

DS #: 4743

APN: 125-17-301-012

PROJECT: REMINGTON COMMERCIAL (UPDATE TO DURANGO 495 COMM)

SUBMITTAL: 1ST

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		August 6, 2015
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Remington Commercial VIII (Update to Durango & 95 Commercial)	Baughman & Turner, Inc.
Cross Streets:	NEC of Oso Blanca Road & Severance Lane	Remington Commercial VIII, LLC
File Number:	F:\Depot\DSMemos\DS4743A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-17-301-012	NDOT
Zoning Action:	TMP-59501; SDR-58128; SUP-58125; SUP-58126 & SUP-58127	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	7/21/2015	8/5/2015	See Comments Below	\$400.00	407591: \$400
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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

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

1. Provide a copy of the zoning/planning conditions associated with this site (**TMP-59501; SDR-58128; SUP-58125; SUP-58126 & SUP-58127**) 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.
2. Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City 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 Planning approval with the next submittal.
3. It is understood that NDOT has conceptually accepted the overall *Durango & 95 Commercial* project drainage study more than a year ago. Obtain NDOT concurrence again for the subject drainage study.
4. The project proposes to construct facilities and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.

5. **Sheet GP-02:** Per the drainage study, the 100-year flow depth at the east side of *Oso Blanca Road* at *Severance Lane* is 0.98ft. The proposed hump (25.00TC/HP and 24.95TC/HP) at the entrance driveway does not provide adequate freeboard which is a minimum of six (6") inches. Review and revise accordingly.
6. **Sheet GP-02:** Label an existing 20'-wide public drainage easement (privately maintained) with recorded document or parcel map number in the next submittal.
7. Revise the construction note for riprap installation per NDOT Standard Drawing R-3.1.5.
8. Provide a section in the drainage study to address the design and calculations (per CCRFCD Section 1500 of the *Hydrologic and Hydraulic Design Manual*) of stormwater quality features for low impact parking lot in the next submittal.

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

END OF REMARKS

ays

T/R/S: T19S/R60E/17
AREA G-17

APH: 125 17 301 012

TC

SDR 58128

414.15 PL

Baughman & Turner, Inc.

Consulting Engineers & Land Surveyors

1210 HINSON ST.

PHONE (702) 870-8771

LAS VEGAS, NEVADA 89102-1604

FAX (702) 878-2695

August 10, 2015

City of Las Vegas Land Development Services

Department of Planning

Attn: Ms. Linda Hartman-Maynard

333 N. Rancho Drive, 1st Floor

Las Vegas, Nevada 89106

**Re: Remington Commercial VIII, Durango & I-95
Justification for Grade Difference**

PLANS APPROVED

PLANNING

Building & Safety Dept.

City of Las Vegas, Nevada

2' GRADE DIFFERENCE ONLY

LHM AUG 11 2015

Conforms to the minimum requirements of
LVMC Title 19, applicable Master Plan
development standards and/or Conditions of
Approval. Make No Change Without Approval.
Plan is Not a Permit to Violate Any Ordinance.

Dear Ms. Hartman-Maynard,

As required by the drainage study review comments, this letter and attached plans are provided as a justification to allow a grade difference of two feet above or below existing grade. The grade difference refers to the commercial development associated with SDR-5818.

58128

The overall desire for the proposed project is to make the property useable. As the site exists today, the natural grade slopes excessively from west to east, and has a 5-foot to 10-foot ledge running north to south at the east property line. Additionally, a 36-inch pipe discharges onto the site at a grade about nine feet below natural grade. If the site were constrained by the two foot rule, this property could not be developed without undue hardship on the owner.

The proposed buildings are variable in size and length to allow more flexibility in the overall design of the parcel. The elevations of the finished floors of the Terrible Herbst and commercial buildings were set to reduce the total amount of fill being brought into the site. Although the elevations were set below the Oso Blanca roadway, an excessive amount of fill will still be required to make the overall parcel useable. Each building is still flood protected per the City's flood control requirements by creating a hump in the driveways and installing a flood wall along the back of sidewalk at the Oso Blanca right-of-way.

Along the east edge of the property, a variable height retaining wall (6-10 feet high) will be installed to help reduce the potential excessive slopes in the parking lots and raise the site to avoid flooding. The elevated height puts the site safely above the three existing NDOT culverts east of the property.

Keeping the excavations to two feet above or below existing grade would cause an undue burden on the project by reducing the useable area to less than 50 percent. The site is bordered on the

August 10, 2015
Remington Durango & I-95
Page 2 of 2

east by the Durango off-ramp, which is above 25-feet higher than the property line. The west and south boundary fronts Oso Blanca Road, which is also higher than the property.

The project site is flood protected according to the criteria stipulated in "Hydrologic Criteria and Drainage Design Manual" of Clark County Regional Flood Control District. We request approval from the City Planning and Development Department to allow the grade difference greater or less than two feet above or below existing grade.

We hope all your concerns have been addressed, and if you have any questions or comments, please feel free to contact me at any time at 702-870-8771 or pamp@baughman-turner.com to discuss.

Respectfully,

A handwritten signature in black ink, appearing to read 'Pamela J. Pitcher', written in a cursive style.

Pamela J. Pitcher
Hydrology Manager

PJP/aw

Enclosures: Grading and Detail Sheets
Drainage Comment Sheet

Albert Sung

From: Michael Cunningham
Sent: Tuesday, August 04, 2015 1:27 PM
To: Albert Sung
Subject: FW: US 95& durango - west side

FYI

Thank you,

Mike C.

From: John S. Ridilla
Sent: Tuesday, August 04, 2015 8:08 AM
To: Michael Cunningham; Christopher Knight
Subject: RE: US 95& durango - west side

Guys, sorry I re-read through this, I noticed some typos. I tried to get this out quickly yesterday, if you need me to edit the email or if there is any confusion on what I wrote, let me know.

From: John S. Ridilla
Sent: Monday, August 03, 2015 4:55 PM
To: Michael Cunningham; Christopher Knight
Cc: John S. Ridilla
Subject: FW: US 95& durango - west side

Guys:

Here are my comments related to the issue at US-92 & Durango and Mr. Marc Bolduc's email dated July 15, 2015 at 11:22 AM regarding his objection to the grading work on APN 125-417-301-013).

1. First, I cannot confirm Bolduc's ownership of the said parcel. The Clark County records state that FNBC-CMLCON I, LLC is the current owner. It would appear that the LLC acquired the property in a Trustee's Deed Upon Sale, acting as the successor to First National Bank of Nevada. There is a limited liability company agreement that I found on-line (it is unexecuted, so it may not be final), but it appears that the LLC is some sort of successor to FNBofNV, and the those parties entered into an agreement with the FDIC whereby the successor LLC took over the assests of FNBofNV. FNBofNV was a lender to the Farm and I95, LCC that lost the property in the Trustee's Sale (perhaps Mr. Bolduc was part of the Farm and I95, LLC, but the ownership is being veiled through a series of LLCs. Absent some other documentation, I cannot confirm Mr. Buldoc has an ownership interesting in the parcel.
2. That being said, NDOT has an underlying "Highway Easement Deed" that is encumbering the ownership of the property. Essentially, the property has no value as the parcel is intended to be used by NDOT for roadway purposes. Apparently, NDOT has determined that portions of the property can be abandoned, and that process was initiated in 2008. I spoke with NDOT right-of-way section, and there were requirements to complete a drainage study and some other work prior to the recordation of the abandonment. NDOT contacted Mr. Buldoc in 2011 (I sent Mike the email), and apparently he did not respond and the abandonment has been well abandoned.

3. My understanding is that the developer's riprap work is being required to mitigate the impacts of flows that are being perpetuated on his property. I assume this is part of the drainage study approved by the City and either approved or accepted by NDOT. The riprap work is to mitigate any potential impacts to the Durango off-ramp embankment. This riprap work is consistent with the Highway Easement Deed as the work is being done to support the operations of the NDOT facility by protecting the embankment from public drainage flows that have the potential to damage the fill. I also understand that NDOT is willing to provide a permit for the developer to perform this work.
4. The NDOT permit will allow the developer to complete the riprap and related drainage work in compliance with the drainage study for the developer's project. This riprap may also have an impact on NDOT abandonment plans for a section of the right of way as the riprap may be in area that was originally to be abandoned. We might want to convey that to NDOT right of way section (I can do that if you want, since I made the initial contact).
5. I am not sure what cause of action Mr. Buldoc would have against the City as he would 1) have to prove ownership of the subject parcel and 2) would have to prove that the riprap work is in violation of NDOT's Highway Easement Deed. Even if Mr. Buldoc can prove ownership, the riprap work, in my opinion, is not inconsistent with NDOT's use of the said parcel under the terms of a usual and customary NDOT Highway Easement Deed (I do want to not I have not seen the Highway Easement Deed, but this is a relatively recent Deed, and I have seen others and the riprap work would be consistent with an appropriate NDOT use).

Hope this helps, call with questions.

John R.

From: Betsy Comella
Sent: Monday, August 03, 2015 10:11 AM
To: John S. Ridilla
Subject: FW: US 95& durango - west side

From: Betsy Comella [<mailto:bcomella@LasVegasNevada.GOV>]
Sent: Monday, August 03, 2015 10:11 AM
To: Betsy Comella
Cc: Betsy Comella
Subject: FW: US 95& durango - west side

-----Original Message-----

From: Marc Bolduc [<mailto:mbolduc@olympiacompanies.com>];
Sent: 7/15/2015 11:22:02 AM
To: Mary Martini (mmartini@dot.state.nv.us) [<mailto:MMartini@dot.state.nv.us>]; Michael Cunningham [<mailto:mcunningham@LasVegasNevada.GOV>];
Subject: US 95& durango - west side

Mary/Michael,

We own some land (APN 125-17-301-013) and we are going thru a relinquishment for NDOT (see attached). I recently drove by the adjacent property and saw a this project illegally grading on our land. I talked to Mike Cunningham from City of Las Vegas who gave me the plans. They are trying to obtain permits from City and NDOT for the subject project.

See 2nd attached. We object to the grading and placement of rip rap on our property (highlighted yellow) and request the City and NDOT NOT issue and permits (and if they have revoke the permit). These proposed improvements on our site are not acceptable. Please have the applicant cease and desist from work on our property and since their approvals are based on this unaccepted design the onsite work should also be held until this is resolved.

Thank you.

Marc Bolduc

702-210-5840

Baughman & Turner, Inc.

Consulting Engineers & Land Surveyors

1210 Hinson Street

Las Vegas, Nevada 89102

Telephone (702) 870-8771

LETTER OF TRANSMITTAL

DATE: July 20, 2015
JOB NO.: 17-19-60
ATTENTION: Albert Sung
RE: Remington Commercial VIII

TO: City of Las Vegas- Land Development
333 N Rancho Dr.
Las Vegas, NV 89106

To whom it may concern:

We are sending: ☐ Attached ☐ Under separate cover via Delivery the following items:
☐ Certifications ☐ Original ☐ Drawings ☐ Prints ☐ Check ☐ Deeds
☐ Tax Letters ☐ Check Prints ☐ Copy of Letter ☐ Sepias ☐ Other

Copies	Dated	Pgs.	Description
1	4/3/14		Wet Stamped copy of Drainage Study
1	4/3/14		DWG CD
1	4/2/14		Fee Check: \$100.00

These are transmitted as checked below:

☐ For approval ☐ For submittal ☐ For your use ☐ For re-submittal
☐ As requested ☐ For review and comment ☐ Other _____

REMARKS: If you should have any questions, please contact Pamela Pitcher @ 870-8771.
Thank you!

RECEIVED BY:

DATE:

COPY TO FILE

SIGNED: Pamela Pitcher

If enclosures are not as noted, kindly notify us at once

 *** FAX TX REPORT ***

TRANSMISSION OK

JOB NO. 2184
 DESTINATION ADDRESS 7028782695
 PSWD/SUBADDRESS
 DESTINATION ID
 ST. TIME 08/06 12:56
 USAGE T 00' 37
 PGS. 2
 RESULT OK

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM		DATE: August 6, 2015
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Remington Commercial VIII (Update to Durango & 95 Commercial)	COPIES TO: Baughman & Turner, Inc.
Cross Streets:	NEC of Oso Blanca Road & Severance Lane	Remington Commercial VIII, LLC
File Number:	F:\Depot\DSMemos\DS4743A.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-17-301-012	NDOT
Zoning Action:	TMP-59501; SDR-58128; SUP-58125; SUP-58126 & SUP-58127	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	7/21/2015	8/5/2015	See Comments Below	\$400.00	407591: \$400
TOTAL FEES (LDDRS):				\$400.00	----

REMARKS:

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1. Provide a copy of the zoning/planning conditions associated with this site (**TMP-59501; SDR-58128; SUP-58125; SUP-58126 & SUP-58127**) 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.
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**TECHNICAL DRAINAGE STUDY UPDATE
REMINGTON COMMERCIAL VIII
(DURANGO & 95 COMMERCIAL)
SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST
CITY OF LAS VEGAS, NEVADA**

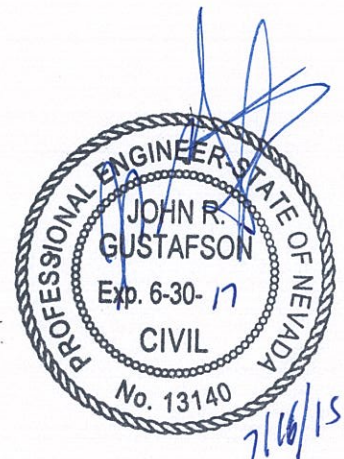
July 16, 2015

PREPARED FOR:

REMINGTON COMMERCIAL DEVELOPMENT
5920 SOUTH RAINBOW BLVD, SUITE 11
LAS VEGAS, NEVADA 89118

PREPARED BY:

BAUGHMAN & TURNER, INC.
1210 HINSON STREET
LAS VEGAS, NEVADA 89102



HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: 95 & Durango Commercial Date: July 13, 2015
 Location of Development: a) Descriptive (Cross Streets) North/South: Oso Blanca Road
East/West: Severence Lane
 b) Section: 17 Township: 19 S Range: 60 E
 c) APN: 125-17-301-012

Name of Owner: Remington Commercial VIII, LLC
 Telephone No.: (702) 222-1420 Fax No.: (702) 222-1699 E-Mail Address: _____
 Address: 5920 S Rainbow Blvd, suite 11 Las Vegas, NV 89118

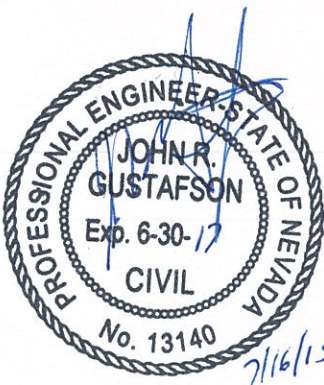
Contact Person-Name: Pamela Pitcher Telephone No.: 702-870-8771
 *E-Mail Address: pamp@baughman-turner.com Fax No.: 702-878-2695

Firm: Baughman & Turner, Inc.
 Address: 1210 Hinson Street Las Vegas, NV 89102

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	Vacate right of way

1. Total Owned Land Area: At Site: 6.51 ac Being Developed/Disturbed: 6.51 acre
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
5. Approximate upstream land area which drains to the subject site: 40 acres
6. Has the site drainage been evaluated in the past? ☒ YES ☐ NO If yes, please identify documentation: TDS for Durango & 9r Commercial (DS4660C) approved 7/29/14 & TDS for Storage One (DS4719A) approved 3/3/15;
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: East to NDOT facilities
8. Briefly describe your proposed schedule for the subject project: Construction to begin late 2015.



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

LIST OF APPENDICES

Appendix A – Figures

- Figure 1 – Vicinity Map
- Figure 2 – Assessor's Parcel Map
- Figure 3 – Aerial View
- Figure 4 – General Aerial View
- Figure 5 – CCRFCD 2013 MPU Facilities Exhibit
- Figure 6 – CCRFCD 2008 MPU Hydrology Summary
- Figure 7 – CLV Northwest Neighborhood Phase 2 Existing Condition
- Figure 8 – CLV Northwest Neighborhood Phase 2 Future Condition
- Figure 9 – FEMA FIRM Panel Map
- Figure 10 – Existing Conditions Drainage Map
- Figure 11 – Developed Conditions Drainage Map

Appendix B – Hydrologic Analyses

- Soils and Curve Number Data & Computations
- Precipitation
- Standard Form 4 Computations
- Existing Condition HEC-1 Analysis (Reference)
- Developed Condition HEC-1 Analysis

Appendix C – Hydraulic Analyses

- Street Capacities
- Storm Drain WSPG Analysis
-

Appendix D – Reference Material

- Technical Drainage Study and Update #1 for Durango and 95 Commercial*
- Approval Letter
- Report excerpts
- HEC-1 Model, Form 4, Soil Information, and Rainfall
- Existing and Developed Condition Drainage Map

Appendix E – Reference Material

- Technical Drainage Study for Storage One*
- Approval Letter
- Referenced HEC-1 Model
- Referenced Plan, Profile and Detail Sheets

Appendix F – Zoning Conditions

Appendix G – Standard Form 2 and CLV submittal Checklist

July 16, 2015

City of Las Vegas, Flood Control Section

333 North Rancho Drive
Las Vegas, Nevada 89106

Attn: Mr. Albert Sung, PE

**Subject: Update to the Technical Drainage Study for Remington Commercial VIII
(Durango and 95 Commercial (DS4660))**

Dear Mr. Sung,

Submitted for your review is an Update to the *Technical Drainage Study for Durango & 95 Commercial*. The project site is located on the northeast corner of Oso Blanca Road and Severance Lane. The project site has been delineated for spatial reference on Figure 1 which has been included in Appendix A. The purpose of this update is to address a Phase II site plan revision.

The site was originally analyzed as a part of the *Technical Drainage Study for Durango & 95 Commercial Study* and *Update #1*. The studies were prepared by Civil Squared Engineering and were approved by the City of Las Vegas (CLV) in June 2014 (DS#4660). The approval letters have been included in this study for reference. An update to Durango & 95 Commercial Study addressed Phase I modifications and was approved in July 2014 (DS#4660-1). The study hereafter will be referred to as *Durango & 95 Commercial Study*. See Appendix D for relevant portions of the studies.

The *Technical Drainage Study for Storage One* (hereafter referred to as *Storage One Study*) updated Phase I of the project site and was prepared by Civil Works, Inc in January 2015 and a subsequent supplement in February 2015 (DS#4719) was submitted. No modifications were made which affected the hydrology impacting Phase II development. See Appendix E for relevant portions of the study.

The previous approved drainage studies have been reviewed and B & T concurs with the recommendations and conclusions except as noted herein. This update shows how the proposed commercial project correlates and/or conforms to the previously approved drainage recommendations and conclusions. In addition, this study addresses flood protection for the onsite improvements and assures that they meet local criteria while minimizing any impact to downstream properties or flood control facilities.

Since approval of the *Durango & 95 Commercial Study* in June 2014, the developer has obtained approval of Phase I (the northern portion of the site, Storage One) and modified the Phase II site plan. The Phase II site plan revises the number and location of proposed buildings. This new site plan requires modifications to the onsite grading and therefore; an

updated drainage study. The Phase II flow patterns were not significantly affected by the site plan changes and remain the same as the approved study.

FEMA FIRM Panel Map

Figure 9, included in Appendix A, has been prepared to show the location of the project site on the current FEMA issued Flood Insurance Rate Map (FIRM) Panel 32003C1745C dated September 27, 2002. The project site is located within a FEMA designated Zone 'X'. A Zone X is described as an area determined to be outside the 0.2% annual chance flood.

2013 CCRFCD MPU Facilities

The previously approved drainage study indicated that the project site is located southwest of the Category A proposed facility Centennial Parkway Channel West / US 95 Branch. The proposed regional facility lies in the US 95 roadway alignment. This facility, Structure CN95 0102 and 0068, is a proposed triple 8' x 7' RCB. There is also a proposed local facility in Oso Blanca. The project site has been delineated on the 2013 Master Plan Update Figure F-13 (See Figure 5 in Appendix A). The proposed site is within the Master Plan Update Drainage Basin NW103-C (refer to H-13 of the CCRFCD 2008 *Las Vegas Valley Flood Control MPU* included as Figure 6 in Appendix A).

Northwest Neighborhood Study Phase 2

The proposed site is also within the *CLV NW Neighborhood Study Phase 2* Basin NW88 (refer to Figure 5: E-12 *Existing Drainage Conditions* of the *CLV NW Neighborhood Study Phase 2*, included as Figure 7 in Appendix A). The Northwest Study is an older study and some of the information has been superseded by the 2013 CCRFCD Master Plan Update. The *Northwest Study Phase 2* Figure F-12, (refer to Figure 8, Appendix A) depicts Future conditions along the US95 corridor as a 12'x10' RCB. The CCRFCD Master Plan has this facility shown as a triple 8'x7' RCB. Local facilities are also shown as RAN 748, 746, and 744. However, RAN 746 has since been abandoned as discussed in the *TDS for Storage One*.

Existing Drainage Condition

The existing on and off-site drainage conditions remain unchanged from the analysis prepared by the *Durango & 95 Commercial Study*. A detailed analysis of the flows that arrive at the intersection of Oso Blanca and Farm Road was provided in the *Addendum #1 to the Durango & 95 Study*. As discussed in the approved study, the site is impacted by offsite flows at four locations, REF 1, REF 2, CP-2 and CP-4. (Please see Figure 10 in Appendix A for a summary of the existing drainage conditions.) REF-1 has been determined to be about 717 cfs at the intersection of Farm and Oso Blanca. Approximately 199 cfs split and travel north in Oso Blanca and another 24 cfs are picked up in the existing storm drain. Therefore, about 494 cfs continue east in the Farm Road alignment within a proposed 40 ft drainage easement. REF-2 is estimated to be about 311 and 104 cfs (for the 100 and 10-year, 6-hour storms, respectively) which flows southeast in Oso Blanca. The flows associated with CP-2 and CP-4 discharge to the site via two 30-inch RCP's. The RCP pipes were installed per CLV #107Y4963 and replace the

RAN 748 and 744 CMP pipes shown in the *NW Neighborhood Study Phase 2*, Figure F-12. Approximately 29 and 12 cfs are discharged to the Phase II development via the 30" RCP. Approximately 12 and 5 cfs (100- and 10-year storms) discharge to the Storage One site.

According to the *Durango & 95 Study*: "The existing condition analysis was developed to analyze the existing onsite basins and to combine them with the referenced flows. As shown on Figure 11, the overall watershed area is comprised of seven sub-basins ONX1-ONX7 totaling about 13.9 acres which is a combination of the subject property's 9.3 acres and the existing non-roadway offsite land. The historical flow pattern of the watershed basin is by sheet flow from west to the east at about 2 to 10 percent grade. Flows generate for the sub-basins drain toward three concentration low points along the east edge of the water shed area (CON1, CON2, and CON3)."

"The easterly property line and edge of the watershed area of the proposed site is about 22-feet below the 95-Durango off-ramp. The off-ramp and Durango drive slope/drain to the west and will not impact the proposed site. Three NDOT culverts (6 ft x 3 ft RCBs) pass under the off ramp and Durango Drive and are located at the three concentration points of the existing on-site flows. These box culverts historically serve as the receiving facilities for the project flows."

"Flow generated from basins ONX1 and ONX2 is manually combined with reference flows REF1 and CP-2, at Concentration Point CON1, with flow values of 34 cfs and 241 cfs during the 10-year and 100-year storm event, respectively. Flow at CON1 will ultimately be captured by the existing North Box culvert and flow under the off-ramp to the west." The *Storage One Study* indicates that 524 cfs will actually be arriving at the North Box culvert during a 100-yr storm, with 207 cfs entering the 6' x 3' RCBC and 337 cfs continuing south to the middle box culvert.

"Flow generated from basins ONX3, ONX4 and ONX5 is combined at Concentration Point CON2, with flow values of 3 cfs and 10 cfs during the 10-year and 100-year storm event, respectively. Flow at CON2 will ultimately be captured by the existing Middle Box culvert and flow under the off-ramp to the west." In addition to these local flows, regional flows from the overflow from CON1, 337 cfs, will arrive at CON2. The *Storage One Study* indicates that 252 cfs will enter the 6' x 3' RCBC and 103 cfs will overflow to CON3.

"Flow generated from basins ONX6 & ONX7 is manually combined with reference flow CP-4, at Concentration Point CON3 with flows values of 15 cfs and 38 cfs during the 10-year and 100-year storm event, respectively. Flow at CON3 will ultimately be captured by the existing South Box culvert and flow under Durango Drive to the west." According to the *Storage One Study*, the 6' x 3' RCBC has the capacity to discharge the expected 141 cfs.

Developed Onsite Drainage Condition

In the developed condition, the offsite flows remain the same. Only the onsite flows have been modified. See Figure 11 for the following discussion. The north end of the site was approved in March 2015 for a Storage One. The flows and drainage mitigation measures for this area have already been approved. As discussed in the *Store One Study*, approximately 544 cfs reach

the north NDOT box culvert at CON1. Calculations provided with the Store One approved study indicate that the box culvert will collect approximately 207 cfs of the 544 cfs reaching it. The remaining 337 cfs will continue south to the middle box culvert at CON2. The 337 cfs is combined with the 25 cfs generated from a portion of the Store One site and on-site runoff (OND3A, OND4, OND5, OFX4, OFX5 and OFX5 = 362 cfs) and are all concentrated at concentration point CON2. The Storage One study indicates that this middle 6' x 3' RCB culvert will collect 252 cfs. The balance, or 110 cfs, will overflow to CON3, the southerly culvert. Flows from basins OND6, OFX6, OFX7, flows from concentration point CP-4, and the overflow from CON2 are all concentrated at concentration point CON3. The total summation of the flow yields 144 cfs in the 100-yr condition. The orifice calculation for the 6' x 3' RCB indicates a headwater elevation of 3.85 ft. The invert of the 6' x 3' RCB is at an elevation of 08.84ft. The water surface elevation was determined to be 12.69 ft with 144 cfs entering the 6' x3' RCB.

Hydrologic/Hydraulic Criteria

Soil Classification

The native soils associated with the site and offsite basins have been classified by the United States Department of Agriculture Soils Conservation Service (SCS) in their soil survey of Las Vegas Valley Area as Soil Unit 610, Pits, gravel and 191, Dalian (very cobbly fine sandy loam, 2 to 8 percent slopes). Per the approved study, "As shown in the Soil Survey Map EX-1 included in Appendix B, about 52% of the site is within type 610 and 48% of the site is within soil type 191, therefore, the CN values are calculated using a combination of the soil types (refer to soil survey maps in Appendix B)." . The soils have a weighted hydrologic soils group of B and C. The curve number summary along with reference materials are included in Appendix B.

Precipitation

The site and its related off-site basins are located outside the McCarran Airport Rainfall Area; therefore, precipitation values were determined using Figures 503 and 506 in CCRFCD's Hydrologic Criteria and Drainage Design Manual, Section 500. The 100-year and 10-year, 6-hour rainfall depth duration frequency values for the off-site basin are 2.00 and 1.30. The precipitation Adjustment factors of 1.43 and 1.24 for the 100-year and 10-year storm events, respectively, were applied to the rainfall depth for the final precipitation values. The 100-year and 10-year, 6-hour rainfall depth duration frequency values for the on- and off-site basin are 2.86 and 1.61. No aerial depth reduction factor was used. The aforementioned HCDDM figures and tables are included in Appendix B.

In accordance with the CCRFCD's Hydrologic Criteria and Drainage Design Manual, the design storm selected was a 6-hour duration storm. Three different 6-hour storm distributions are allowed in the Clark County area, labeled SDN-3, SDN-4, and SDN-5 (see Table 503). For drainage areas less than 8 square miles, an SDN-3 is required. The drainage area associated with this site is less than 8 square miles; therefore, an SDN-3 was used.

Time of Concentration and Lag Time

The Criteria Manual's Standard Form 4 was completed to determine the time of concentration for each drainage basin. For all basins, which comprise less than 1 square mile, the time of concentration was calculated as follows:

$$T_c = T_i + T_t$$

Where: T_c = Time of Concentration
 T_i = Initial, inlet or overland flow time
 T_t = Travel time in the ditch, gutter, etc.

The time of concentration is the sum of the initial flow time, T_i and the travel time, T_t . The minimum T_c recommended for non-urban watersheds is 10 minutes and 5 minutes minimum for urban watersheds.

Initial flow time was calculated as follows:

$$T_i = 1.8(1.1 - K)L_o^{1/2}/S^{1/3}$$

Where: T_i = Initial overland flow time (in minutes)
 $K = 0.0132CN - 0.39$ L_o = Length of overland flow (maximum 500 feet)
 CN = Curve Number S = Average basin slope (in percent)

The lag time was calculated as follows:

$$T_{lag} = 0.6T_c \text{ (in hours) (See Appendix B for Form 4 and calculations)}$$

Summary of Findings

Table 1 and 2 list the 100-year and 10-year, 6-hour storm flows. The HEC-1 printouts can be found in Appendix B.

Table 1. Peak Flow Summary

Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
Existing Condition*			
ONX1	0.77	<1	1
ONX2	1.51	1	2
ONX3	2.42	1	4
ONX4	0.63	1	2
ONX5	2.06	1	4
ONX6	3.46	2	5
ONX7	3.04	1	4
	13.89		
OSO1	0.60	1	3

OSO2	0.80	2	3
OSO3	0.50	1	2
OSO4	0.70	1	3
OSO5	0.33	1	1
REF1	-	28	717**
REF2	-	104	311
CP-2	-	5	12
CP-4	-	12	29
CON1	-	34	525**
CON2	-	3	355**
CON3	-	15	141**

*Referenced from TDS Durango & 95 Commercial

**Recalculated by Add #1 to TDS Durango & 95 Commercial

Table 2. Peak Flow Summary

Basin	Area (acres)	10-year Flow (cfs)	100-year Flow (cfs)
Developed Condition			
OND1**	0.77	<1	<1
OFX1*	0.66	<1	<1
OFX2*	0.36	<1	1
OND2**	0.95	2	3
OND3**	0.89	2	3
ONX3A**	0.59	1	2
OND4	1.85	3	6
OND5	3.85	5	11
OFX3*	0.34	<1	1
OFX4*	0.25	<1	1
OFX5*	1.62	2	4
OND6	0.84	1	3
OFX7*	0.65	<1	1
OSO2*	0.80	2	3
OSO3*	0.50	1	2
OSO4*	0.70	1	3
OSO5*	0.33	1	1
REF2*	-	104	311
CP-4*	-	12	29
CON1	-	34	544**

CON2	-	3	362
CON3	-	15	144

*Referenced from TDS Durango & 95 Commercial

**Recalculated by TDS Update Storage One

Analysis to determine peak flow rates were achieved using the SCS Unit Hydrograph Method. The input parameters discussed in Section IV, A – C were input into HEC-1, a computer program designed by ACOE (Army Corps of Engineers) to evaluate rainfall runoff models. The results are shown in the Table above. A summary of input parameters and the HEC-1 printouts can be found in Appendix B.

Onsite Street Flow

Street capacity analyses were performed to determine the depth of flow in Oso Blanca Road. Table 3 summarizes the 100 and 10-year flow in the street.

Table 3. Street Capacity Summary

Location	Q (cfs)	D (feet)	V (fps)	D x V	Remarks
100-Year Flow					
HS1 Oso Blanca – West Side	200	1.21	7.18	8.69	Flow is carried on the west side VxD <8 is not met; D less than 2 ft. is met
HS1 Oso Blanca – East Side	111	0.98	5.64	5.53	VxD <8 is met; D less than 2 ft. is met*
HS2 Oso Blanca	4	0.35	1.59	0.56	VxD <8 is met; D less than 2 ft. is met
HS3 Oso Blanca	2	0.30	1.33	0.40	VxD <8 is met; D less than 2 ft. is met
10-Year Flow					
HS1 Oso Blanca – West Side	104	1.00	5.09	5.09	Flow is contained on west side. VxD <6 is met; D less than 1; dry lane met on east side
HS2 Oso Blanca	2	0.29	1.38	0.40	Flow is carried in Swale VxD <6 is met; D less than 1; dry lane met
HS3 Oso Blanca	1	0.25	1.18	0.30	VxD <6 is met; D less than 1; dry lane is met

All the roadways meet the 100-year Clark County criteria for depth and VxD (i.e. VxD less than 8), as well as, the 10-year criteria for VxD (i.e. VxD less than 6) except for the west side of Oso Blanca. Oso Blanca meets the 10-yr dry lane criteria. See Appendix C for street capacity calculations.

Resulting street flows have been identified on Figure 8, included in the pocket in the back of this report. The Flowmaster hydraulic calculations have been provided in Appendix C.

Proposed Finished Floor Protection

The proposed finished floor elevations of all the buildings have been set below the Oso Blanca street improvements. This is due to the natural slope of the ground sloping down and away from the street. In order to provide adequate flood protection for the buildings, a flood wall is proposed along the back of walk along the west property line as approved in the previous studies. The wall will be a minimum of 18-inches above the 100-yr street flow or 1.19 ft above the back of sidewalk north of the south driveway. South of the south driveway the floodwall will be 2 ft above the back of sidewalk. All proposed finished floors have been adequately flood protected to meet City of Las Vegas and CCRFCD criteria.

Table 4. Minimum Future Finished Floor Elevation Determination

Street	Top of Curb	Free-board	Finished Floor Based on Top of Curb	Flowline Elevation	Depth of Flow	Free-board	Finished Floor Based on Depth of Flow	Minimum Top of floodwall for flood protection
Terribles	26.96	0.5	27.46	26.26	0.25	0.25	26.76	2627.46>2624.60
Bldg #1	26.78	0.5	27.28	26.28	0.25	0.25	26.78	2627.28>2626.90
Bldg #2a	26.78	0.5	27.28	26.28	0.25	0.25	26.78	2627.28>2622.70
Bldg #2b	26.0	0.5	26.5	25.5	0.3	0.3	26.10	2626.5>2622.20
Bldg #2c	25.5	0.5	26.0	25.0	0.3	0.3	25.60	2626.0>2621.70
Bldg #3	24.8	0.5	25.3	24.3	0.35	0.35	25.00	2625.3>2623.87
Bldg #4	23.72	0.5	24.22	23.22	0.98	0.98	25.18	2625.20>2622.45

Storm Drain & Drop Inlet Design

Per the Durango & 95 study: "The WSPGW computer program was utilized in determining the water surface elevation for the 30-inch storm drain system. The water surface elevations have been summarized in the South WSPG Analysis Exhibit. The Tailwater Calculation was determined using the FlowmasterV8i computer program...Flows from the existing CP-4 30-inch storm drain with flows of 29 cfs during the 100-yr storm event are utilized for the system headworks flow in the WSPG analysis. See Appendix C for reference WSPGW analysis.

Parking Lot BMP

The Grading Plan indicates areas of rip-rap buffer strips, and landscape swales with fine, closing growing grasses. A note has been added to the Grading Plan indicating that the Property Owner is responsible to maintain the best management practices such as but not limited to the removal of accumulated sediment and debris and care of the vegetation.

Proposed Facilities

The drainage facilities required for this site consist of:

- a) Positive onsite grading;

- b) A floodwall around west side of property for flood protection. Height varies from 1.5 to 2 ft.
- c) Rip and fine grasses in swales and at discharge locations for Parking Lot BMP.
- d) 400 LF of 36" RCP for continuation of existing RCP
- e) Slot drains and curb openings to perpetuate flow
- f) Valley gutter at parking lot flowlines

Conclusions

- A justification letter will be submitted to the City Planning and Development Department to justify the grade difference. A copy of the approval will be submitted to the City Flood Control Department when available.
- The drainage study has been submitted to NDOT for their review and concurrence. Copies of the approval letter will be provided to the City Flood Control upon receipt.
- Although the runoff generated Onsite Basin OND5 has increased from what the previously approved drainage study had established, it is shown to have no adverse impacts to downstream property or existing facilities. The additional runoff will overflow to the southerly NDOT culvert and be conveyed east from there. Overall there is only a 3 cfs increase in flow at CONN3.
- All street flow satisfies CCRFCD Manual Sections 300 and 1600 criteria.
- The proposed 36" storm drain satisfies CCRFCD Manual Section 800 criteria. The proposed storm drain connects the existing CLV RAN 744 facility that enters the site to the NDOT facility at the exit of the site.
- All proposed finished floors have been adequately flood protected above the adjacent street flow by a minimum 1.5 ft high floodwall around the west side of the site and satisfies CCRFCD Manual Section 1600 criteria and CLV criteria.
- The proposed improvements detailed in this Update Study are shown on the grading plan, profile, and detail sheets included in pocket at the end of this report.

If you have any questions or require additional information, please do not hesitate to contact us.

