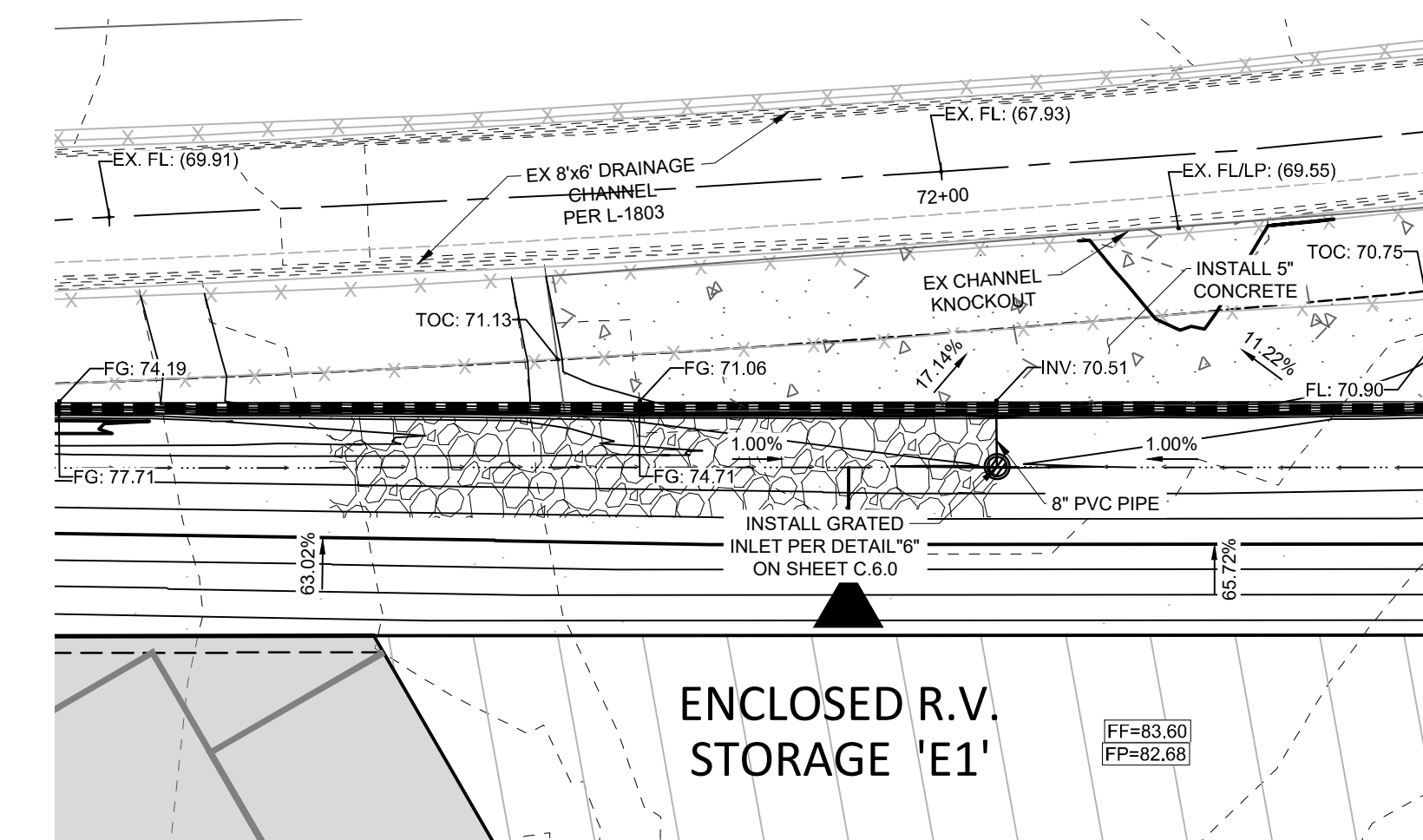
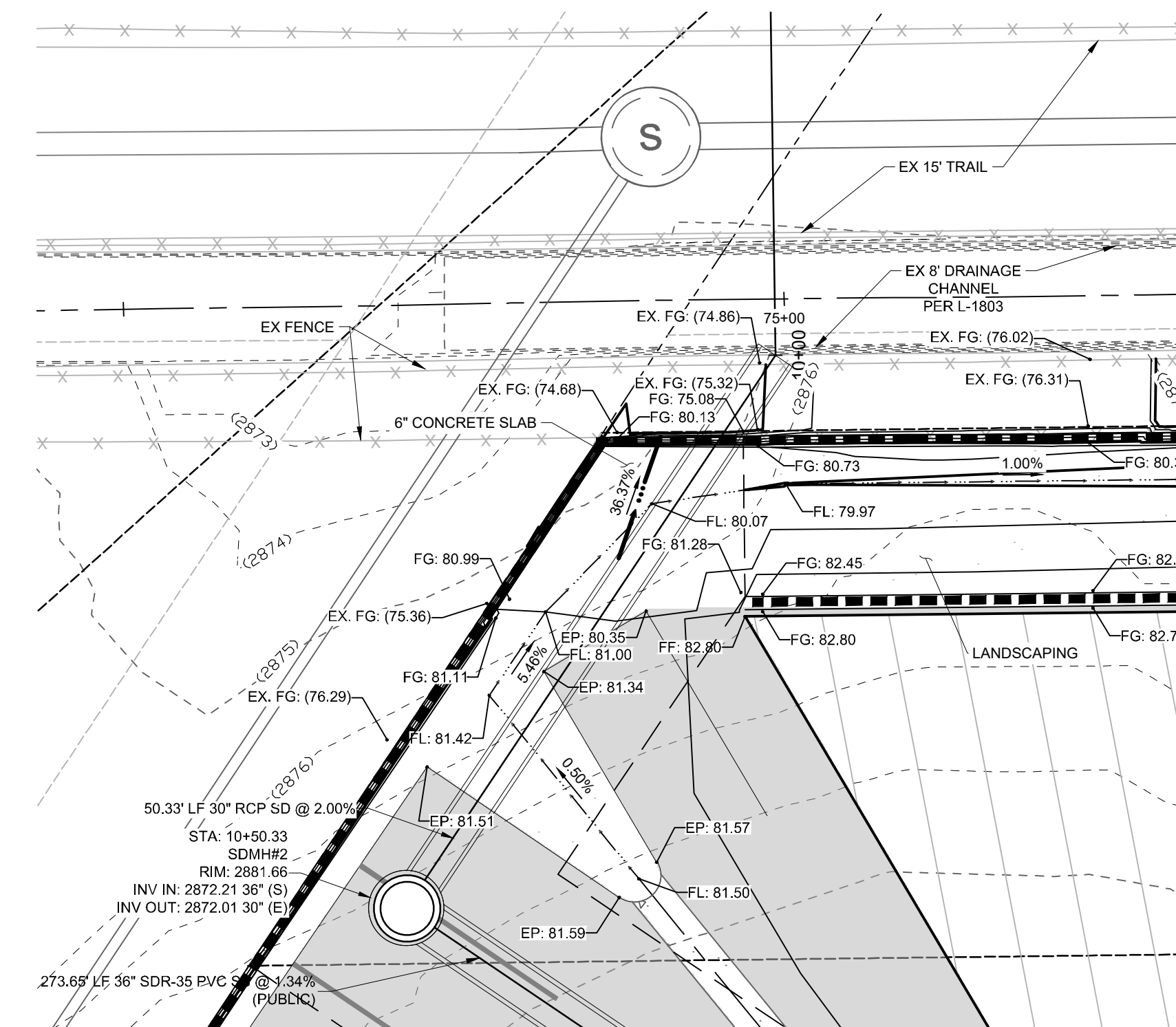


BMP DETAIL

SCALE: 1" = 10'

3

-



BMP OUTLET DETAIL

SCALE: 1" = 10'

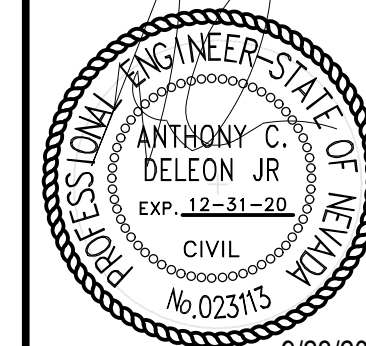
4
-

WARNING



IF THIS BAR DOES NOT
MEASURE 2" THEN
DRAWING IS NOT TO SCALE

DRAWING INFO		REV #  DATE	
DATE	9/23/20		
DESIGNED	SS		
DRAWN	PP/HD		
CHECKED	ACD		
PROJECT	NV-2/108-1911		
		*SEE GENERAL NOTES SHEET	



9/23/2020

EPIC STORAGE AT ANN ROAD

CITY OF LAS VEGAS, NEVADA

DETAILS 2

APN# 126-36-101-017



C.6.1