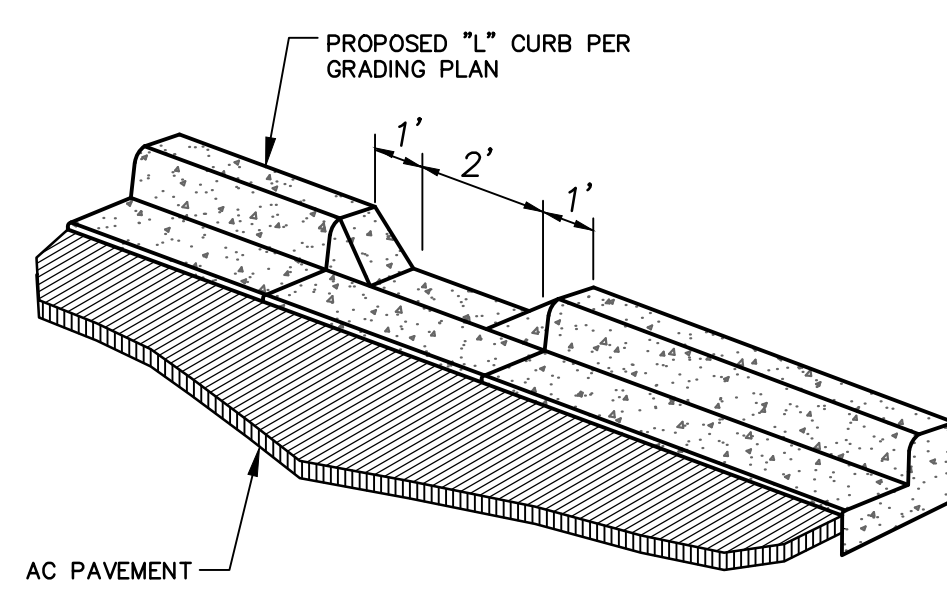
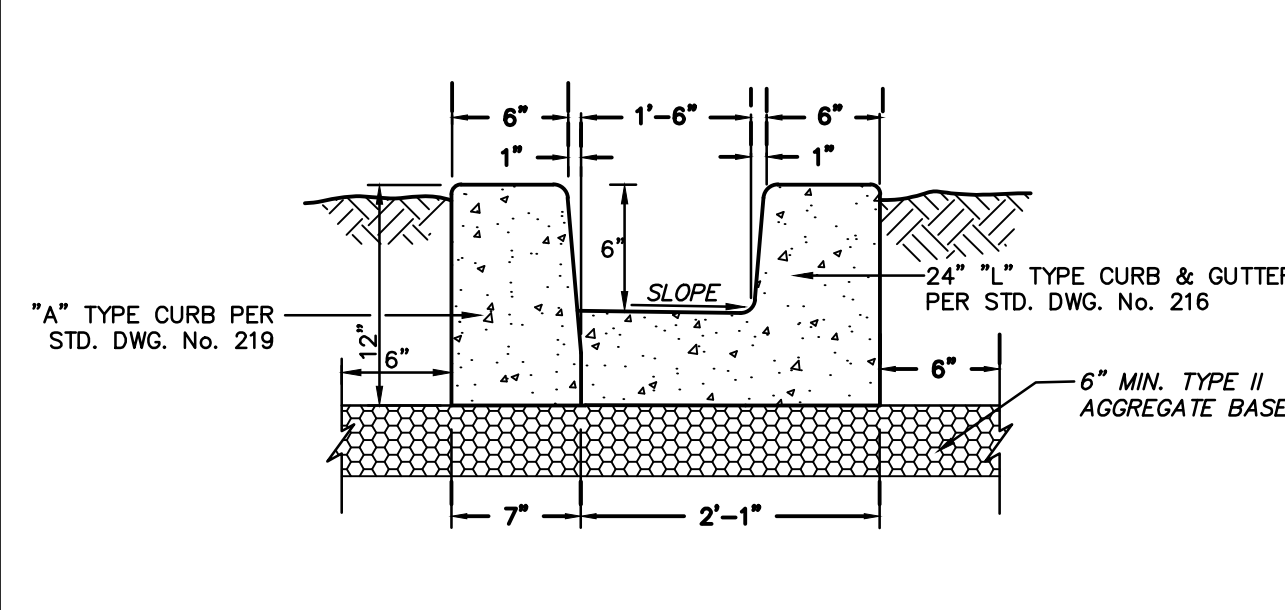
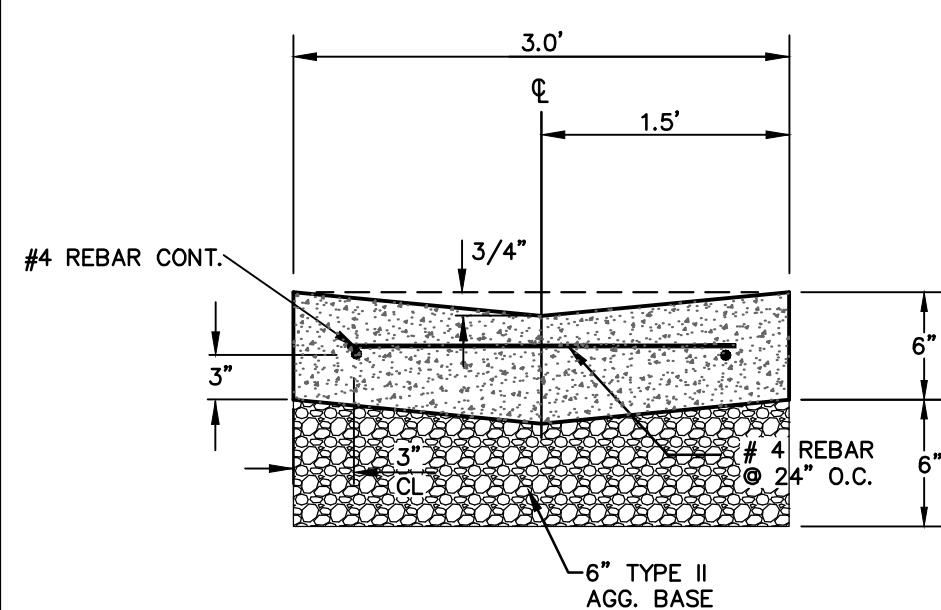
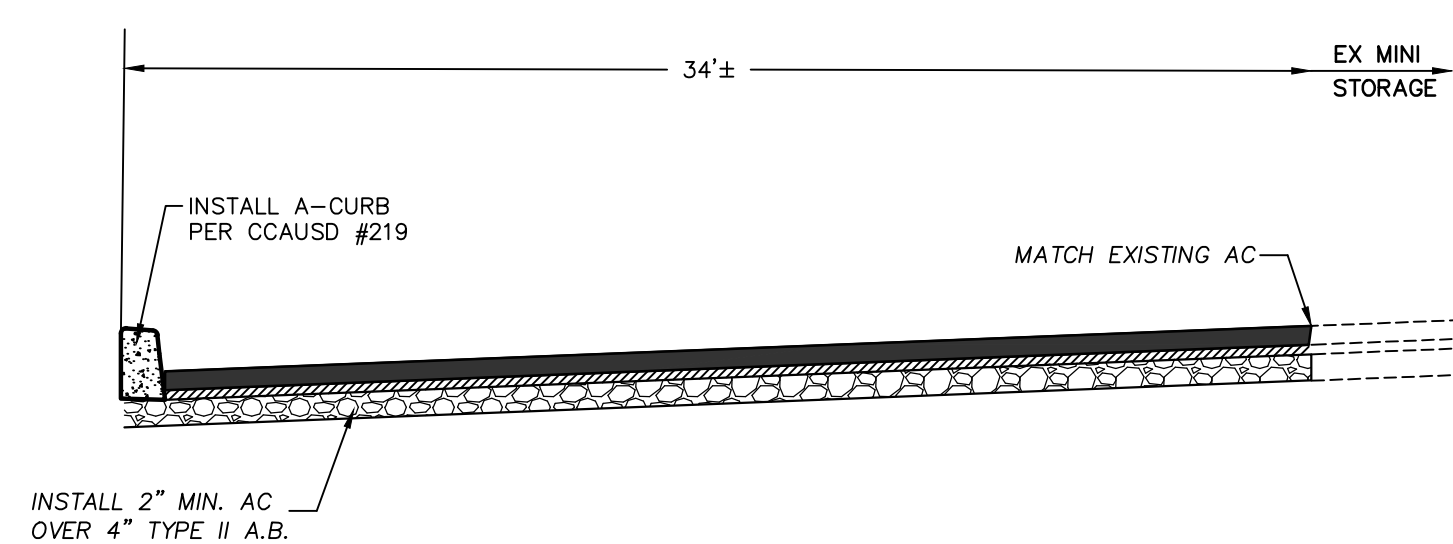
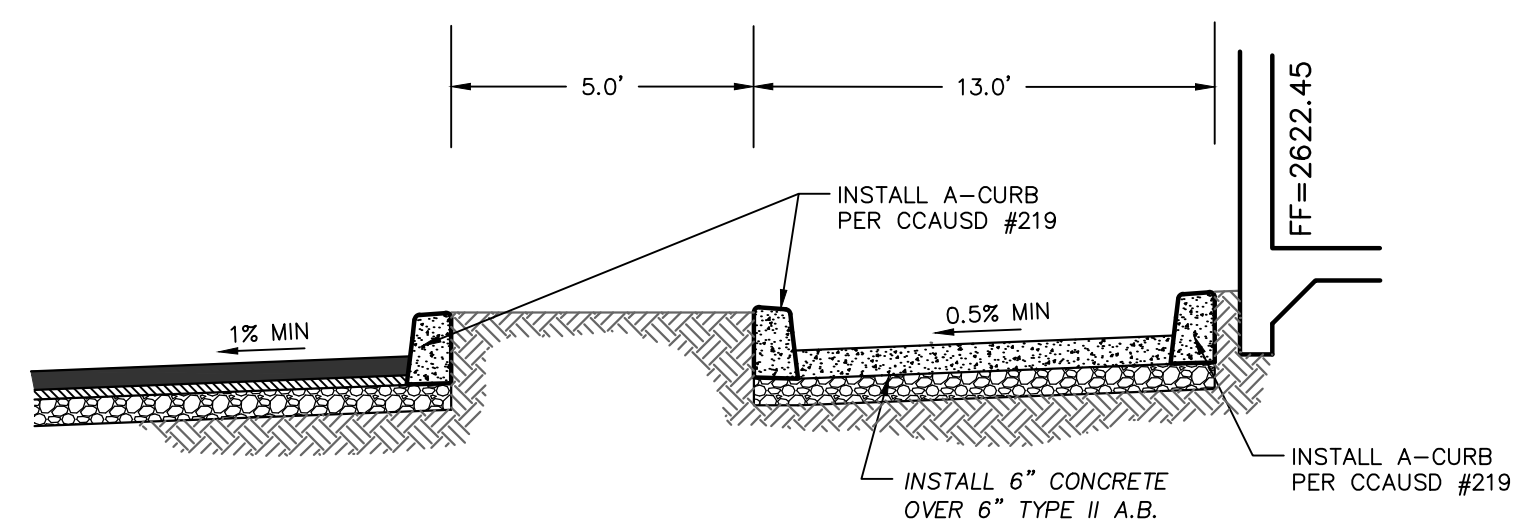
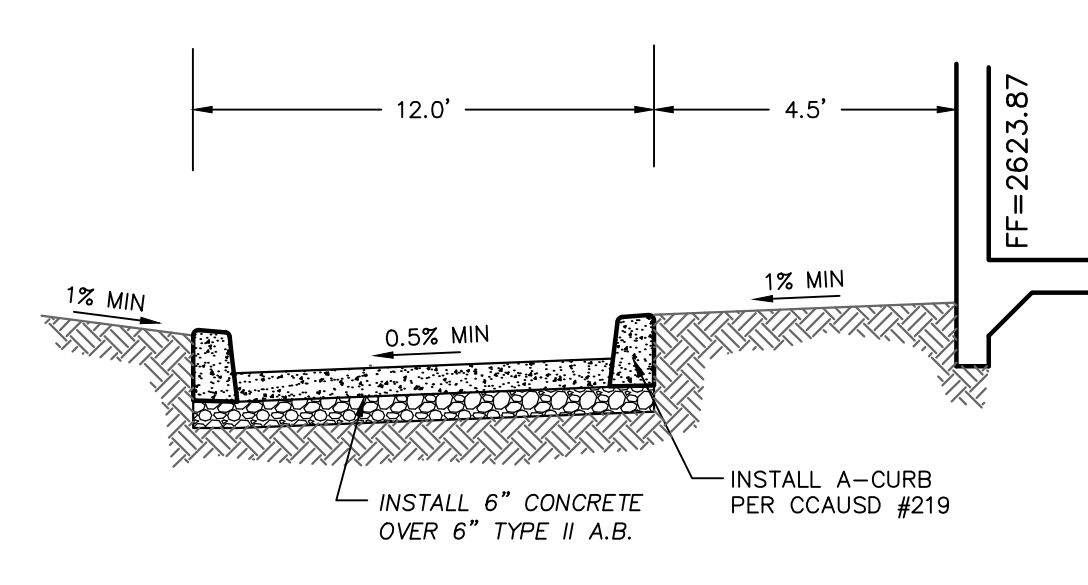
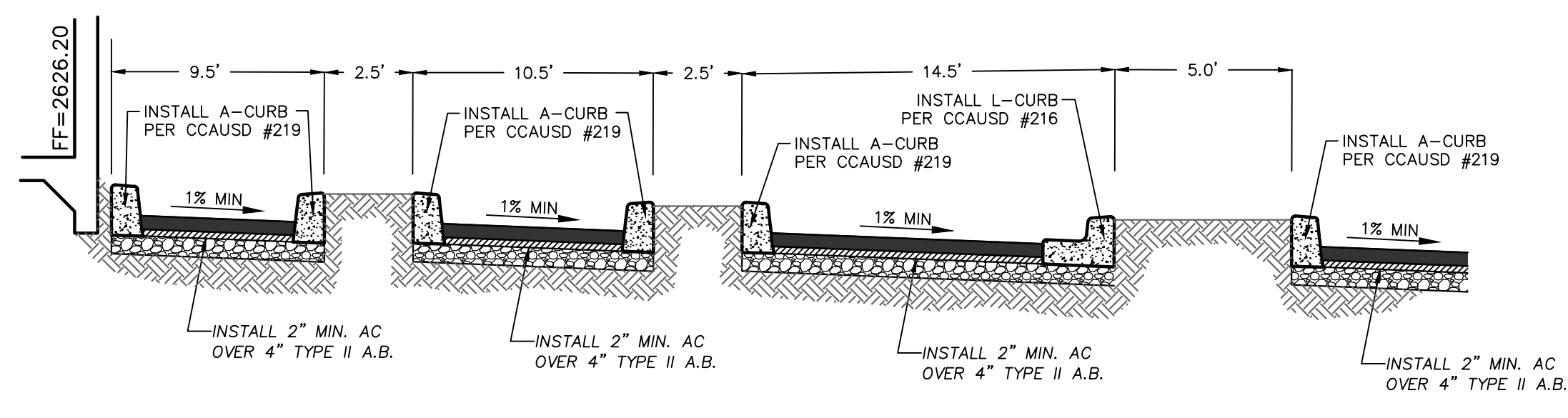
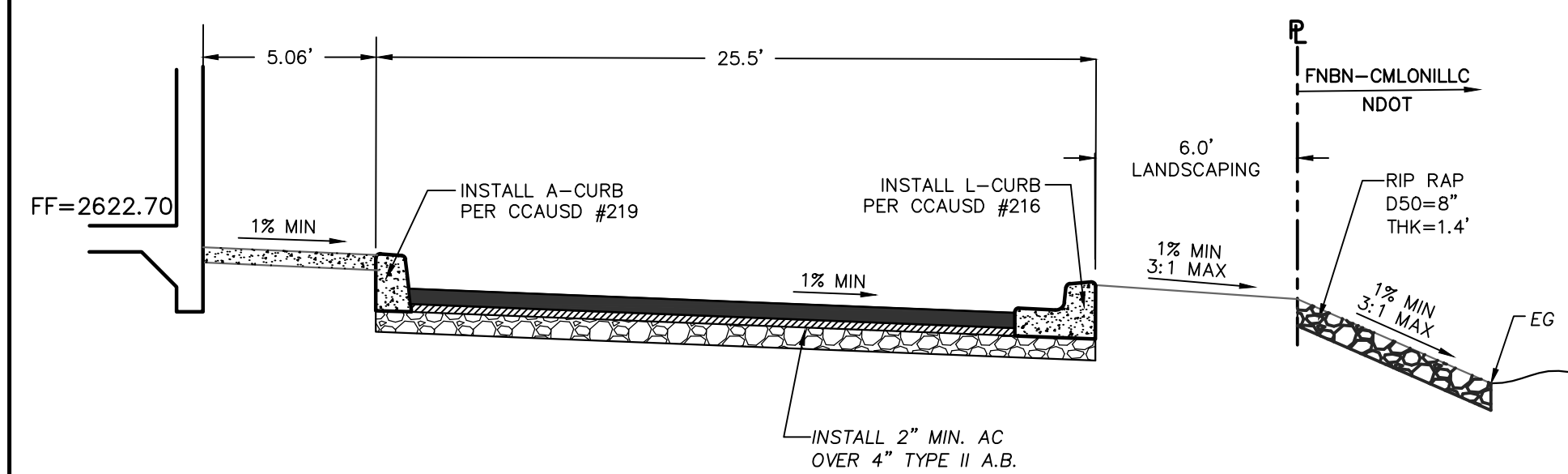
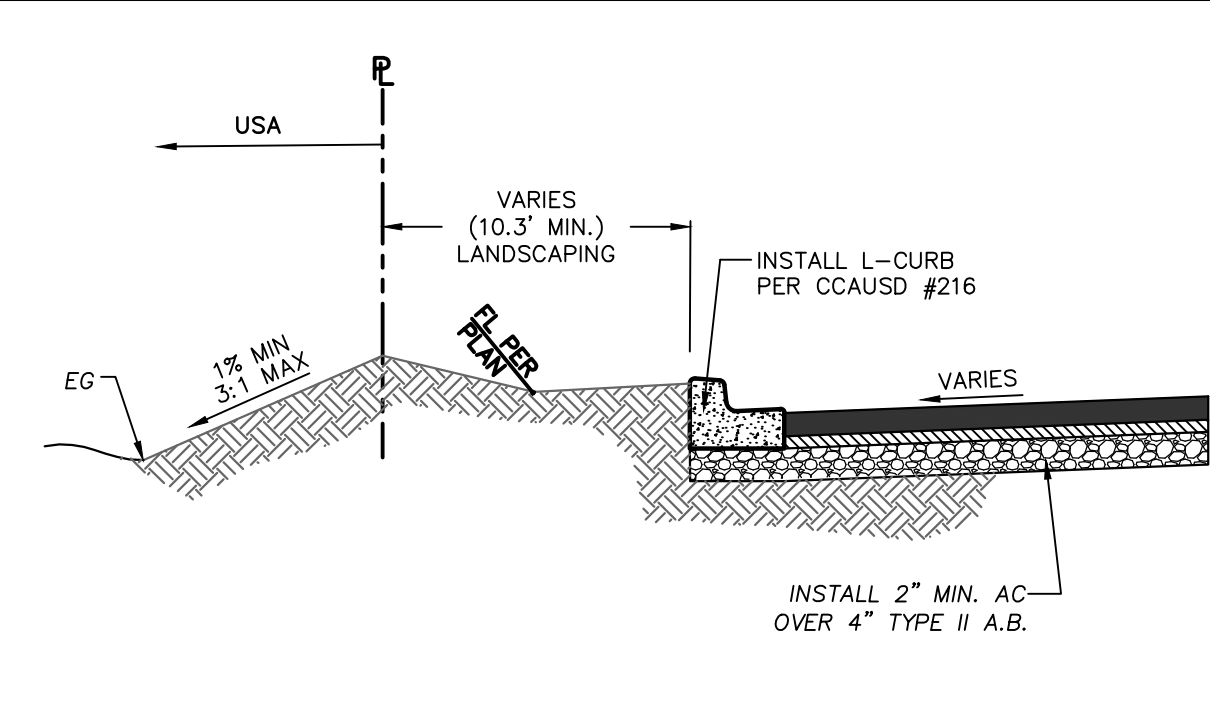
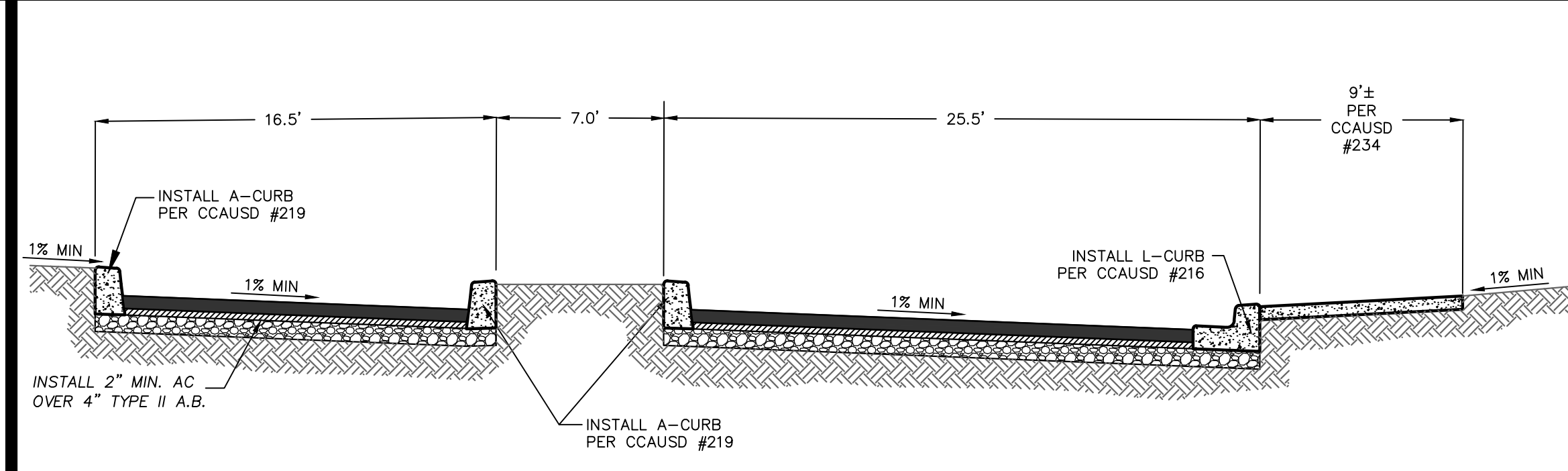
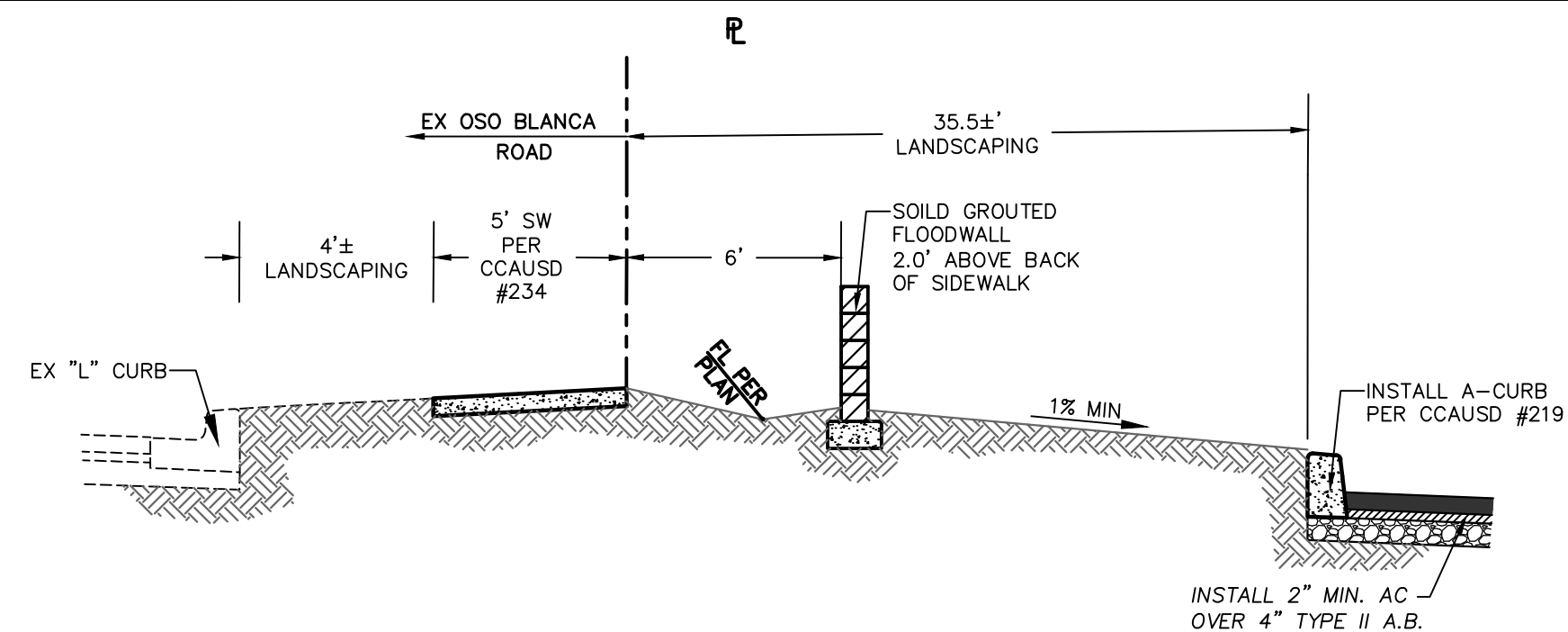
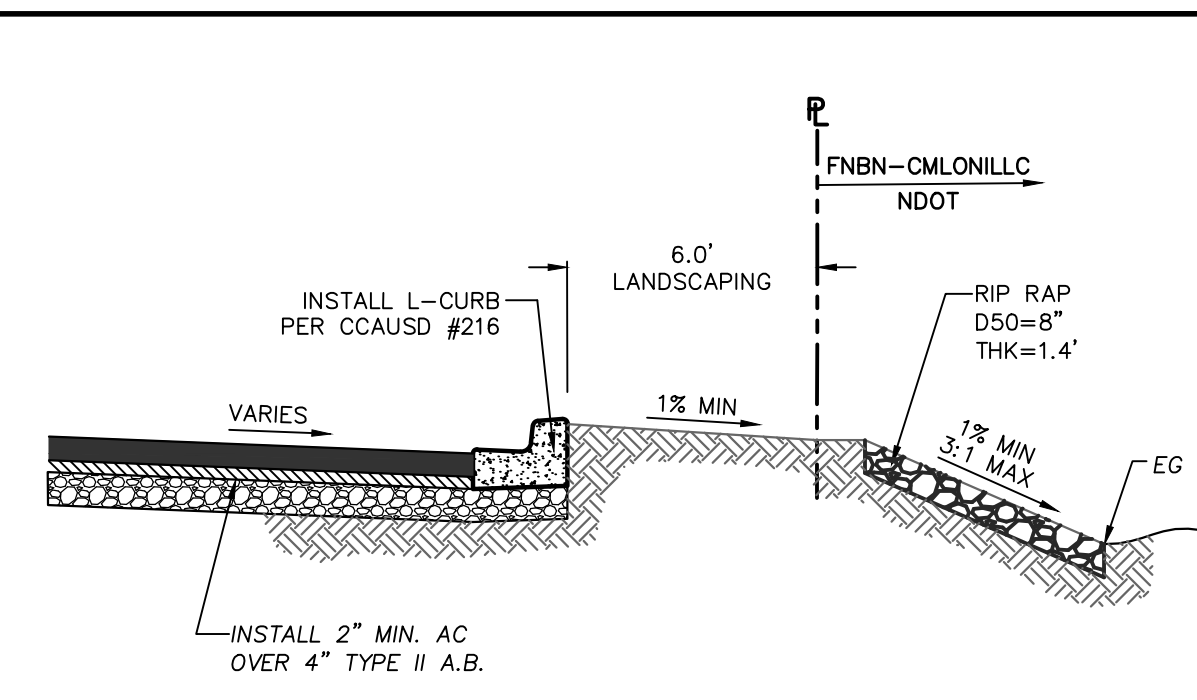
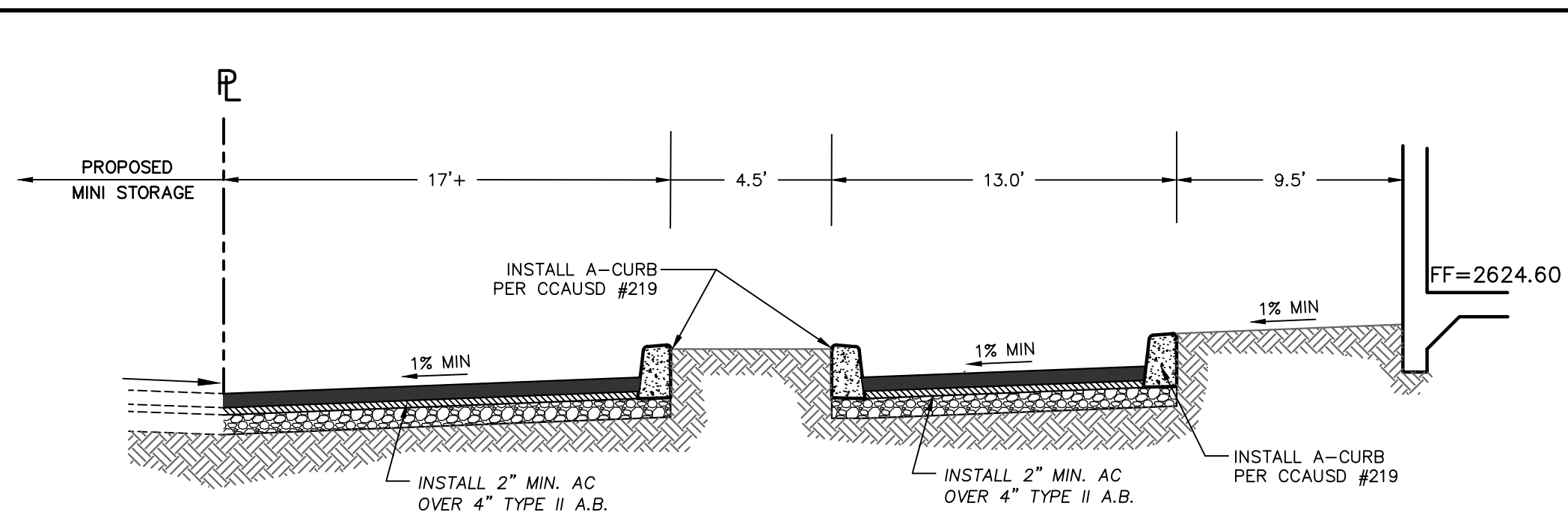
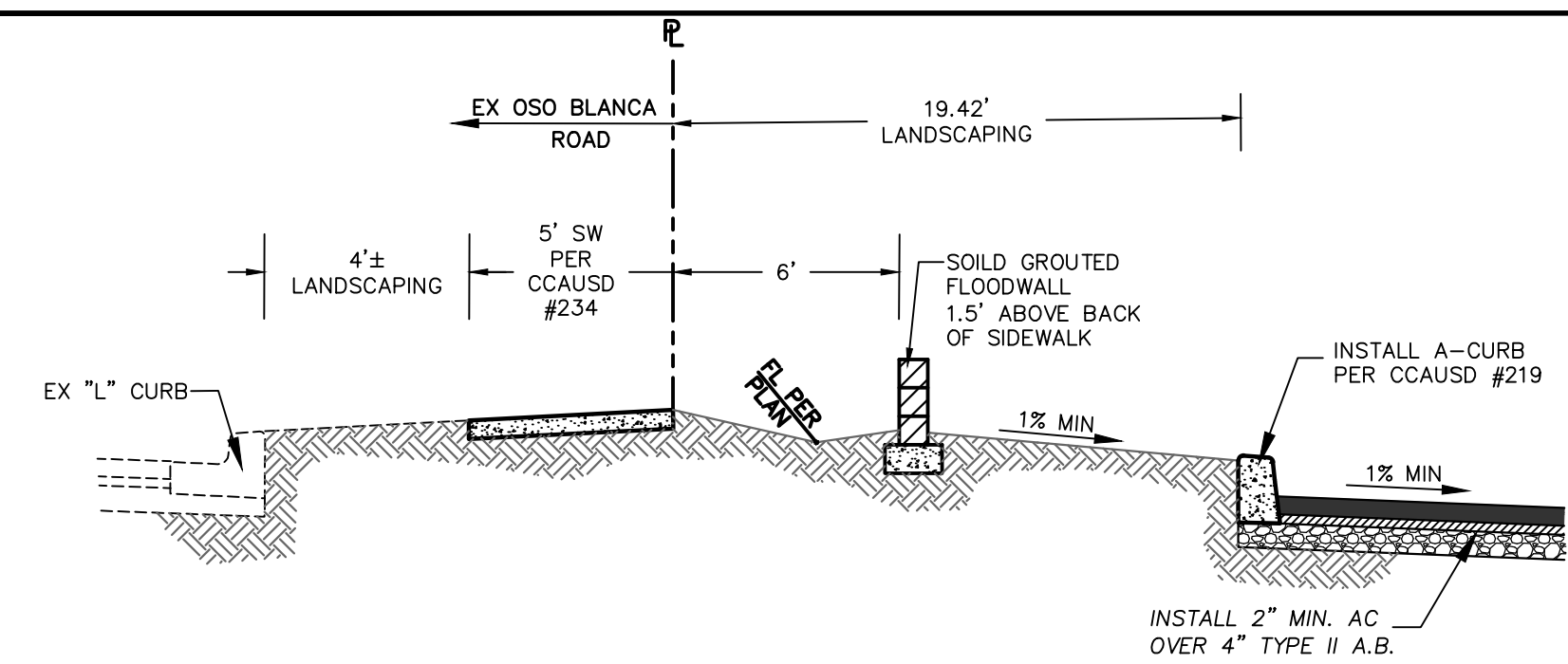
Respectfully Submitted,

Pamela Pitcher
Hydrology and Traffic Manager

References

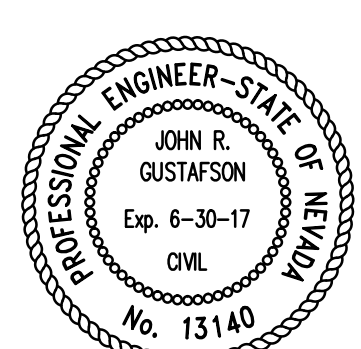
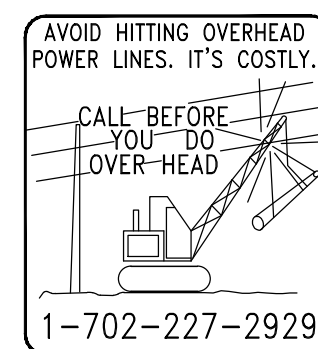
The following documents were used in the preparation of this hydrology study update:

- 1) DRAINAGE DESIGN MANUAL, 1999 - Hydrologic Criteria and Drainage Design Manual, Clark County Regional Flood Control District.
- 2) CCRFCD, 2013 - Flood Control Master Plan Update, Volumes 1 and 2, Clark County Regional Flood Control District, James M. Montgomery Consulting Engineers, Inc., September, 2013.
- 3) SCS, 1985 - Soil Survey of the Las Vegas Valley Area, Nevada, U.S. Department of Agriculture, Soil Conservation Service, Washington D.C., July, 1985.
- 4) FEMA, 2011 - Flood Insurance Rate Maps, Clark County, Nevada, U.S. Federal Emergency Management Agency, November 16, 2011.
- 5) HEC-1, 1998 - HEC1vm v.2 Flood Hydrograph Package, 2.01, U.S. Army Corps of Engineers, the Hydrologic Engineering Center, Davis, California, 1998.
- 6) Westar Development, 2015 – Technical Drainage Study for Storage One at 7422 Oso Blanca, Civil Works, Inc., January 2015.
- 7) DDB Holdings, LLC, 2014 – Technical Drainage Study for Durango & 95 Commercial, Civil Squared Engineering, March 2014.



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.



REMINGTON COMMERCIAL VIII
DETAIL SHEET
SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.B.& M.
CITY OF LAS VEGAS
A.P.N. 125-17-301-012

BAUGHMAN & TURNER, INC.

CIVIL ENGINEERS	LAND SURVEYORS	LAND PLANNERS
12120 HINSON STREET	LAS VEGAS, NEVADA	
PHONE: (702) 870-8771	FAX: (702) 878-2695	89102

JRG	REMITT
RDM	
JRG	
1" = 50'	

PREPARED FOR :

REMINGTON COMMERCIAL

DATE CREATED	REV NO.	REVISIONS	APP'D INITIALS	DATE APPROVED
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LEGEND

- PROPERTY LINE
- STREET CENTERLINE
- LOT LINE
- BUILDING SETBACK LINE
- PROPOSED "L" CURB & GUTTER
- EXISTING "L" CURB & GUTTER
- PROPOSED "L" CURB & GUTTER
- EXISTING CONTOUR LINES
- PROPOSED SCREEN/RETAINING WALL
- EXISTING SCREEN/RETAINING WALL
- PROPOSED FLOW LINE
- PROPOSED EDGE OF PAVEMENT
- EXIST. EDGE OF PAVEMENT
- SAWCUT LINE

SIGHT VISIBILITY ZONE

*NOTE: NO STRUCTURE, VEGETATION, OR OBJECT OF ANY KIND IS PERMITTED OVER TWENTY FOUR (24) INCHES IN HEIGHT (MEASURED FROM THE TOP OF THE ADJACENT CURB (IF CURB EXISTS)) WITHIN THE SIGHT VISIBILITY ZONE. EXCEPT STREET LIGHTING AND TRAFFIC CONTROL DEVICES.

PROPOSED ELEVATION & LOCATION
EXISTING ELEVATION & LOCATION

PROPOSED GRADE
CONSTRUCTION NOTE

PROPOSED HYDRANT
CENTERLINE
TOP OF CURB
EP
CR
FG
TF
TRW
BSW
GB
BVC
EVC
F.F.
HP
AC
EQ
BCR
ECR
< PT.
PC

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.

VICINITY MAP
NTS

		QUANTITY	
		PUBLIC	PRIVATE
1	INSTALL "A" CURB PER USDOCA DWG. #219	LF	6724
2	INSTALL 24" "L" TYPE C & G PER CCAUSD #216	LF	1870
3	INSTALL 5" SIDEWALK PER CCAUSD #234	SF	-
4	2" AC OVER 4" TYPE II	SY	17540
5	INSTALL TRASH ENCLOSURE SEE ARCHITECTURAL PLANS	EA	6
6	INSTALL COMMERCIAL DRIVEWAY PER NDOT DWG. R-5.3.1 AND R-5.3.3	SF	1547
7	INSTALL 8" CROSS GUTTER PER CCAUSD #228	SF	756
8	INSTALL TYPE "D" CURB RAMP PER NDOT DWG. 5.2.2	EA	2
9	INSTALL SLOT GUTTER DETAIL #2 SHEET DT01	LF	35
10	INSTALL 2" CURB CUT PER DETAIL #3 SHEET DT01	EA	1
11	6" CONCRETE OVER 6" TYPE II	SY	421
12	INSTALL 3" WIDE VALLEY GUTTER PER DETAIL #1 SHEET DT01	LF	285
13	INSTALL FLOOD WALL SOLID GROUTED TW=BSW+1.50'	LF	618
14	INSTALL FLOOD WALL SOLID GROUTED TW=BSW+2.00'	LF	117
15	INSTALL SIDEWALK NDOT DWG R-5.2	SF	4226
16	INSTALL FINE, CLOSE GROWING, WATER RESISTANT GRASS	SF	2000
17	INSTALL RIP-RAP, D50=8", THICKNESS=16"	SF	13950

		QUANTITY	
		PUBLIC	PRIVATE
A	INSTALL 36" RCP STORM DRAIN PIPE	LF	430
B	INSTALL TYPE III STORM DRAIN MANHOLE PER CCAUSD #406	EA	1
C	INSTALL NDOT HEADWALL DWG. R-2.5.1 AND R-2.5.1.1	EA	1

BEST MANAGEMENT PRACTICES NOTE
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

OWNER / DEVELOPER
REMINGTON COMMERCIAL VIII
5920 S. RAINBOW BLVD. #11
LAS VEGAS NV, 89119
702-222-1420

BENCHMARK
CITY OF LAS VEGAS BENCHMARK 5LV90 1756
RIVET AND AND PLATE IN TOP OF CURB @ NW CORNER OF OSO
BLANCA RD AND DURANGO.
ELEV=798.4331 METERS = 2619.53 FEET (NAVD 88)

LEGAL DESCRIPTION
BEING A PORTION OF THE NORTHEAST QUARTER
(NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4)
OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60
EAST, M.D.M., CLARK COUNTY NEVADA.
PARCEL TWO (2) AS SHOWN IN FILE 119, PAGE 67
OF PARCEL MAPS, CLARK COUNTY RECORDERS
OFFICE, CLARK COUNTY, NEVADA.

FLOOD ZONE DATA
THIS SITE IS LOCATED IN THE ZONE "X". ZONE "X" HAS BEEN
DETERMINED TO BE AN AREA OUTSIDE THE 0.2% ANNUAL CHANVE
FLOODPLAIN PER FIRM COMMUNITY PANEL NO. 32003C1745E

BASIS OF BEARING
SOUTH 00°08'57" WEST BEING THE BEARING OF THE
WEST LINE OF GOVERNMENT LOT 11,
SECTION 17 TOWNSHIP 19 SOUTH, RANGE 60 EAST,
M.D.M. AS SHOWN IN BOOK 140, PAGE 12 OF PLATS ON
FILE IN THE CLARK COUNTY NEVADA, RECORDER'S
OFFICE.

MATCH LINE - SEE SHEET GP02

DISCLAIMER NOTE

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Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call
811
OR
1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVER-HEAD
1-702-227-2929

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

PROFESSIONAL ENGINEER-STATE OF NEVADA
JOHN R. GUSTAFSON
Exp. 6-30-17
CIVIL
No. 13140

REMINGTON COMMERCIAL VIII GRADING PLAN

SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.B. & M. CITY OF LAS VEGAS

A.P.N. 125-17-301-012

PREPARED FOR: **BAUGHMAN & TURNER, INC.**
CIVIL ENGINEERS
1210 HINSON STREET
LAS VEGAS, NEVADA 89102
PHONE: (702) 870-8771 FAX: (702) 878-2695

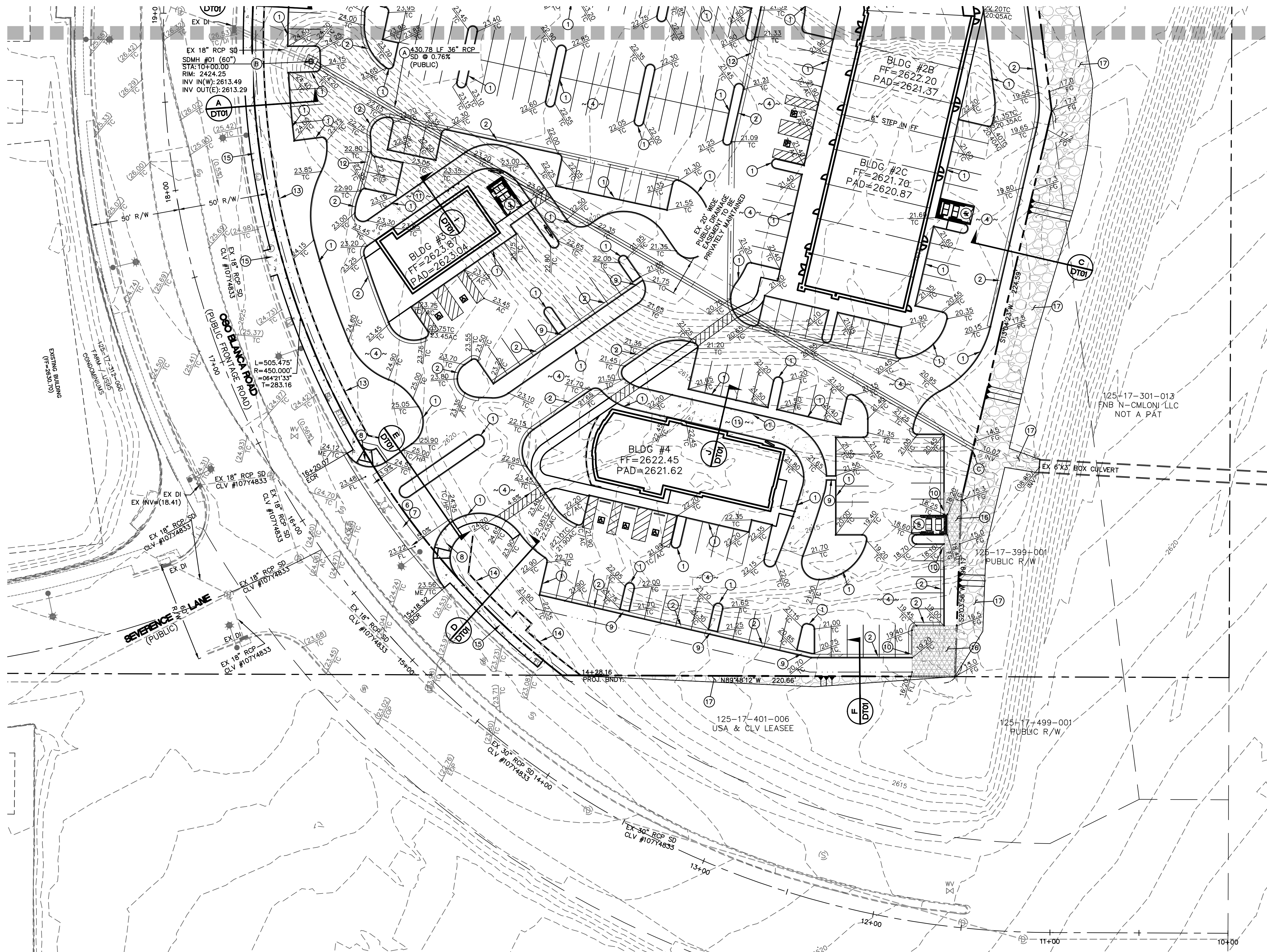
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REVISIONS
DATE No. APP'D

SHEET
GP01

PROJ. NO.
REM.95.DUR

MATCH LINE - SEE SHEET GP01

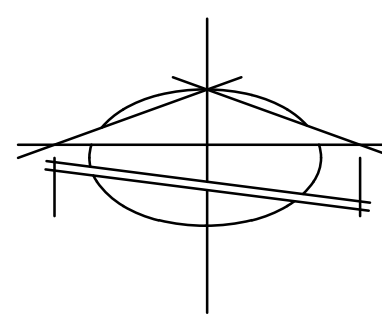
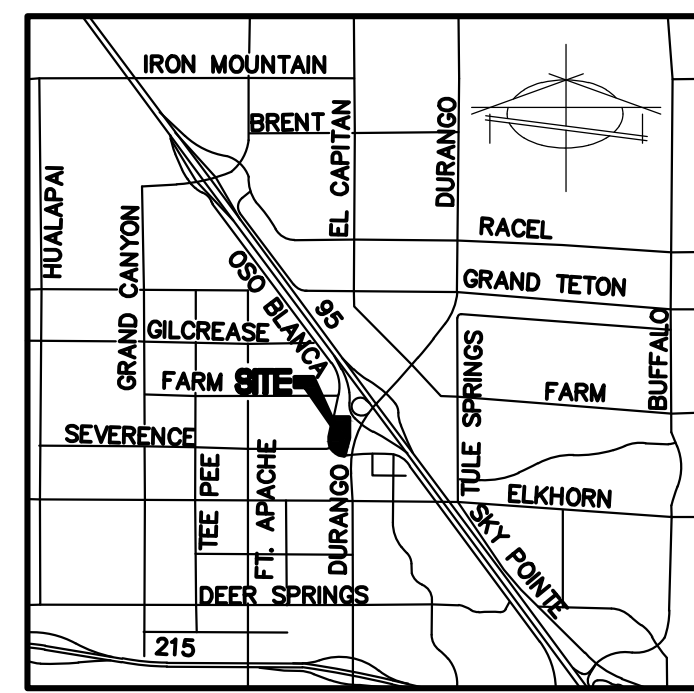


LEGEND

- PROPERTY LINE
- STREET CENTERLINE
- LOT LINE
- BUILDING SETBACK LINE
- PROPOSED "L" CURB & GUTTER
- EXISTING "L" CURB & GUTTER
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- PROPOSED ELEVATION & LOCATION
- EXISTING ELEVATION & LOCATION
- PROPOSED GRADE
- CONSTRUCTION NOTE
- PROPOSED HYDRANT
- CENTERLINE
- TOP OF CURB
- EP
- EDGE OF PAVEMENT
- CROWN LINE
- FINISHED GRADE
- TOP OF FOOTING
- TOP OF RETAINING WALL
- BACK OF SIDEWALK
- GRADE BREAK
- BEGIN VERTICAL CURVE
- END VERTICAL CURVE
- FINISHED FLOOR
- HIGHPOINT
- ASPHALTIC CONCRETE
- EXISTING GROUND
- BEGIN CURB RETURN
- END CURB RETURN
- ANGLE POINT
- POINT OF CURVATURE



CONSTRUCTION NOTES

		QUANTITY	
		UNIT	PUBLIC PRIVATE
1	INSTALL "A" CURB PER USCCA DWG. #219	LF	- 6724
2	INSTALL 24" "L" TYPE C & G PER CCAUSD #216	LF	- 1870
3	INSTALL 5" SIDEWALK PER CCAUSD #234	SF	- -
4	2" AC OVER 4" TYPE II	SY	- 17540
5	INSTALL TRASH ENCLOSURE SEE ARCHITECTURAL PLANS	EA	- 6
6	INSTALL COMMERCIAL DRIVEWAY PER NDOT DWG. R-5.3.1 AND R-5.3.3	SF	1547 -
7	INSTALL 8" CROSS GUTTER PER CCAUSD #228	SF	756 -
8	INSTALL TYPE "D" CURB RAMP PER NDOT DWG. 5.2.2	EA	2 -
9	INSTALL SLOT GUTTER DETAIL #2 SHEET DT01	LF	- 35
10	INSTALL 2" CURB CUT PER DETAIL #3 SHEET DT01	EA	- 1
11	6" CONCRETE OVER 6" TYPE II	SY	- 421
12	INSTALL 3" WIDE VALLEY GUTTER PER DETAIL #1 SHEET DT01	LF	- 285
13	INSTALL FLOOD WALL SOLID GROUTED TW=BSW+1.50'	LF	618 -
14	INSTALL FLOOD WALL SOLID GROUTED TW=BSW+2.00'	LF	117 -
15	INSTALL SIDEWALK NDOT DWG R-5.2	SF	4226 -
16	INSTALL FINE, CLOSE GROWING, WATER RESISTANT GRASS	SF	- 2000
17	INSTALL RIP-RAP, D50=8", THICKNESS=16"	SF	- 13950

DRAINAGE CONSTRUCTION NOTES

		QUANTITY	
		UNIT	PUBLIC PRIVATE
A	INSTALL 36" RCP STORM DRAIN PIPE	LF	430 -
B	INSTALL TYPE III STORM DRAIN MANHOLE PER CCAUSD #406	EA	1 -
C	INSTALL NDOT HEADWALL DWG. R-2.5.1 AND R-2.5.1.1	EA	1 -

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.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call
811
OR
1-800-227-2600

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVER-HEAD
1-702-227-2929

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

PROFESSIONAL ENGINEER-STATE OF NEVADA
JOHN R. GUSTAFSON
Exp. 6-30-17
CIVIL
No. 13140

OWNER / DEVELOPER

REMINGTON COMMERCIAL VIII
5920 S. RAINBOW BLVD. #11
LAS VEGAS NV, 89119
702-222-1420

LEGAL DESCRIPTION

BEING A PORTION OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY NEVADA.

PARCEL TWO (2) AS SHOWN IN FILE 119, PAGE 67 OF PARCEL MAPS, CLARK COUNTY RECORDERS OFFICE, CLARK COUNTY, NEVADA.

BASIS OF BEARING

SOUTH 0°08'57" WEST BEING THE BEARING OF THE WEST LINE OF GOVERNMENT LOT 11, SECTION 17 TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M. AS SHOWN IN BOOK 140, PAGE 12 OF PLATS ON FILE IN THE CLARK COUNTY NEVADA, RECORDER'S OFFICE.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK 5LV90 1756

RIVET AND AND PLATE IN TOP OF CURB @ NW CORNER OF OSO BLANCA RD AND DURANGO.

ELEV=798.4331 METERS = 2619.53 FEET (NAVD 88)

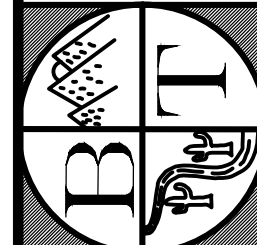
FLOOD ZONE DATA

THIS SITE IS LOCATED IN THE ZONE "X". ZONE "X" HAS BEEN DETERMINED TO BE AN AREA OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN PER FIRM COMMUNITY PANEL NO. 32003C1745E

PREPARED FOR :
REMINGTON COMMERCIAL

DATE: JUNE 2015
DESIGN: MJ
DRAWN: MJ
CHECK: JRG
SCALE: 1"=30'

BAUGHMAN & TURNER, INC.
CIVIL ENGINEERS
1210 HINSON STREET
LAS VEGAS, NEVADA 89102
PHONE: (702) 870-8771 FAX: (702) 878-2695



REMINGTON COMMERCIAL VIII
GRADING PLAN

SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.B. & M.

CITY OF LAS VEGAS

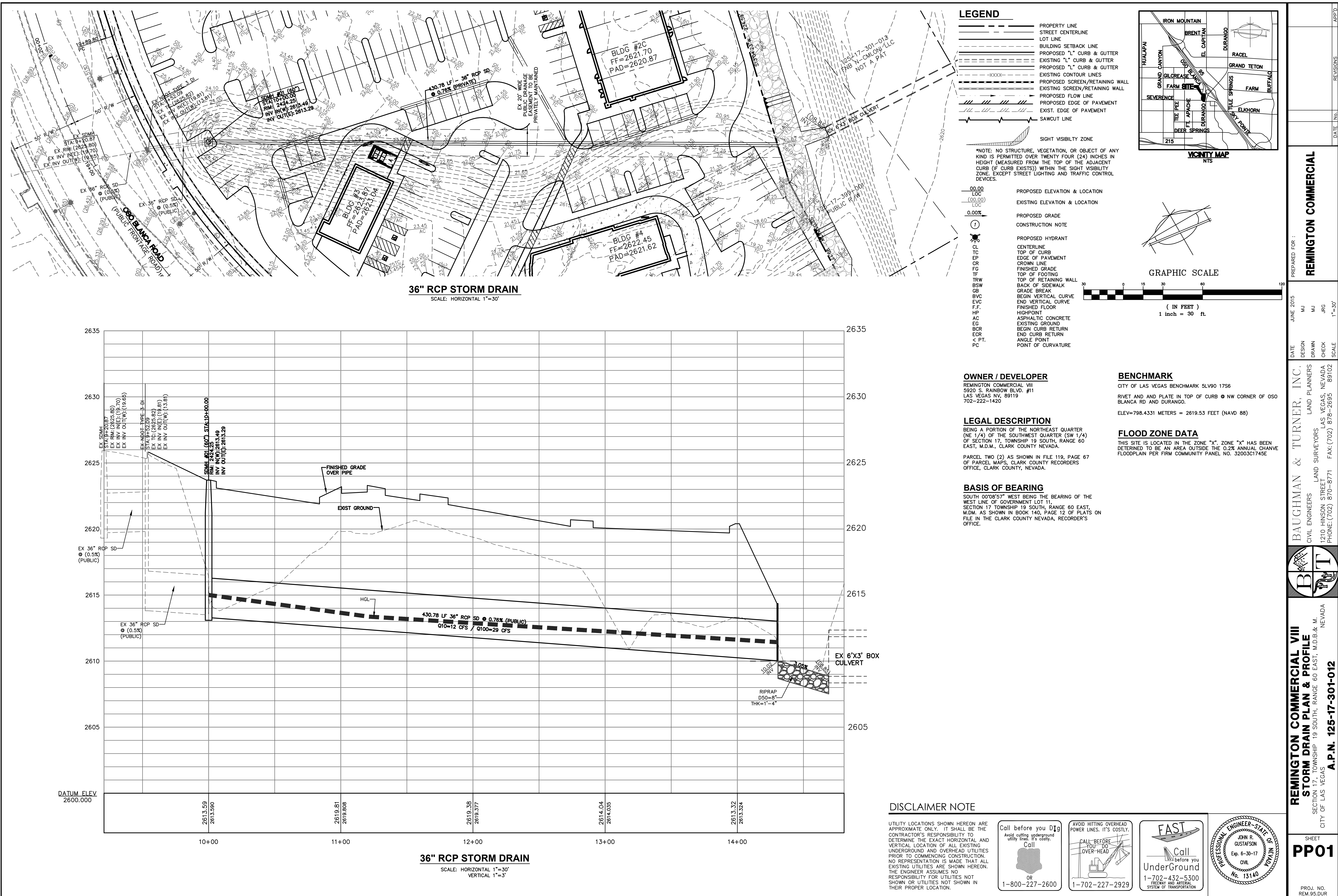
NEVADA

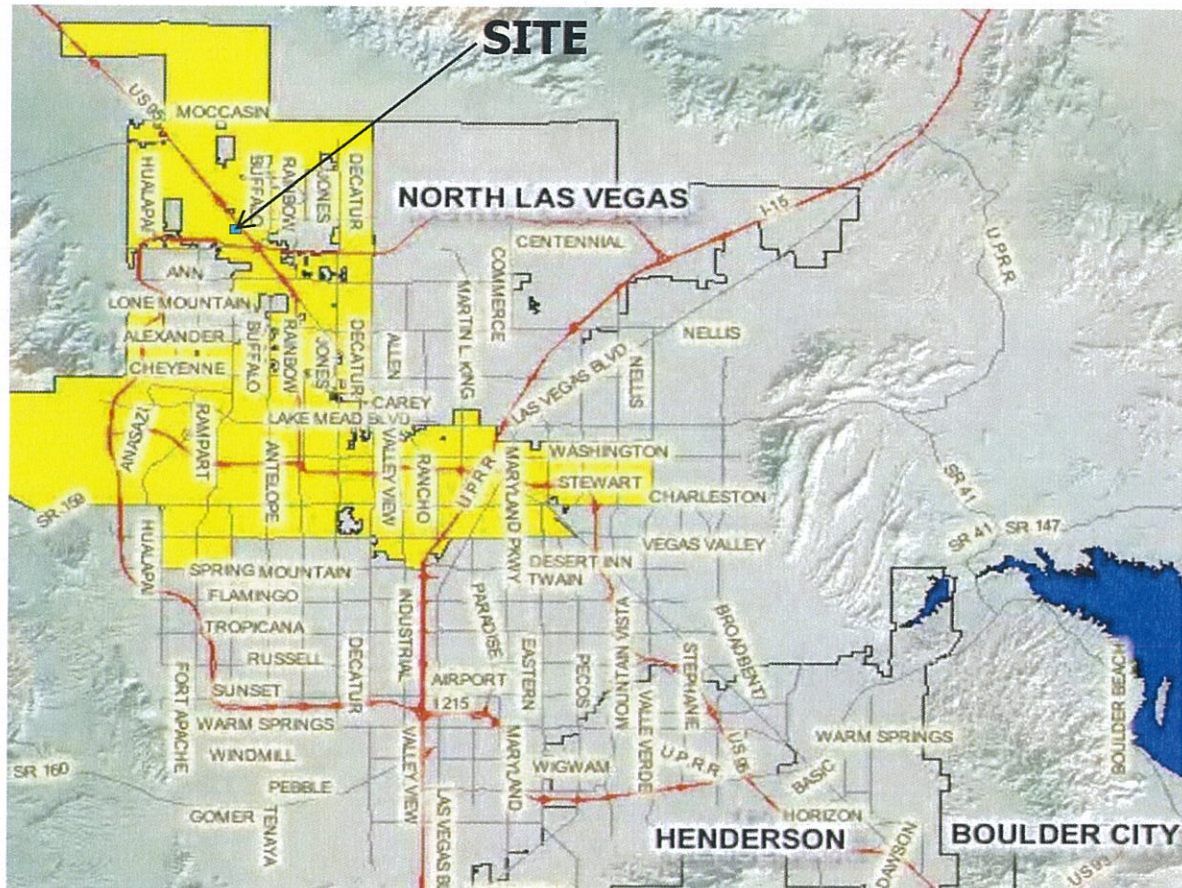
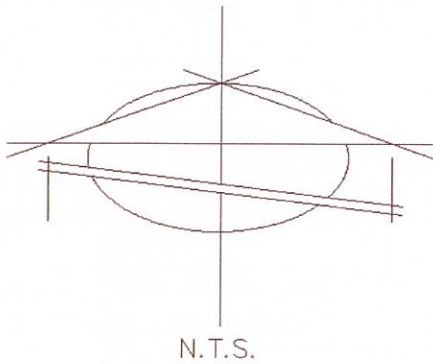
A.P.N. 125-17-301-012

SHEET

GP02

PROJ. NO. REM.95.DUR





VICINITY MAP

FIGURE 1



BAUGHMAN & TURNER, INC.
 CIVIL ENGINEERS LAND SURVEYORS LAND PLANNERS
 1210 HINSON STREET LAS VEGAS, NEVADA
 (702) 870-8771 89102

PREPARED FOR :

DURANGO & 95

DATE: Jan 2015
 DESIGN: PJP
 DRAWN: PJP
 FIGURE NO.: 1
 JOB:

NOTES

This map is for assessment use only and does NOT represent a survey.

No liability is assumed for the accuracy of the data delineated herein. Information on roads and other non-assessed parcels may be obtained from the Road Document Listing in the Assessor's Office.

This map is compiled from official records, including surveys and deeds, but only contains the information required for assessment. See the recorded documents for more detailed legal information.

MAP LEGEND

Parcel Boundary

Sub Boundary

PM/LD Boundary

Road Easement

Match / Leader Line

Historic Lot Line

Historic Sub Boundary

Historic PM/LD Boundary

Section Line

Condominium Unit

Air Space PCL

Right of Way PCL

Sub-Surface PCL

001 Road Parcel Number

001 Parcel Number

1.00 Acreage

202 Parcel Sub/Seq Number

PB 24-45 Plat Recording Number

5 Block Number

5 Lot Number

GL5 Gov. Lot Number

BOOK

T19S R60E

SEC.

17

MAP

N 2 SW 4

125-17-3

099

100

126

125

137

138

Scale: 1" = 200'

Rev: 7/11/2014

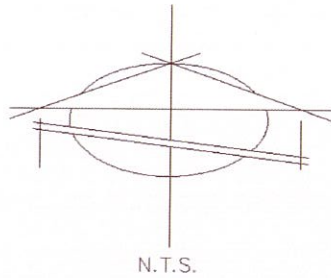
CLARK COUNTY

ASSESSOR

NEVADA



FIGURE 2, APN



AERIAL VIEW

FIGURE 3

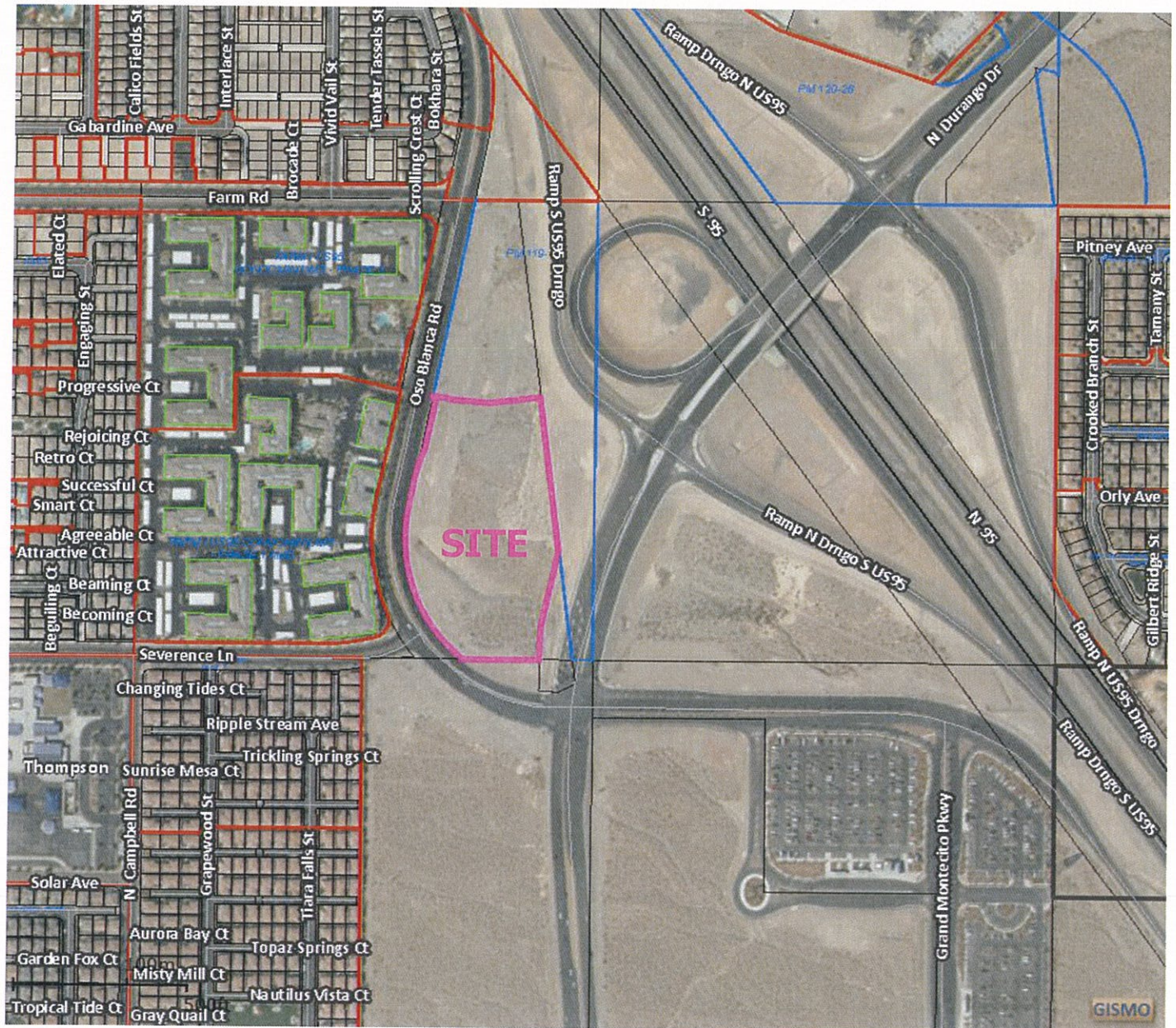
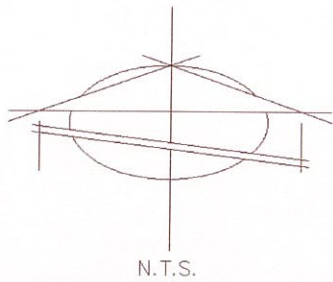


BAUGHMAN & TURNER, INC.
 CIVIL ENGINEERS LAND PLANNERS
 LAND SURVEYORS
 1210 HINSON STREET LAS VEGAS, NEVADA
 (702) 870-8771 89102

PREPARED FOR :

DURANGO & 95

DATE: MAY 2015
 DESIGN: PJP
 DRAWN: PJP
 FIGURE NO. 3:
 JOB:



GENERAL AERIAL VIEW

FIGURE 4



BAUGHMAN & TURNER, INC.
 CIVIL ENGINEERS LAND SURVEYORS LAND PLANNERS
 1210 HINSON STREET LAS VEGAS, NEVADA 89102
 (702) 870-8771

PREPARED FOR :

DURANGO & 95

DATE: JAN 2015
 DESIGN: PJP
 DRAWN: PJP
 FIGURE NO. 5:
 JOB:

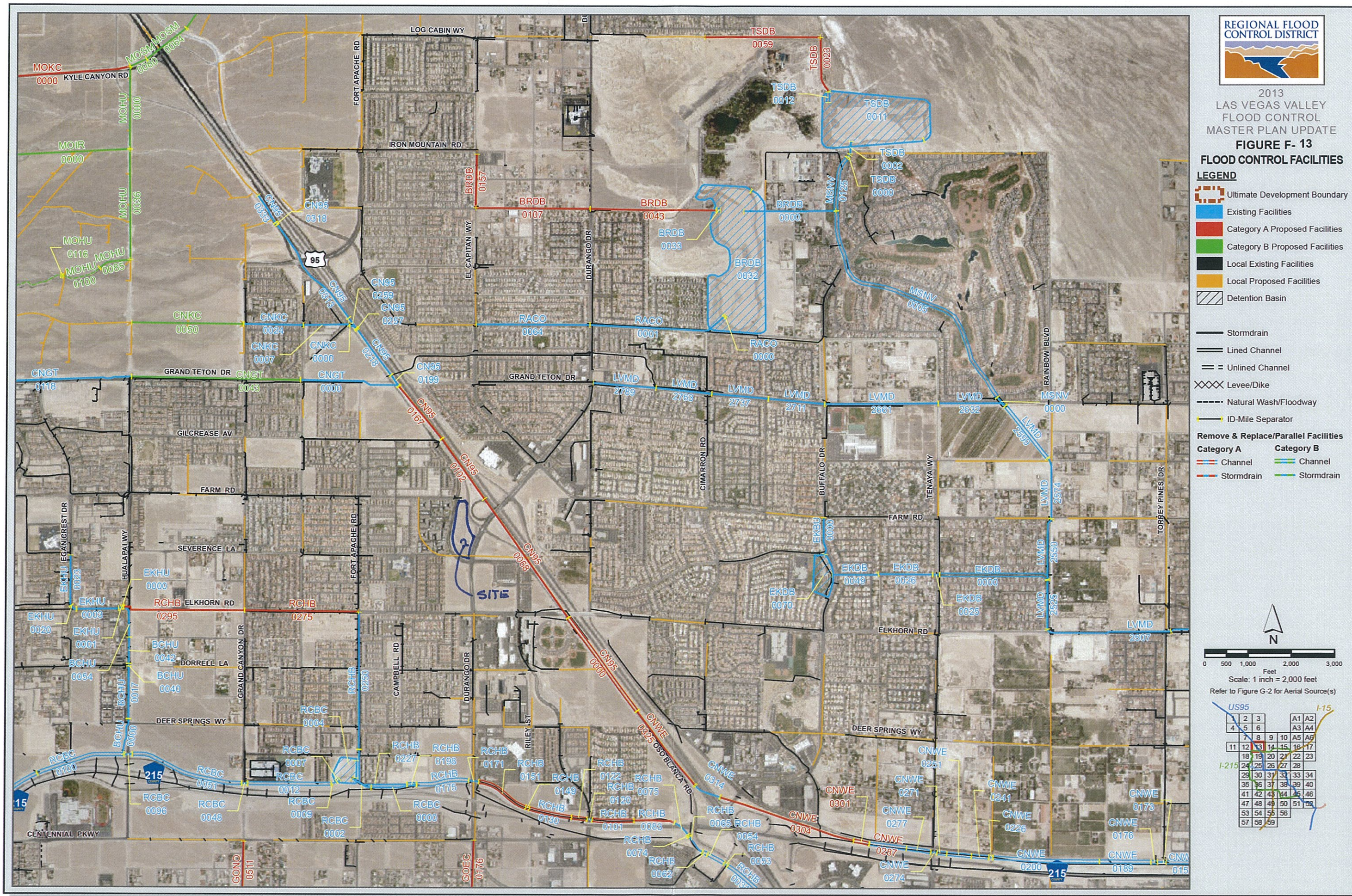


FIGURE 5 - 2013 MPD FACILITIES

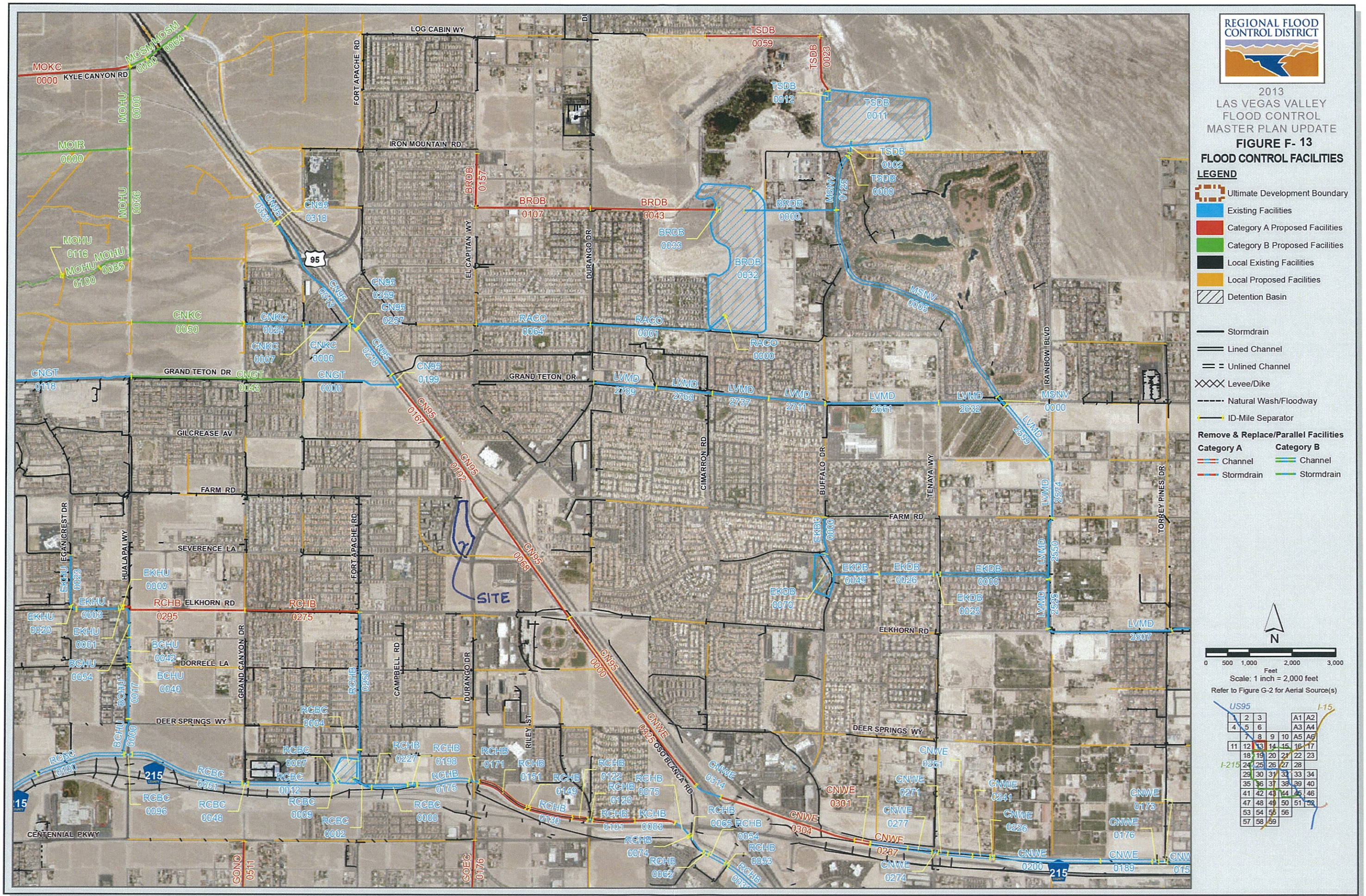


FIGURE 5 - 2013 MPU FACILITIES

ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%) **
BCHU		BELTWAY CHANNEL - HUALAPAI						
0000	E	12' X 5' RCAP	853	501	CBA3-C	WEST3	0.84	1.11
0017	E	8' X 5' RCAP	1216	501	CBA3-C	WEST3	0.84	1.33
0040	E	66" RCP	60	222	DNW26-C	WEST3	0.51	1.04
0042	E	60" RCP	615	222	DNW26-C	WEST3	0.51	1.42
0054	E	54" RCP	770	222	DNW26-C	WEST3	0.51	1.23
BRDB		BRENT DRAINAGE SYSTEM						
0000	E	36" RCP with 18" Orifice Plate	2170	37	BRDB	WEST3	2.48	0.40
0031	E	45,080 cfs PMF Spillway		45080	CBRDB	WEST3	2.48	
0032	E	450 ac-ft South Environmental Enhancement Area		1902	CBRDB	WEST3	2.48	
0033	E	Energy Dissipator	100	957	CNW113-C	WEST3	1.58	
0043	P1	8' X 6' RCB	2920	957	CNW113-C	WEST3	1.58	2.10
0107	P1	8' X 6' RCB	2660	957	CNW113-C	WEST3	1.58	2.40
0157	P1	12' X 6' RCB	1260	741	CNW96-C	WEST3	0.95	0.25
CN95		CENTENNIAL PKWY CHANNEL WEST / U.S 95 BRANCH						
0000	P1	Conc Chnl 22'W 10'D 0:1 SS	2690	3340	CNWBB3-C	WEST3	3.36	2.17
0068	P1	3' 8' X 7' RCB	3380	3216	CNW103-C	WEST3	3.05	2.12
0102	P1	3' 8' X 6' RCB	1710	2888	2CNW89-C	WEST3	2.66	2.09
0167	P1	2' 10' X 6' RCB	1580	2160	2CNW71-E	WEST3	1.64	1.50
0199	E	2' 10' X 6' RCB	320	1423	2CNW72-C	WEST3	1.14	0.82
0218	E	15' X 9' RCB	1127	1423	2CNW72-C	WEST3	1.14	0.82
0257	E	Transition Structure	59	1423	2CNW72-C	WEST3	1.14	0.77
0259	E	15' X 9' RCB	290	653	CNW74-C	WEST3	0.44	0.77
0313	E	10' X 6' RCB	2680	653	CNW74-C	WEST3	0.44	2.50
0318	E	Transition Structure	60	653	CNW74-C	WEST3	0.44	1.50
0333	E	5' X 5' RCB	670	339	NW62-S	WEST3	0.22	1.50
CNGT		CENTENNIAL PKWY CHANNEL WEST / GRAND TETON BRANCH						
0000	E	10' X 5' RCB	2376	600	CNW71-E	WEST3	0.47	2.58
0043	P0	6' X 6' RCB	3980	600	CNW71-E	WEST3	0.47	3.00
0118	E	6' X 5' RCAP	5472	363	KYLEDET*	KYLEDB	57.73	3.72
CNKC		CENTENNIAL PKWY CHANNEL WEST / KYLE CANYON BRANCH						
0000	E	12' X 4' RCB	377	999	CNW72-C	WEST3	0.71	4.58
0007	E	10' X 5' RCB	874	999	CNW72-C	WEST3	0.71	3.28
0024	E	8' X 5' RCB	1385	999	CNW72-C	WEST3	0.71	2.40
0050	P0	84" RCP	2610	854	CNW72-C	WEST3	0.71	3.60
CNWE		CENTENNIAL PKWY CHANNEL WEST						
0150	E	Conc Chnl 40'W 9.5'D 0:1 SS	2279	4233	CNW3B3-C	WEST3	5.64	0.42
0173	E	3' 18' X 8' RCBC @ Torrey Pines	200	4233	CNW3B3-C	WEST3	5.64	0.42
0176	E	Conc Chnl 40'W 9'D 0:1 SS	150	4233	CNW3B3-C	WEST3	5.64	0.41
0189	E	Conc Chnl 36'W 10'D 0:1 SS	1200	4067	CNW2D4-C	WEST3	5.15	0.42
0200	E	Conc Chnl 36'W 9'D 0:1 SS	2470	4067	CNW2D4-C	WEST3	5.15	1.00
0226	E	2' 18' X 8.5' RCBC @ Rio Vista	100	4067	CNW2D4-C	WEST3	5.15	0.51
0241	E	Conc Chnl 36'W 9.5'D 0:1 SS	405	3951	CNW2D3-C	WEST3	4.65	0.51
0251	E	Conc Chnl 36'W 9'D 0:1 SS	575	3951	CNW2D3-C	WEST3	4.65	0.51
0271	E	Conc Chnl 32'W 10'D 0:1 SS	229	3951	CNW2D3-C	WEST3	4.65	0.51
0274	E	32' X 10' RCBC @ Tenaya	142	3951	CNW2D3-C	WEST3	4.65	0.51
0277	E	Conc Chnl 32'W 9'D 0:1 SS	579	3951	CNW2D3-C	WEST3	4.65	0.64
0287	E	Conc Chnl 13'W 10'D 2:1 SS	605	3593	CNW2B2-C	WEST3	3.84	1.19
0301	P2	Conc Chnl 32'W 10'D 0:1 SS	235	3593	CNW2B2-C	WEST3	3.84	1.19
0304	P2	32' X 10' RCB	3259	3593	CNW2B2-C	WEST3	3.84	1.79
0314	E	22' X 7' RCB	785	3593	CNW2B2-C	WEST3	3.84	1.79
0325	P1	32' X 10' RCB	2200	3593	CNW2B2-C	WEST3	3.84	1.75
EKBH		ELKHORN SPRINGS AND BUFFALO						
0000	E	60" RCP	1046	375	NW134-C	WEST3	0.46	1.00
EKDB		ELKHORN SPRINGS DETENTION BASIN						
0000	E	Grass Chnl 15'W 5.8'D 3.5:1 SS	2575	238	CNW150-C	WEST3	1.41	0.39
0025	E	4' X 3' RCB	160	120	ELKBASIN	WEST3	0.84	0.50
0026	E	48" RCP	1270	120	ELKBASIN	WEST3	0.84	1.23
0049	E	60" RCP	1095	120	ELKBASIN	WEST3	0.84	0.13
0070	E	48 ac-ft Elkhorn Springs Detention Basin		629	CNW133-C	WEST3	0.84	
EKHU		ELKHORN AND HUALAPAI						
0000	E	6' X 5' RCB Overflow Structure	48	638	CNW26-C	WEST3	0.51	0.91
0001	E	6' X 5' RCAP	72	638	CNW26-C	WEST3	0.51	0.91
0003	E	6' X 4' RCAP	980	638	CNW26-C	WEST3	0.51	3.61
0020	E	6' X 5' RCAP	150	638	CNW26-C	WEST3	0.51	3.61
0023	E	8' X 5' RCAP	1200	638	CNW26-C	WEST3	0.51	0.90
GOEC		GOWAN NORTH - EL CAPITAN BRANCH						
0176	P1	78" RCP	1320	363	CCPFR-C	ALLGOW3	0.46	1.15
GONO		GOWAN NORTH SYSTEM						
0511	P1	7' X 6' RCB	1320	546	CCPHW-C	ALLGOW3	0.60	1.14
LVMD		LAS VEGAS WASH - MIDDLE						
2490	E	2' 13' X 7' RCB	2555	2278	CNW168-C	CWEST3	4.69	0.40
2507	E	2' 13' X 9' RCB	2831	2278	CNW168-C	CWEST3	4.69	0.36
2525	E	24' X 8' RCB	1140	1913	CNW159-C	CWEST3	3.91	0.40
2550	E	24' X 8' RCB	1445	1664	CD161-C	CWEST3	3.41	0.40
2574	E	24' X 8' RCB	1430	1664	CD161-C	CWEST3	3.41	0.40
2599	E	Conc Chnl 24'W 7'D 2:1 SS	1577	1585	CNW162-C	CWEST3	3.08	0.50
2632	E	18' X 5' RCB	1580	968	CNW138-C	WEST3	1.16	0.46
2661	E	18' X 5' RCB	2640	968	CNW138-C	WEST3	1.16	0.46
2711	E	10' X 5' RCB	1320	968	CNW138-C	WEST3	1.16	1.54
2737	E	10' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	2.22
2763	E	6' X 5' RCB	1320	818	CNW139-C	WEST3	0.93	1.79
2789	E	6' X 5' RCB	1470	818	CNW139-C	WEST3	0.93	2.17
MOHU		MOCCASIN - HUALAPAI BRANCH						
0000	P0	14' X 8' RCB	1920	761	2CNW45-N	LOWER3	2.10	0.50
0036	P0	10' X 8' RCB	2590	368	CNW45-N	LOWER3	1.15	0.50
0085	P0	72" RCP	790	368	CNW45-N	LOWER3	1.15	3.00
0100	P0	Natural Wash	850	65	DMODB1	LOWER3	0.81	3.00
0116	P0	60" RCPC	12	65	DMODB1	LOWER3	0.81	3.00
0118	P0	Natural Wash	3485	65	DMODB1	LOWER3	0.81	3.00
MOIR		MOCCASIN - IRON MOUNTAIN BRANCH						
0000	P0	66" RCP	2770	446	2CNW33-C	LOWER3	1.76	3.60
MOKC		MOCCASIN AND KYLE CANYON						
0000	P1	11' X 8' RCB	5450	2662	CNW35-C	LOWER3	2.69	3.40
MOSM		MOCCASIN AND SHEEP MOUNTAIN PARKWAY						
0000	P0	14' X 9' RCB	3370	3778	CNW64-C	LOWER3	5.32	2.40
0064	P0	14' X 8' RCB	880	3505	CNW50-C	LOWER3	4.99	3.00
0080	P0	14' X 8' RCB	710	3325	2CNW35-C	LOWER3	4.80	3.00
MSNV		MOUNTAIN SPA/VISTA RANCH						
0000	E	6' 12' X 5' RCBC @ Grand Telon	273	679	CNW163-C	CWEST3	1.67	0.40
0005	E	Grass Chnl 100'W 4.5'D 10:1 SS	6325	679	CNW163-C	CWEST3	1.67	0.40
0125	E	Grass Chnl 100'W 4.5'D 10:1 SS	1300	116	CNW147E	WEST3	1.54	0.40
RACO		RACEL STREET COLLECTOR						
0000	E	96" RCP Baffled Energy Dissipator	54	497	CNW111S	WEST3	0.55	4.20
0001	E	78" RCP	3245	497	CNW111S	WEST3	0.55	2.46
0064	E	78" RCP	2650	423	DNW111S	WEST3	0.44	2.09
RCBC		RANCHO ROAD SYSTEM - BELTWAY CHANNEL						
0000	E	6' X 5' RCB	1062	222	FADB	WEST3	1.60	1.04
0002	E	54" RCP Outlet with 41" Orifice	503	222	FADB	WEST3	1.60	2.38
0003	E	2,341 cfs PMF Spillway		2341	FADBIN	WEST3	1.60	
0004	E	76 ac-ft Fort Apache Detention Basin		1255	FADBIN	WEST3	1.60	
0007	E	Energy Dissipator	100	1255	FADBIN	WEST3	1.60	
0009	E	12' X 6' RCBC @ Fort Apache Detention Basin	133	1255	FADBIN	WEST3	1.60	1.79
0012	E	Conc Chnl 12'W 6'-7'D 0:1 SS	1937	1255	FADBIN	WEST3	1.60	3.15
0048	E	12' X 6' RCBC @ Grand Canyon	140	1040	CMNA1	WEST3	1.32	3.15
0051	E	Conc Chnl 12'W 6'-8'D 0:1 SS	2660	1040	CMNA1	WEST3	1.32	3.44
0096	E	1' 10' X 6' and 1' 6' X 6' RCBC @ Hualapai Way	190	1040	CMNA1	WEST3	1.32	1.93
0100	E	Conc Chnl 12'W 5.5'D 0:1 SS	2085	598	CDMNA1	WEST3	0.48	2.88
0140	E	Conc Chnl 10'W 5'D 0:1 SS	2155	598	CDMNA1	WEST3	0.48	1.65
RCHB		RANCHO ROAD SYSTEM - BELTWAY						
0034	E	Conc Chnl 21'W 8'D 0:1 SS	1000	2631	CNW1C-W	WEST3	4.68	1.19
0053	E	2' 12' X 8' RCBC @ South Ramp Connector	85	2304	CDW1C1	WEST3	4.31	1.40
0054	E	Conc Chnl 21'W 8'D 0:1 SS	432	2304	CDW1C1	WEST3	4.31	1.51
0062	E	Transition Structure	130	2304	CDW1C1	WEST3	4.31	1.51
0065	E	24' X 7' RCB	480	2304	CDW1C1	WEST3	4.31	0.30
0074	E	24' X 6' RCB	50	2226	CNWBC6-C	WEST3	4.17	0.30
0075	E	20' X 6' RCBC @ Beltway	428	2226	CNWBC6-C	WEST3	4.17	2.81
0083	P1	20' X 6' RCB	950	2226	CNWBC6-C	WEST3	4.17	2.49
0101	P1	Conc Chnl 20'W 7'D 0:1 SS	980	2226	CNWBC6-C	WEST3	4.17	2.38
0120	E	20' X 6' RCBC @ Grand Montecito	120	2226	CNWBC6-C	WEST3	4.17	1.00
0122	P1	Conc Chnl 16'-20'W 6'D 0:1 SS	350	2226	CNWBC6-C	WEST3	4.17	1.84
0130	P1	Conc Chnl 16'W 6'D 0:1 SS	1012	2226	CNWBC6-C	WEST3	4.17	2.67
0149	P1	Conc Chnl 16'W 6'-7'D 0:1 SS	87	1888	CNWBC3	WEST3	3.75	2.27
0151	P1	Conc Chnl 16'W 7'D 0:1 SS	1255	1888	CNWBC3	WEST3	3.75	2.65
0171	E	16' X 6' RCBC @ El Capitan Way	234	1888	CNWBC3	WEST3	3.75	1.75
0175	E	Conc Chnl 14'W 7'D 0:1 SS	1220	1888	CNWBC3	WEST3	3.75	2.93
0198	E	Conc Chnl 14'W 7'D 0:1 SS	225	1402	CNWBA6-C	WEST3	3.61	2.93
0227	E	12' X 6' RCB	1885	1402	CNWBA6-C	WEST3	3.61	1.02
0250	E	12' X 6' RCB	3200	1402	CNWBA6-C	WEST3	3.61	1.00
0275	P1	7' X 6' RCB	2650	973	CNW66-C	WEST3	1.75	3.30
0295	P1	7' X 6' RCB	2875	973	CNW66-C	WEST3	1.75	3.30
TSDB		TULE SPRINGS DRAINAGE SYSTEM						
0000	E	2' 10' X 4' RCBC @ Echo Grande	100	26	TULEDB	WEST3	1.35	1.04
0002	E	36" RCP with 22" Orifice Plate	320	26	TULEDB	WEST3	1.35	0.33
0010	E	14,013 cfs PMF Spillway		14013	CTULEDB	WEST3	1.35	
0011	E	117 ac-ft North Environmental Enhancement Area		804	CTULEDB	WEST3	1.35	
0012	E	Energy Dissipator	260	376	CNW148-C	WEST3	0.52	
0023	P1	84" RCP	1320	376	CNW148-C	WEST3	0.52	0.80
0059	P1	78" RCP	2640	376	CNW148-C	WEST3	0.52	1.

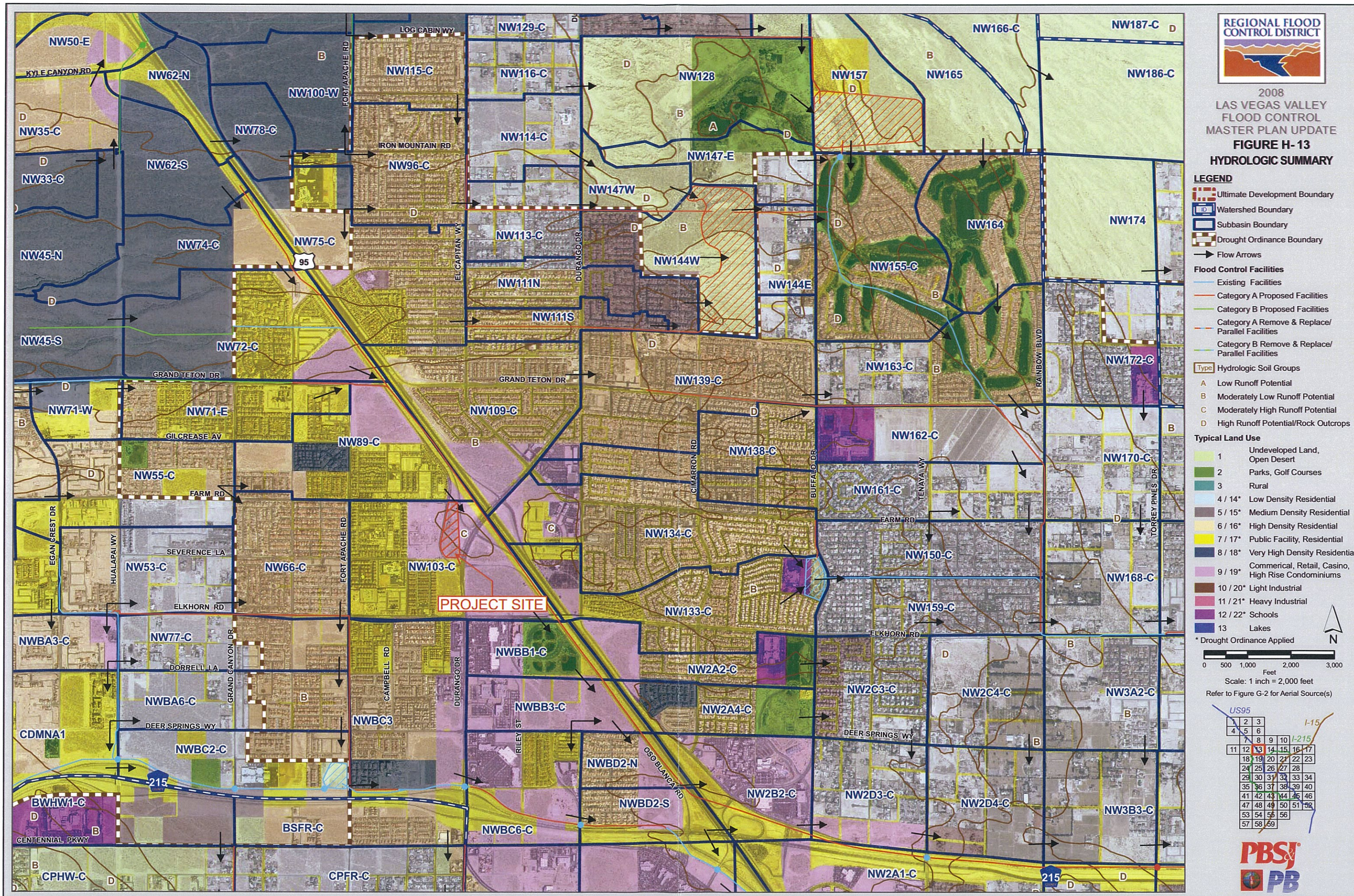


Figure 6 - 2008 MPU Hydrologic Summary



NORTHWEST
NEIGHBORHOOD
STUDY
PHASE 2

LEGEND

SUB-BASIN BOUNDARY

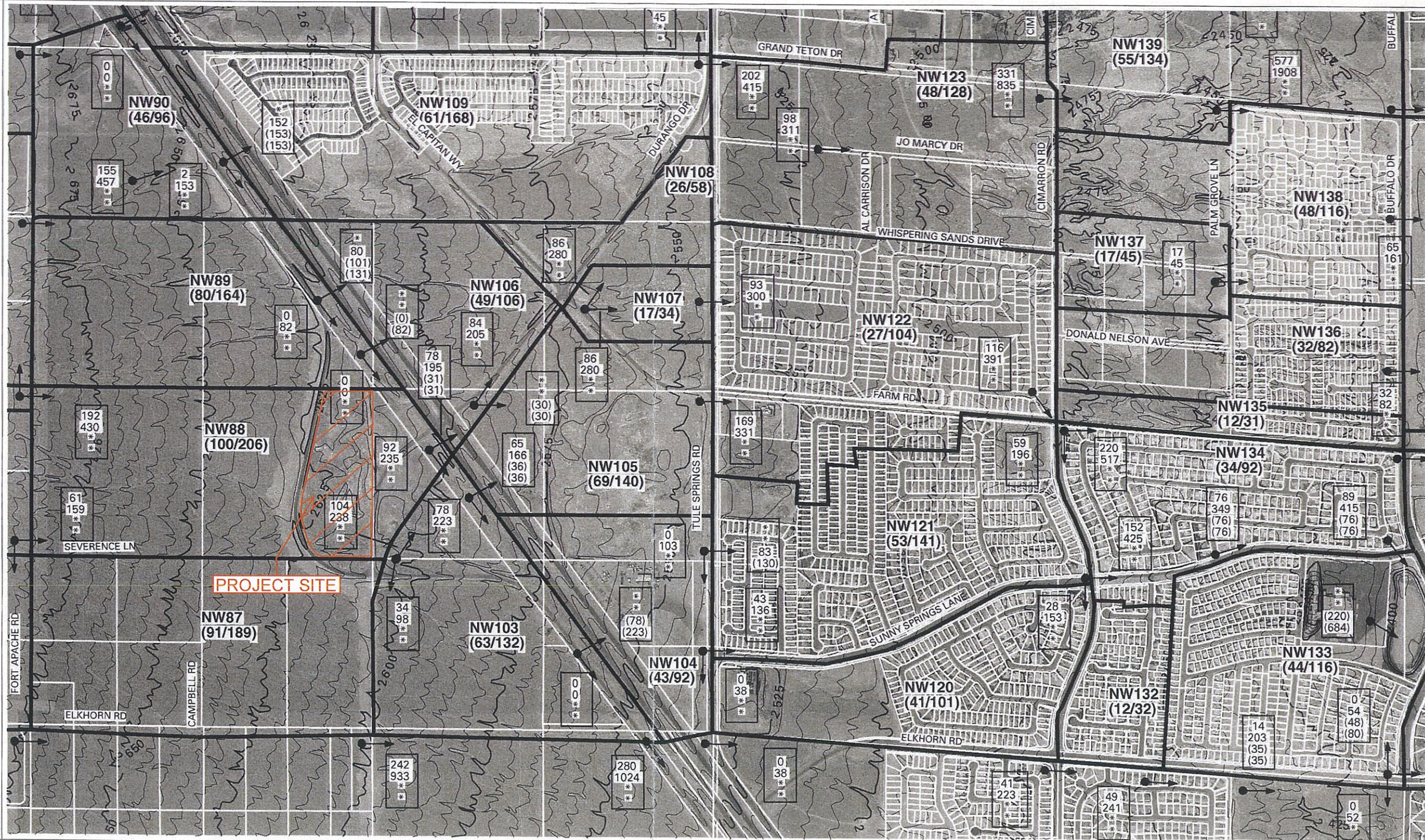
FLOW ARROW

250 10-YEAR STREET FLOW
500 100-YEAR STREET FLOW
300 10-YEAR FACILITY FLOW
800 100-YEAR FACILITY FLOW
(FLOWS IN CFS)

BWJS Basin-ID
(13/59) Contributing flow
(10-Year / 100-Year)
from the basin (cfs)

PHOTO DATE: SEPTEMBER 1998

FIGURE E-12

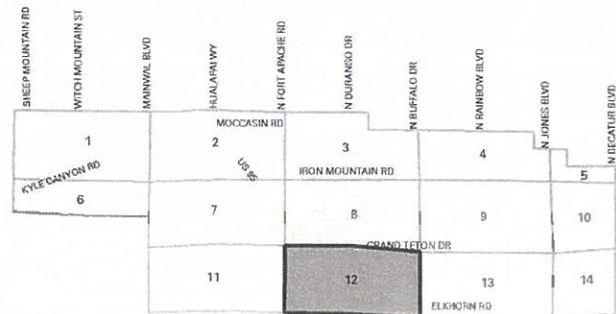


EXISTING DRAINAGE CONDITIONS



501 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-8139
Phone: 702/263-7275
Fax: 702/263-7200

ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES



NOTE:

Existing conditions are based on future
CN values with only existing local and
CCRFCD facilities in place

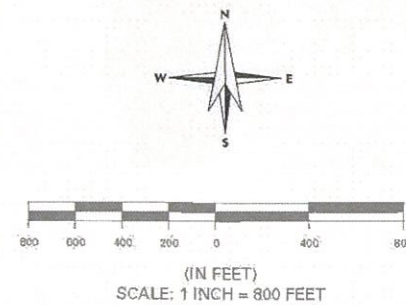
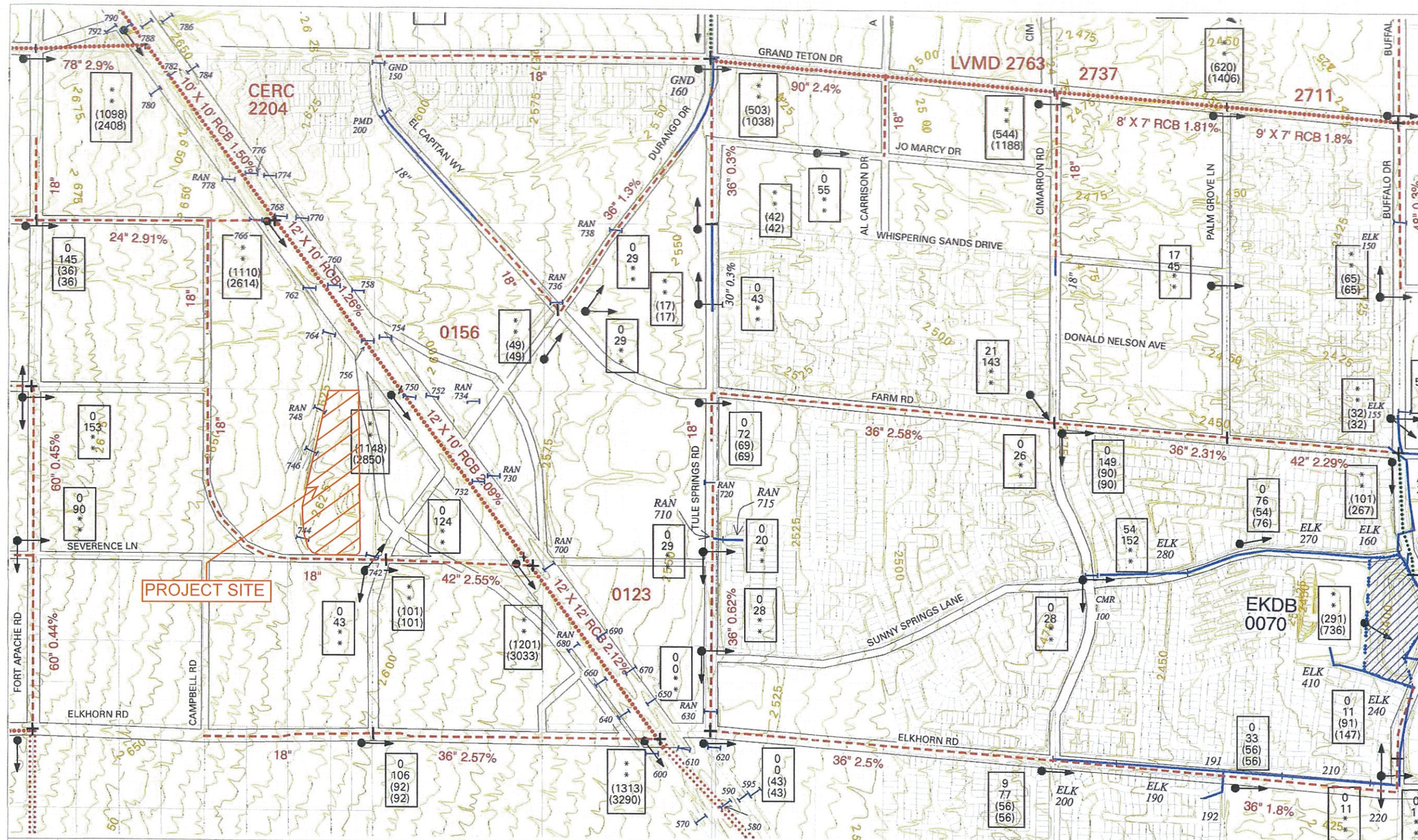


Figure 7 - CLV NW Neighborhood Phase 2 - Existing Conditions



NORTHWEST NEIGHBORHOOD STUDY PHASE 2

LEGEND

- EXISTING REGIONAL DETENTION BASINS
- PROPOSED REGIONAL DETENTION BASINS (Not included in 1996 MPU)
- EXISTING REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES
- PROPOSED REGIONAL BRIDGES (Not included in 1996 MPU)
- EXISTING LOCAL BRIDGES
- PROPOSED REGIONAL CULVERT
- EXISTING REGIONAL CULVERT
- EXISTING LOCAL CULVERT
- EXISTING REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE
- PROPOSED REGIONAL PIPELINE (Not included in 1996 MPU)
- EXISTING LOCAL PIPELINE
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- EXISTING REGIONAL CHANNEL
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- EXISTING LOCAL CHANNEL
- PROPOSED LOCAL CHANNEL
- PROPOSED REGIONAL CHANNEL (Not included in 1996 MPU)
- EXISTING REGIONAL DIKE/LEEVEE
- PROPOSED REGIONAL DIKE/LEEVEE
- PROPOSED REGIONAL DIKE/LEEVEE (Not included in 1996 MPU)
- PROPOSED LOCAL DIKE/LEEVEE

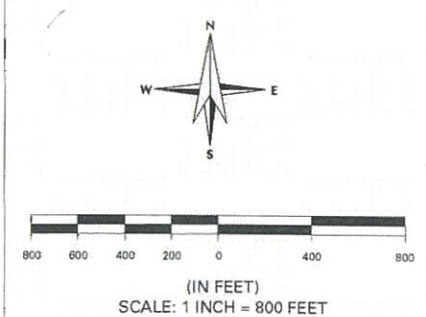
FIGURE F-12

FUTURE DRAINAGE CONDITIONS



901 North Green Valley Parkway, Suite 100
Henderson, Nevada 89014-6139
Phone: 702/263-7275
Fax: 702/263-7200

ENGINEERING PLANNING GIS SURVEYING CONSTRUCTION SERVICES



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**19 CITY OF LAS VEGAS
NOR WEST NEIGHBORHOOD
FLOOD CONTROL MASTER PLAN
PHASE 2**

LEGEND

REGIONAL STREAM NAME DESIGNATOR AAB
PARENT STREAM NAME
STREAM NAME
REGIONAL ID / RIVER MILE 0000
DISTANCE ABOVE
CONFLUENCE WITH PARENT STREAM
MILES
TENTHS OF A MILE

LOCAL STREAM NAME DESIGNATOR AAB

LOCAL ID NUMBER 000

EXISTING FACILITY E

PROPOSED OR MODIFIED FACILITY P

CONTINGENCY LEVEL:

MASTER PLAN P1

FACILITY PLAN P2

PRELIMINARY DESIGN P3

DESIGN P4

BOTTOM WIDTH W

DEPTH D

SIDE SLOPE, H:V SS

CORRUGATED METAL PIPE CMP

CULVERT

CORRUGATED METAL ARCH CMAP

PIPE CULVERT

REINFORCED CONCRETE BOX RCB

RCB CULVERT RCBC

REINFORCED CONCRETE PIPE RCP

RCP CULVERT RCPC

REINFORCED CONCRETE RCACP

ARCH PIPE CULVERT

GENERAL COMMENT G1

FACILITY SPECIFIC COMMENT S1

PUBLIC DRAINAGE EASEMENT PDE

NOTES:

FLOW = 100 YEAR DESIGN FLOW
(REGIONAL FACILITIES)

FLOW = FACILITY CAPACITY
(LOCAL FACILITIES)

**FLOOD CONTROL FACILITIES
INVENTORY**



ID	ID No.	E/P	Plan No.	Facility Description	Facility Length	Slope (%)	Flow (cfs)
F-9							
REGIONAL FACILITIES							
LVMD	2632	P1	1996 Master Plan Update/1999 NN Phase 2	LAS VEGAS WASH MIDDLE	1,400	0.59	1,754
LVMD	2661	P1	1996 Master Plan Update/1999 NN Phase 2	9'x9' RCBC	2,640	1	1,552
MSIM	0000	P1	1999 NN Phase 2	MTN SPA AND IRON MTN	100		
MSIM	0000	P1	1999 NN Phase 2	10'x9' RCBC			
NVMS	0000	P1	1999 NN Phase 2	NEW VISTA RANCH CHANNEL/MTN SPA	6,960	0.4	2,263
NVMS	0000	P1	1999 NN Phase 2	Grass Chnl 100' W, 6' D, 10:1 SS			
F-10							
REGIONAL FACILITIES							
GTEA	0189	P1	1996 Master Plan Update	GRAND TETON DRIVE CHANNEL EAST	8,250		800
GTEA	0189	P1	1996 Master Plan Update	Conc Chnl 6'D 8'W 2:1 SS			
LVUP	0446	E	1996 Master Plan Update	UPPER LAS VEGAS WASH			4,240
LVUP	0446	E	1996 Master Plan Update	Natural Wash/Designated Floodplain			
F-11							
REGIONAL FACILITIES							
EKHU	0000	P1	1999 NN Phase 2	ELKHORN AND HUALAPAI	2,640	2.18	500
EKHU	0000	P1	1999 NN Phase 2	72" RCP			
RCHB	0295	P1	1999 NN Phase 2	RANCHO ROAD SYSTEM - BELTWAY	3,740	3.31	938
RCHB	0395	P1	1999 NN Phase 2	84" RCP	1,100	3.44	718
RCHB	0395	P1	1999 NN Phase 2	78" RCP			
RCLV	0000	P1	1996 Master Plan Update/1999 NN Phase 2	RANCHO AND LAS VEGAS WASH	2,640	2.90	812
RCLV	0067	P1	1996 Master Plan Update/1999 NN Phase 2	78" RCP	2,640	3.41	594
RCLV	0118	P1	1996 Master Plan Update/1999 NN Phase 2	72" RCP	2,640	3.94	494
RCLV	0168	P1	1996 Master Plan Update/1999 NN Phase 2	66" RCP	2,640	4.09	488
RCLV	0168	P1	1996 Master Plan Update/1999 NN Phase 2	60" RCP			
F-12							
REGIONAL FACILITIES							
CERC	0123	P1	1996 Master Plan Update/1999 NN Phase 2	CENTENNIAL AND RANCHO	1,800	2.12	3,033
CERC	0156	P1	1996 Master Plan Update/1999 NN Phase 2	12' X 12' RCBC	3,400	2.09	2850
CERC	2204	P1	1996 Master Plan Update/1999 NN Phase 2	12' X 10' RCBC	1,700	1.5	2408
EKDB	0070	E	327Y-4229	ELKHORN SPRINGS DETENTION BASIN			736/121
EKDB	0070	E	327Y-4229	Elkhorn Springs Detention Basin 48 ac-ft			
LVMD	2711	P1	1996 Master Plan Update/1999 NN Phase 2	LAS VEGAS WASH MIDDLE	1,320	1.80	1,406
LVMD	2737	P1	1996 Master Plan Update/1999 NN Phase 2	9'x7' RCBC	1,320	1.81	1,188
LVMD	2763	P1	1996 Master Plan Update/1999 NN Phase 2	8'x7' RCBC	2,640	2.40	1,038
LVMD	2763	P1	1996 Master Plan Update/1999 NN Phase 2	90" RCP			

Note: Flows for culverts crossing U.S. 95/Rancho (RAN facilities) between Kyle Canyon Road and Durango Drive are based on headwater to the crown of U.S. 95 and do not include flows overtopping U.S. 95. These flows were taken from the "U.S. 95 - Frontage Roads, Phase III Durango Interchange to Kyle Canyon Road, Draft Final Drainage Report" by Louis Berger & Associates, Inc., Dated: May 17, 1994.

ID	ID No.	E/P	Plan No.	Facility Description	Facility Length	Slope (%)	Flow (cfs)
F-12							
LOCAL FACILITIES							
CMR	100	E	327Y-4299-1	18" RCP	147	0.98	10
ELK	150	E	107Y-4488-6	36" RCP	96	0.40	41
ELK	155	E	107Y-4488-2	24" RCP	72	0.25	11
ELK	160	E	107Y-4488-2	18" RCP	110	2.25	16
ELK	190	E	327Y-4299-1	21" RCP	1,419	1.50	12
ELK	191	E	327Y-4299-1	24" RCP	278	0.54	14
ELK	192	E	327Y-4299-1	18" RCP	51	0.65	7
ELK	200	E	327Y-4299	18" RCP	411	1.63	12
ELK	210	E	327Y-4299-2	27" RCP	798	1.70	35
ELK	220	E	327Y-4299-2	36" RCP	484	1.90	80
ELK	240	E	327Y-4299-2	18" RCP	833	0.25	5
ELK	270	E	327Y-4299-2	36" RCP	1,912	1.75	76
ELK	280	E	327Y-4299-2	24" RCP	505	4.46	41
ELK	290	E	327Y-4299-2	18" RCP	709	0.25	5
ELK	410	E	75-99	12" PVC	512	1.00	2
GND	150	E	107Y-4513	36" RCP	108	0.5	47
GND	160	E	107Y-4513	36" RCP	62	3.73	129
PMD	200	E	107Y-4513	36" RCP	71	0.5	47
RAN	570	E	HWY BK T-5	24" CMP	69	1.00	24
RAN	580	E	HWY BK T-5	24" CMP	140	1.00	24
RAN	590	E	HWY BK T-5	24" CMP	73	1.00	24
RAN	595	E	107Y-4498-2A	24" RCP	65	1.08	23
RAN	600	E	HWY BK T-5	24" CMP	56	1.00	36
RAN	610	E	HWY BK T-5	30" CMP	140	1.00	36
RAN	620	E	HWY BK T-5	2" 24" CMP	48	1.00	36
RAN	630	E	HWY BK T-5	6' x 3' RCBC	48	1.00	234
RAN	640	E	HWY BK T-5	2" 24" CMP	70	1.00	68
RAN	650	E	HWY BK T-5	2" 30" CMP	168	1.00	68
RAN	660	E	HWY BK T-5	6' x 3' RCBC	45	1.00	132
RAN	670	E	HWY BK T-5	6' x 3' RCBC	112	1.00	132
RAN	680	E	HWY BK T-5	2" 24" CMP	61	1.00	48
RAN	690	E	HWY BK T-5	2" 24" CMP	190	1.00	48
RAN	700	E	HWY BK T-5	6' x 3' RCBC	113	1.00	81
RAN	710	E	HWY BK T-5	6' x 3' RCBC	51	1.00	81
RAN	715	E	107Y-4382-1,2,3	10' x 3' RCBC	50	8.46	115
RAN	720	E	HWY BK T-5	30" CMP	71	1.00	22
RAN	730	E	HWY BK E-10	30" CMP	66		35
RAN	732	E	HWY BK E-10	30" CMP	72		35
RAN	734	E	HWY BK E-10	30" CMP	74		30
RAN	736	E	HWY BK E-10	2" 6' x 3' RCBC	171		179
RAN	738	E	HWY BK E-10	24" CMP	70	2.43	19
RAN	742	E	HWY BK E-10	6' x 3' RCBC	42		
RAN	744	E	HWY BK E-10	30" CMP	32	1.44	27
RAN	746	E	HWY BK E-10	24" CMP	60	1.52	15
RAN	748	E	HWY BK E-10	30" CMP	60	2.04	32
RAN	750	E	HWY BK E-10	30" CMP	85		30
RAN	752	E	HWY BK E-10	30" CMP	86		30
RAN	754	E	HWY BK E-10	6' x 3' RCBC	61		179
RAN	756	E	HWY BK E-10	6' x 4' RCBC	64		179
RAN	758	E	HWY BK E-10	6' x 3' RCBC	44		130
RAN	760	E	HWY BK E-10	6' x 3' RCBC	60		130
RAN	762	E	HWY BK E-10	6' x 3' RCBC	60	2.00	130
RAN	764	E	HWY BK E-10	6' x 3' RCBC	50	2.00	179
RAN	766	E	HWY BK E-10	30" CMP	47	2.98	30
RAN	768	E	HWY BK E-10	30" CMP	100		30
RAN	770	E	HWY BK E-10	30" CMP	86		30
RAN	774	E	HWY BK E-10	2" 42" CMP	72		111
RAN	776	E	HWY BK E-10	2" 42" CMP	104		111
RAN	778	E	HWY BK E-10	2" 42" CMP	70	1.71	111
RAN	780	E	HWY BK E-10	24" CMP	47	3.13	11
RAN	782	E	HWY BK E-10	24" CMP	66		11
RAN	784	E	HWY BK E-10	24" CMP	54		11
RAN	786	E	HWY BK E-10	10' x 10' RCBC	62	4.35	1,498

Figure 8a. - CLV NW Neighborhood Phase 2 - Flood Control Facilities

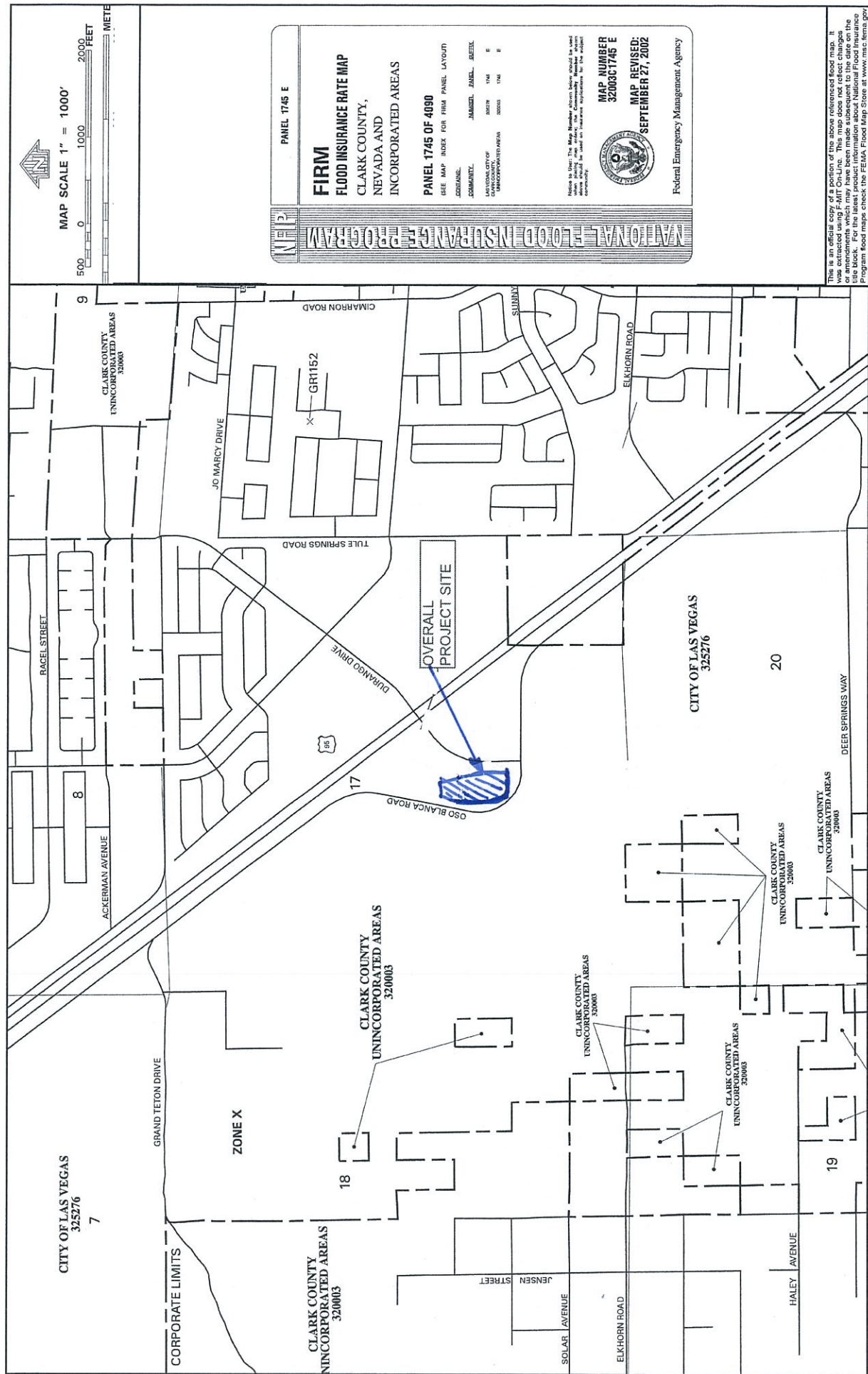
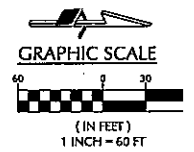
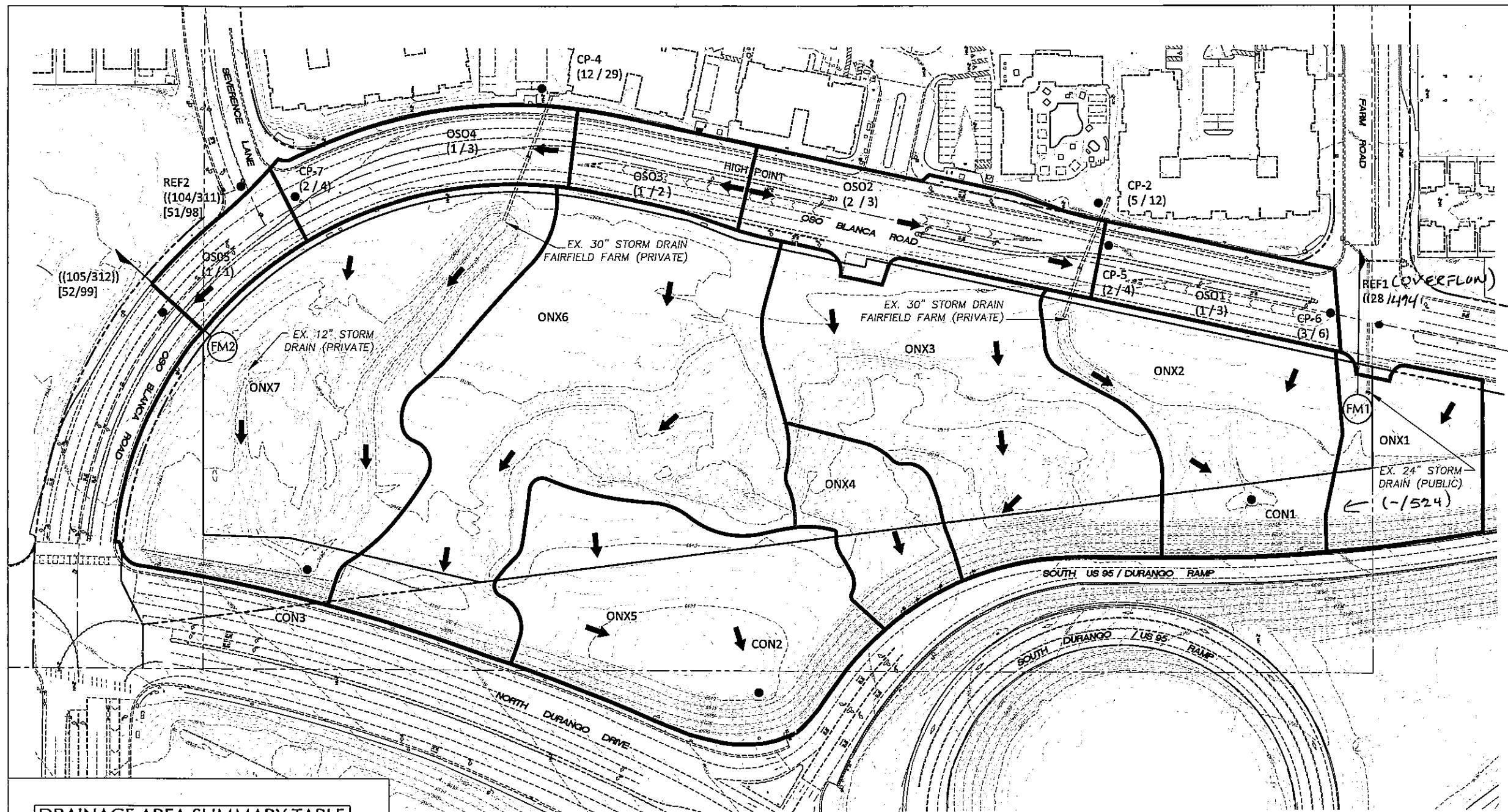


Figure 9 - Flood Insurance Rate map



DRAINAGE AREA SUMMARY TABLE

BASIN ID	AREA (ACRES)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
ONX1	0.77	<1	1
ONX2	1.51	1	2
ONX3	2.42	1	4
ONX4	0.63	1	2
ONX5	2.06	1	4
ONX6	3.46	2	5
ONX7	3.04	1	4
OSO1	0.60	1	3
OSO2	0.80	2	3
OSO3	0.50	1	2
OSO4	0.70	1	3
OSO5	0.37	1	1
REF1	-	28	226
REF2	-	104	311
CP-2	-	5	12
CP-4	-	12	29

CONCENTRATION POINT SUMMARY TABLE

CONCENTRATION POINT	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
CON1	34	241
CON2	3	10
CON3	15	38

CON1 = ONX1 + ONX2 + REF1 + CP-2
 CON2 = ONX3 + ONX4 + ONX5
 CON3 = ONX6 + ONX7 + CP-4

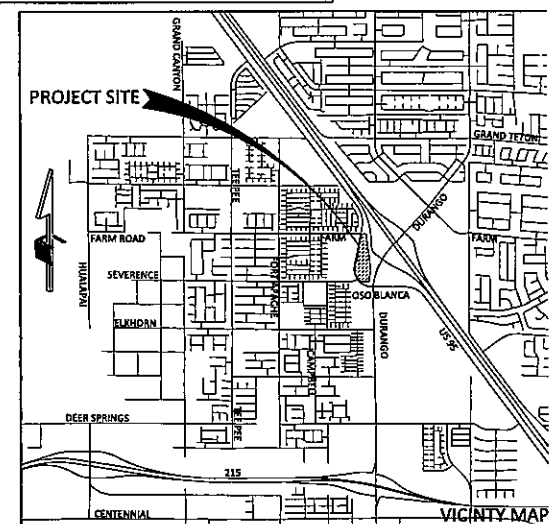
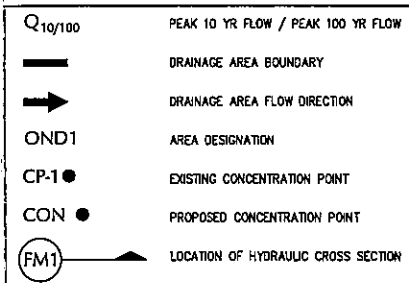
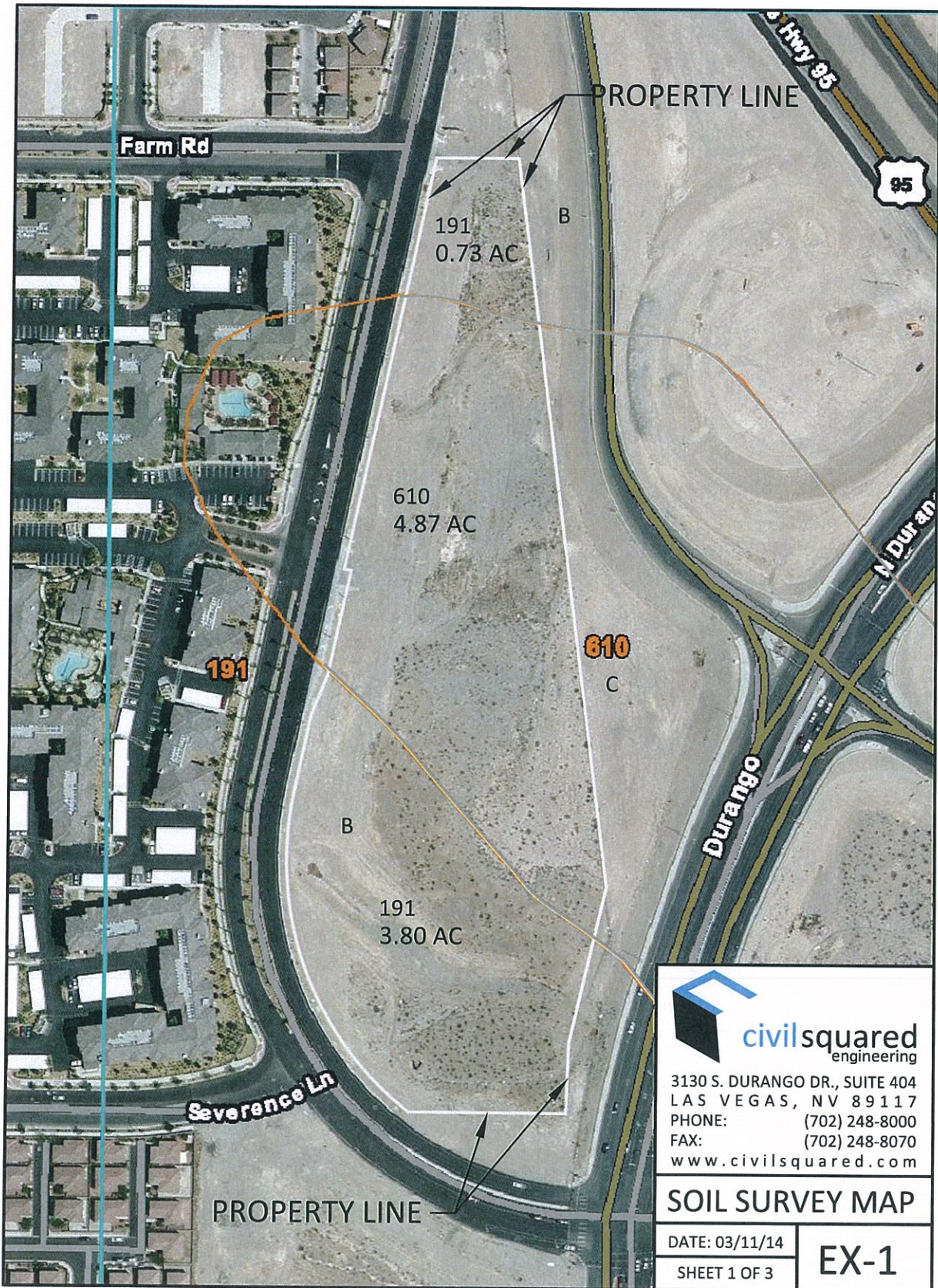


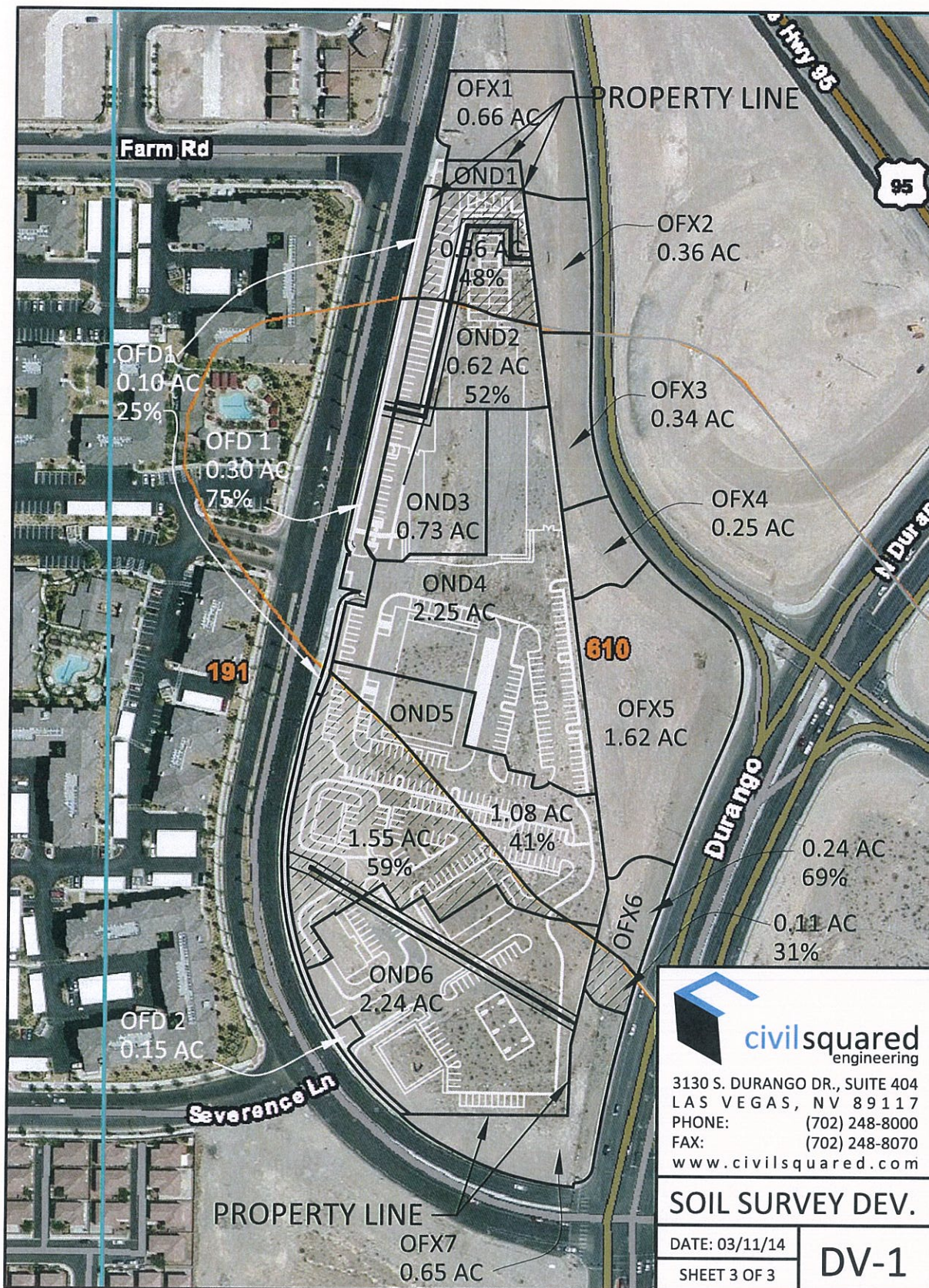
Figure 10 - Existing Drainage Conditions



REFERENCE



REFERENCE



REFERENCE

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (SEMIARID RANGELANDS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition ²	A ³	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹Average runoff condition, and $I_a = 0.2S$.

²Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: >70% ground cover.

³Curve numbers for group A have been developed only for desert shrub.

REFERENCE

Revision	Date

**WRC
ENGINEERING**

REFERENCE:

SCS TR-55, USDA, June 1986.

**TABLE 602
4 of 4**

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS (URBAN AREAS¹)

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area ²	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.):					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)*...		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					

See Table 602A

REFERENCE

Developing urban areas

Newly graded areas (pervious areas only, no vegetation)*	77	86	91	94
--	----	----	----	----

- 1 Average runoff condition, and $I_p = 0.2S$.
- 2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system. Impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using Figure 603.
- 3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
- 4 Composite CN's for natural desert landscaping should be computed using Figure 603 based on the impervious area percentage (CN #98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
- 5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using Figure 603 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Revision	Date

WRC
ENGINEERING

REFERENCE:
SCS TR-55, USDA, June 1986.

TABLE 602
1 of 4

DURANGO & 95 COMMERCIAL
JOB NO. 4114
SHEET 1 OF 2

CURVE NUMBER CALCULATION

Per Table 602 Sheet 1 of 4 and Table 602 Sheet 4 of 4 in the *Hydrologic Criteria and Drainage Design Manual* and the *National Cooperative Soil Survey*

SOIL #610 - Pits, gravel				
SOIL	%	HYDRO-LOGIC GROUP	EXISTING CN SEE NOTE #1	DEVELOPED CN SEE NOTE #2
610	100	C	85	94
COMPOSITE CN			85.0	94.0

CN = CURVE NUMBER

SOIL #191 - Dalian very cobbly fine sandy loam, 2 to 8 percent slopes				
SOIL	%	HYDRO-LOGIC GROUP	EXISTING CN SEE NOTE #1	DEVELOPED CN SEE NOTE #2
Dalian	100	B	77	92
COMPOSITE CN			77.0	92.0

CN = CURVE NUMBER

NOTE:

1. Existing Curve Number with Desert Shrub in poor condition per Table 602, sheet 4 of 4, in the *Drainage Design Manual*.
2. Developed Curve Number with Urban districts, Commercial and business, per Table 602, sheet 1 of 4, in the *Drainage Design Manual*.

REFERENCE

DURANGO & 95 COMMERCIAL
JOB NO. 4114
SHEET 2 OF 2

CURVE NUMBER SUMARRY

Per Table 602 Sheet 1 of 4 and Table 602 Sheet 4 of 4 in the *Hydrologic Criteria and Drainage Design Manual and the National Cooperative Soil Survey*

BASIN	TYPE OF DEVELOPMENT	SOIL 610 (85/94)	SOIL 191 (77/92)	CURVE NUMBER
ONX1	Existing		100%	77.0
ONX2	Existing	33%	67%	79.6
ONX3	Existing	100%		85.0
ONX4	Existing	100%		85.0
ONX5	Existing	100%		85.0
ONX6	Existing	48%	52%	80.8
ONX7	Existing		100%	77.0
OND1	Comm/Bus		100%	92.0
OND2	Comm/Bus	52%	48%	93.0
OND3	Comm/Bus	100%		94.0
OND4	Comm/Bus	100%		94.0
OND5	Comm/Bus	41%	59%	92.8
OND6	Comm/Bus		100%	92.0
OFD1	Comm/Bus	75%	25%	93.5
OFD2	Comm/Bus		100%	92.0
OFX1	Existing		100%	77.0
OFX2	Existing		100%	77.0
OFX3	Existing	100%		85.0
OFX4	Existing	100%		85.0
OFX5	Existing	100%		85.0
OFX6	Existing	69%	31%	82.5
OFX7	Existing		100%	77.0

See existing and developed soil survey maps for percentage areas

REFERENCE

DURANGO & 95 COMMERCIAL

RAINFALL CALCULATION

Per Figure 503 and 506; Table 501 and 502 of the *Hydrologic Criteria and Drainage Design Manual* .

STORM EVENT	RAINFALL DEPTH (IN)	PRECIPITATION ADJUSTMENT RATIOS	SIX-HOUR DEPTH AREA REDUCTION FACTORS	DESIGN RAINFALL DEPTH (IN)
10-YEAR	1.30	1.24	1.00	1.61
100-YEAR	2.00	1.43	1.00	2.86

10YEAR/100-YEAR DESIGN RAINFALL DEPTH RATIO:

0.564

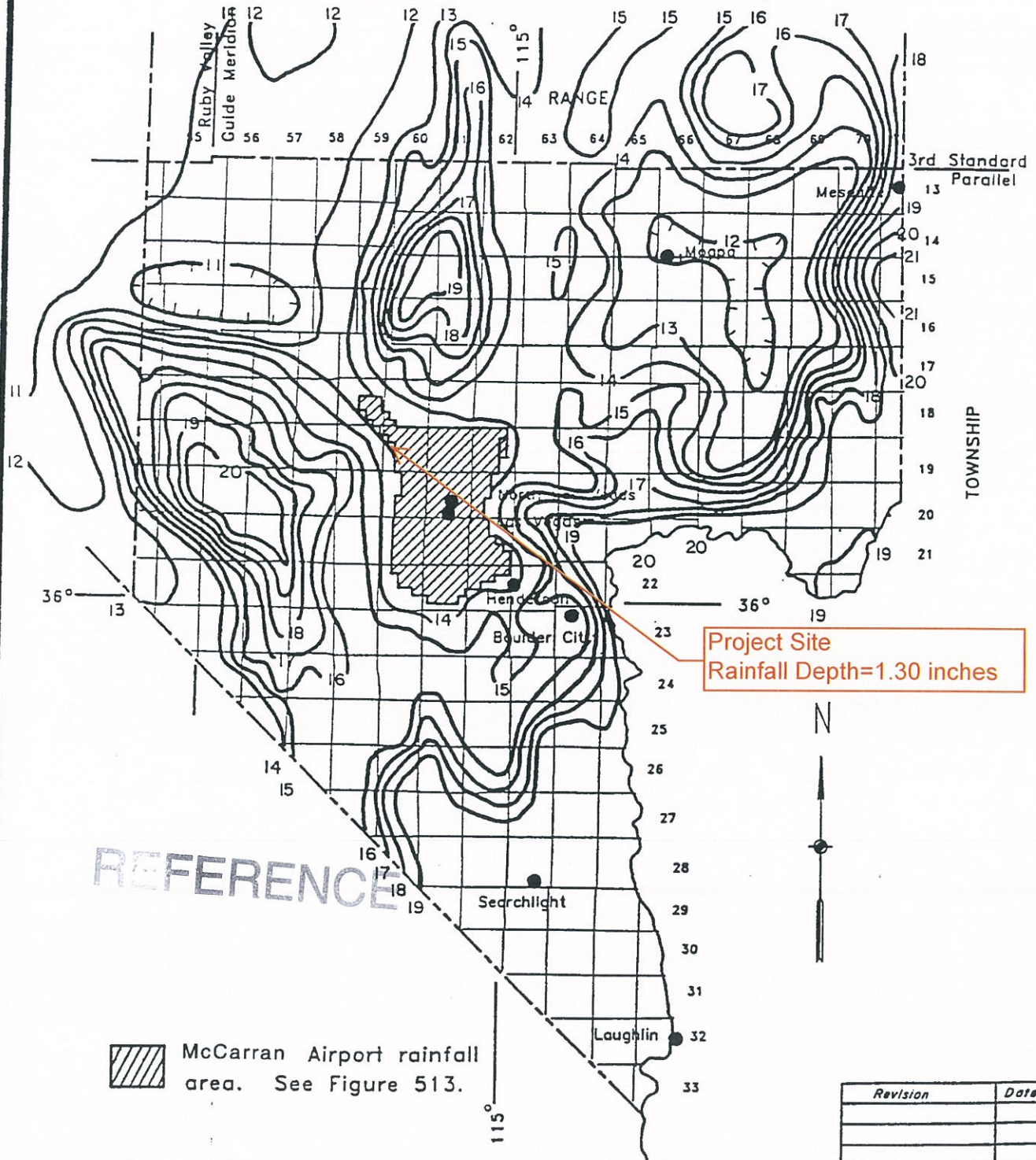
NOTE:

1. Rainfall Depth are taken from Figure 503 and 506 of the Drainage Design Manual.
2. Precipitation Adjustment Ratios are taken from Table 501 of the Drainage Design Manual.
3. Six-Hour Depth Area Reduction Factors is taken from Table 502.

REFERENCE

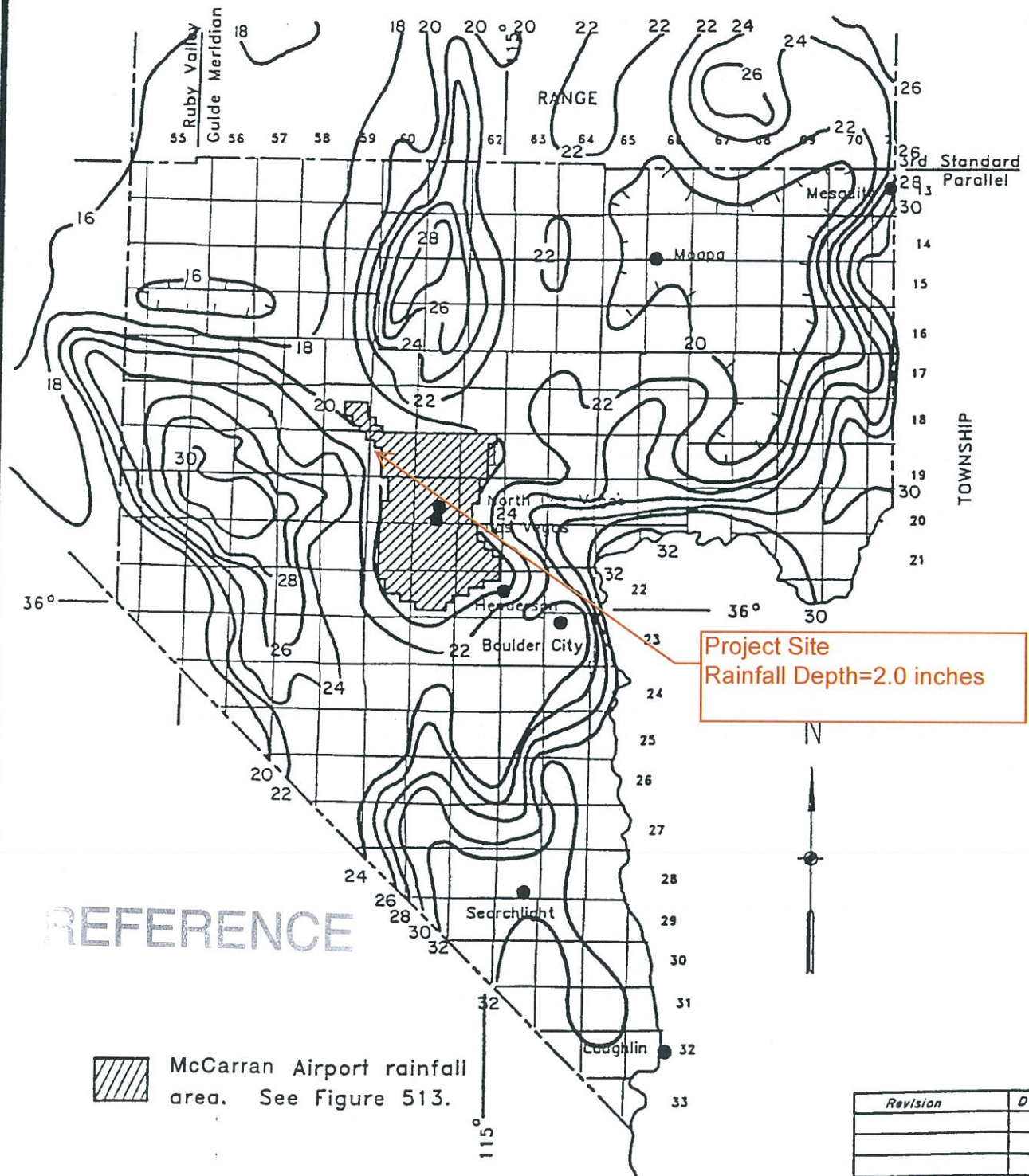
HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 10-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RAINFALL DEPTH-DURATION-FREQUENCY 100-YEAR, 6-HOUR (DEPTHS IN TENTHS OF INCHES)



PRECIPITATION ADJUSTMENT RATIOS

<u>Recurrence Interval</u>	<u>Ratio to NOAA Atlas 2</u>
2-year	1.00
5-year	1.16
10-year	1.24
25-year	1.33
50-year	1.39
100-year	1.43

- NOTE: 1. Multiply the values obtained from the NOAA Atlas 2 by the above ratios to obtain the adjusted precipitation values.
2. NOAA Atlas 2 values for use with TR-55 shall not be adjusted by the above ratios.
3. Tables 505 and 506 require no adjustments.

REFERENCE

<i>Revision</i>	<i>Date</i>

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX HOUR DEPTH-AREA REDUCTION FACTORS

<u>Drainage Area (Square Miles)</u>	<u>Six-Hour Depth-Area Reduction Factor</u>
0.0	1.00
0.5	0.98
1.0	0.97
2.0	0.93
4.0	0.91
6.0	0.90
8.0	0.88
10.0	0.86
20.0	0.79
30.0	0.74
50.0	0.68
100.0	0.60
150.0	0.55
200.0	0.51
300.0	0.46
400.0	0.42
500.0	0.39

- NOTES: 1. A graphical representation of these factors is presented in Figure 514.
2. Consult with the local entity and/or the CCRFCD for guidance in using the Depth-Area Reduction Factors for drainage areas greater than 200 square miles.

REFERENCE

<i>Revision</i>	<i>Date</i>

**WRC
ENGINEERING**

REFERENCE:
USACE, Los Angeles District, 1988

TABLE 502

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

SIX-HOUR STORM DISTRIBUTIONS

Percent of Total Storm Depth				Percent of Total Storm Depth			
Storm Time (In Minutes)	SDN3	SDN4	SDN5	Storm Time (In Minutes)	SDN3	SDN4	SDN5
0	0.0	0.0	0.0	185	32.2	37.6	43.0
5	2.0	2.0	2.0	190	35.2	41.5	47.7
10	5.7	5.8	5.9	195	40.9	46.2	51.4
15	7.0	7.5	8.0	200	49.9	53.0	56.1
20	8.7	9.9	11.0	205	59.0	61.0	63.0
25	10.8	12.6	14.4	210	71.0	71.0	71.0
30	12.4	13.7	15.0	215	74.4	73.2	72.0
35	13.0	14.5	16.0	220	78.1	75.6	73.1
40	13.0	14.9	16.8	225	81.2	78.2	75.2
45	13.0	15.1	17.1	230	81.9	79.9	77.9
50	13.0	15.5	18.0	235	83.5	81.3	79.0
55	13.0	15.6	18.2	240	85.1	82.3	79.5
60	13.0	15.9	18.7	245	85.6	83.0	80.4
65	13.3	16.2	19.0	250	86.0	83.5	81.0
70	14.0	16.9	19.7	255	86.8	84.4	82.0
75	14.2	17.2	20.2	260	87.6	85.1	82.6
80	14.8	17.9	21.0	265	88.8	86.4	84.0
85	15.8	18.9	22.0	270	91.0	88.5	85.9
90	17.2	20.1	23.0	275	92.6	90.8	88.9
95	18.1	21.1	24.1	280	93.7	92.4	91.0
100	19.0	22.0	25.0	285	95.0	94.4	93.8
105	19.7	22.8	25.9	290	97.0	96.8	96.6
110	19.9	23.2	26.5	295	97.6	97.3	97.0
115	20.0	24.0	28.0	300	98.2	97.8	97.4
120	20.1	24.6	29.0	305	98.5	98.2	97.9
125	20.4	25.2	30.0	310	98.7	98.4	98.1
130	21.4	26.0	30.5	315	98.9	98.6	98.3
135	22.9	26.9	30.9	320	99.0	98.8	98.5
140	24.1	27.6	31.0	325	99.3	99.1	98.9
145	24.9	28.3	31.7	330	99.3	99.2	99.0
150	25.1	28.6	32.1	335	99.4	99.3	99.2
155	25.6	29.2	32.7	340	99.5	99.4	99.3
160	27.0	30.2	33.3	345	99.8	99.7	99.6
165	27.8	31.2	34.6	350	99.8	99.8	99.7
170	28.1	32.1	36.1	355	99.9	99.9	99.9
175	28.3	33.2	38.1	360	100.0	100.0	100.0
180	29.5	35.2	40.8				

- Notes: 1. For drainage areas less than 8 square miles in size, use SDN 3.
 2. For drainage areas greater than or equal to 8 square miles and less than 12 square miles in size, use SDN 4.
 3. For drainage areas greater than or equal to 12 square miles, use SDN 5.
 4. A graphical representation of these values is presented on Figure 515.

Revision	Date

REFERENCE:

TABLE 503


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 06MAR14 TIME 11:51:06
*
*****

```

```

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

```

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXXX 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

*DIAGRAM

1 ID CIVIL SQUARED ENGINEERING
2 ID DURANGO & 95 COMMERCIAL
3 ID CITY OF LAS VEGAS, NV
4 ID

EXISTING CONDITION

5 ID
6 ID
7 ID INPUT FILE :4114E.DAT
8 ID OUTPUT FILE:4114E.OUT
9 ID

10 ID *****
11 ID * ONSITE DRAINAGE BASIN AREA = 13.9 ACRES *
12 ID * DEPTH-DURATION-FREQUENCY VALUE = 2.86-in *
13 ID * DEPTH-AREA REDUCTION VALUE = 1.0 *
14 ID * STORM DISTRIBUTION #3 *
15 ID * ABSTRACTION METHOD: SCS CN *
16 ID * HYDROLOGIC METHOD: SCS UH *
17 ID * ROUTING METHOD: *
18 ID * RATIO 1 = 10-YEAR EVENT *
19 ID * RATIO 2 = 100-YEAR EVENT *
20 ID * STARTED: 3/03/14 *
21 ID * REVISED: *
22 ID *****

23 ID
24 JR PREC .564 1.000
25 IT 5 0 0 360
26 IO 5 0 0
27 IN 5 0 0
*

28 KK ONX1
29 BA 0.0012
30 PB 2.86
31 PC .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
32 PC .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
33 PC .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
34 PC .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
35 PC .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
36 PC .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
37 PC .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
38 PC .998 .999 1.00
39 LS 0 77.0
40 UD 0.102
*

REFERENCE

41	KK	ONX2	
42	BA	.0024	
43	LS	0	79.6
44	UD	0.128	
	*		

1

HEC-1 INPUT

PAGE 2

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
45	KK CON1
46	KM COMBINE ONSITE BASINS ONX1, ONX2
47	HC 2
	*
48	KK ONX3
49	BA 0.0038
50	LS 0 85.0
51	UD 0.108
	*
52	KK ONX4
53	BA 0.0010
54	LS 0 85.0
55	UD 0.050
	*
56	KK ONX5
57	BA 0.0032
58	LS 0 85.0
59	UD 0.097
	*
60	KK CON2
61	KM COMBINE ONSITE BASINS ONX3, ONX4 AND ONX5
62	HC 3
	*
63	KK ONX6
64	BA 0.0054
65	LS 0 80.8
66	UD 0.126
	*
67	KK ONX7
68	BA 0.0048
69	LS 0 77.0
70	UD 0.073
	*
71	KK CON3
72	KM COMBINE ONSITE BASINS ONX6, ONX7
73	HC 2
	*
74	KK OS05
75	BA .0005
76	LS 0 96.6
77	UD 0.062
	*
78	ZZ

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
28	ONX1	
	.	
41	ONX2	
	.	


```

45      CON1.....
      .
      .
48      .      ONX3
      .
      .
52      .      .      ONX4
      .      .
      .      .
56      .      .      ONX5
      .      .
      .      .
60      .      CON2.....
      .
      .
63      .      .      ONX6
      .      .
      .      .
67      .      .      ONX7
      .      .
      .      .
71      .      .      CON3.....
      .      .
      .      .
74      .      .      OS05

```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 06MAR14 TIME 11:51:06
*****

```

```

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

```

CIVIL SQUARED ENGINEERING
DURANGO & 95 COMMERCIAL
CITY OF LAS VEGAS, NV

EXISTING CONDITION

INPUT FILE :4114E.DAT
OUTPUT FILE:4114E.OUT

```

*****
* ONSITE DRAINAGE BASIN AREA = 13.9 ACRES
* DEPTH-DURATION-FREQUENCY VALUE = 2.86-in
* DEPTH-AREA REDUCTION VALUE = 1.0
* STORM DISTRIBUTION #3
* ABSTRACTION METHOD: SCS CN
* HYDROLOGIC METHOD: SCS UH
* ROUTING METHOD:
* RATIO 1 = 10-YEAR EVENT
* RATIO 2 = 100-YEAR EVENT
* STARTED: 3/03/14
* REVISED:
*****

```

```

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

```

```

IT      HYDROGRAPH TIME DATA
          NMIN      5  MINUTES IN COMPUTATION INTERVAL
          IDATE      1  0  STARTING DATE
          ITIME      0000  STARTING TIME
          NQ      360  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE      2  0  ENDING DATE
          NDTIME      0555  ENDING TIME
          ICENT      19  CENTURY MARK

```


COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 29.92 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
.56 1.00

1

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

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				.56	1.00
HYDROGRAPH AT					
+	ONX1	.00	1 FLOW	0.	1.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	ONX2	.00	1 FLOW	1.	2.
			TIME	3.58	3.58
2 COMBINED AT					
+	CON1	.00	1 FLOW	1.	3.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	ONX3	.00	1 FLOW	1.	4.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	ONX4	.00	1 FLOW	1.	2.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	ONX5	.00	1 FLOW	1.	4.
			TIME	3.50	3.50
3 COMBINED AT					
+	CON2	.01	1 FLOW	3.	10.
			TIME	3.50	3.50
HYDROGRAPH AT					
+	ONX6	.00	1 FLOW	2.	5.
			TIME	3.58	3.58
HYDROGRAPH AT					
+	ONX7	.00	1 FLOW	1.	4.
			TIME	3.50	3.50
2 COMBINED AT					
+	CON3	.01	1 FLOW	3.	9.
			TIME	3.58	3.50
HYDROGRAPH AT					
+	OSO5	.00	1 FLOW	1.	1.
			TIME	3.50	3.50

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

TIME OF CONCENTRATION

BAUGHMAN & TURNER, INC.
CONSULTING ENGINEERS

PROJECT NO. : 23-22-60

DEVELOPMENT : Remington 95 & Durango Commercial

FILE : Existing & Developed Condition

CALCULATED BY: pp

DATE : 07/15/15

Sub-Basin Data					Initial/Overland Time (T _i)			Travel Time (T _t)					T _c	T _c Check (Urbanized Basins)		Final T _c	T _{lag}	Remarks
DESIG	CN	K	AREA (acres)	AREA (mi ²)	LENGTH (ft)	SLOPE (%)	T _i (min)	LENGTH (ft)	SLOPE (%)	V ₁ (fps)	V ₂ (fps)	T _t (min)	T _c =T _i +T _t (min)	TOTAL (ft)	T _c (min)	T _c (min)	T _{lag} (hrs)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)

Existing Condition

OFX1	77	0.626	0.66	0.0010	20	5.00	2.2	310	1.61	2.56	N/A	2.0	4.2	330.0	11.8	4.2	0.050	
OFX2	77	0.626	0.36	0.0006	16	3.10	2.3	96	3.120	3.57	N/A	0.4	2.8	112.0	10.6	2.8	0.050	
OFX3	85	0.732	0.34	0.0005	190	0.62	10.7	195	3.840	2.90	N/A	1.1	11.8	N/A	N/A	11.8	0.118	
OFX4	85	0.732	0.25	0.0004	21	4.76	1.8	70	2.140	2.96	N/A	0.4	2.2	91.0	10.5	2.2	0.050	
OFX5	85	0.732	1.62	0.0025	12	0.50	2.9	138	4.350	4.21	N/A	0.5	3.4	150.0	10.8	3.4	0.050	
OFX6	83	0.699	0.35	0.0005	20	0.50	4.1	70	3.570	3.82	N/A	0.3	4.4	90.0	10.5	4.4	0.050	
OFX7	77	0.626	0.65	0.0010	44	1.59	4.8	210	2.620	3.27	N/A	1.1	5.9	254.0	11.4	5.9	0.059	

Developed Condition Onsite

OND1	92	0.824	0.11	0.0002	14	0.5	2.3	118	4.24	4.16	N/A	0.5	2.8	132.0	10.7	2.8	0.050	
OND2	93	0.838	0.95	0.0015	50	3.6	2.2	200	0.50	1.43	N/A	2.3	4.5	250.0	11.4	4.5	0.050	
OND3	94	0.851	0.89	0.0014	70	4.9	2.2	220	1.08	2.10	N/A	1.7	4.0	290.0	11.6	4.0	0.050	
OND3A	94	0.851	0.59	0.0009	40	5.0	1.7				N/A		1.7	40.0	10.2	1.7	0.050	
ONDTR	94	0.851	1.85	0.0029	165	1.7	4.8	235	1.30	2.30	N/A	1.7	6.5	400.0	12.2	6.5	0.065	
OND5	93	0.835	3.85	0.0060	60	0.8	3.9	765	0.83	1.84	2.79	6.1	10.0	825.0	14.6	10.0	0.100	
OND6	92	0.824	0.84	0.0013	60	1.3	3.5	335	1.96	2.83	N/A	2.0	5.5	395.0	12.2	5.5	0.055	
OFD1	94	0.844	0.40	0.0006	26	2.0	1.9	515	0.90	1.92	2.90	4.4	6.3	541.0	13.0	6.3	0.063	
OFD2	92	0.824	0.15	0.0002	5	2.0	0.9	631	1.26	2.27	3.43	4.3	5.2	636.0	13.5	5.2	0.052	

T _i = (1.48(1.1-K)L ^{0.5} (1/2)) / (S ^{0.5} /3)				For the travel time (T _t) calculations.				Travel Time Velocity Formulas				All basins over one square mile are calculated by the equation T _{lag} = 20Kn(L ^{0.5} /S ^{0.5}) ^{0.33} and denoted by shaded gray (See Worksheet).			
T _c = T _i + T _t				V ₁ applies to the first 500 feet of travel distance;				Existing				Developed			
K = 0.0132(CN) ^{-0.39}				V ₂ applies to the remaining travel distance.				V ₁ = 14.8*(S/100) ^{1/2}				V ₂ = 20.2*(S/100) ^{1/2}			
T _{lag} = 0.6T _c								V ₂ = 29.4*(S/100) ^{1/2}							

REFERENCE:

STANDARD FORM 4


```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
*
* RUN DATE 15JUL15 TIME 13:32:08
*
*****

```

```

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

```

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X X XXXXXX XXXXX X
X X X X XX
X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXX 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 -AMSK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*DIAGRAM
1 ID
2 ID Durango & 95 Commercial
3 ID Developed Condition
4 ID
5 ID File u:\pam \HEC-1\REM95DV\HC1
6 ID
7 IT 5 360
8 IO 5
9 IN 5
10 JR PREC 0.564 1.0
* *****
* Developed Conditions *
* *****

11 KK OND1
12 BA 0.0002
13 PB 2.86
14 PC 0.00 2 5.7 7 8.7 10.8 12.4 13 13 13
15 PC 13 13 13.3 14 14.2 14.8 15.8 17.2 18.1
16 PC 19 19.7 19.7 20.1 20.1 20.4 21.4 22.9 24.1 24.9
17 PC 25.1 25.6 27 27.8 28.1 28.3 29.5 32.2 35.2 40.9
18 PC 49.9 59 71 74.4 78.1 81.2 81.9 83.5 85.1 85.6
19 PC 86 86.8 87.6 88.8 91 92.6 93.7 95 97 97.6
20 PC 98.2 98.5 98.7 98.9 99 99.3 99.3 99.4 99.5 99.8
21 PC 99.8 99.9 100
22 LS 92.0
23 UD 0.0500

24 KK OFX1
25 BA 0.0001
26 LS 77
27 UD 0.0500

28 KK OFX2
29 BA 0.0006
30 LS 77
31 UD 0.0500

32 KK OND3
33 BA .0014
34 LS 94
35 UD 0.05

36 KK OND2
37 BA .0015
38 LS 93
39 UD 0.05

40 KK CON1
41 HC 5

```

1 HEC-1 INPUT PAGE 2

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
42 KK OND3A
43 BA .0009
44 LS 94
45 UD 0.05

```


46	KK	OND4	
47	BA	0.0029	
48	LS		94
49	UD	0.0650	
50	KK	OND5	
51	BA	0.0060	
52	LS		93
53	UD	0.100	
54	KK	OFX3	
55	BA	.0005	
56	LS		85
57	UD	0.118	
58	KK	OFX4	
59	BA	.0004	
60	LS		85
61	UD	0.05	
62	KK	OFX5	
63	BA	.0025	
64	LS		85
65	UD	0.05	
66	KK	CON2	
67	HC	5	
68	KK	OND6	
69	BA	.0013	
70	LS		92
71	UD	0.055	
72	KK	OFX6	
73	BA	.0005	
74	LS		82.5
75	UD	0.05	
76	KK	OFX7	
77	BA	.0010	
78	LS		77
79	UD	0.063	
80	KK	CON3	
81	HC	3	

1

HEC-1 INPUT

PAGE 3

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

82	KK	OFD1	
83	BA	.0006	
84	LS		93.5
85	UD	0.063	
86	KK	OFD2	
87	BA	.0002	
88	LS		92
89	UD	0.052	
90	ZZ		

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
11	OND1	
	.	
24	.	OFX1
	.	.
28	.	.
	.	OFX2
	.	.
32	.	.
	.	OND3
	.	.
36	.	.
	.	OND2
	.	.
40	CON1.....	
	.	
42	.	OND3A
	.	.
46	.	.
	.	OND4
	.	.
50	.	.
	.	OND5
	.	.
54	.	.
	.	OFX3
	.	.

HYDROGRAPH AT +	OFX2	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	OND3	.00	1	FLOW TIME	2. 3.50	3. 3.50
HYDROGRAPH AT +	OND2	.00	1	FLOW TIME	2. 3.50	3. 3.50
5 COMBINED AT +	CON1	.00	1	FLOW TIME	4. 3.50	8. 3.50
HYDROGRAPH AT +	OND3A	.00	1	FLOW TIME	1. 3.50	2. 3.50
HYDROGRAPH AT +	OND4	.00	1	FLOW TIME	3. 3.50	6. 3.50
HYDROGRAPH AT +	OND5	.01	1	FLOW TIME	5. 3.50	11. 3.50
HYDROGRAPH AT +	OFX3	.00	1	FLOW TIME	0. 3.58	1. 3.58
HYDROGRAPH AT +	OFX4	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	OFX5	.00	1	FLOW TIME	2. 3.50	4. 3.50
5 COMBINED AT +	CON2	.01	1	FLOW TIME	10. 3.50	23. 3.50
HYDROGRAPH AT +	OND6	.00	1	FLOW TIME	1. 3.50	3. 3.50
HYDROGRAPH AT +	OFX6	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	OFX7	.00	1	FLOW TIME	0. 3.50	1. 3.50
3 COMBINED AT +	CON3	.00	1	FLOW TIME	2. 3.50	5. 3.50
HYDROGRAPH AT +	OED1	.00	1	FLOW TIME	1. 3.50	1. 3.50
HYDROGRAPH AT +	OED2	.00	1	FLOW TIME	0. 3.50	0. 3.50

(544 cfs w/flows from farm)

(362 cfs w/flows from overflow)

(144 cfs w/flows from overflow & reference)

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

Worksheet for Irregular Section - FM2 East Half OSO 100yr

Friction Method	Manning Formula
Solve For	Normal Depth

Channel Slope	0.00610	ft/ft
Discharge	111.00	ft ³ /s
Section Definitions		

Roughness Segment Definitions

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

Normal Depth		0.98	ft
Elevation Range	0.00 to 1.20 ft		
Flow Area		19.67	ft²

Worksheet for Irregular Section - FM2 East Half OSO 100yr

Results

Wetted Perimeter	39.14	ft
Hydraulic Radius	0.50	ft
Top Width	38.00	ft
Normal Depth	0.98	ft
Critical Depth	1.11	ft
Critical Slope	0.00299	ft/ft
Velocity	5.64	ft/s
Velocity Head	0.50	ft
Specific Energy	1.48	ft
Froude Number	1.38	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.98	ft
Critical Depth	1.11	ft
Channel Slope	0.00610	ft/ft
Critical Slope	0.00299	ft/ft

Cross Section for Irregular Section - FM2 East Half OSO 100yr

Friction Method	Manning Formula
Solve For	Normal Depth

Channel Slope	0.00610	ft/ft
Normal Depth	0.98	ft
Discharge	111.00	ft ³ /s

The graph shows the elevation profile of a road. The Y-axis represents Elevation from -0.20 to 1.40 in increments of 0.10. The X-axis represents Station from 0+00 to 0+35 in increments of 0+05. A green line shows the road profile, starting at (0+00, 0.70), descending to (0+10, 0.50), dropping sharply to a minimum of approximately -0.05 at Station 0+10, then rising to (0+10, 0.18) and continuing to (0+35, 0.70). A blue horizontal line is drawn at Elevation 1.00, marked with a blue triangle symbol '▽' at Station 0+20.

REF2 100yr = 311 cfs
Spillover flow from west half of Oso Blanca. Flow is 11 cfs on the east half of Oso Blanca Road.
18" freeboard + 0.98 WS = 2.48' above street flowline elevation.
Back of walk is 0.68' above Oso Blanca flowline. 2.48'-0.68' = 1.8' min. height flood wall above back of sidewalk.

HSI - Oso Blanca

Worksheet for Irregular Section - FM2 West Half OSO Max 100-YR

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00610 ft/ft
Discharge 200.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+53	1.20
0+53	0.70
0+79	0.17
0+79	0.13
0+81	0.00
0+81	0.50
0+81	0.50
0+90	0.68

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+53, 1.20)	(0+79, 0.13)	0.013
(0+79, 0.13)	(0+81, 0.00)	0.013
(0+81, 0.00)	(0+81, 0.50)	0.013
(0+81, 0.50)	(0+90, 0.68)	0.013

Options

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

Results

Normal Depth 1.21 ft
Elevation Range 0.00 to 1.20 ft

Worksheet for Irregular Section - FM2 West Half OSO Max

Results

Flow Area	27.84	ft²
Wetted Perimeter	38.58	ft
Hydraulic Radius	0.72	ft
Top Width	37.00	ft
Normal Depth	1.21	ft
Critical Depth	1.42	ft
Critical Slope	0.00267	ft/ft
Velocity	7.18	ft/s
Velocity Head	0.80	ft
Specific Energy	2.01	ft
Froude Number	1.46	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.21	ft
Critical Depth	1.42	ft
Channel Slope	0.00610	ft/ft
Critical Slope	0.00267	ft/ft

Cross Section for Irregular Section - FM2 West Half OSO Max

Friction Method	Manning Formula
Solve For	Normal Depth

Channel Slope	0.00610	ft/ft
Normal Depth	1.21	ft
Discharge	200.00	ft ³ /s

REF2 100yr = 311 cfs
Flow at 200 cfs will begin to spill over the island median onto the east side of Oso Blanca.
 $311 \text{ cfs} - 200 \text{ cfs} = 111 \text{ cfs}$
that will spill over median south of Severence.

Worksheet for Irregular Section - FM-2 Severence10yr

Results

Top Width	37.00	ft
Normal Depth	1.00	ft
Critical Depth	1.08	ft
Critical Slope	0.00402	ft/ft
Velocity	5.09	ft/s
Velocity Head	0.40	ft
Specific Energy	1.41	ft
Froude Number	1.21	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.00	ft
Critical Depth	1.08	ft
Channel Slope	0.00610	ft/ft
Critical Slope	0.00402	ft/ft

HSI - Oso Blanca

Cross Section for Irregular Section - FM-2 Severence 10yr

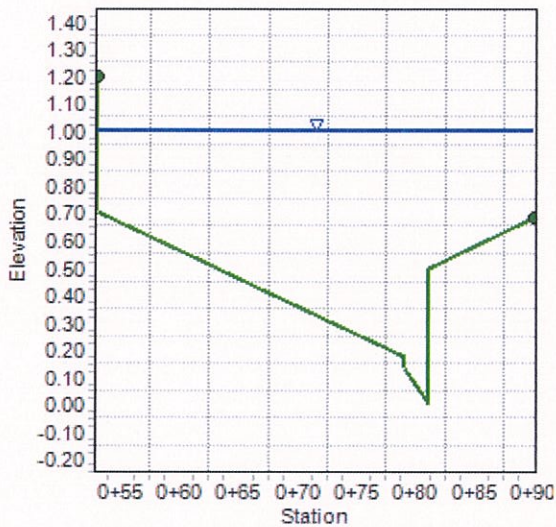
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope	0.00610	ft/ft
Normal Depth	1.00	ft
Discharge	104.00	ft ³ /s

Cross Section Image



REF2 10yr = 104 cfs
Flow is contained to the
west half of Oso Blanca
Road and does not spill
over the island median
onto the subject project.

REFERENCE

HS2 Oso Blanca 100-yr

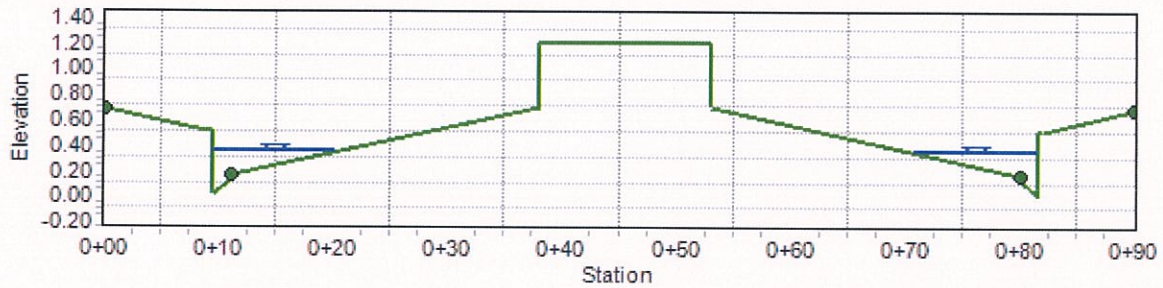
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00560 ft/ft
Normal Depth 0.35 ft
Discharge 4.00 ft³/s

Cross Section Image



HS2 Oso Blanca 100-yr

Project Description

Friction Method

Manning Formula

Solve For

Normal Depth

Input Data

Channel Slope

0.00560 ft/ft

Discharge

4.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.68
0+09.0	0.50
0+09.5	0.50
0+09.5	0.00
0+11.0	0.13
0+11.0	0.17
0+38.0	0.70
0+38.0	1.20
0+53.0	1.20
0+53.0	0.70
0+80.0	0.17
0+80.0	0.13
0+81.5	0.00
0+81.5	0.50
0+82.0	0.50
0+90.0	0.68

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.68)	(0+11.0, 0.17)	0.013
(0+11.0, 0.17)	(0+80.0, 0.17)	0.017
(0+80.0, 0.17)	(0+90.0, 0.68)	0.013

HS2 Oso Blanca 100-yr

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	0.35	ft
Elevation Range	0.00 to 1.20	ft
Flow Area	2.52	ft²
Wetted Perimeter	22.18	ft
Hydraulic Radius	0.11	ft
Top Width	21.39	ft
Normal Depth	0.35	ft
Critical Depth	0.33	ft
Critical Slope	0.00860	ft/ft
Velocity	1.59	ft/s
Velocity Head	0.04	ft
Specific Energy	0.39	ft
Froude Number	0.82	
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		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.33	ft
Channel Slope	0.00560	ft/ft
Critical Slope	0.00860	ft/ft

HS2 Oso Blanca 10-yr

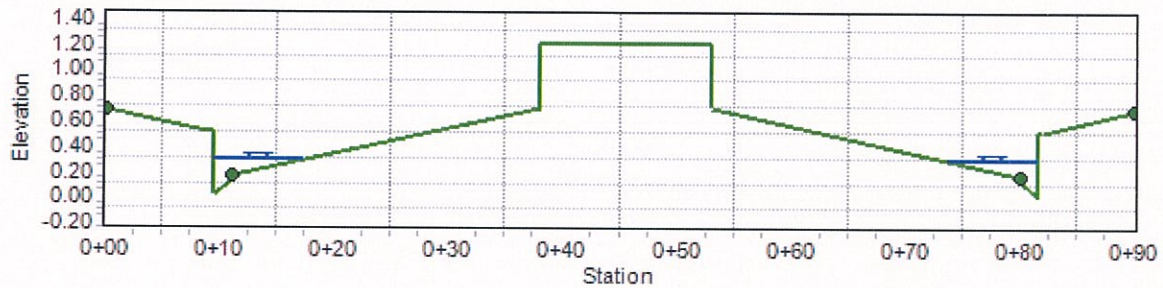
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00560 ft/ft
Normal Depth 0.29 ft
Discharge 2.00 ft³/s

Cross Section Image



HS2 Oso Blanca 10-yr

Project Description

Friction Method

Manning Formula

Solve For

Normal Depth

Input Data

Channel Slope

0.00560 ft/ft

Discharge

2.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.68
0+09.0	0.50
0+09.5	0.50
0+09.5	0.00
0+11.0	0.13
0+11.0	0.17
0+38.0	0.70
0+38.0	1.20
0+53.0	1.20
0+53.0	0.70
0+80.0	0.17
0+80.0	0.13
0+81.5	0.00
0+81.5	0.50
0+82.0	0.50
0+90.0	0.68

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.68)	(0+11.0, 0.17)	0.013
(0+11.0, 0.17)	(0+80.0, 0.17)	0.017
(0+80.0, 0.17)	(0+90.0, 0.68)	0.013

HS2 Oso Blanca 10-yr

Options

Current Kougness vweigted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth	0.29	ft
Elevation Range	0.00 to 1.20	ft
Flow Area	1.45	ft ²
Wetted Perimeter	16.19	ft
Hydraulic Radius	0.09	ft
Top Width	15.51	ft
Normal Depth	0.29	ft
Critical Depth	0.28	ft
Critical Slope	0.00915	ft/ft
Velocity	1.38	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.79	
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		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.28	ft
Channel Slope	0.00560	ft/ft
Critical Slope	0.00915	ft/ft

Project Description

Input Data

Cross Section Image



HS3 Oso Blanca 100-yr

Project Description

Friction Method

Manning Formula

Solve For

Normal Depth

Input Data

Channel Slope

0.00510 ft/ft

Discharge

2.00 ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.68
0+09.0	0.50
0+09.5	0.50
0+09.5	0.00
0+11.0	0.13
0+11.0	0.17
0+38.0	0.70
0+38.0	1.20
0+53.0	1.20
0+53.0	0.70
0+80.0	0.17
0+80.0	0.13
0+81.5	0.00
0+81.5	0.50
0+82.0	0.50
0+90.0	0.68

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.68)	(0+11.0, 0.17)	0.013
(0+11.0, 0.17)	(0+80.0, 0.17)	0.017
(0+80.0, 0.17)	(0+90.0, 0.68)	0.013

HS3 Oso Blanca 100-yr

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	0.30	ft
Elevation Range	0.00 to 1.20	ft
Flow Area	1.51	ft ²
Wetted Perimeter	16.57	ft
Hydraulic Radius	0.09	ft
Top Width	15.88	ft
Normal Depth	0.30	ft
Critical Depth	0.28	ft
Critical Slope	0.00917	ft/ft
Velocity	1.33	ft/s
Velocity Head	0.03	ft
Specific Energy	0.32	ft
Froude Number	0.76	
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		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.28	ft
Channel Slope	0.00510	ft/ft
Critical Slope	0.00917	ft/ft

HS3 Oso Blanca 10-yr

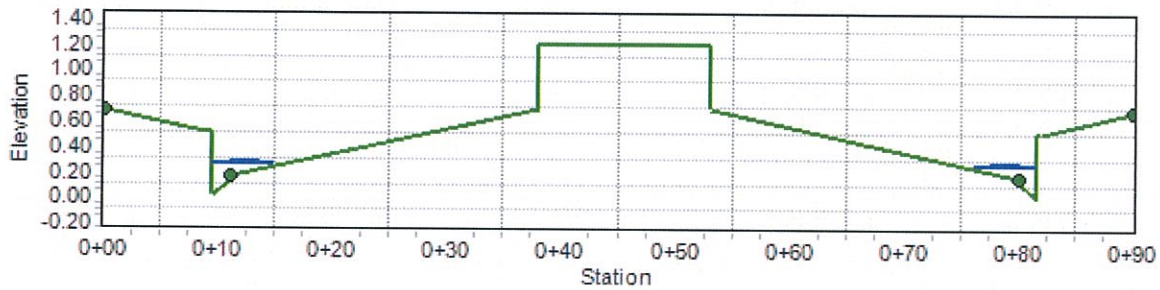
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Normal Depth 0.25 ft
Discharge 1.00 ft³/s

Cross Section Image



HS3 Oso Blanca 10-yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Discharge 1.00 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.0	0.68
0+09.0	0.50
0+09.5	0.50
0+09.5	0.00
0+11.0	0.13
0+11.0	0.17
0+38.0	0.70
0+38.0	1.20
0+53.0	1.20
0+53.0	0.70
0+80.0	0.17
0+80.0	0.13
0+81.5	0.00
0+81.5	0.50
0+82.0	0.50
0+90.0	0.68

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.0, 0.68)	(0+11.0, 0.17)	0.013
(0+11.0, 0.17)	(0+80.0, 0.17)	0.017
(0+80.0, 0.17)	(0+90.0, 0.68)	0.013

HS3 Oso Blanca 10-yr

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	0.25	ft
Elevation Range	0.00 to 1.20	ft
Flow Area	0.85	ft ²
Wetted Perimeter	11.42	ft
Hydraulic Radius	0.07	ft
Top Width	10.83	ft
Normal Depth	0.25	ft
Critical Depth	0.23	ft
Critical Slope	0.00946	ft/ft
Velocity	1.18	ft/s
Velocity Head	0.02	ft
Specific Energy	0.27	ft
Froude Number	0.74	
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		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.23	ft
Channel Slope	0.00510	ft/ft
Critical Slope	0.00946	ft/ft

REFERENCE

[TITLE]
Durango & 95 Commercial
South Pipe Run

[REPORT]
COMPOSITE_ONLY

[NETWORK]
**TYPE NAME
**-----
Outlet "Node8"
Reach "Link6"
Headwork "Node7"

**BRANCH DEFINITIONS

[OUTLET]
**NAME STATION INVERT GROUND CHANNEL WATER SURFACE
** ELEV ELEV ID ELEV (opt.)
**-----
"Node8" 1000 10 12 "South" 0

[HEADWORK]
**NAME INVERT GROUND CHANNEL FLOW WATER SURFACE
** ELEV ELEV ID ELEV (opt.)
**-----
"Node7" 13.29 22.83 "South" 29 0

[WALLENTRENCE]
**NAME INVERT GROUND CHANNEL LOSS
** ELEV ELEV ID COEFFICIENT(opt.)
**-----

[WALLEEXIT]
**NAME INVERT GROUND CHANNEL LOSS
** ELEV ELEV ID COEFFICIENT(opt.)
**-----

[BRIDGEENTRENCE]
**NAME INVERT GROUND CHANNEL REDUCTION
** ELEV ELEV ID FACTOR(opt.)
**-----

[BRIDGEEXIT]
**NAME INVERT GROUND CHANNEL REDUCTION
** ELEV ELEV ID FACTOR(opt.)
**-----

[JOIN]
**NAME INVERT GROUND CHANNEL LENGTH MANNINGS n NUMBER OF CONFLUENCE
** ELEV ELEV ID BRANCHES ANGLE
**-----

[JUNCTION]
**Name INVERT GROUND CHANNEL LENGTH MANNINGS n NUMBER OF CONFLUENCE FLOW
** ELEV ELEV ID LATERALS ANGLE
**-----

REFERENCE

[TRANSITION]

**NAME	INVERT ELEV	GROUND ELEV	CHANNEL ID	LENGTH	MANNINGS n
**					

[REACH]

**NAME	INVERT ELEV	GROUND ELEV	CHANNEL ID	LENGTH	MANNINGS n	CURVE (opt)	ANGLE POINT(opt)	NUMBER MANHOLES(opt)
**								
"Link6"	13.29	22.83	"South"	422.21	0.013	0	0	0

[DROP]

**Name	INVERT ELEV	GROUND ELEV	CHANNEL ID	LOSS COEFFICIENT
**				

[CHANNEL]

**REGULAR TYPES 1-4 7-8

**ID	TYPE	HEIGHT	WIDTH	LEFT SLOPE	RIGHT SLOPE	NUMBER PIERS	AVG PIER WIDTH	INVERT CROSS FALL	NUM OF BARRELS
**									
"South"	4	3							1

**IRREGULAR TYPES 5-6

**ID	TYPE NUMBER	AVG PIER	PIER1	PIER2	PIER3	PIER4	PIER5	PIER6	PIER7	PIER8	PIER9	PIER10
**	PIERS	WIDTH	ELEV	ELEV	ELEV	ELEV	ELEV	ELEV	ELEV	ELEV	ELEV	ELEV
**												

[POINT]

**ID	XCOORD	YCOORD
**		

REFERENCE

 Water Surface Profile Gradient (WSPG)
 XP WSPG
 Engine Version 3.0 30/09/2011
 XP Solutions www.xpsolutions.com

INPUT FILE

 H:\Cad\Land\4114\Admin\Drainage\Technical Drainage Study\Hydraulic Analysis\XP-WSPG\4114 Durango South.wsx
 Computed 03/11/14 10:18:03

TITLE INFORMATION

 Durango & 95 Commercial
 South Pipe Run

WARNING SUMMARY

RESULTS

Main Line

Composite Profile:

ELEMENT NAME	TYPE	STATION	INVERT ELEV	GROUND ELEV	W.S. ELEV	DEPTH	Q	BARREL VELOC.	VELOC. HEAD	ENERGY GRADE LN	SUPER ELEV	CRITICAL DEPTH	FROUDE NUMBER	SLOPE	NORMAL DEPTH	CROSS SECTION
###																
"Node8"	Outlet	1000.00	10.00	12.00	11.487	1.487	29.00	1 8.30	1.07	12.56	0.000	1.743	0.000	0.00000	0.000	Circular Pipe
	"i.p."	1235.96	11.84	18.05	13.325	1.487	29.00	1 8.30	1.07	14.39	0.000	1.743	1.355	0.00779	1.487	Circular Pipe
	"i.p."	1329.46	12.57	20.45	14.062	1.495	29.00	1 8.24	1.05	15.12	0.000	1.743	1.341	0.00779	1.487	Circular Pipe
	"i.p."	1394.40	13.07	22.12	14.625	1.552	29.00	1 7.86	0.96	15.58	0.000	1.743	1.248	0.00779	1.487	Circular Pipe
	"i.p."	1413.05	13.22	22.60	14.831	1.612	29.00	1 7.49	0.87	15.70	0.000	1.743	1.161	0.00779	1.487	Circular Pipe
	"i.p."	1420.33	13.28	22.78	14.951	1.675	29.00	1 7.14	0.79	15.74	0.000	1.743	1.079	0.00779	1.487	Circular Pipe
"Link6"	Reach	1422.21	13.29	22.83	15.032	1.742	29.00	1 6.81	0.72	15.75	0.000	1.743	1.001	0.00779	1.487	Circular Pipe
"Node7"	Headwrk	1422.21	13.29	22.83	15.033	1.743	29.00	1 6.81	0.72	15.75	0.000	1.743	0.000	0.00000	0.000	Circular Pipe

*) in the W.S.ELEV column indicates flooding, it is set whenever W.S.ELEV > GROUND ELEV
 i.p. = intermediate point processing results for reaches

Cross Section for North 30in RCP Tailwater Calc

Project Description

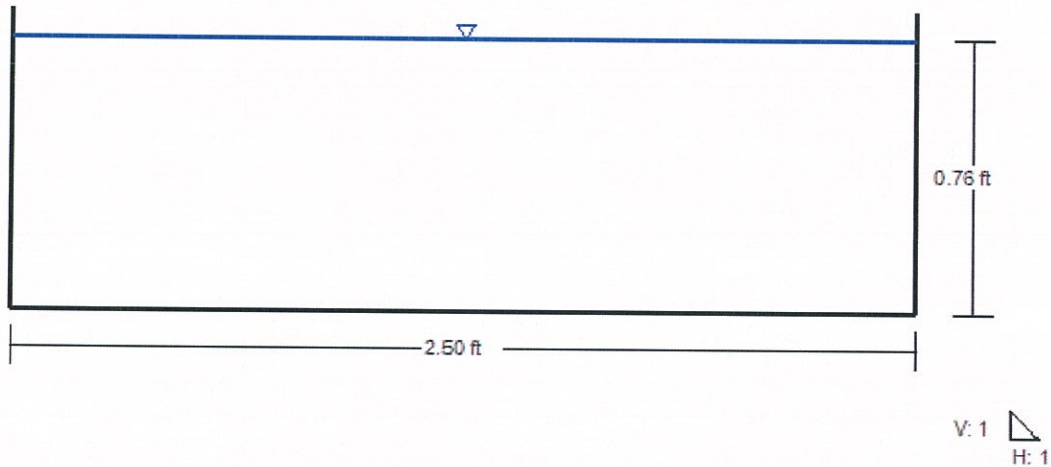
Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00840	ft/ft
Normal Depth	0.76	ft
Bottom Width	2.50	ft
Discharge	12.00	ft ³ /s

TAILWATER=0.76'

Cross Section Image



TAILWATER CALCULATION:
TAILWATER=75.83+WS
(WHERE WS=WATER SURFACE ELEVATION)
TAILWATER=75.83+0.76
TAILWATER=76.59

REFERENCE

Worksheet for South 30in RCP Tailwater Calc

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00770	ft/ft
Bottom Width	2.50	ft
Discharge	29.00	ft ³ /s

Results

Normal Depth	1.49	ft
Flow Area	3.74	ft ²
Wetted Perimeter	5.49	ft
Hydraulic Radius	0.68	ft
Top Width	2.50	ft
Critical Depth	1.61	ft
Critical Slope	0.00634	ft/ft
Velocity	7.76	ft/s
Velocity Head	0.94	ft
Specific Energy	2.43	ft
Froude Number	1.12	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.49	ft
Critical Depth	1.61	ft
Channel Slope	0.00770	ft/ft
Critical Slope	0.00634	ft/ft

REFERENCE

Cross Section for South 30in RCP Tailwater Calc

Project Description

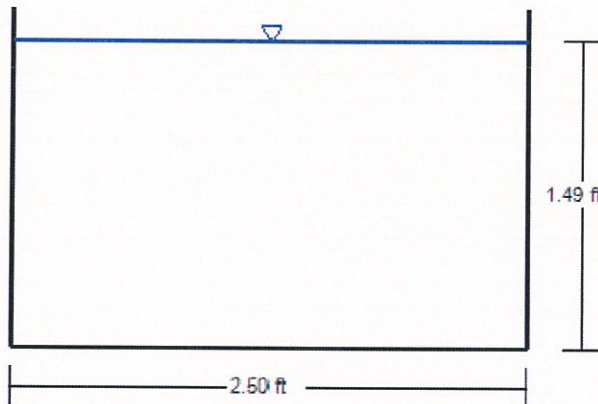
Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00770	ft/ft
Normal Depth	1.49	ft
Bottom Width	2.50	ft
Discharge	29.00	ft ³ /s

TAILWATER=1.49'

Cross Section Image



V: 1
H: 1

TAILWATER CALCULATION:
TAILWATER=75.83+WS
(WHERE WS=WATER SURFACE ELEVATION)
TAILWATER=75.83+1.49
TAILWATER=77.32

REFERENCE

CONN 3

South 6 x 3 Box

Project Description

Solve For

Headwater Elevation

Input Data

Discharge	144.00	ft ³ /s
Centroid Elevation	1.50	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.65	
Opening Width	6.00	ft
Opening Height	3.00	ft

Results

Headwater Elevation	3.85	ft
Headwater Height Above Centroid	2.35	ft
Tailwater Height Above Centroid	-1.50	ft
Flow Area	18.00	ft ²
Velocity	8.00	ft/s

CONN3

Cross Section for revised Box flows

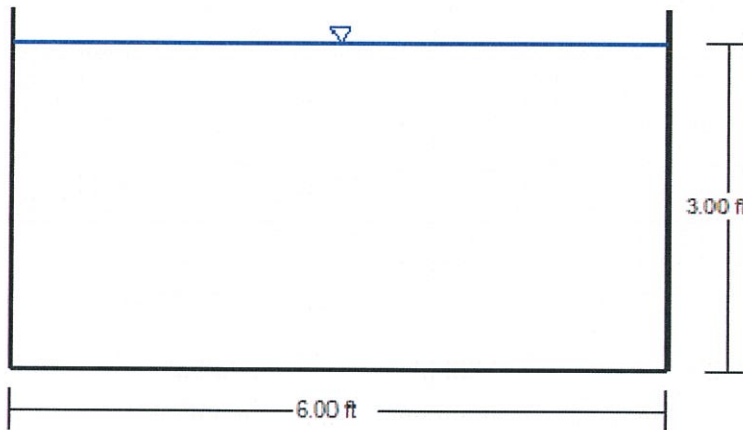
Project Description

Solve For Headwater Elevation

Input Data

Discharge	144.00	ft ³ /s
Headwater Elevation	3.85	ft
Centroid Elevation	1.50	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.65	
Opening Width	6.00	ft
Opening Height	3.00	ft

Cross Section Image



V: 1
H: 1

RIPRAP SIZE CALCULATION

Per formula 734 of the manual:

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

Where: V= Mean Channel Velocity (fps)

S= Longitudinal Channel Slope (ft. /ft.)

S_s= Specific Gravity of Rock (minimum recommended S_s=2.5)

d₅₀= Rock Size (ft.) for which 50 percent of the Riprap by weight is smaller.

For the worst case (section FM-3)

$$V = 5.01$$

$$S = 0.022$$

Took minimum specific gravity S_s=2.5

$$d_{50} = (3 \times V \times (S^{0.17}) / (S_s - 1))^2$$

$$d_{50} = 0.33'$$

Accepting the minimum recommended size= 8"

REFERENCE



TECHNICAL DRAINAGE STUDY for DURANGO & 95 COMMERCIAL

APN 125-17-301-006

March 2014

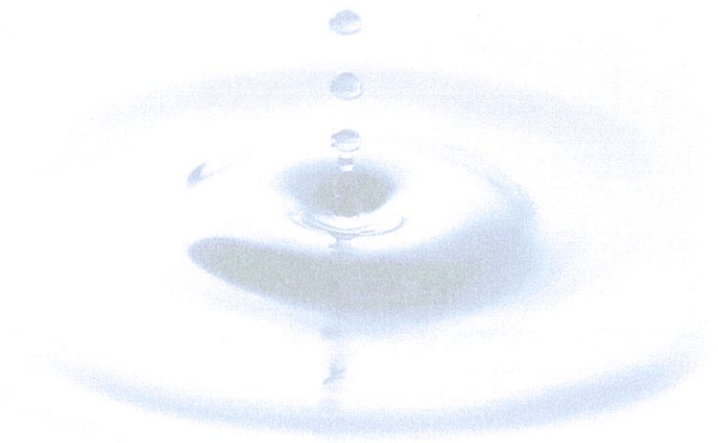
CIVIL SQUARED ENGINEERING PROJECT NO. 4114

**Prepared for:
Mr. David Brown
DDB Holdings LLC
9910 W. Cheyenne Ave.
Las Vegas, NV 89129**

702-643-4940



3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
Phone: (702) 248-8000
Fax: (702) 248-8070
www.civilsquared.com



I. GENERAL DESCRIPTION

A. Study Overview And Purpose

This Technical Drainage Study will serve to address the existing and developed drainage conditions for the Durango & 95 Commercial property. The proposed site will ultimately consist of a mix of commercial and retail buildings on approximately 9.3± acres. The site has not been previously studied; however, the TDS for Farm Road/US 95 infrastructure was approved by the CLV on Oct. 12, 2006 for Oso Blanca Road.

The following tasks were performed in the preparation of this report:

- 1) Identify the Federal Emergency Management Agency (FEMA) Flood Plain designation for the project site.
- 2) Identify known existing or planned Clark County Regional Flood Control District (CCRFCD) or local drainage facilities that affect or are affected by the site.
- 3) Review Approved Drainage Studies for the subject site and other projects in the vicinity of the site.
- 4) Estimate runoff generated within and around the project site for the 10-year and 100-year, six-hour storm events, and to provide recommendations for drainage facilities.

The purpose of this study is to obtain an approved study to allow development of the site.

B. Site Description and Location

The project site is within APN 125-17-301-006 and a portion of Section 17, Township 19 South, Range 60 East, in the city of Las Vegas Nevada. More Specifically the site is located on the northwest corner of OSO Blanca and Durango Drive. The site consists of arid rangeland and desert shrub vegetative cover in poor hydraulic condition. The site slopes from west to east with various slopes ranging from two to ten percent. The site is bordered by the existing Fairfield Farm development and OSO Blanca on the west; the US 95/Durango off-ramp on the north and east, and by OSO Blanca Road and North Durango drive on the south (refer to Figure 1 - Vicinity Map, figure 2 – Site Map and Figure 10 Assessor's Parcel Map included in Appendix A).

C. Master Planning Information

According to the Clark County Regional Flood Control District Figure F-13 of the (CCRFCD) 2013 Las Vegas Valley Flood Control Master Plan Update, the site is located southwest of the Category A proposed facility Centennial Parkway Channel West / 95 (ID= CN95, refer to Figures 3 & 4 in Appendix A) and west of three 3'x6' RCB Storm Drains, crossing under US 95 and Durango (refer to NDOT reference plans in Appendix D).

The proposed site is within the Master Plan Update Drainage Basin NW103-C (refer to Figures 5: H-13 of the CCRFCD 2008 Las Vegas Valley Flood Control MPU, included in Appendix A).

The proposed site is also within the CLV NW Neighborhood Study Phase 2 Basin NW88 (refer to Figure 7: E-12 Existing Drainage Conditions of the CLV NW Neighborhood Study, included in Appendix A). The flows from the Northwest Study were included in the referenced studies below. The Northwest Study Phase 2 Figure F-12, (refer to Figure 8, Appendix A) depicts Future conditions along the US95 corridor as a 12'x10' RCB, which is in conflict with the CCRFCD master plan which depicts an 8'x7' RCB. Local facilities are also shown as RAN 748, 746, and 744, which have since been replaced by other facilities or abandon.

D. Floodplain Information

According to the Federal Emergency Management Agency (FEMA) Community Panel FM32003C1745E, Clark County, Nevada and Incorporated Areas, effective September 27, 2002, the proposed site is located within Zone "X". Zone "X" is described as an area to be outside of the 500-year floodplain. Refer to Figure 6, F.I.R.M. Flood Insurance Rate Map, in Appendix A.

E. Previous Drainage Studies

The following approved drainage studies were reviewed in the preparation of this technical drainage study.

1. Technical Drainage Study and Addenda for Astoria @ Town Center North & South, approved June 27, 2004 prepared by VTN Nevada.
2. Technical Drainage Study and Addenda for Fairfield at Farm / 95, approved August 6, 2007, prepared by VTN Nevada.

Civil Squared Engineering has reviewed these studies and concurs with and accepts the analysis as presented in these approved drainage studies (refer to specific cited sections of these studies in Appendix D).

II. HYDROLOGIC PARAMETERS

The SCS Unit Hydrograph Methodology in conjunction with the HEC-1 and HEC-HMS (as backup) Flood Hydrograph Packages, from the US Army Corps of Engineers, were used to determine the peak runoff generated by the 10-year and 100-year, 6-hour storm events. Parameters used in the HEC analyses are described in the following paragraphs (refer to HEC-1 output data in Appendix B).

A. Precipitation

The project site is located just outside of the McCarran Airport Rainfall Area. The 6-hour, 10-year and 100-year storm event rainfall depths were obtained from the Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual (CCRFGD HC&DDM). Since the drainage area for this project site encompasses less than eight (8) square miles, the Storm Distribution Number Three (SDN3) was utilized (refer to Table 503 in Appendix B).

The rainfall depth of 1.30-inches and 2.00-inches during the 10-year and 100-year 6-hour storm events, respectively, were calculated using Figures 503 and Figure 506 of the CCRFGD HC&DDM.

The precipitation adjustment factors of 1.24 and 1.43 during the 10-year and 100-year storm events, respectively, are applied to the rainfall depth for the final precipitation values. These adjustment factors are obtained from Table 501 of the CCRFGD HC&DDM.

The six-hour depth-area reduction factor of 1.00 during the 10-year and 100-year storm event has been applied to the rainfall depth for the final precipitation values since the drainage area for these basins are less than 0.5 square miles. These adjustment factors are obtained from Table 502 of the CCRFGD HC&DDM in appendix B.

The final precipitation values with adjustment factors are 1.61-inches and 2.86-inches during the 10-year and 100-year events respectively. The 10-year/100-year precipitation ratio for the HEC-1 analysis is 0.564.

The Rainfall Calculation Table for the final precipitation values and referenced materials are included in Appendix B.

B. Soil Classification

The proposed site consists of soil types 610 (pits, gravel) and 191 (Dailan very cobbly fine sandy loam, 2 to 8 percent slopes). As shown on the Soil Survey Map EX-1 included in Appendix B, about 52% of the site is within soil type 610 and 48% of the site is within soil type 191 therefore, the CN values are calculated using a combination of the soil types (refer to soil survey maps in Appendix B).

Average Existing Condition CN values were taken from Table 602, Sheet 4 of 4, with a cover description of Desert Shrub and hydrologic Soil group B and C in poor condition. Developed Condition CN values were taken from Table 602, Sheet 1 of 4, with cover description of Urban districts and hydrologic Soil group B and C in Commercial and Business. The Curve Number Summary along with reference materials are included in Appendix B.

C. Time of Concentration And Lag Time

Time of Concentration calculations were performed per section 602 of the HCDDM for basins less than one square mile. The methodology was developed by the Federal Aviation Administration (FAA1970) and is outlined as follows:

$$t_c = t_i + t_t$$

TLAG = $0.60t_c / 60$ (hr) – Lag time used in HEC1 model

In which t_c = Time of Concentration (min)
 t_i = Initial, Inlet, or Overland Flow Time (min)
 t_t = Travel Time in the Ditch, Gutter, Storm Sewer, etc.(min)

The initial overland flow time is calculated as follows:

$$t_i = 1.8(1.1-K)L_o^{1/2}/S^{1/3}$$

Where K = flow resistance factor
 L_o = overland flow length
 L = length of channel (etc.)
 S = average slope of basin (%)

For SCS & TR55 unit hydrographic Methods

$$K = 0.0132(CN) - 0.39$$

Where: CN = SCS runoff curve number
 $t_t = L/60V$ (min)
 V = average channel velocity (ft/sec)

Velocity determination for time of concentration

At the upstream end of a drainage area, the initial overland flows begin to collect and gradually increase from small, shallow flows to larger, deeper flows with greater velocities. To estimate the average velocity for flow condition that constantly varies throughout the length of drainage area, two generalized relationships can be used. Velocity V_1 applies to the small shallow flows in the first 500 feet or less of travel distance and velocity V_2 applies to the remainder of the travel distance where the velocity is greater. Manning's equation was used to derive formulas for estimating the two travel time velocities. The equations are as follows:

$$V = CS^{1/2} \quad C = 1.49/n R^{2/3} \quad R = A/P$$

Where: V = Average Velocity (fps)
 S = Average Slope (ft/ft)
 N = Manning's Roughness Coefficient
 R = Hydraulic Radius (ft)
 P = Wetted Perimeter (ft)
 A = Area of Flow (sq. ft.)

Two sets of coefficients were determined, one for developed conditions and the other for undeveloped conditions. For the first developed-conditions velocity (V1), the appropriate coefficient (C=20.2) represents street flow with $n = 0.016$ and a depth of flow in the gutter of 0.3 feet. For the second developed-conditions velocity (V2), the appropriate coefficient (C=30.6) represents curb height street flow. As may be noted, V2 is approximately equal to 1.5 times V1. Typically, drainage areas are delineated such that the channelized flow considered in the calculations of travel times is within streets and other minor watercourses and does not include significant lengths of major improvement floodway and channels in the travel distance for the time of concentration. For the first undeveloped conditions velocity (V1), the appropriate coefficient (C = 14.8) represents wide channel flow with $D = 0.25'$ and $n = 0.04$. For the second undeveloped conditions velocity (V2), the appropriate coefficient (C = 29.4) represents wide channel flow with a depth of 0.7 feet and $n = 0.04$.

For urbanized basins, the time of concentration should not exceed the time of concentration calculated by the following equation.

$$t_c = L / 180 + 10$$

Where: L = Watershed Length (ft)

Additionally, the minimum t_c for urbanized areas is 5 minutes.

These methods are consistent with the methods outlined in Technical Release 55, SCS (TR55) for calculating the time of concentration and should provide times of concentration and lag times that are consistent with one another and with the degree of accuracy of typical hydrologic modeling.

The Standard Form 4s for Existing and Developed conditions are included in Appendix B.

III. HYDROLOGY

A. Existing Drainage Condition

(The following description refers to Figure 11, Existing Condition Drainage Basin Map).

Existing flows west of Oso Blanca Road are referenced directly from the approved Fairfield at Farm/US 95 approved study DS4117. The developed flows in this study are used and accepted as the existing and developed off-site street flows for this study.

As shown in the appendix of DS4117 Addendum #1, Figure 5B (developed basin map), Oso Blanca has been broken into four sub-basins, OSO1-OSO4, with two concentration points, CP-2 and CP-4. Two additional unnamed referenced concentration point flows are shown at Farm Road on the north, named in this report as REF1, and Severence Lane on the south, named in this report as REF2. As shown in referenced FlowMaster sections OSO N-2 and OSO S-3, the flow in Oso Blanca Road is contained within the roadway right-of-way and does not affect the subject site during the 100-yr event. One additional off-site cross-section, FM2, in OSO Blanca, was created south of Severence Lane at the southwest corner of the proposed site. One additional off-site cross-section, FM1 was created at the northwest corner of the site at the intersection of Farm Road and Oso Blanca (refer to FlowMaster sections in Appendix C). Each of these sections was created to address the existing REF1 and REF2 flows and are further discussed under the flow depth analysis section below.

Also in the reference material from DS4117, Figure 5B, two concentration points, CP-2 (north) and CP-4 (south), are referenced as existing off-site flows in this study. These flows are generated from the west property's (Fairfield at 95) on-site flows which discharge to a 30-inch RCP storm drain pipe at each location. These two 30-inch RCPs reach under Oso Blanca and discharge 12 cfs to the north and 29 cfs to the south onto the subject property. The RCP pipes were installed per CLV #107Y4963 (refer to reference material in Appendix D) and replace the RAN 748 and 744 CMP pipes shown in the NW Neighborhood Study Phase 2 Figure F-12 and associated Facilities Inventory. It is noted that RAN 746, a 24-inch CMP has been built over/abandon in place upstream during the construction of the westerly property, and is no longer functional. It will be abandon at the downstream end on-site with these proposed improvements.

At the northwest corner of the site at the intersection of Farm Road and Oso Blanca, a 24-inch RCP discharges onto the subject property. Per the approved improvement plans CLV #107Y4794 and the TDS for Astoria at Town Center South, two 4-foot type "CM" drop inlets were installed in a sump condition at the east end of Farm Road to collect the REF1 flow (see Reference Material in Appendix D). The inlets connect to two 18-inch laterals which terminate at a manhole and finally connect to a 24-inch RCP sloping at a 1% reach under Oso Blanca. The pipe discharges at the northwest corner property line of the subject site via a beehive bubbler system.

The existing condition analysis was developed to analyze the existing onsite basins and combine with the reference flows. As shown on Figure 11 included in Appendix A, the overall watershed area is comprised of seven sub-basins ONX1 – ONX7 totaling about 13.9 acres which is a combination of the subject property's 9.3 acres and the existing non-roadway offsite land. The historical flow pattern of the watershed basin is by

sheet-flow from west to the east at about 2 to 10 percent grade. Flows generated from the sub-basins drain toward three concentration low points along the east edge of the watershed area.

The easterly property line and edge of the watershed area of the proposed site is about 22-feet below the 95-Durango off-ramp. The off-ramp and Durango drive slope/drain to the west and will not impact the proposed site. Three NDOT culverts pass under the off-ramp and Durango Drive and are located at the three concentration points of the existing on-site flows. These box culverts historically serve as the receiving facilities for the project flows.

Flow generated from basins ONX1 & ONX2 is manually combined with reference flows REF1 and CP-2, at Concentration Point CON1, with flow values of 34 cfs and 241 cfs during the 10-year and 100-year storm event, respectively. Flow at CON1 will ultimately be captured by the existing North Box culvert and flow under the off-ramp to the west.

Flow generated from basins ONX3, ONX4 & ONX5 is combined at Concentration Point CON2, with flow values of 3 cfs and 10 cfs during the 10-year and 100-year storm event, respectively. Flow at CON2 will ultimately be captured by the existing Middle Box culvert and flow under the off-ramp to the west.

Flow generated from basins ONX6 & ONX7 is manually combined with reference flow CP-4, at Concentration Point CON3, with flow values of 15 cfs and 38 cfs during the 10-year and 100-year storm event, respectively. Flow at CON3 will ultimately be captured by the existing South Box culvert and flow under Durango Drive to the west.

The three NDOT culverts were installed per NDOT project no. STP-095-2(022) / CLV#107Y3813 (refer to Reference Material Appendix D). The culvert information is summarized in Table 3 in section E below.

The basin area and flow rates during the 10-year and 100-year storm events, respectively, in the existing drainage condition, are included in Table 1

B. Developed Drainage Condition

(The following description refers to Figure 12, Developed Condition Drainage Basin Map).

The developed condition analysis was created to analyze the developed onsite basins and combine them with the accepted approved flows in the surrounding areas. As shown on Figure 12, included in Appendix A, the proposed development is located within basins OND1 thru OND7. Basins ONX1 thru ONX7 represent areas outside of the subject site which contribute to the flow of the overall watershed area affecting the

discharge points, but they will not be disturbed as part of the developemtn of the subject property.

The proposed development has been graded to follow the historical drainage pattern of west to east and concentrates the flow at the three separate existing box culverts.

Flow generated from basins OND1, OND2, OND3, ONX1 and ONX2 is manually combined with reference flows REF1 and CP-2, at Concentration Point CON1, with flow values of 35 cfs and 243 cfs during the 10-year and 100-year storm event, respectively. Flow at CON1 will ultimately be captured by the existing North Box culvert and flow under the off-ramp to the west. Please note that the flow values of <1 cfs and <1 cfs during the 10-year and 100-year storm event in the HEC-1 report, respectively, for basin OND3 is assumed for sizing of the 1'x1' catch basin at 0.50 cfs. Basin OND3 is also routed overland in HEC-1, although it is actually discharging to the on-site pipe system. The north on-site pipe system has been created to capture the flow from CP-2, from the reference material, and route it through the site and discharge through a headwall at the property line at the east edge of the site. A WSPG pipe analysis has been created to verify capacity and routing (refer to North WSPG in Appendix C).

Flow generated from basins OND4, OND5, OFX3, OFX4 and OFX5 is combined at Concentration Point CON2, with flow values of 9 cfs and 21 cfs during the 10-year and 100-year storm event, respectively. Flow at CON2 will ultimately be captured by the existing Middle Box culvert and flow under the off-ramp to the west.

Flow generated from basins OND6, OFX6 & OFX7 is manually combined with reference flow CP-4, at Concentration Point CON3, with flow values of 16 cfs and 38 cfs during the 10-year and 100-year storm event, respectively. An on-site pipe system has been created to capture the flow from CP-4, in the reference material, and route it through the site and discharge at the property line at the east edge of the site in a flaired end section. A WSPG pipe analysis has been created to verify capacity and routing (refer to South WSPG in Appendix C). Flow at CON3 will ultimately be captured by the existing South Box culvert and flow under Durango Drive to the west.

The existing 100-year depth-of-flow FlowMaster sections, OSO S-3 and OSO N-3 were used from the approved DS4117 study to establish the hump heights in the driveways and the height of the west flood protection wall along the Oso Blanca right-of-way (refer to reference material in Appendix D and section C below). Since the proposed FFE's of the proposed buildings have been set below the OSO Blanca flowline elevation, a flood wall is proposed along the back of sidewalk along the west property line. The wall will be a minimum of 18-inches above the 100-yr street flow or 1.19' above the back of sidewalk to flood protect the proposed buildings.

The basin areas and flow rates during the 10-year and 100-year storm events, respectively, in the proposed drainage condition, are included in Table 1.

IV. HYDRAULIC ANALYSIS

A. Peak Flows

The following Table 1 shows a summary of the runoff generated by each basin determined from the HEC-1 model. The HEC-1 analyses in the existing and developed conditions are included in Appendix.

Table 1
Peak Flow Summary

Basin	Area (ac)	10-year Flow (cfs)	100-year Flow (cfs)
Existing Condition			
ONX1	0.77	<1	1
ONX2	1.51	1	2
ONX3	2.42	1	4
ONX4	0.63	1	2
ONX5	2.06	1	4
ONX6	3.46	2	5
ONX7	3.04	1	4
	13.89 ac		
OSO1	0.60	1	3
OSO2	0.80	2	3
OSO3	0.50	1	2
OSO4	0.70	1	3
OSO5	0.33	1	1
REF1	-	28	226
REF2	-	104	311
CP-2	-	5	12
CP-4	-	12	29
CON1	-	34	241
CON2	-	3	10
CON3	-	15	38
Developed Condition			
OND1	0.11	<1	<1
OND2	1.18	2	4
OND3	0.73	<1	<1
OND4	2.23	4	7
OND5	2.63	4	8

OND6	2.24	3	7
OFD1	0.40	1	1
OFD2	0.15	<1	<1
OFX1	0.66	<1	<1
OFX2	0.36	<1	1
OFX3	0.34	<1	1
OFX4	0.25	<1	1
OFX5	1.62	2	4
OFX6	0.35	<1	1
OFX7	0.65	<1	1
	13.89 ac		
OSO1	0.60	1	3
OSO2	0.80	2	3
OSO3	0.50	1	2
OSO4	0.70	1	3
OSO5	0.33	1	1
REF1	-	28	226
REF2	-	104	311
CP-2	-	5	12
CP-4	-	12	29
CON1	-	35	243
CON2	-	9	21
CON3	-	16	38

B. Flow Depth Analysis

The Flow Master V8i computer program was utilized to determine the maximum velocity and depth for the onsite and offsite streets. Following Table 2 summarizes the flow depth analysis for the 10-year and 100-year storm events for the hydraulic sections shown on Figure 12. Copies of the flow depth calculations are included in Appendix C.

Table 2
Flow Depth Analysis

Hydraulic Section	Street Width (ft)	Flow 100-year (cfs)	Slope (%)	Depth 100-year (ft)	Velocity 100-year (ft/s)	D x V 100-year
(FM1)	80	209	3.4	0.81	8.28	6.71
FM1	90	311	0.61	1.16	5.91	6.86
FM2	90	226	0.60	0.86	4.97	5.83

(OSO S-3)	90	4	0.61	0.34	1.72	0.58
(OSO N-2)	90	6	0.51	0.37	1.99	0.74

Please note that the flow values in the referenced developed condition are utilized for the flow depth analysis. Flow at Severence and Oso Blanca, REF2, is combined with OSO5 flow and utilized for hydraulic sections FM2 at Severence Lane. Flow at REF1 is utilized for hydraulic section FM1. Section (FM1) is taken from the Astoria at Town Center approved study and used to support the flow condition at Farm Road in conjunction with Section FM1 using the REF1 100-yr flow. Reference sections from the Farm Road/US 95 study, (OSO S-3) and (OSO N-2), are used to establish driveway and flood wall heights as previously discussed.

Sections (FM1) and FM1 indicate that the flow from Farm Road will be contained to the sump condition created by the Astoria improvement plans (see Reference Material Appendix D). Section FM1 shows the 226 cfs will not weir over the centerline of OSO Blanca, but will eventually flow north along Oso Blanca, or into the two constructed drop inlets and eventually bubble over onto the subject property.

Section FM2 Severence West 10yr at the intersection of Severence Lane and Oso Blanca shows a 10-yr flow will be contained on the west half of Oso Blanca and discharges to the south toward Durango Drive. As shown on section FM2 West Half OSO Max., during the 100-yr, flow will, theoretically, overtop the center island median at 200cfs (refer to section FM2 West Half OSO Max). The remaining 111 cfs was used to create section FM2 East Half OSO 100yr which shows a depth of flow on the east half of Oso Blanca of 0.98'. A 24-inch high flood wall is proposed from just south of the intersection of Severence and Oso Blanca to the end of the property (see section for wall height calculation).

C. Entrance Requirement

The two entrances on Oso Blanca are elevated a minimum of 0.5-feet above the 100-year water surface elevation of Oso Blanca to prevent water coming into the site. From section (OSO S-3) the depth of flow is $0.34' + 0.50' = 0.84'$ therefore a minimum depth of 0.84' between the flowline in the entrance valley gutter and the highpoint of the entrance will be maintained. For the middle driveway a depth of 0.37' is shown in OSO N-3 and was used to set a minimum highpoint elevation of 0.87' above the flowline.

D. Rip Rap Sizing

A rip rap calculation is provided for the downstream end of the 30-inch storm drains at the north and south concentration points, in Appendix C. As shown in the calculations a rip rap pad with d_{50} of 4-inch and thickness of 8-inch is proposed. Refer to the Grading Plans included in Appendix E for limits.

E. Drop Inlet and Box Culvert Calculations

A 1'x1' catch basin is proposed to capture flows from OND3 and discharge via a 6-inch PVC pipe into the proposed storm drain manhole. The Flow Master V8i computer program was utilized in determining the size of the drop inlet. The 50% clogging factor was applied using the built-in clogging factor in Flow Master (refer to 1'x1' Grate Inlet in a Sag in Appendix C).

In addition, the analysis for the three existing box culverts are included in Appendix C. The Flow Master V8i computer program was utilized in determining the maximum discharge for each of the boxes (refer to FlowMaster calculations in Appendix C). The sizes of the boxes were confirmed by survey data to match the NDOT design plans (see Reference Material in Appendix D). Results are summarized below.

Table 3
Box Culvert Analysis

North Box 1800mm x 900mm (6' x 3')	232 LF	INV IN=2613.08	S = 4.78%
		INV OUT=2602.0	Capacity = 587 cfs
Middle Box 1800mm x 900mm (6' x 3')	374 LF	INV IN=2605.14	S = 3.55%
		INV OUT=2591.9	Capacity = 506 cfs
South Box 1800mm x 900mm (6' x 3')	196 LF	INV IN=2608.86	S = 2.99%
		INV OUT=2603.0	Capacity = 464 cfs

F. Storm Drain Analysis

The WSPGW computer program was utilized in determining the water surface elevation for the two 30-inch storm drain systems. The water surface elevations have been summarized in the North and South WSPG Analysis Exhibits, included in Appendix C. The Tailwater Calculation was determined using the Flow Master V8i computer program and is included in Appendix C. Flows from existing CP-4 and CP-2 30-inch storm drains, with flow values of 12 cfs (north) and 29 cfs (south) during the 100-year storm event, are utilized for the systems headworks flow in the WSPG analysis.

A new storm drain manhole will be placed at the outlets of the existing 30-inch pipes and routed through the site via a 30-inch RCP. Refer to the Grading Plans included in Appendix D. Each of the 30-inch storm drain runs will require a private easement privately maintained.

At the northwest corner of the site the existing 24-inch system previously installed will remain. A public storm drain easement will need to be created for the discharge and maintenance of the system.

G. Onsite Parking Lot Storm Water Treatment

Per section 1502.2 of the CCRFCD manual, parking lot designs must be submitted to local entities with the TDS. We have prepared a Drainage Area Map depicting the half acre/acre parking lot areas which outline the treatment area limits as shown in Figures 1501 and 1502 of the manual.

The grading plans in Appendix E indicate the construction of the selected BMP's which will be installed to treat the parking lot areas: landscape swales, depressed medians, buffer strips, rock swales, and settling basins.

Design runoff volumes were calculated for each developed basin per section 1502.3 of the manual. Water quality design calculations and table of results are included in Appendix C.

V. SUMMARY

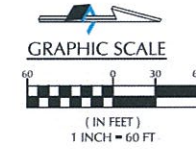
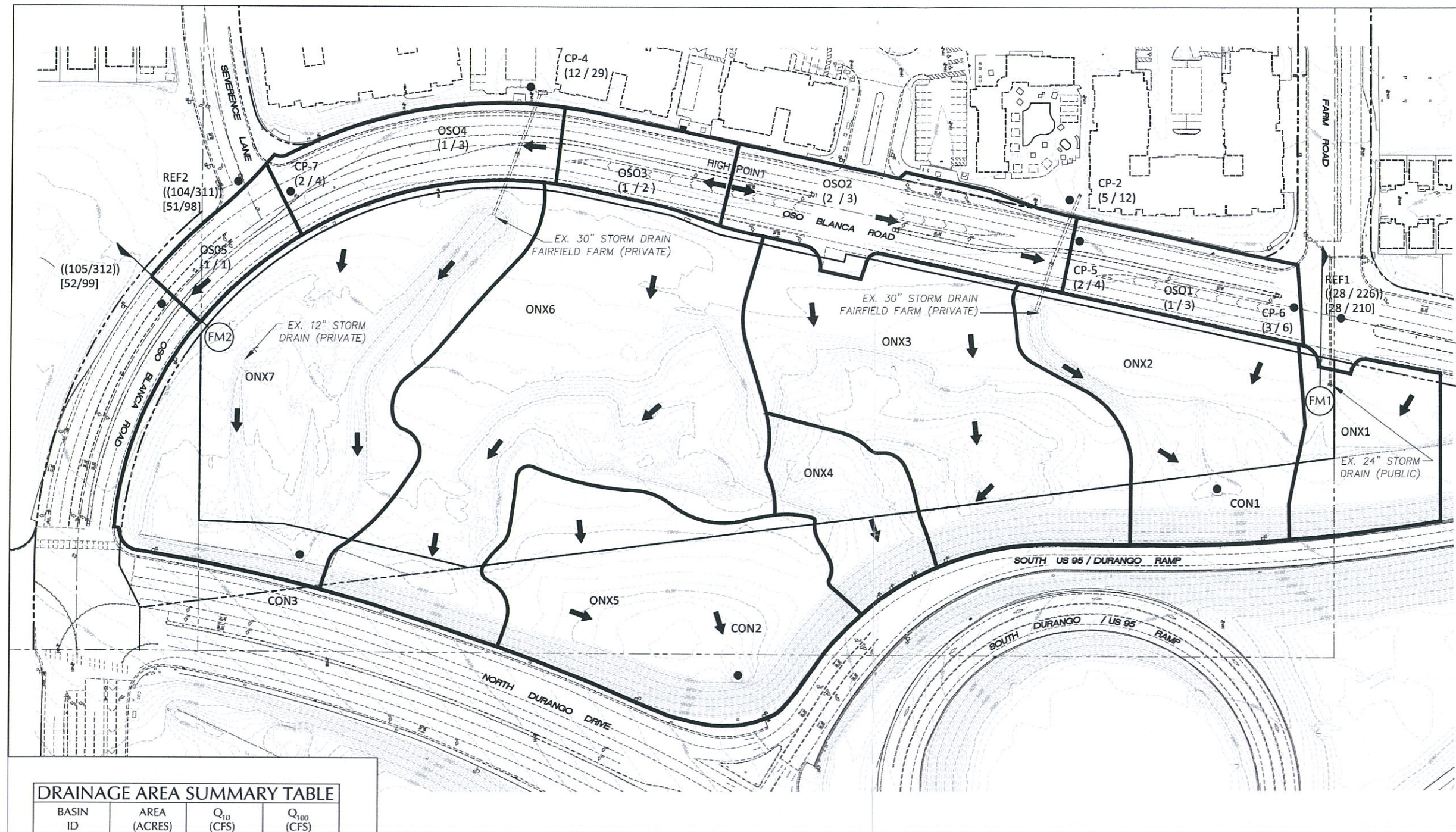
A. Conclusion

As detailed in this study, the Durango & 95 commercial development is in compliance with the CCRFCD HC&DDM. Runoff from the project site will continue to flow in accordance with the natural historical drainage patterns. Water surface elevations within adjacent streets will not significantly impact the project site or negatively impact adjacent or downstream properties.

- The existing box culverts are of sufficient size to accept the discharges from the proposed development
- An NDOT permit will be required for any proposed improvements along OSO Blanca
- A letter of permission will be required to install the proposed rip-rap at the discharge points in the NDOT right-of-way
- NDOT concurrence with this drainage study is required
- Private drainage easements will be required for the two 30-inch storm drain pipes traversing the site
- A Public drainage easement will be required for the existing 24-inch pipe discharging on the northwest corner of the site
- A flood wall will be installed along the OSO Blanca frontage to flood protect the site

B. References

Clark County Regional Flood Control District Hydrologic Criteria and Drainage Design Manual, Adopted August 1999, WRC Engineering (updated by Montgomery Watson).
Revised September 12, 2013



NO.	DESCRIPTION OF REVISIONS	DATE	APPROVAL

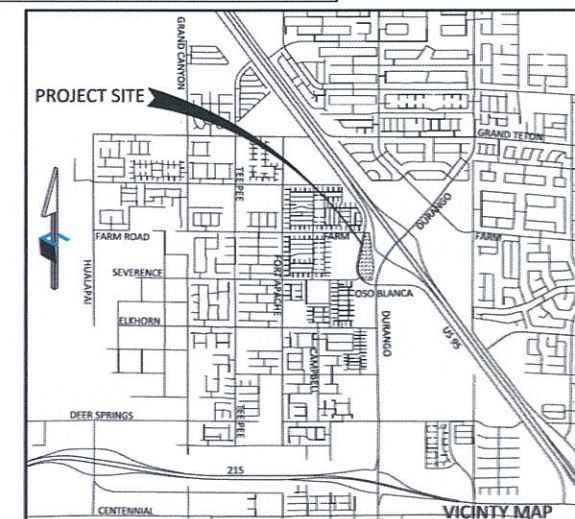
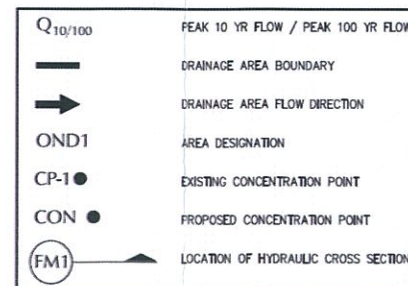
DRAINAGE AREA SUMMARY TABLE

BASIN ID	AREA (ACRES)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
ONX1	0.77	<1	1
ONX2	1.51	1	2
ONX3	2.42	1	4
ONX4	0.63	1	2
ONX5	2.06	1	4
ONX6	3.46	2	5
ONX7	3.04	1	4
OSO1	0.60	1	3
OSO2	0.80	2	3
OSO3	0.50	1	2
OSO4	0.70	1	3
OSO5	0.37	1	1
REF1	-	28	226
REF2	-	104	311
CP-2	-	5	12
CP-4	-	12	29

CONCENTRATION POINT SUMMARY TABLE

CONCENTRATION POINT	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
CON1	34	241
CON2	3	10
CON3	15	38

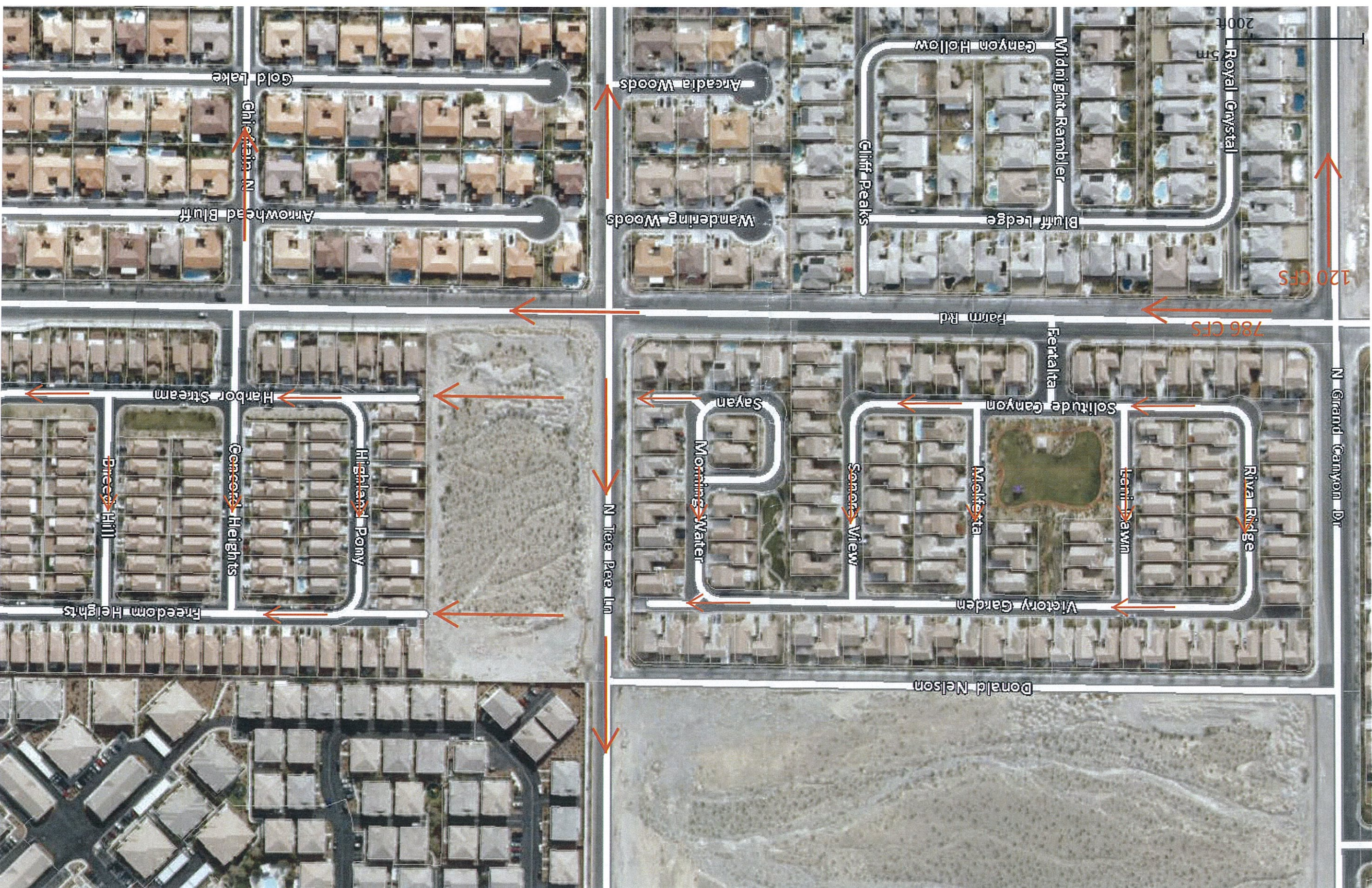
CON1 = ONX1 + ONX2 + REF1 + CP-2
CON2 = ONX3 + ONX4 + ONX5
CON3 = ONX6 + ONX7 + CP-4

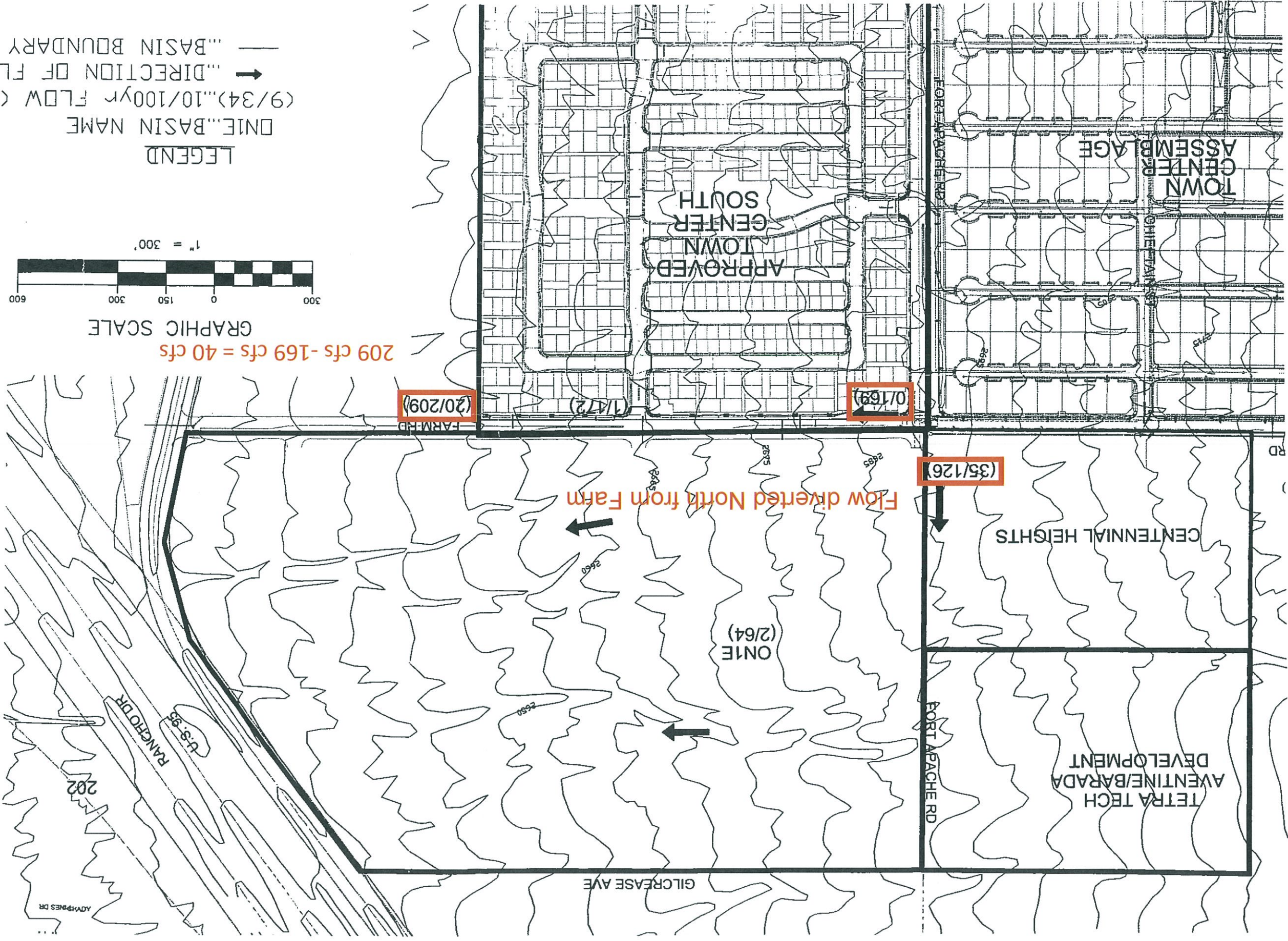


DURANGO & 95 COMMERCIAL
APN: 125-17-301-006
EXISTING CONDITION DRAINAGE BASIN MAP

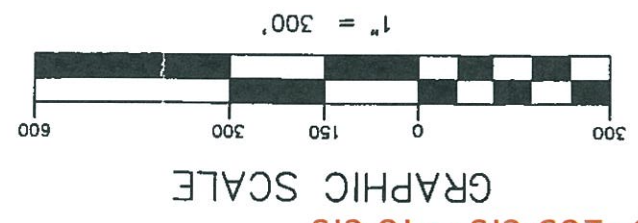
DATE: 3/11/2014
JOB NUMBER: 4114
DESIGNED: B.ZAHEDI, P.E.
DRAWN: B.ZAHEDI, P.E.
CHECKED: P. FRITZ, P.E.
SHEET NUMBER

FIGURE 11





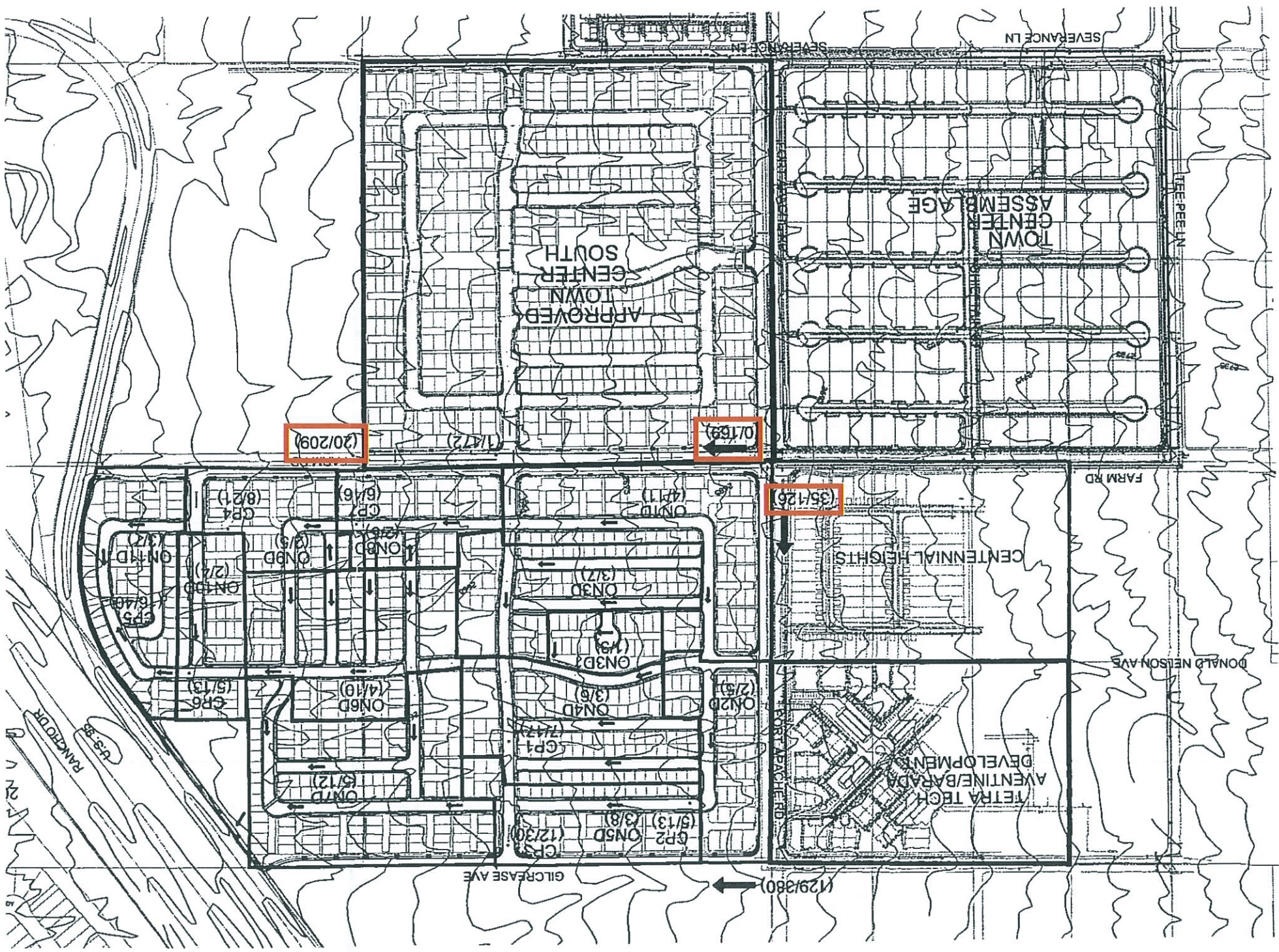
--- BASIN NAME
 --- DIRECTION OF FLOW
 --- BASIN BOUNDARY
 (9/34) 10/100yr FLOW (cfs)



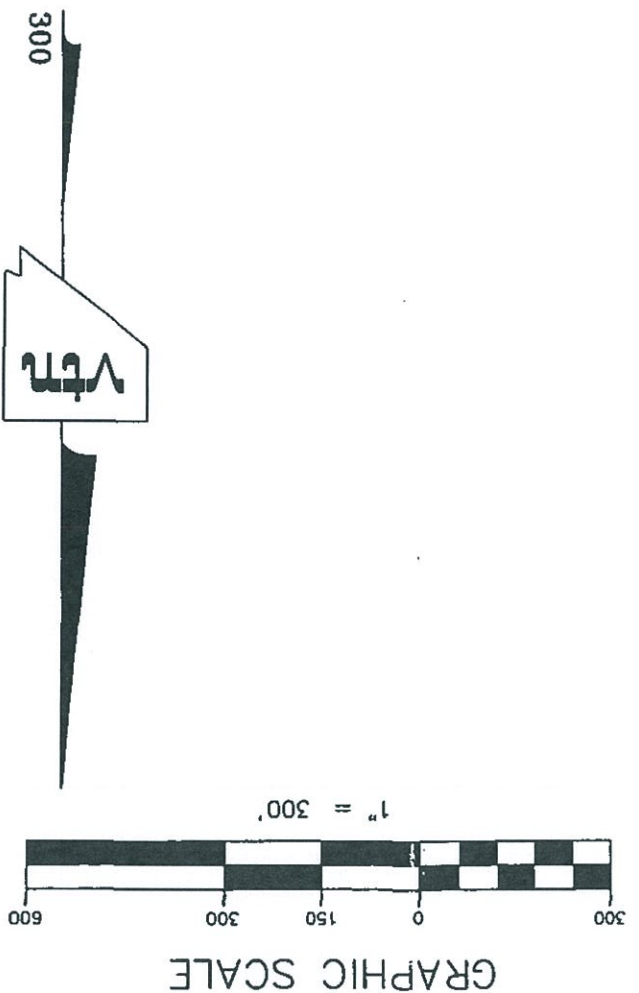
EXISTING BASIN MAP
 ASTORIA • TOWN CENTER NORTH
 FIGURE 4

W.O.#: _____
 DATE: FEB 2003
 BY: DF
 SCALE: _____
 SHEET _____ OF _____





LEGEND
 --- BASIN NAME
 --- DIRECTION OF FLOW (9/34) --- 10/100 YR FLOW (CFS)
 --- BASIN BOUNDARY

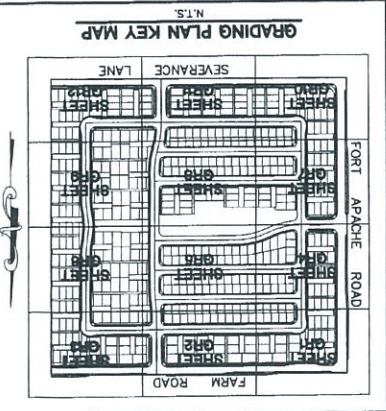
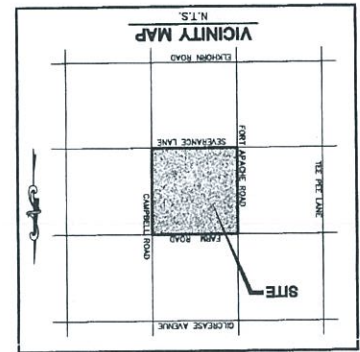
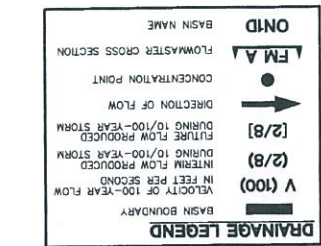


Call before you dig
1-800-227-2600
D19
Call before you dig
1-800-227-2600
D19

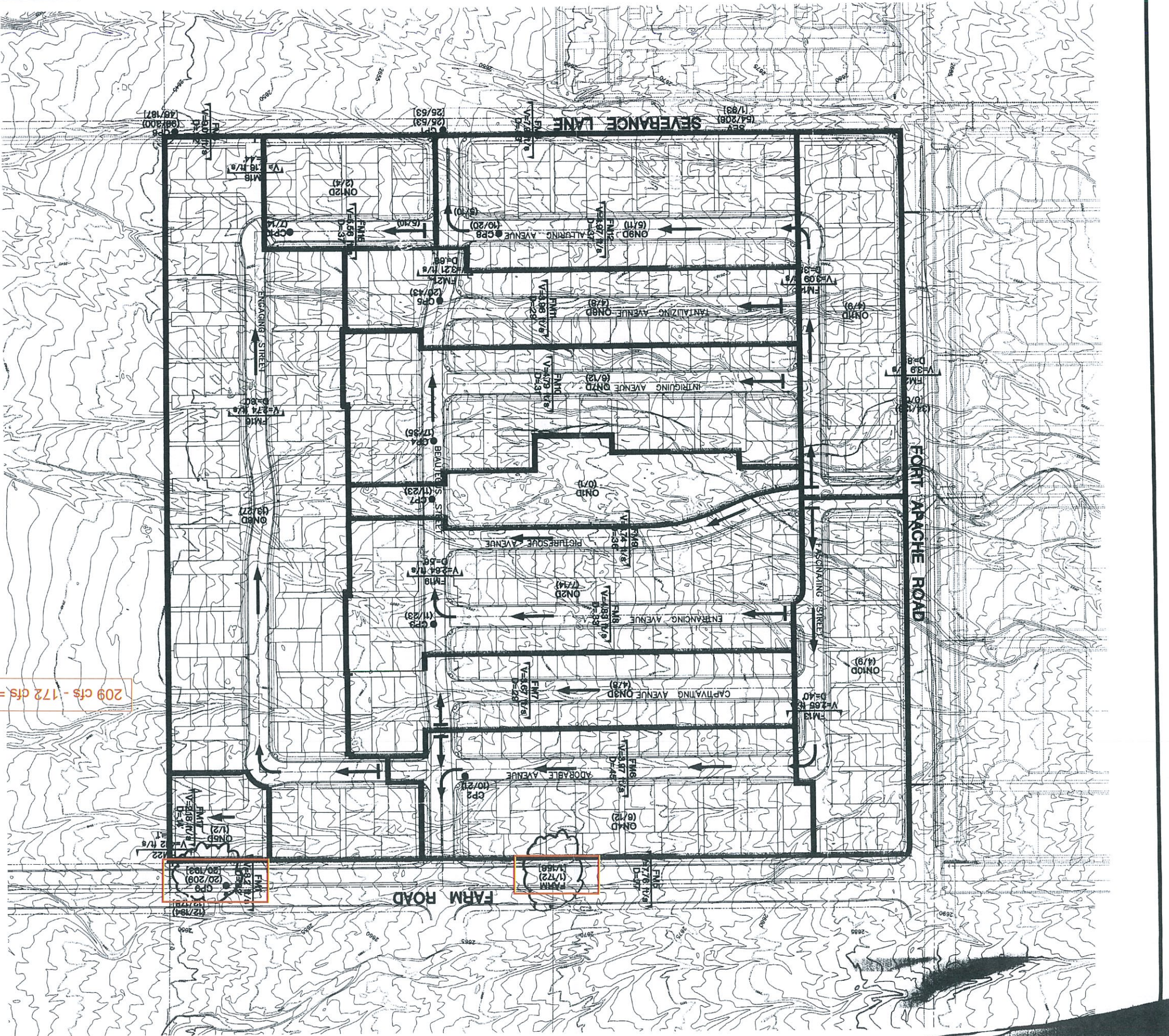
LEGAL DESCRIPTION
BEING A PORTION OF THE NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

BENCHMARKS
PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
CLARK COUNTY BENCHMARK: 0090706
ELEVATION: 799.117 METERS (2621.77 FEET)
HEADWALL ON THE WEST SIDE OF U.S. 95 NEAR MILE MARKER 90.15.

BASIS OF BEARINGS
THE BASIS OF BEARINGS FOR THIS PROJECT IS GRID NORTH AS DETERMINED BY THE NEVADA COORDINATE SYSTEM OF 1983 (NCS83), EAST ZONE (2701), DETERMINED BY CLARK COUNTY GIS CONTROL POINTS 802, 803, 804, AND 805, AS SHOWN ON A RECORD OF SURVEY ON FILE IN THE CLARK COUNTY, NEVADA, RECORDERS' OFFICE, IN BOOK 88 OF SURVEYS, AT PAGE 53.



209 cfs - 172 cfs = 37 cfs



FLOWMASTER SECTION SUMMARY									
Section	Slope	Discharge	Depth (ft)	Veloc (ft/s)	FM1	FM2	FM3	FM4	FM5
FM1	1.00%	1.60	0.15	1.62	2.47	2.91	1.73	2.18	2.24
FM2	1.00%	3.60	0.28	2.47	3.26	3.26	2.24	2.24	2.24
FM3	1.00%	9.00	0.35	2.91	2.18	2.18	2.18	2.18	2.18
FM4	1.57%	0.80	0.12	1.73	1.57	1.57	1.57	1.57	1.57
FM5	1.50%	3.00	0.17	2.18	2.18	2.18	2.18	2.18	2.18
FM6	1.00%	3.60	0.24	3.26	3.26	3.26	3.26	3.26	3.26
FM7	6.00%	1.20	0.11	3.26	3.26	3.26	3.26	3.26	3.26
FM8	1.00%	6.20	0.24	2.26	2.26	2.26	2.26	2.26	2.26
FM9	1.00%	0.80	0.10	1.26	1.26	1.26	1.26	1.26	1.26
FM10	1.00%	0.60	0.14	1.57	1.57	1.57	1.57	1.57	1.57
FM11	1.00%	0.50	0.13	1.54	1.54	1.54	1.54	1.54	1.54
FM12	1.00%	2.20	0.20	2.02	2.02	2.02	2.02	2.02	2.02
FM13	1.25%	0.70	0.11	1.49	1.49	1.49	1.49	1.49	1.49
FM14	1.00%	1.30	0.16	1.75	1.75	1.75	1.75	1.75	1.75
FM15	1.00%	0.50	0.14	1.54	1.54	1.54	1.54	1.54	1.54
FM16	1.00%	0.70	0.14	1.59	1.59	1.59	1.59	1.59	1.59
FM17	1.00%	1.60	0.13	1.52	1.52	1.52	1.52	1.52	1.52
FM18	1.00%	1.80	0.21	2.09	2.09	2.09	2.09	2.09	2.09
FM19	1.00%	1.70	0.14	1.59	1.59	1.59	1.59	1.59	1.59
FM20	1.00%	1.80	0.16	1.69	1.69	1.69	1.69	1.69	1.69
FM21	1.00%	1.50	0.13	1.49	1.49	1.49	1.49	1.49	1.49
FM22	1.00%	1.80	0.09	1.17	1.17	1.17	1.17	1.17	1.17
FM23	1.48%	2.00	0.17	2.15	2.15	2.15	2.15	2.15	2.15

FM sections that changed

226 cfs - 209 cfs = 17 cfs

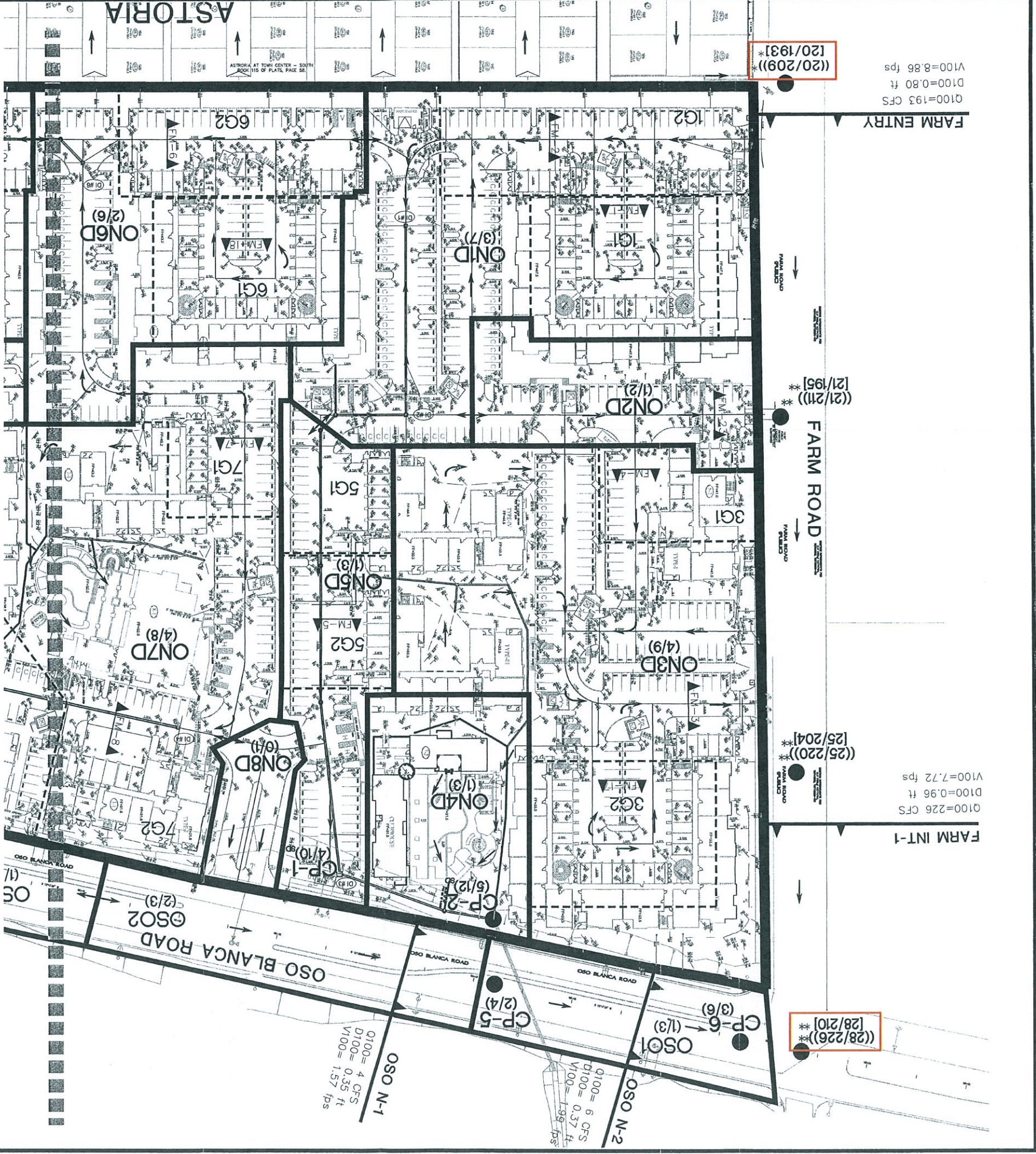
LEGEND

- SITE BOUNDARY
- SUB-BASIN DELINEATION
- SUB-BASIN DELINEATION
- COMBINATION POINT
- BASIN NAME
- 3GI SUB-BASIN NAME
- CP-3 COMBINATION POINT NAME
- (2/5) — (10/100) YEAR STORM EVENT
- DIRECTION OF FLOW
- (120/209) — INTERIM FLOW
- 120/1931 — ULTIMATE FLOW
- FLOWMASTER SECTION
- FM-1 — FLOWMASTER NAME
- (4/11) — FLOW INSIDE STORM DRAIN
- * FLOW VALUES REFERENCED FROM ASTORIA AT TOWN CENTER.
- ** REFERENCED FLOW IS STRAIGHT ADDED TO CP FLOW.



This grading plan is a part of drainage study # 4117 which was received on 11/5/17 and revised on 11/5/17. Page 18 of 49

MATCHLINE SEE FIGURE 7B



Q100=226 CFS
D100=0.96 ft
V100=7.72 fps

Q100=193 CFS
D100=0.80 ft
V100=8.86 fps

(120/209)

(21/21)

(25/220)

(28/226)

Q100= 4 CFS
D100= 0.35 ft
V100= 1.57 fps

Q100= 6 CFS
D100= 0.37 ft
V100= 1.99 fps

BENCHMARKS
PROJECT DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD83)
CLARK COUNTY BENCHMARK: 009017NS
ELEVATION: 799.117 METERS (2621.77 FEET)
NINETEEN AND SQUARE ALUMINUM PLATE IN TOP CORNER OF HEAVENLY ON THE WEST SIDE OF U.S. 95 NEAR MILE MARKER 90.15.

BASIS OF BEARINGS
NORTH 015°47'42" EAST, BEING THE BEARING OF THE WEST LINE OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, CLARK COUNTY, NEVADA, AS SHOWN ON A RECORD OF SURVEY ON FILE IN THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE. IN FILE 114 OF SURVEYS, AT PAGE 57.

LEGAL DESCRIPTION
PROPERTY DESCRIBED IN A PRELIMINARY TITLE REPORT PROVIDED BY NEVADA TITLE COMPANY, NO. 01-12-1405-JAH, DATED AS OF DEC. 12, 2001.
APN 125-17-201-001
GOVERNMENT LOT 5, LYING WITH THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CLARK COUNTY, NEVADA.

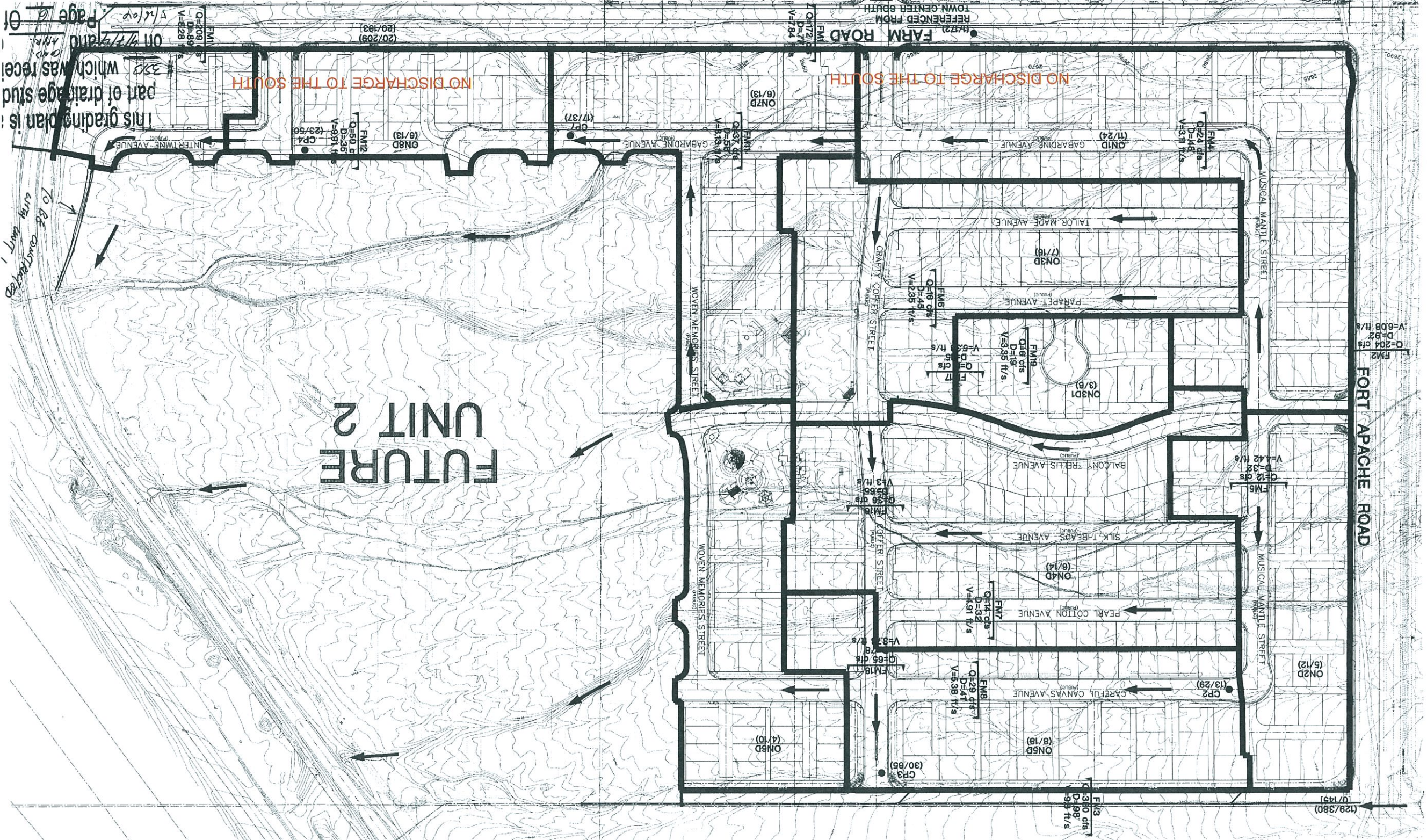
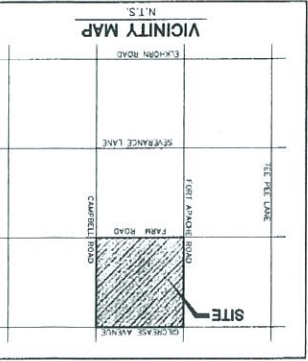
FLOOD CONTROL QUANTITIES	
3 COURSE SOLID GROUT	4970 LF
DRAINAGE EASEMENT	6500 sq. ft.
2 COURSE SOLID GROUT WALL	1390 LF

DRAINAGE LEGEND	
	BASIN BOUNDARY
	VELOCITY OF 100-YEAR FLOW IN FEET PER SECOND
	DIRECTION OF FLOW
	CONCENTRATION POINT
	FLOWMASTER CROSS SECTION
	DEPTH OF FLOW (ft)
	VELOCITY (ft/s)

Call before you Dig
1-800-227-2600
Avoid cutting underground utility lines. It's costly.

Call before you Overhead
1-702-593-6111
Avoid overhead power line contact. It's costly.

NOTE:
ALL DRAINAGE EASEMENTS MUST BE COMMON LOTS AND PUBLIC DRAINAGE EASEMENT TO BE PRIVATELY MAINTAINED BY HOME OWNERS ASSOCIATION.
ALL PRIVATE STREETS ARE P.U.E., PUBLIC SEWER EASEMENTS, MAINTAINED BY H.O.A.

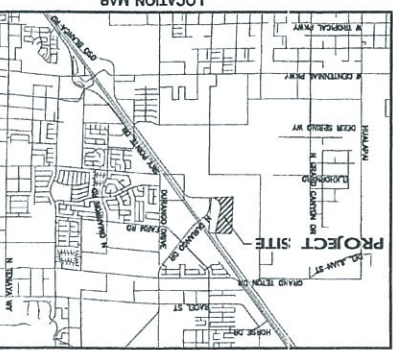


This grading plan is part of drainage study which was received on 11/17/2011 and 11/18/2011. Page 1 of 1

This grading plan is a part of drainage study # 4117 which was received on 8/3/07 and approved on 8/6/07. Page 6 of 12

SIDEWALK RAMPS			
NO.	"A"	"B"	C
1	8.0'	8.0'	

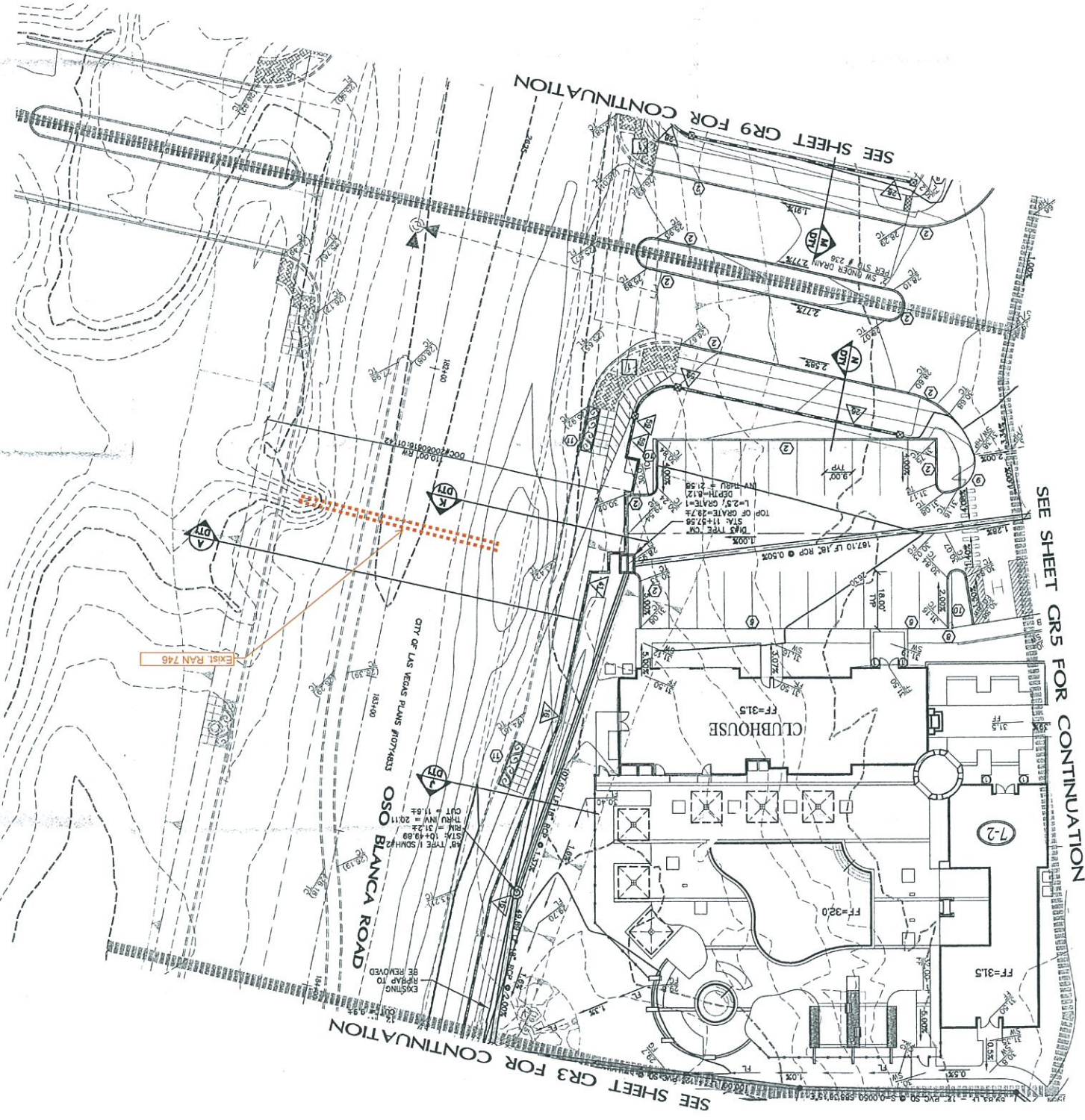
KEY MAP OF IMPROVEMENTS



CONSTRUCTION ITEMS	QTY	UNIT	AMOUNT
1. CONSTRUCTION 24" TYPE "C" CURB & GUTTER	1	LINEAL FOOT	10.00
2. CONSTRUCTION 7" 18" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
3. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
4. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
5. SLOPE AND REMOVE ASPHALT PAVING, EXISTING DRIVE WITH NEW PAVING.	1	SQ. YD.	10.00
6. SLOPE AND REMOVE ASPHALT PAVING, EXISTING DRIVE WITH NEW PAVING.	1	SQ. YD.	10.00
7. SIDEWALKS PER STD. DIMS. 210', 224' & 230'	1	LINEAL FOOT	10.00
8. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
9. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
10. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00
11. CONSTRUCTION 12" 24" ISLAND CURB PER SIDE	2	LINEAL FOOT	20.00

NOTE:
SEE SHEETS HZ1-HZ3 FOR ALL
FRONT OF CURB DIMENSIONS

			NO
X	X		NO
X	X		NO
X	X		NO
DIM A	DIM A		NO
SIDEWALK RAMP DATA			
SIDEWALK RAMP TRANSITION LENGTHS			



1. CERTIFY THAT THIS DRAWING PLAN IS IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT (053966).

2.26.02

NO. DIM. A. DIM. B.

1	1/4"	1/4"
2	1/4"	1/4"
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96	1/4"	1/4"
97	1/4"	1/4"
98	1/4"	1/4"
99	1/4"	1/4"
100	1/4"	1/4"

SIDEWALK RAMP TRANSITION LENGTHS

PROPOSED "L" CURB
EX "L" CURB
CONSTRUCTION PHASE LINE
OR UNIT BOUNDARY LINE
EX AC
EX DIRT ROAD
CONC BLOCK WALL
RETAINING WALL
CENTER LINE
FUTURE IMPROVEMENTS
EX IMPROVEMENTS
R/W OR P/L
PROJECT BOUNDARY LINE
SIGHT VISIBILITY EASEMENT
GRADE
C/A MEASURED FROM ROUGH
LOW POINT
HIGH POINT
DESIGN GRADE
FLOW LINE
EDGE OF PAV
TOP OF CURB
TO FINISH GRADE
EX CENTER LI
SOUTH EX TO
NORTH EX TO
FUTURE
EXISTING

LEGEND
REMOVE AC
3/4" ROTUMILL
EX CONTOUR(S) INTERVAL
EX CONTOUR(S) INTERVAL
SLOPE
EDGE OF EXIST A.C.
SAW CUT & MATCH A.C.
TO FINISH GRADE
EX CENTER LI
SOUTH EX TO
NORTH EX TO
FUTURE
EXISTING

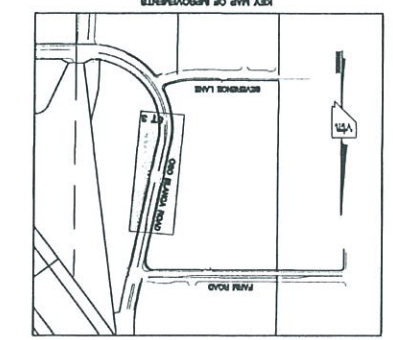
BENCHMARK
CITY OF LAS VEGAS BENCHMARK (1984-1985)
NAD83 ELEVATION 778.950 METERS (2555.61 FEET)
R/W CUT & MATCH A.C.
TO FINISH GRADE
EX CENTER LI
SOUTH EX TO
NORTH EX TO
FUTURE
EXISTING

RECORDING OFFICE, IN BOOK 88 OF SHIFTS, AT PAGE 53.
AS SHOWN ON A RECORD OF SURVEY ON FILE IN THE CLARK COUNTY, NEVADA,
DETERMINED BY CLARK COUNTY AS CONTROL POINTS 802, 803, 804, AND 805.
BY THE NAD83 COORDINATE SYSTEM OF 1983 (NAD83), EAST ZONE, (2701).
THE BASIS OF BEARINGS FOR THIS PROJECT IS GRID NORTH AS DEFINED
BY THE NAD83 COORDINATE SYSTEM OF 1983 (NAD83), EAST ZONE, (2701).

NOTE: CONTRACTOR SHALL VERIFY HORIZONTAL AND
VERTICAL LOCATION OF EXISTING UTILITIES AND
NOTIFY THE DESIGN ENGINEER IMMEDIATELY OF
ANY DISCREPANCIES PRIOR TO CONSTRUCTION.
NOTE: "ALL WORK IN NDOT R/W REQUIRES AN
"NOT PERMIT".

CONSTRUCTION ITEMS
1. CONSTRUCT 24" TYPE "L" CURB & GUTTER
PER STD. DWG. 210.
2. CONSTRUCT TYPE "2" ISLAND CURB
PER STD. DWG. NO. R-5.1.1.
3. CONSTRUCT 8 FOOT WIDE CROSS CUTTER
PER STD. DWG. NO. R-5.1.1.
4. CONSTRUCT PUBLIC R.O.W. CURB RETURN
AND TOWN CENTER STANDARDS.
5. SIDEWALKS PER STD. DWGS. 210, 234,
6. SAWCUT AND REPAIR ASPHALT PAVING
MATCH EXISTING EDGE WITH NEW PAVING.
7. CONSTRUCT TYPE "A" TACK ON ISLAND CURB
PER NDOT STD. DWG. NO. R-5.1.1.
8. SEE DETAIL "ACCENT PATTERN AT STREET
INTERSECTIONS", SEE SHIT 4 OF 21 (071).
9. CONSTRUCT TEMPORARY 5' WIDE AC WALKWAY
3" 4" OF CEMENT SLURRY PER VDCS 2.19.02.B.30.

GRAPHIC SCALE
1" = 40'

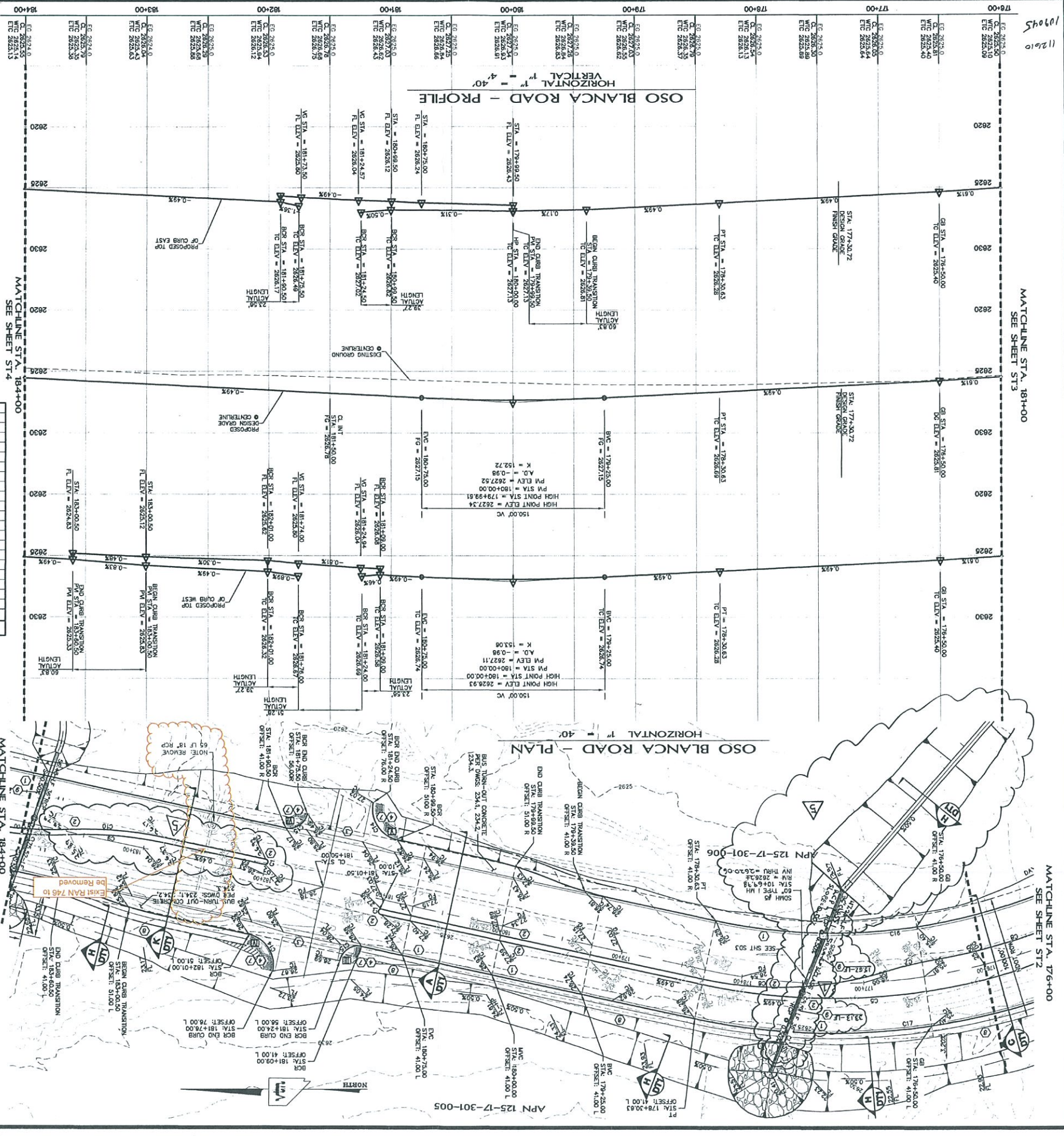


Call before you dig
1-800-227-2600
Call before you dig
1-702-227-2929

Underground
Call before you dig
1-702-227-2929
1-702-227-2600

BACK OF CURB RADIUS TANGENT DELTA

STATION	DELTA	TANGENT	RADIUS
C1	6.28	2.00	180.00
C2	418.22	492.00	19.60
C3	39.15	300.00	118.74
C4	152.29	300.00	77.82
C5	233.36	512.00	118.74
C6	153.39	300.00	78.41
C7	38.85	300.00	19.45
C8	64.98	488.00	371.44
C9	77.16	298.00	38.80
C10	78.19	302.00	39.32
C11	11.00	7.00	14.50
C12	289.01	749.34	22.05
C13	53.45	30.00	37.10
C14	39.27	25.00	90.00
C15	23.56	15.00	90.00
C16	298.90	459.00	153.85
C17	37.47	541.00	195.26
C18	51.12	30.00	34.29
C19	38.15	30.00	22.14
C20	114.50	628.00	57.41
C21	204.80	459.00	25.33



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:

June 18, 2014

TO:

Land Development Services
Department of Building & Safety

FROM:

Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works

SUBJECT:

Drainage Study for:

Durango & 95 Commercial – Phase 1

COPIES TO:

Civil Squared Engineering

Cross Streets:

SEC of Farm Road & Oso Blanca Road

DDB Holdings LLC

File Number:

F:\Depot\DSMemos\DS4660C.doc

Bart Anderson, P.E., DevCo

Parcel Number:

125-17-301-006

NDOT

Zoning Action:

PMP-52656; SDR-52440; VAR-52439;
SUP-52437 & SUP-52438

FEMA Flood Zone

YES

NO

X

Proposed Storm Drain

YES

NO

X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/13/2014	3/27/2014	Not Approved	\$400.00	350812: \$400
2 nd Submittal	4/28/2014	5/12/2014	Not Approved	\$400.00	355003: \$400
3 rd Submittal	5/28/2014	6/18/2014	See Comments Below	\$400.00	358354: \$400
TOTAL FEES (LDDRS):				\$1,200.00	----

REMARKS:

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

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

- The approval of this drainage study is limited to the *Phase 1 Development* only (northern half of the subject site). Upon *Phase 2 development*, a 2'-grade difference from the *City Planning Department* will be required for its improvements.
- The project proposes to construct facilities (riprap pads in couple locations) and/or increase flows within *Nevada Department of Transportation* (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.
- Revise *Section G/C8.01* to include the proposed riprap and label with size and thickness information. The minimum acceptable riprap size is $d_{50} = 8"$.
- The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

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

END OF REMARKS

ays

T/R/S: T19S/R60E/17
AREA G-17



ADDENDUM 2 TO THE TECHNICAL DRAINAGE STUDY for DURANGO & 95 COMMERCIAL

MAY 2014

CIVIL SQUARED ENGINEERING PROJECT NO. 4114

**Prepared for:
Mr. David Brown
DDB Holdings LLC
9910 W. Cheyenne Ave.
Las Vegas, NV 89129**

702-643-4940



3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
Phone: (702) 248-8000
Fax: (702) 248-8070
www.civilsquared.com



May 28, 2014

Albert Sung
City of Las Vegas Flood Control
333 N. Rancho Drive
Las Vegas, NV 89106



3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
Phone: (702) 248-8000
Fax: (702) 248-8070
www.civilsquared.com

**SUBJECT: TECHNICAL DRAINAGE STUDY FOR DURANGO & 95 COMMERCIAL
(DS 4660A)
Civil Squared Engineering Project No. 4114**

Dear Mr. Sung:

This Addendum #2 is being submitted to City of Las Vegas Flood Control Division to address the review comments to the above mentioned study that were issued on May 14, 2014. The comments are reiterated for your convenience. A copy of the comment letter is included in Appendix A.

Comment #1

The response to the previous Comment #1 was that the approval for the 2'-grade difference from the City Planning was limited to the Mini-Storage Building in the northern half of the development only. However, the set of improvement plans submitted show the overall development instead of just half of the site. Either another approval from City Planning for the southern half is obtained or the subject improvement plans must be split into two phases to match the City planning's approval status. Address and resolve in the next submittal.

Response #1

The grading plans have been revised to show the development is divided into two phases. The current improvements for the northern part of the development are considered Phase 1 north of the proposed property line. Please refer to Appendix C for the revised plans. It is understood that Phase 2 (southern half) will need to receive its own grade difference from planning at the time it is being developed.

Comment #2

The project proposes to construct facilities (riprap pads in couple location) and/or increase flows within Nevada Department of Transportation (NDOT) right-of-Way. The engineer must contact NDOT for encroachment permit for the proposed project.

Response #2

Attached, in Appendix A, is a copy of the drainage acceptance letter from NDOT, received May 23, 2014. The encroachment permit application is applied for and obtained as part of the improvement plan process and will be submitted as part of the Phase 1 & 2 improvement plans. A note has been added to the grading plans.

Comment #3

Developed Condition Drainage Basin Map (Figure 12): The revised 100-year overflow into the corridor adjacent to the north of the subject site is 494 cfs per the last addendum. However, the Q100 show in the flow analysis summary table is only 311 cfs (Section FM1), please address and resolve in the next submittal. Revise hydraulic calculation of FM1 and FM2 accordingly.

Response #3

The sections have been revised and updated on the Basin Map. Per revised plan, section FM1 is located at the south end of Oso Blanca at Severance and represents the 312 cfs in the street. Section FM5 has been added to show the 494 cfs and the depth of flow along the proposed 40' drainage easement. Section FM6 has been added for information purposes and calculations. For the locations of these sections, please refer to Figure 12 in Appendix A.

Comment #4

The major event flow velocity in the corridor stated in the above comment is erosive. Concrete-lined the whole 40'-wide flow corridor and dedicate which as a Public Drainage Easement to be privately maintained. The dedication of the drainage easement must be done prior to the final acceptance of the improvement plans.

Response #4

The revised plan shows the 40' public drainage easement which will be privately maintained. The process of recording will be done before final acceptance. The drainage easement will be Concrete-lined the whole 40'-wide and is indicated in FlowMaster section FM5 and Section E of the grading plan detail sheet.

Comment #5

Hydraulic Section FM3 and FM4 are missing in the Flow Depth Analysis Summary Table. Provide the section information in the next submittal.



Response #5

The hydraulic sections (FM2, FM3, FM4, FM5 and FM6) are cut to show the flow depth and velocity along the east side of the property. The FlowMaster calculations of the sections are provided in Appendix B and the Flow Depth Analysis Summary table has been updated on Figure 12 Appendix A.

Comment #6

In the existing condition, the overflow from the intersection of Farm Road and Oso Blanca Road sheet flows in an open fashion to the three NDOT culverts for discharge. However, after the proposed development, with a flood wall/ retaining wall along the north and east boundaries, the same overflow will be conveyed in a confined flow path to reach the three coverts. Major event flow velocity is likely erosive. Provide hydraulic calculation to prove otherwise or install erosion protective measures in the offsite area to the east. Obtain NDOT approval for the proposed works in their property.

Response #6

We provided sections FM2, FM3, FM4 and FM6 along east side of the property to show the flow velocity and depth. Without riprap, the flow reaches 8-10 fps, so, the area will have rip-rap up to the water surface elevation at these locations. The riprap calculation is included in Appendix B and the grading plans have been updated to show the limits of rip-rap.

Comment #7

Second request: Sheet C4.03: The hump in the driveway entrance off of Severance Lane intersection does not have six inches (6") minimum freeboard. Review and revised accordingly.

Response #7

Per section S-3 the depth of flow is 0.29 feet and the hump provided met the requirements. However, in the unlikely event the entire flow in Severance crests the center island median prior to heading south in Oso Blanca, we used FM1 Section depth of flow to establish the hump height, and therefore the grading plan has been revised. Per hydraulic section FM1, the 100-year flow creates 1.16' depth of flow. The finished grade hump is raised 1.66 feet above the flow line at this location. Please refer to grading plan for the revised elevation in Appendix C.



Comment #8

Sheet C4.03: Show the parcel line limit between Parcel 2 and Parcel 3 as identified in the proposed parcel map.

Response #8

Sheet C4.03 has been revised to show the proposed parcel line as depicted on the attached Parcel Map (see Appendix C). There is no parcel line division at this time.

Comment #9

Sheet C8.01: Section E/C8.01: Revise the min. flood wall from 2.0' above existing ground to 3.0'. Section G/C8.01: Show the flood wall above the adjacent top of curb in the detail and raise the height from 1.33' to 1.50'.

Response #9

Sheet C8.01 detail sections have been revised as requested.

Comment #10

Second Request: Label existing storm drain systems in the perimeter streets with City of Las Vegas recoded drawing number on all pertinent plans-Existing storm drain in Oso Blanca Road has not been labeled (sheet C4.03)

Response #10

We apologize for the omission in the previous submittal. Sheet C4.03 has been revised and included in Appendix C.

Comment #11

Revise all riprap size to a minimum of $d_{50}=8''$.

Response #11

Noted, the size has been revised. Per NDOT comment #2 the rip-rap size has been increased as well.

Comment #12

The proposed Parcel Map shall (i) have a note clearly identify the maintenance responsibility of each individual parcel owner for the drainage easement running with their parcel limit; (ii) An inter-site drainage right note and (ii) Dedicate a 40'-wide public drainage easement (privately maintained) along the northern boundary.



Response #12

The Parcel Map has been revised. The text "public drainage easement privately maintained by owner" is labeled for each easement. An inter-site drainage right note has been labeled. Along the northern boundary, the 40' public drainage easement will be dedicated per the map. The document will be provided as soon as recorded. See Appendix C for a copy of the proposed PM.

Comment #13

The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

Response #13

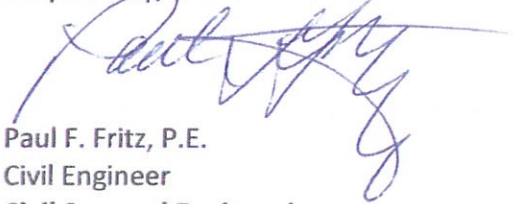
The plans have been revised. The quantity of all drainage improvements within public drainage easements is provided in the revised grading plan.

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 the certifies a stomwater pollution presentation 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 surfaces 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.

Response:
Noted

We hope this addresses your concerns regarding this project. If you have any questions or additional information is needed, please feel free to contact this office.

Respectfully,



Paul F. Fritz, P.E.
Civil Engineer
Civil Squared Engineering





STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

BRIAN SANDOVAL
Governor

RUDY MALFABON, P.E., Director

RECEIVED

MAY 23 2014

**CIVIL SQUARED
ENGINEERING**

May 19, 2014

In Reply Refer to:

C010
PAUL F. FRITZ, P.E.
CIVIL SQUARED ENGINEERING
3130 S.DURANGO DRIVE SUITE 404
LAS VEGAS, NV 89117

TECHNICAL DRAINAGE STUDY

Durango & 95 Commercial

Clark County

RECEIVED

MAY 23 2014

**CIVIL SQUARED
ENGINEERING**

Dear M. Paul Fritz:

The Nevada Department of Transportation (NDOT) Hydraulics Section has received and reviewed the following document(s) for the above-referenced project.

Document:	Dated:
Addendum #1 to the TDS for Durango & 95 Commercial	April 2014
Drainage Information Form	April 24, 2014
Civil Squared Transmittal	April 29, 2014
Disc	May 1, 2014

The drainage design information presented in the reviewed document(s):

	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project.
X	is acceptable in concept. Final Hydraulic Section approval will be based on review of final design documents submitted with the NDOT Right-Of-Way Occupancy Permit application that must be submitted for this project. The following comments should be addressed with the permit application:
	must be supplemented or modified to satisfy the following comment(s) before preliminary Hydraulic Section approval can be granted:

1. As per the "TERMS AND CONDITIONS RELATING TO RIGHT-OF-WAY OCCUPANCY PERMITS", All Facilities constructed within NDOT right of way should be constructed per NDOT Standards Plans for Road and Bridge Construction 2010.
2. For the proposed riprap pads (Sheets C4.01 & C4.03) Construct riprap pad per NDOT Standard Plans for Road and Bridge Construction 2010, R-3.1.5. Please consider upsizing the riprap stone. Otherwise there is a chance during high flows the proposed $D_{50} = 4"$ will end up inside the existing RCBs.



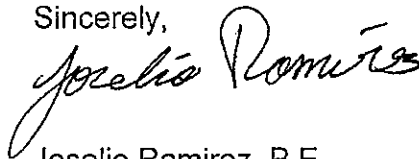
3. Please explain why the Existing RAN 746 is to be abandoned? If that culvert is currently operational, NDOT Hydraulics will not approve the proposed condition of abandoning it unless direct benefit to Department and to the general public is demonstrated by the PERMITTEE.
4. FYI – Displaying alignment stations on plan sheets (existing, proposed, grading, drainage basin maps, etc) is highly recommended and very helpful for reviewers.

All submittals regarding this project must be forwarded through (or copied to) the local NDOT District permitting office. All pertinent drainage design documents (including those previously submitted for preliminary review) must be submitted to the local NDOT District permitting office with the Right-Of-Way Occupancy Permit Application. All plans and reports must be signed and stamped by a Nevada registered civil engineer.

No liability is assumed by the Department in performing this review. Verification and acceptance of all background information, design data and conclusions is the responsibility of the consulting engineer.

Please call me at (775)-888-7532 should you have any questions.

Sincerely,



Joselio Ramirez, P.E.
Senior Hydraulic Engineer

c: Mary Martini, P.E., District I Engineer
Rudye Lucero, District I Permits
Charlton Pratt, HQ Permit Coordinator
Thaddeus Stephenson, District I Permits

PARCEL MAP

A PORTION OF GOVERNMENT LOT 11, SITUATED WITHIN THE NORTHEAST QUARTER (NE 1/4) OF THE
SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M.,
CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.

OWNERS' CERTIFICATE

FBNB-CMLCON I, LLC, A DELAWARE LIMITED LIABILITY COMPANY DO HEREBY CERTIFY THAT THEY ARE THE OWNERS OF THE PARCELS OF LAND SHOWN HEREON, AND DO HEREBY CONSENT TO THE PREPARATION AND RECORDATION OF THIS PARCEL MAP, HAVE CAUSED THE LAND TO BE SURVEYED AND PLATTED INTO PARCELS, AND DO HEREBY:

OFFER AND DEDICATE TO THE CITY OF LAS VEGAS ALL THE STREETS (EXCEPT PRIVATE STREETS) AND THE OTHER PUBLIC RIGHTS-OF-WAY AND PLACES AS INDICATED AND OUTLINED HEREON, FOR THE USE OF THE PUBLIC; AND GRANT TO THE CITY OF LAS VEGAS THE EASEMENTS, AS INDICATED AND OUTLINED HEREON, FOR THE USE OF THE PUBLIC.

FURTHER, THE UNDERSIGNED OWNER HEREBY GRANTS AND CONVEYS TO THE CITY OF LAS VEGAS AND TO ITS SUCCESSORS AND ASSIGNS A FIVE-FOOT WIDE EASEMENT ADJACENT TO ALL PROPERTY LINES WHERE LOTS OR COMMON AREAS ADJUT PUBLIC STREETS FOR PURPOSES OF PLACING PUBLIC FIRE HYDRANTS, PUBLIC STREETLIGHTS, TRAFFIC SIGNALS, CONDUITS AND APPURTENANCES, AND AN ADDITIONAL EASEMENT OF UP TO TWO FEET IN RADIUS FROM EACH FIRE HYDRANT, STREETLIGHT, TRAFFIC SIGNAL, CONDUIT AND APPURTENANCE, TO EXTEND BEYOND THE FIVE-FOOT EASEMENT IF NECESSARY, TOGETHER WITH THE RIGHT OF INGRESS TO AND EGRESS FROM THESE EASEMENTS.

BY: _____ DATE _____

AS: _____

FOR: FBNB-CMLCON I, LLC, A DELAWARE LIMITED LIABILITY COMPANY

ACKNOWLEDGMENT

STATE OF _____ SS

COUNTY OF _____

THIS INSTRUMENT WAS ACKNOWLEDGED BEFORE ME ON _____.

BY: _____

AS: _____

FOR: FBNB-CMLCON I, LLC, A DELAWARE LIMITED LIABILITY COMPANY

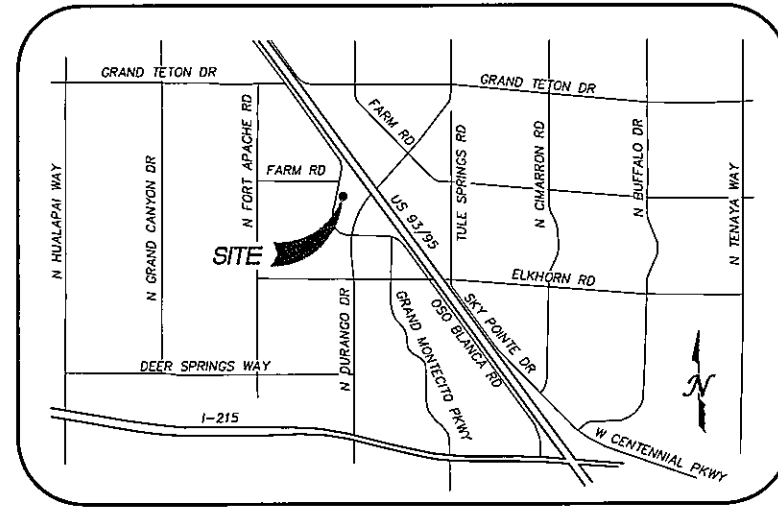
NOTARY PUBLIC _____ DATE _____
MY COMMISSION EXPIRES: _____

LAS VEGAS VALLEY WATER DISTRICT NOTE

THESE PARCELS CURRENTLY HAVE NO WATER SERVICE, AND A WATER COMMITMENT IS NOT GRANTED, IMPLIED, OR GUARANTEED BY THE APPROVAL OF THIS MAP.

CITY OF LAS VEGAS FLOOD CONTROL NOTE

ALL SUBDIVIDED PARCELS COMPRISING THIS COMMERCIAL SUBDIVISION SHALL PROVIDE PERPETUAL INTERSITE COMMON DRAINAGE RIGHTS ACROSS ALL EXISTING AND FUTURE PARCEL LIMITS



VICINITY MAP

N.T.S.

CERTIFICATE OF DIRECTOR OF PLANNING APPROVAL

I CERTIFY THAT THIS PARCEL MAP WAS APPROVED AND THE PARCELS HEREIN WERE ACCEPTED FOR DEDICATION BY THE DIRECTOR OF PLANNING ON THE _____ DAY OF _____.

FLINN FAGG, AICP
DIRECTOR OF PLANNING
CITY OF LAS VEGAS

BASIS OF BEARING

SOUTH 00°08'57" WEST, BEING THE BEARING OF THE WEST LINE OF GOVERNMENT LOT 11, SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

GROSS AREA = 13.94 ACRES

SURVEYOR'S CERTIFICATE

I, DENNIS W. LAYTON, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF NEVADA, CERTIFY THAT:

- THIS PLAT REPRESENTS THE RESULTS OF A SURVEY CONDUCTED UNDER MY SUPERVISION AT THE INSTANCE OF FBNB-CMLCON I, LLC, A DELAWARE COMPANY AND SORENSON GROUP MANAGEMENT, LLC, A DELAWARE COMPANY.
- THE LANDS SURVEYED LIE WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AND THE SURVEY WAS COMPLETED ON DECEMBER 16, 2013.
- THIS PLAT COMPLIES WITH THE APPLICABLE STATE STATUTES AND IS IN EFFECT ON THE DATE THAT THE LOCAL GOVERNMENT GAVE ITS APPROVAL.
- THE MONUMENTS DEPICTED ON THE PLAT ARE OF THE CHARACTER AND POSITION INDICATED AND ARE OF SUFFICIENT NUMBER AND DURABLE MATERIAL TO PERMANENTLY MARK THE CORNERS AND BOUNDARIES OF THE PARCELS SHOWN ON THE PLAT.

DENNIS W. LAYTON
PROFESSIONAL LAND SURVEYOR
NEVADA LICENSE NO. 11829



CITY SURVEYOR'S CERTIFICATE

I, ALAN R. RIEKKI, CITY SURVEYOR OF THE CITY OF LAS VEGAS, DO HEREBY CERTIFY THAT I HAVE EXAMINED THIS PARCEL MAP AND AM SATISFIED THAT THE MAP IS TECHNICALLY CORRECT.

CITY OF LAS VEGAS SURVEYOR
ALAN R. RIEKKI, PLS
NEVADA CERTIFICATE No. 12469

DATE _____

MAP REFERENCES

- BOOK 140, PAGE 12 OF PLATS
- BOOK 139, PAGE 72 OF PLATS
- BOOK 121, PAGE 16 OF PLATS
- FILE 114, PAGE 57 OF SURVEYS
- FILE 179, PAGE 88 OF SURVEYS
- NEVADA DEPARTMENT OF TRANSPORTATION (N.D.O.T.) RIGHT-OF-WAY PLANS PROJECT STP-095-2(022)

COUNTY RECORDER'S NOTE

ANY SUBSEQUENT CHANGES TO THIS MAP SHOULD BE EXAMINED AND MAY BE REFERENCED TO THE COUNTY RECORDER'S CUMULATIVE MAP INDEX, N.R.S. 27

PARCEL MAP

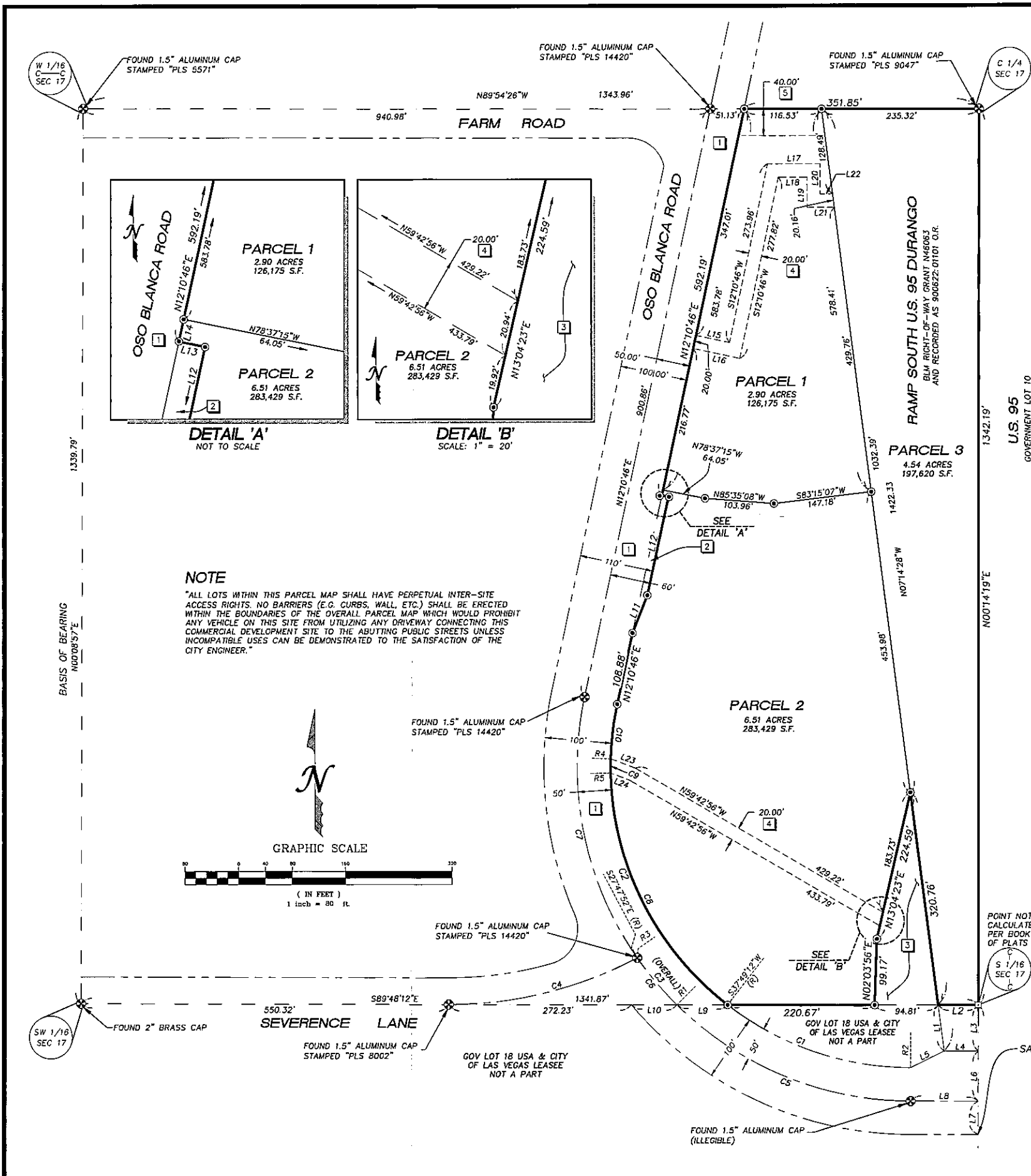
A PORTION OF GOVERNMENT LOT 11, SITUATED WITHIN THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA.



Heritage Surveying
7207 W. SAHARA AVENUE, SUITE 105
LAS VEGAS, NEVADA 89117
(702) 474-6277 (HSA-MAPS)
FAX (702) 255-6902
HERITAGE-SURVEYING.COM

Date: 15 MAY 14
Drawn: D.S. CROWTHER
Checked: D. LAYTON
Job Number: 405.0006

Sheet No. 1 OF 2



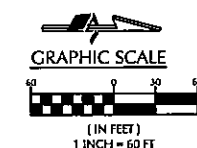
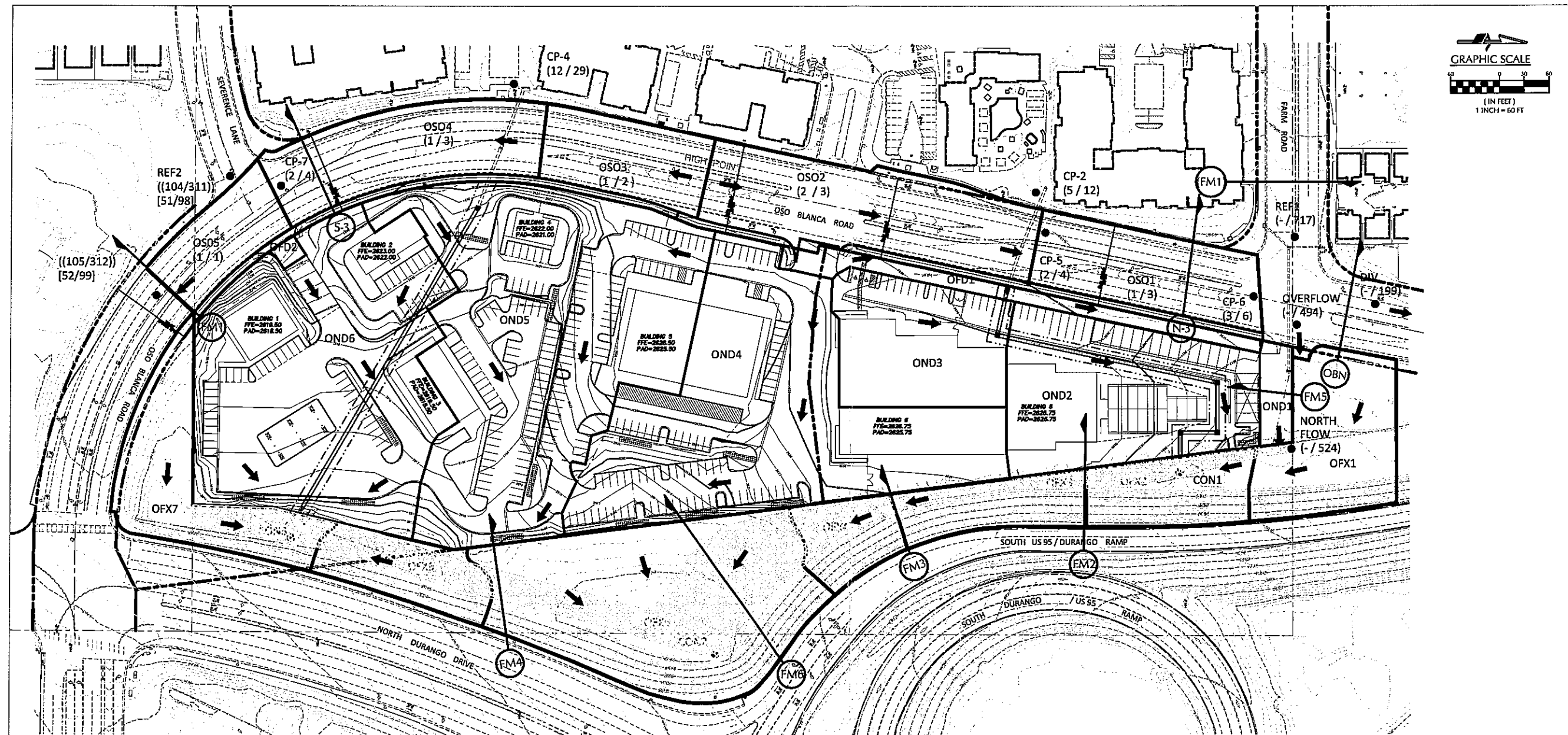
- LEGEND**
- SECTION LINE
 - STREET CENTERLINE
 - BOUNDARY LINE
 - ADJOINING RIGHT-OF-WAY LINE
 - RADIAL LINE
 - FOUND MONUMENT AS SHOWN AND DESCR
 - SET 5/8" REBAR WITH 1 1/2" ALUMINUM CAP
 - CALCULATED POSITION
 - OFFICIAL RECORDS
 - CURVE DATA
 - LINE DATA
 - RADIAL LINE DATA
 - SQUARE FEET
 - SEE NOTES

CURVE TABLE				
CURVE	RADIUS	DELTA	LENGTH	TANGENT
C1	450.00'	37°35'11"	295.20'	153.13'
C2	450.00'	64°21'34"	505.48'	283.16'
C3	500.00'	101°56'45"	889.65'	616.85'
C4	600.00'	27°59'47"	293.18'	149.58'
C5	500.00'	44°29'49"	388.31'	204.54'
C6	500.00'	10°32'38"	92.01'	46.14'
C7	500.00'	46°54'18"	409.32'	216.91'
C8	450.00'	51°08'19"	401.64'	215.31'
C9	450.00'	02°43'18"	21.38'	10.69'
C10	450.00'	10°29'56"	82.46'	41.34'

RADIAL TABLE	
LINE	BEARING
R1	S44°43'50"W
R2	S00°14'01"W
R3	S55°16'28"W
R4	N88°19'10"W
R5	S88°57'32"W

- NOTES**
- RIGHT-OF-WAY DEDICATED PER 20060616:01;
 - RIGHT-OF-WAY DEDICATED PER 20070425:01.
 - RIGHT-OF-WAY DEDICATED PER 20030505:01.
 - 20.00 FEET WIDE PUBLIC DRAINAGE EASEMENT PRIVATELY MAINTAINED BY INDIVIDUAL PROPEL OWNER AND GRANTED HEREON.
 - 40.00 FEET WIDE PUBLIC DRAINAGE EASEMENT PRIVATELY MAINTAINED BY INDIVIDUAL PROPEL OWNER AND GRANTED HEREON.

Heritage Surveying
7207 W. SAHARA AVENUE, SUITE 115
LAS VEGAS, NEVADA 89117
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FAX (702) 255-6902
HERITAGE-SURVEYING.COM



civil squared
engineering
3130 S. DURANGO DR., SUITE 404
LAS VEGAS, NV 89117
PHONE: (702) 248-8000
FAX: (702) 248-8070
www.civilsquared.com

NO.	DESCRIPTION OF REVISIONS	DATE	APPROVAL

DRAINAGE AREA SUMMARY TABLE

BASIN ID	AREA (ACRES)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
OND1	0.11	<1*	<1*
OND2	1.18	2	4
OND3	0.73	<1*	<1*
OND4	2.23	4	7
OND5	2.63	4	8
OND6	2.24	3	7
OFD1	0.40	1	1
OFD2	0.15	<1*	<1*
OFX1	0.66	<1*	<1*
OFX2	0.36	<1*	1
OFX3	0.34	<1*	1
OFX4	0.25	<1*	1
OFX5	1.62	2	4
OFX6	0.35	<1*	1
OFX7	0.65	<1*	1

*A 0.5 CFS DURING THE 100-YEAR STORM EVENT IS ASSUMED FOR CALCULATIONS.

CONCENTRATION POINT SUMMARY TABLE

CONCENTRATION POINT	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
CON1	35	543
CON2	9	376
CON3	16	174

CON1 = (OND1 + OND2 + OND3 + OFX1 + OFX2) + NORTH FLOW + CP-2
 CON2 = (OND4 + OND5 + OFX3 + OFX4 + OFX5) + OVERFLOW
 CON3 = (OND6 + OFX6 + OFX7) + CP-4 + OVERFLOW

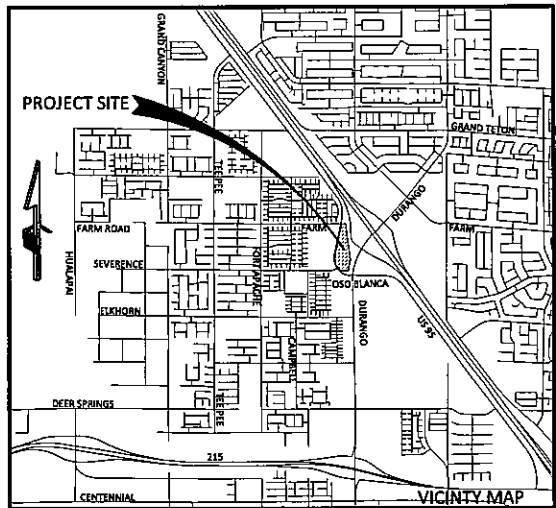
FLOW DEPTH ANALYSIS SUMMARY

SECTION	STREET WIDTH (FT)	Q ₁₀₀ (CFS)	SLOPE (%)	D ₁₀₀ (ft)	V ₁₀₀ (ft/sec)	Q ₁₀₀ x V ₁₀₀
(FM1)	80	209	3.4	0.81	8.28	6.71
FM1	90	312	0.61	1.16	5.92	6.87
FM2	-	308	1.17	3.89	4.03	-
FM3	-	309	2.20	3.19	5.01	-
FM4	-	123	1.60	2.17	2.89	-
FM5	-	494	6.35	2.80	2.76	-
FM6	-	329	5.40	1.35	4.20	-
OSO OBN	54	199	0.42	1.36	5.66	7.70
OSO S-3	90	4	0.61	0.34	1.72	0.58
OSO N-3	90	6	0.51	0.37	1.99	0.74

BOX CULVERT FLOW

BOX	Q ₁₀₀ (CFS)
NORTH	233
MIDDLE	206
SOUTH	163

- Q_{10/100} PEAK 10 YR FLOW / PEAK 100 YR FLOW
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA FLOW DIRECTION
- OND1 AREA DESIGNATION
- CP-1 ● EXISTING CONCENTRATION POINT
- CON ● PROPOSED CONCENTRATION POINT
- (FM1) — LOCATION OF HYDRAULIC CROSS SECTION



DURANGO & 95 COMMERCIAL
 APN: 125-17-301-006
DEVELOPED CONDITION DRAINAGE BASIN MAP

DATE: 5/28/2014
 JOB NUMBER: 4114
 DESIGNED: B.ZAHEDI, P.E.
 DRAWN: P. FRITZ, P.E.
 CHECKED: P. FRITZ, P.E.
 SHEET NUMBER

FIGURE 12



ADDENDUM #1 to the TECHNICAL DRAINAGE STUDY for DURANGO & 95 COMMERCIAL

APN 125-17-301-006

April 2014

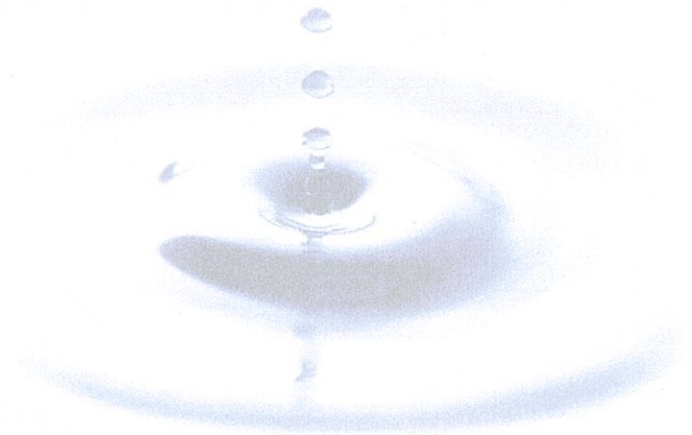
CIVIL SQUARED ENGINEERING PROJECT NO. 4114

**Prepared for:
Mr. David Brown
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9910 W. Cheyenne Ave.
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702-643-4940



3130 S. Durango Drive, Suite 404
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www.civilsquared.com



April 22, 2014

John Alabado
City of Las Vegas Land Development Services
Department of Planning
333 N. Rancho Dr., 1st Floor
Las Vegas, NV 89106

PLANS APPROVED
PLANNING
Building & Safety Dept.
City of Las Vegas, Nevada
* GRADE DIFFERENTIAL ONLY
JA APR 22 2014

Conforms to the minimum requirements of
LVMC Title 19, applicable Master Plan
development standards and/or Conditions of
Approval. Make No Change Without Approval.
Plan is Not a Permit to Violate Any Ordinance.

civilsquared
engineering

**RE: Durango & 95 Commercial – Technical Drainage Study
Justification for Grade Difference**

Dear Mr. Alabado:

As required by comment #1 of the remarks section of the drainage response letter received from the City of Las Vegas Flood Control on 31 March 2014, this letter and attached plans are provided as a justification to allow a grade difference of two feet above or below existing grade. The grade difference refers only to the northern portion of this site, the mini-storage, per SDR-52440. The southern portion of the property is shown graded for the overall technical drainage study and is conceptual at this time; however, it needs to be shown and referenced in order to give an order of magnitude to the property as a whole. It is our understanding the southern portion of the site will be subject to its own SDR and separate grade differential justification letter at the time of development in the future.

The overall desire for the proposed project is to make the property useable. As the site exists today the natural grade slopes excessively from west to east and has a 5-foot to 10-foot ledge running north to south. Additionally, two pipes discharge onto the site at a grade about nine feet below natural grade. If the site were constrained by the two foot rule this property could not be developed without undue hardship on the owner.

The proposed buildings are variable in size and length to allow more flexibility in the overall design of the parcel. The elevations of the finished floors of the mini storage and conceptual buildings were set to reduce the total amount of fill being brought into the site. Although the elevations were set well below the Oso Blanca roadway, and over two feet of cut in areas, an excessive amount of fill will still be required to make the overall parcel useable. Each building is still flood protected per the City's flood control requirements by creating a hump in the driveways and installing a flood wall along the back of sidewalk at the right-of-way.

Along the east edge of the property a variable height retaining wall (6-10 feet high) will be installed to help reduce the potential excessive slopes in the parking lots and raise the site to avoid flooding for the 717 cfs discharging down Farm Road. The elevated height puts the site safely above the three existing NDOT culverts east of the property.

CIVIL SQUARED ENGINEERING, LLC, 3130 S. DURANGO DRIVE, SUITE 404, LAS VEGAS, NEVADA 89117
(702) 248-8000 • FAX (702) 248-8070 • www.civilsquared.com

Keeping the excavations to two feet above or below existing grade would cause an undue burden on the project by reducing the useable area to less than 50 percent. The site is bordered on the east by the Durango off-ramp which is about 25-feet higher than the property line. The west edge fronts Oso Blanca Road and a multi-family development and is proposed to be about five feet below the roadway.

The project site is flood protected according to the criteria stipulated in "Hydrologic Criteria and Drainage Design Manual" of Clark County Regional Flood Control District. We request approval from the City Planning and Development Department to allow the grade difference greater or less than two feet above or below existing grade.

We hope all your concerns have been addressed and if you have any questions or comments, please feel free to contact me at any time at 248-8000 or pfritz@civilsquared.com to discuss.

Respectfully,

Paul F. Fritz, P.E.
Civil Squared Engineering

Encl: Grading and Detail Sheets
Drainage Comment Sheet

h:\cad\andw\114\admin\drainage\technical drainage study\comments\justification letter grade difference - rev1.doc

April 22, 2014

Albert Sung
City of Las Vegas Flood Control
333 N. Rancho Drive
Las Vegas, NV 89106



3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
Phone: (702) 248-8000
Fax: (702) 248-8070
www.civilsquared.com

**SUBJECT: TECHNICAL DRAINAGE STUDY FOR DURANGO & 95 COMMERCIAL
(DS 4660A)
Civil Squared Engineering Project No. 4114**

Dear Mr. Sung:

This Addendum #1 is being submitted to City of Las Vegas Flood Control Division to address the review comments to the above mentioned study that were issued on March 31, 2014. The comments are reiterated for your convenience. A copy of the comment letter is included in Appendix A.

Comment #1

Sites with a grade difference of 2 feet above or below existing are required to have approval from the *City Planning and Development Department*. The engineering 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 Planning approval with the next submittal.

Response #1

A justification letter was submitted to City Planning for review and comment. John Alabado replied that the letter would refer to the mini-storage portion only. The southern portion of the site will be subject to its own SDR and grade differential letter at a time when the parcel is developed. Letter and responses are included in Appendix A.

Comment #2

Provide a copy of the zoning/planning conditions associated with this site (PMP-52656; SDR-52440; VAR-52439; SUP-52438) 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 #2

Copies of requested documents are included in Appendix A.

Comment #3

The project proposes to construct facilities (riprap pads in couple locations) and/or increase flows within Nevada Department of Transportation (NDOT) right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project. NDOT concurrence for the proposed drainage study must be obtained prior to the final approval of the study by the *City of Las Vegas*.

Response #3

The original submittal study and this addendum have been submitted to NDOT for review, concurrence and encroachment permit. Once approval from NDOT is received, we will forward copies to CLV Flood Control for final approval of the study.

Comment #4

The study stated that RAN 746 (24"-CMP had been built over/abandon in place upstream during construction of the apartment project. Provide documentation or construction plans for verification in the next submittal.

Response #4

Per Sheet GR2 of the Farm Road / US95 Grading Plan RAN 746 is to be abandoned. Also on sheet GR6 of the Fairfield at Farm Road / US95 Grading Plan the upstream development does not tie into the facility. Per Sheet ST3 Oso Blanca Improvements the line is to be abandoned. Lastly, physical evidence in the field indicates that there are no manholes or drop inlets which connect to RAN 746 (see Appendix D for referenced plans).

Comment #5

A recent Capital Improvement Project for "Rancho System – Fort Apache Storm Drain" identified the Master Plan Update (MPU) flow rate within Farm Road at about 790 cfs during a major storm event at the intersection of Farm and Grand Canyon. There are also two (2) MUP basins downstream of this point that impact the Farm and Oso Blanca intersection area being proposed for the subject development.

The engineer must provide a detailed analysis of the offsite flows that impact this site as the identified flow of 226 cfs (REF1) shown in the last submittal underestimates the



existing flow impacts. The MPU flow rate within Farm Road will necessitate that a future MPU Facility be extended in Farm Road from the US95 MPU Facility Westerly to Hualapai.

However, this development must be able to accommodate the interim drainage impacts from this higher existing 100-year flow rate. It appears that the proposed northern retaining wall constricts the flow conveyance in the proposed condition and will cause big negative impact to the intersection area. Provide hydraulic calculations to compare the existing and proposed condition water surface profiles and verify whether the downstream NDOT culverts have capacity base on the new and higher flow rate.

Response #5

Our analysis and review starts with the goal of determining the offsite flow rates that impact the intersection of Farm Road and Oso Blanca Road. To do this we have backed up to the intersection of Farm Road and Grand Canyon Dr. From the HEC-1 WEST3.OUT file taken from the CCRFCD website, the combined ratio 2 hydrograph at this intersection depicts a flow rate of 786 cfs from basin NW55-C and is being used as the base for Farm Rd flows. Evaluation continued east on Farm Rd. to determine additional discharges into this flow from basins: NW66-C (south), NW89-C (north) and NW103-C (south).

Review of NW66-C to the south indicates that all flows discharge to the south and do not impact Farm Rd. Review of NW89-C to the north of Farm Rd before Fort Apache are as follows: Terrasano discharges east to Tee Pee and flows north (no impact), the empty lot east of Terrasano discharges east into Centennial Heights via two drainage easement channels (no impact), and Centennial Heights accepts the flows from the empty lot to the west and discharges site flows to the northeast corner of the site into Fort Apache and flows north (no impact). At the intersection of Farm Rd and Fort Apache, Fort Apache has a high point, and the road slopes to the north and to the south respectively. At the intersection, Per figure 4 & 5 of the Astoria at Town Center North studies, 126 cfs from Farm Rd discharges to the north with the remaining 660 cfs flowing east in Farm Rd. See maps and data in Appendix B.

For Farm Rd from Fort Apache to Oso Blanca, the roadway is potentially affected by NW89-C to the north and NW103-C to the south. Per the approved drainage study basin map for Astoria at Town Center North the project discharges overland to the east and empties into Oso Blanca north of the Farm road intersection (no impact). NW103-C has two approved studies, Astoria at Town Center South and Fairfield at Farm Road US95, which discharge into Farm Road. Per the basin maps included in Appendix D the flows discharging into Farm are 37 cfs and 17 cfs respectively. Per figure 4 of the Astoria at Town Center North study, 40 cfs will be conveyed along Farm Road to the east. We will use the more conservative value of 40 cfs in lieu of the 37 cfs for our calculations. See maps and data in Appendix B.



Adding all the contributing flows together yields a total of about 717 cfs at the intersection of Farm Road and Oso Blanca Road. The developed basin map has been updated to include this value and is shown in Figure 12, Appendix B.

The next step was to analyze the intersection to see what flows would discharge onto the site. As noted in the original study there is an existing dual drop inlet/SD system which removes 24 cfs from surface flow in the intersection and bubbles out to the east on the subject property. Since Oso Blanca slopes to the north, the first analysis was done to determine the flow conveyed to the north. The flow rate to the north will be the amount conveyed in the irregular channel calculation for Oso Blanca with depth set at the top of the median island curb since after that depth is reached, flows will overtop and head east. A second calculation for a broad-crested weir along the centerline of Oso Blanca, from median nose to median nose was run to determine the depth of flow east in Oso Blanca. As shown in FlowMaster Section OBN in Appendix C, the discharge to the north for the irregular channel is about 199 cfs. Subtracting this amount and the 24 cfs (from the underground system) from the 717 cfs yields a flow rate of 494 cfs weir flowing over the Oso Blanca centerline at about 1.21-feet deep (See Appendix C for weir section). This will combine with the flows from CP-6 (basins OFD1, OSO2, OSO1), OND1, Bubbler SD system and OFX1) and represent the flow rate affecting the North Edge of the parcel at about 525 cfs. A flood wall is proposed along this edge at a height of six inches above the 1.21-foot depth or 1'-9" min. This north flow will combine with OFX2, OND2, OND3 and CP-2 (36-inch pipe flow) at CON1, which will reach the north box culvert with a total of about 543 cfs.

The box itself can convey the 543 cfs at a depth of 2.80-feet (see North Box Capacity in Appendix C); however, the culvert is inlet controlled. Using a conservative approach we ran iterations of a rectangular orifice calculation for the North 3'x 6' box and an irregular section (section FM2) at the constriction point until a headwater depth balance was achieved at about 19.50. We also checked the elevations with the rating curves for each (see Appendix C). This elevation established the head available to "push" the flow through the box with the remaining cfs running south overland to the middle box. The results show about 188 cfs enters the north box with the remaining 355 flowing south. A second pinch point for overland flow was analyzed for depth of flow (section FM3) with a resulting depth of flow at 18.96 which confirms the flow to the south.

The 355 cfs is combined with the 21 cfs generated from the site runoff (OND5, OND4, OFX4, OFX5, and OFX5 = 376 cfs) and flows toward the middle culvert at CON2. This culvert is also inlet and headwater controlled and will act in the same manner as the north culvert increasing



discharge until it overtops the next highpoint to the south (section FM4) and the remaining flows are conveyed into the south culvert. The final onsite flows (OND6, OFX7, OFX6 and CP-4 (pipe flows) = 38 cfs) will generate enough head on the south and middle boxes, (without overtopping the Durango intersection) to equalize at a total flow rate of 414 cfs and an elevation of about 14.07 (see orifice and curve calculations in Appendix C). The middle box will convey about 236 cfs and the south box will convey the final 178 cfs.

This overall concept is a very conservative, worst-case scenario approach. Flows could have been conveyed north at the Farm/Oso intersection along the east side of Oso Blanca if reduced flow rates were needed. Additionally the ponding volume could have been considered to increase the flow into the north and middle culverts had the south culvert not been able to handle the flow. The water surface elevation at the south box reaches a maximum elevation of 14.07 and the breeching elevation at the back of sidewalk at the Durango/Oso intersection is 19.39, creating about five feet of freeboard. The minimum grades of the wall protecting the site are also above this water surface elevation. Since the conservative approach worked, a secondary approach was not calculated.

The total flow from Farm Road + local onsite and offsite flows = 800 cfs. The 199 cfs diverted north + the total flow out of the three culverts = 801 cfs.

Comment #6

Sheet C4.01: It is not clear how the drainage along a proposed "L"-curb at the east property line discharge at the northeast corner. Is it through a wall opening or something?

Response #6

We have added a wall drain detail on the detail sheet and added a construction note on the plans.

Comment #7

Sheet C4.02: there is a low point "15.06 FG/LP" at the southeast corner of the plan appears to be not discharging to anywhere. There is also another low point at about 160' north of the stated low point in the same dilemma. Revise and revise accordingly.

Response #7

Curb cut construction note has been added to each of the locations and detailed on the detail sheet.

Comment #8



Sheet C4.03: The hump in the driveway entrance off of Severance Lane intersection does not have six inches (6") minimum freeboard. Review and revise accordingly.

Response #8

Driveway hump has been raised to provide 6-inch minimum freeboard.

Comment #9

Sheet C8.01:

Detail Section H: Raise the height of the flood wall portion from 1.33' to 1.5'

Detail Section M: Raise the height of the flood wall portion for 1.33' to 2.0'

Response #9

Detail Sections H and M have been revised accordingly.

Comment #10

All drainage easements must be "public drainage easements to be privately maintained" to be labeled on the grading plans and to be dedicated as such in the final map or by separate document if final map does not apply.

Response #10

All drainage easements have been labeled "private drainage easements to be privately maintained". Easements will be dedicated on the parcel map currently in for recordation with Bart Anderson.

Comment #11

The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

Response #11

Public drainage quantities have been added to applicable sheets.

Comment #12

It appears that the subject property has a parcel map (PMP) application and yet the improvement plans do not show any parcel limits. Address whether the development exists as one single lot or in more than one parcels eventually in the next submittal.



Response #12

The subject property has a parcel map application in and the map is being reviewed. The owner is planning on selling the north portion of the parcel to the mini-storage developer (SDR-52440). The proposed property line between the north and south parcels has been added to the plans to delineate the two lots. It is noted that the parcel map cannot be released to record until the parcel map requirements have been met; which includes drainage requirements (see Parcel Map in Appendix E).

Comment #13

City of Las Vegas does not allow HDPE pipe in public right-of-ways or public drainage easements. Note that City of Las Vegas only allows the use of HDPE storm drain pipes for privately owned and privately maintained storm drain systems which serve and are located exclusively on private properties. Any proposed HDPE storm drain pipes must also meet all design criteria established by the Clark County Regional Flood Control District and must be installed per Clark County Regional Transportation Commission Uniform Standard Drawings and Specifications.

Response #13

RCP is now specified for all pipes within public drainage easements.

Comment #14

Label existing storm drain systems in the perimeter streets with City of Las Vegas recorded drawing number on all pertinent plans.

Response #14

Storm drain has been labeled accordingly.

Comment #15

Show the finished floor elevation of all existing buildings adjacent to Oso Blanca Road.

Response #15

Adjacent finish floor elevations have been labeled accordingly.

Comment #16

Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (Storm water Quality Management Stamp and Sign Detail.



Response #16

Noted and updated accordingly on plans.

Comment #17

Regarding best management practices, fine, close-growing, water resistant grasses in the proposed landscape swale areas are preferred. Clearly identify as such on all pertinent plans.

Response #17

Noted and updated accordingly on plans.

Comment #18

Provide a note on all grading plans: "Property owner is responsible to maintain the best management practices such as but limited to the removal of accumulated sediment and debris and care of the vegetation"

Response #18

Noted and updated accordingly on plans.

We hope this addresses your concerns regarding this project. If you have any questions or additional information is needed, please feel free to contact this office.

Respectfully,

Paul F. Fritz, P.E.
Civil Engineer
Civil Squared Engineering





Memorandum

Department of Public Works
City Engineer Division
Survey Section

Phone (702) 229-6217
Fax (702) 804-8582
www.lasvegasnevada.gov

From: ALAN R RIEKKI, PLS - CITY SURVEYOR
To: PETER LOWENSTEIN - DEPARTMENT OF PLANNING
STEVE SWANTON - DEPARTMENT OF PLANNING
HERITAGE SURVEYING
F N B N-C M L O N I L L C - % SORENSON GROUP MGT
LAND DEV ASSOCIATES INC
DENNIS LAYTON, PLS - HERITAGE SURVEYING
CC: BART ANDERSON, P.E. - Engineering Project Manager
Date: February 11, 2014
RE: **PARCEL MAP 52656 - OSO BLANCA & DURANGO PARCEL MAP**

Attached is a redlined drawing delineating comments for the above map. **THE REDLINED PRINT MUST BE RETURNED TO SURVEY ALONG WITH A CORRECTED DRAWING FOR APPROVAL.**

603415 CURRENT PL Status: Conditional Approval February 04, 2014

If you have any questions regarding the following Planning comments please call 229-6301
Department of Planning staff has administratively approved your request for technical review of the subject parcel map, subject to the changes and corrections noted as follows:

1. The parcel file number "PMP-52656" shall be placed above the Recorder's block in the lower right hand corner of the cover sheet.
2. Change the title of the planning jurat from "Director of Planning" to "Certificate of Director of Planning Approval."
3. Please remove the word "DATE" on the Director's signature line.
4. Add the name of the Director of Planning as "Flinn Fagg, AICP."

606862 DEVCO Status: Conditional Approval February 11, 2014

If you have any questions regarding the following Development Coordination comments please call 229-6541

REVISED COMMENTS: -- These comments supersede all previous memos/comments:

We note that normally off-site improvements are required with Parcel Map applications, however this site has an associated Site Development Plan Review (SDR-52440) in which off-site improvements are proposed to coincide with phased development. Therefore, no improvements or bonds are required with the recordation of this Parcel Map.

We also note that the City has received several requests similar to this Parcel Map which were later modified at the applicant's request to be turned into commercial subdivisions. While we can

approve this Parcel Map request, we suggest that the commercial subdivision option be explored prior the resubmittal of this Parcel Map.

CONDITIONS OF APPROVAL:

1. Provide a note on the mylar of this map that states "All lots within this Parcel Map shall have perpetual inter-site access rights. No barriers (e.g. curbs, wall, etc.) shall be erected within the boundaries of the overall Parcel Map which would prohibit any vehicle on this site from utilizing any driveway connecting this commercial development site to the abutting public streets unless incompatible uses can be demonstrated to the satisfaction of the City Engineer."
2. The boundary of this Parcel map shall be revised to match what is shown as the legal parcel on the Clark County Assessor's Map. Alternatively, provide documentation to the satisfaction of the City Surveyor that the "not a part" portions of this Parcel Map are separate legal Parcels.
3. Prior to the recordation of this Parcel Map or the submittal of any construction drawings, a Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works. No building or grading permit can be issued until this drainage plan/study is received and approved. The drainage plan/study is required at this time to determine what elevation structures should be built at to achieve a minimum protection from floodwater damages, and also to determine what drainage easements, if any, are necessary and are needed to be noted on this parcel map prior to recordation. Provide and improve all drainageways as recommended in the City of Las Vegas Neighborhood Drainage Studies and in the approved drainage plan/study. The Drainage Study required by SDR-52440 maybe used to satisfy this condition provided that it addresses the areas covered by this Parcel Map.
4. These conditions of approval are valid only for a period of one year. The City of Las Vegas reserves the right to modify or add conditions of approval if this parcel map is not recorded within one year of the date of this memo. Construction plans approved subsequently are valid only for a one year period following the date of this memo unless Public Works allows the plans to be valid for a longer period of time.
5. Comply with all applicable condition of SDR-52440 and any other site related actions. If SDR 52440 is not approved, these conditions are not valid and new conditions must be issued which address only this Parcel Map.

603416 SURVEY Status: Denied February 05, 2014

If you have any questions regarding the following Survey comments please call 229-6217

Please provide a Las Vegas Valley Water District jurat concerning water service for the proposed parcel split. A submittal should be made to the Las Vegas Valley Water District in order to determine which jurat is appropriate for this property.

Please provide a total acreage for the property.

Please correct minor labeling issues as marked.

End of Comments.





LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Sorenson Group Mgt.
FNBC-CMLON I, LLC
299 South Main Street, #2200
Salt Lake City, Utah 84111-2288

**RE: SDR-52440 [PRJ-52157] - SITE DEVELOPMENT PLAN REVIEW RELATED TO
SUP-52437 AND SUP-52438
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Site Development Plan Review FOR A PROPOSED THREE-STORY, 122,325 SQUARE-FOOT MINI-STORAGE FACILITY WITH A WAIVER OF THE TOWN CENTER DEVELOPMENT STANDARDS TO ALLOW 10% OPEN SPACE WHERE 20% OPEN SPACE IS REQUIRED on 2.90 acres at the southeast corner of Farm Road and Oso Blanca Road (portion of APN 125-17-301-006), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-52157], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval for Special Use Permit (SUP-52437) and Special Use Permit (SUP-52438) 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 combined site plan and landscape plan, date stamped 01/14/14, and the building elevations and floor plans, dated stamped 12/26/13, except as amended by conditions herein.
4. A Waiver from the Town Center Development Standards Manual is hereby approved, to allow 10% open space where 20% open space is required.
5. All recreational vehicles shall be completely screened from view from surrounding properties and abutting streets by exterior walls.
6. 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.

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301

FAX 702.474.0352

TTY 702.386.9108

www.lasvegasnevada.gov

7. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
8. The applicant shall coordinate with the City Surveyor and other city staff to determine the most appropriate mapping action necessary to consolidate the existing lots. The mapping action shall be completed and recorded prior to the issuance of any building permits.
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, and 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.
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

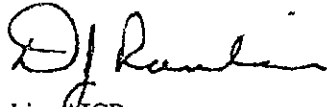
12. In accordance with code requirements of Title 13.56, construct all incomplete half-street improvements on Oso Blanca Road adjacent to this site concurrent with development of this site as required by the Department of Public Works. Construction of off-site improvements may be phased so that off-site improvements will be required concurrent with adjacent onsite development activities. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.
13. Obtain an Occupancy Permit from the Nevada Department of Transportation (NDOT) for all driveways or other private improvements in the Oso Blanca Road public right-of-way adjacent to this site prior to constructing any improvements within NDOT jurisdiction.
14. Meet with the Fire Protection Engineering Section of the Department of Fire Services to discuss fire requirements for this site.
15. 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.
16. As appropriate, submit an Encroachment Agreement to the City of Las Vegas or obtain an Occupancy Permit from the Nevada Department of Transportation for all landscaping and private improvements in the Oso Blanca Road public right-of-way adjacent to this site.

Sorenson Group Mgt.
FNBC-CMLON I, LLC
SDR-52440 [PRJ-52157] - Page Three
February 12, 2014

17. 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 **February 11, 2014** 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 please access <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after **February 24, 2014**. 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,



Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. James Meservey
StorageOne
2990 South Durango Drive
Las Vegas, Nevada 89117-4412

Mr. Bob Genzer
Genzer Consulting
9612 Hawksbill Court
Las Vegas, Nevada 89117-0646

John Martinez, Jr.

From: James Marshall <jmarshall@LasVegasNevada.GOV>
Sent: Monday, April 21, 2014 9:51 AM
To: John Martinez, Jr.
Subject: 125-17-301-006
Attachments: SDR-52440.pdf; SUP-52438.pdf; SUP-52437.pdf; PMP-52656.pdf

Attached are the conditions of approval for SDR-52440, SUP-52438 and SUP-52437.

VAR-52439 was removed and not needed.

PMP – 52656 – conditions of approval are administrative.

Jim Marshall
Senior Planner
333 N. Rancho Drive
Ph: 229-5274



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

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LAS VEGAS, NEVADA 89106

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TTY 702.386.9108

www.lasvegasnevada.gov

February 12, 2014

Sorenson Group Mgt.
FNBC-CMLON I, LLC
299 South Main Street, #2200
Salt Lake City, Utah 84111-2288

**RE: SUP-52437 [PRJ-52157] - SPECIAL USE PERMIT RELATED TO SUP-52438 AND
SDR-52440
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Special Use Permit FOR A PROPOSED MINI-STORAGE FACILITY WITH A WAIVER OF THE REQUIREMENT TO PROVIDE A RETAIL OR OFFICE FACADE ON ALL EXTERIOR WALLS at the southeast corner of Farm Road and Oso Blanca Road (portion of APN 125-17-301-006), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-52157], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

1. Conformance to all Minimum Requirements under Town Center Development Standards Manual for a Mini-Storage Facility use.
2. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-52440) 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. A Waiver from Town Center Development Standards Manual is hereby approved, to allow no retail façade where such is required.
5. 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.
6. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
7. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.



CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM

DATE:

July 29, 2014

TO:

Land Development Services
Department of Building & Safety

FROM:

Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works

SUBJECT:

Drainage Study for:

Durango & 95 Commercial – Phase 1 - Update

COPIES TO:

Civil Squared Engineering

Cross Streets:

SEC of Farm Road & Oso Blanca Road

DDB Holdings LLC

File Number:

F:\Depot\DSMemos\DS4660D.doc

Bart Anderson, P.E., DevCo

Parcel Number:

125-17-301-006

NDOT

Zoning Action:

PMP-52656; SDR-52440; VAR-52439;
SUP-52437 & SUP-52438

FEMA Flood Zone

YES

NO

X

Proposed Storm Drain

YES

NO

X

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal	3/13/2014	3/27/2014	Not Approved	\$400.00	350812: \$400
2 nd Submittal	4/28/2014	5/12/2014	Not Approved	\$400.00	355003: \$400
3 rd Submittal	5/28/2014	6/18/2014	Approved	\$400.00	358354: \$400
4 th Submittal	7/14/2014	7/28/2014	See Comments Below	\$100.00	363730: \$100
TOTAL FEES (LDDRS):				\$1,300.00	****

REMARKS:

4th Submittal: Update to revise the finish floor elevation and the grading in Phase 1 Improvement

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

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

1. The approval of this drainage study update is limited to the *Phase 1 Development* only (northern half of the subject site). *Upon Phase 2 development, a 2'-grade difference from the City Planning Department will be required for its improvements.*
2. The project proposes to construct facilities (riprap pads in couple locations) and/or increase flows within *Nevada Department of Transportation (NDOT)* right-of-way. The engineer must contact NDOT for encroachment permit for the proposed project.
3. The engineer must provide a table on the grading plans that shows a quantity estimate of all drainage improvements within Public Drainage Easements. All drainage improvements within Public Drainage Easements must be bonded and inspected.

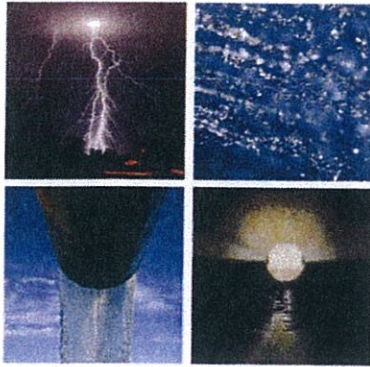
NOTE: Any future changes to the proposed design (or design assumptions) as outlined in the approved drainage study and attached preliminary grading plan which affect drainage must be addressed in a Drainage Study Update and accepted by the *City of Las Vegas Flood Control Section*. Additionally, conditional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

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

END OF REMARKS

ays

T/R/S: T19S/R60E/17
AREA G-17



Rec'd: 7/17/14

**UPDATE TO THE
TECHNICAL DRAINAGE STUDY
FOR
DURANGO & 95 COMMERCIAL**

APN 125-17-301-006

*DS 4660-1
G-17*

July 2014

CIVIL SQUARED ENGINEERING PROJECT NO. 4114

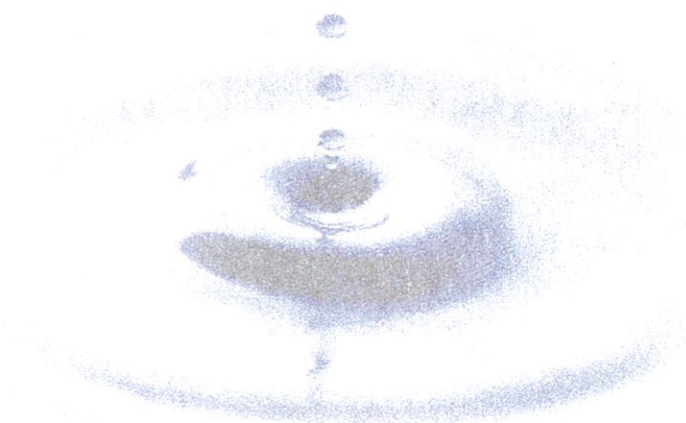
\$100-

Prepared for:
Mr. David Brown
DDB Holdings LLC
9910 W. Cheyenne Ave.
Las Vegas, NV 89129

702-643-4940



3130 S. Durango Drive, Suite 404
Las Vegas, Nevada 89117
Phone: (702) 248-8000
Fax: (702) 248-8070
www.civilsquared.com





July 8, 2014

Albert Sung
City of Las Vegas Flood Control Section
Public Works Department
333 N. Rancho Drive
Las Vegas, NV 89106

**SUBJECT: UPDATE TO THE TECHNICAL DRAINAGE STUDY FOR DURANGO & 95
COMMERCIAL (DS# 4660C)
Civil Squared Engineering Project No. 4114**

Dear Mr. Sung:

We are submitting for your review and approval an update to the Technical Drainage Study for Durango & 95 Commercial project (DS# 4660C). The purpose of this update is to address changes made to the Phase-I site plan subsequent to the City of Las Vegas approval. A copy of the Drainage Study Approval Letter from City of Las Vegas Flood Control section has been included in Appendix C.

Since approval of the above mentioned Drainage Study, the developer of Phase I has made the following changes: the alignment of the 36-inch RCP storm drain (North Storm drain), off-site grading to the east, onsite local grading, building size and revised/stepped finish floor elevations. Although the site has changed, the general overall Phase I flow patterns were not affected by the changes and remain the same as the approved study.

According to the Clark County Regional Flood Control District 2013 Las Vegas Valley Flood Control Master Plan Update, the project is adjacent to Regional Facility CN95 0068 in US 95; however, the project still does not affect the facility. Please refer to Figure 1 and 2 (a copy of F-13 of the Clark County Regional Flood Control District 2013 Las Vegas Valley Flood Control Master Plan Update) included in Appendix A.

Per Federal Emergency Management Agency (FEMA) Community Panel 32003C1745E, Clark County, Nevada and Incorporated Areas, effective September 27, 2002, the proposed site is located within unshaded Zone "X". Per FEMA, Unshaded Zone "X" is described as an area to be outside of the 500-year floodplain. Refer to Figure 3, FIRM Flood Insurance Rate Map, included in Appendix A.

Grading

The overall size of the proposed building #6 has decreased. The approved finished floor elevation was 2626.75 feet. The proposed building has since been divided into three different finished floor elevations: 2625.45, 2624.95 and 2624.45 feet. All finished floor elevations are above the 100-year water surface elevation adjacent to the building; however, the 6" free board criteria is not satisfied. To achieve 6-inches of free board, 6-inches of floodproofing material is proposed above the finished grade adjacent to the building's exterior walls. For the depth of flow around the building refer to FlowMaster sections FM8, 9 and 10 in Appendix B.

Storm Drain

The approved zigzag alignment of the north 36-inch RCP has been replaced with a straight alignment. The proposed straight 36-inch RCP intercepts the off-site flow as approved and also discharges at the same location as approved. The XPWSPG model and the riprap calculation have been revised. Please refer to Appendix B for the riprap calculation and XPWSPG input and output results.

Off-site Grading

The off-site grading east of the property has been revised to reduce the height of the retaining wall. Due to this grading change, the intercepting capacity of the three existing 6'x3' RCBs has changed. To reflect the changes the FlowMaster sections: FM-2, FM-3, FM-4, FM-6 and the RCB Capacity Calculation have been updated and are included in Appendix B.

The grading and storm drain changes are shown in the form of redline revisions to the approved improvement plans and a new grading sheet, which are included in Appendix D.

Please note that, the size of Basin OND3 and OND4 have been slightly changed to reflect a minor on-site grading change. A 0.45 acre portion has been added to OND3 ($0.73+0.45= 1.18$ Acre) and OND4 is decreased by the same amount ($2.23-0.45 = 1.78$ acre). Standard Form 4 and HEC-1 have been revised and are included in Appendix B. Note: on the approved standard form 4, the area of OND3 was previously mistyped and showed <1 cfs flow. All affected calculations been revised.

We look forward to your acceptance of this Update to the Technical Drainage Study for Durango & 95 Commercial. If you have any questions or additional information is needed, please feel free to contact our office.

Respectfully,



Said A. Mohammed, P.E.
Project Engineer
Civil Squared Engineering



Paul F. Fritz, P.E.
Project Manager
Civil Squared Engineering



TIME OF CONCENTRATION															
DEVELOPMENT:				DURANGO & 95 COMMERCIAL				STANDARD FORM 4				DATE: 7/10/2014			
SUB-BASIN DATA				INITIAL / OVERLAND TIME (t _i)				TRAVEL TIME (t _r)				t _c CHECK (URBANIZED BASINS)		FINAL t _c	
DES.	K	AREA	AREA	LEN.	SLOPE	t _i	LEN	SLOPE	VEL (V ₁)	VEL (V ₂)	t _r	TOTAL LENGTH	t _c (L/180) +10	Min	REMARKS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10a)	(10b)	(11)	(12)	(13)	(14)	(15)
DEVELOPED ONSITE															
OND1	0.8244	0.11	0.0002	14	0.50	2.34	118	4.24	4.16	N/A	0.47	132	10.73	5.00	92.0
OND2	0.8376	1.18	0.0018	35	1.50	2.44	364	2.20	3.00	N/A	2.02	399	12.22	5.00	93.0
OND3	0.8508	1.18	0.0018	35	1.50	2.32	110	0.93	1.95	N/A	0.94	145	10.81	5.00	94.0
OND4	0.8508	1.78	0.0028	112	0.60	5.63	385	2.99	3.49	N/A	1.84	497	12.76	7.47	94.0
OND5	0.8350	2.64	0.0041	144	1.39	5.13	445	1.90	2.78	N/A	2.66	589	13.27	7.79	92.8
OND6	0.8244	2.24	0.0035	52	0.80	3.85	359	2.23	3.02	N/A	1.98	411	12.28	5.84	92.0
OFD1	0.8442	0.40	0.0006	26	2.00	1.86	515	0.90	1.92	2.90	4.43	541	13.01	6.30	93.5
OFD2	0.8244	0.15	0.0002	5	2.00	0.88	631	1.26	2.27	3.43	4.31	636	13.53	5.19	92.0
OFX1	0.6264	0.66	0.0010	20	5.00	2.23	310	1.61	1.88	N/A	2.75	330	11.83	5.00	77.0
OFX2	0.6264	0.36	0.0006	16	3.10	2.34	96	3.12	2.61	N/A	0.61	112	10.62	5.00	77.0
OFX3	0.7320	0.34	0.0005	190	0.62	10.71	195	3.84	2.90	N/A	1.12	385	12.14	11.83	85.0
OFX4	0.7320	0.25	0.0004	21	4.76	1.80	70	2.14	2.17	N/A	0.54	91	10.51	5.00	85.0
OFX5	0.7320	1.62	0.0025	12	0.50	2.89	138	4.35	3.09	N/A	0.75	150	10.83	5.00	85.0
OFX6	0.6990	0.35	0.0005	20	0.50	4.07	70	3.57	2.80	N/A	0.42	90	10.50	5.00	82.5
OFX7	0.6264	0.65	0.0010	44	1.59	4.84	210	2.62	2.40	N/A	1.46	254	11.41	6.31	77.0

Travel Time Velocity Formulas*				* - See CCRFCD HC&DDM Sec. 602.1	
Existing		Developed		For the travel time (T _r) calculations:	
V ₁ = 14.8*(S/100) ^{1/2}		V ₁ = 20.2*(S/100) ^{1/2}		V ₁ applies to the first 500 feet of travel distance	
V ₂ = 29.4*(S/100) ^{1/2}		V ₂ = 30.6*(S/100) ^{1/2}		V ₂ applies to the remaining travel distance	

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1-----
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* JUN 1998
* VERSION 4.1
* RUN DATE 08JUL14 TIME 18:11:47
*-----

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

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X
X X X X X
X X XXXXXXX XXXXX XXX

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

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

1

HEC-1 INPUT

PAGE 1

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
          *DIAGRAM
1         ID      CIVIL SQUARED ENGINEERING
2         ID      DURANGO & 95 COMMERCIAL
3         ID      CITY OF LAS VEGAS, NV
4         ID
5         ID      DEVELOPED CONDITION
6         ID
7         ID      INPUT FILE :4114D.DAT
8         ID      OUTPUT FILE:4114D.OUT
9         ID
10        ID      *****
11        ID      *      ONSITE DRAINAGE BASIN AREA = 19.4 ACRES      *
12        ID      *      DEPTH-DURATION-FREQUENCY VALUE = 2.86-in    *
13        ID      *      DEPTH-AREA REDUCTION VALUE = 1.0            *
14        ID      *      STORM DISTRIBUTION #3                        *
15        ID      *      ABSTRACTION METHOD: SCS CN                    *
16        ID      *      HYDROLOGIC METHOD: SCS UH                     *
17        ID      *      ROUTING METHOD:                                *
18        ID      *      RATIO 1 = 10-YEAR EVENT                      *
19        ID      *      RATIO 2 = 100-YEAR EVENT                     *
20        ID      *      STARTED: 3/05/14                             *
21        ID      *      REVISED:                                     *
22        ID      *****
23        ID
24        JR      PREC . .564 1.000
25        IT      5      0      0      360
26        IO      5      0      0
27        IN      5      0      0
28        /KK     OND1
29        BA      .0002
30        PB      2.86
31        PC      .000 .020 .057 .070 .087 .108 .124 .130 .130 .130
32        PC      .130 .130 .130 .133 .140 .142 .148 .158 .172 .181
33        PC      .190 .197 .199 .200 .201 .204 .214 .229 .241 .249
34        PC      .251 .256 .270 .278 .281 .283 .295 .322 .352 .409
35        PC      .499 .590 .710 .744 .781 .812 .819 .835 .851 .856
36        PC      .860 .868 .876 .888 .910 .926 .937 .950 .970 .976
37        PC      .982 .985 .987 .989 .990 .993 .993 .994 .995 .998
38        PC      .998 .999 1.00
39        LS      0      92.0
40        UD      0.050
          *
41        /KK     OND2
42        BA      .0018
43        LS      0      93.0
44        UD      0.050

```


LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
45	/KK OND3
46	BA .0018
47	LS 0 94.0
48	UD 0.050
	*
49	/KK OFX1
50	BA .0001
51	LS 0 77.0
52	UD 0.050
	*
53	/KK OFX2
54	BA .0006
55	LS 0 77.0
56	UD 0.050
	*
57	/KK CON1
58	KM COMBINE BASINS OND1, OND2, OND3, OFX1, OFX2
59	HC 5
	*
60	/KK OND4
61	BA .0028
62	LS 0 94.0
63	UD 0.075
	*
64	/KK OND5
65	BA .0041
66	LS 0 92.8
67	UD 0.078
	*
68	/KK OFX3
69	BA .0005
70	LS 0 85.0
71	UD 0.118
	*
72	/KK OFX4
73	BA .0004
74	LS 0 85.0
75	UD 0.050
	*
76	/KK OFX5
77	BA .0025
78	LS 0 85.0
79	UD 0.050
	*

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
80	/KK CON2
81	KM COMBINE ONSITE BASINS OND4, OND5, OFX3, OFX4, OFX5
82	HC 5
	*
83	KK OND6
84	BA .0035
85	LS 0 92.0
86	UD 0.058
	*
87	KK OFX6
88	BA .0005
89	LS 0 82.5
90	UD 0.050
	*
91	KK OFX7
92	BA .0010
93	LS 0 77.0

94	UD	0.063	
	*		
95	KK	CON3	
96	KM	COMBINE ONSITE BASINS OND6, OFX6, OFX7	
97	HC	3	
	*		
98	KK	OFD1	
99	BA	.0006	
100	LS	0	93.5
101	UD	0.063	
	*		
102	KK	OFD2	
103	BA	.0002	
104	LS	0	92.0
105	UD	0.052	
	*		
106	ZZ		

1

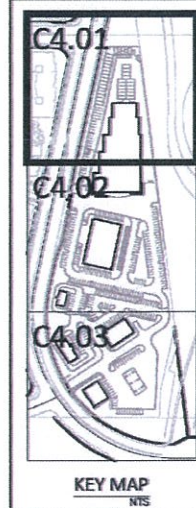
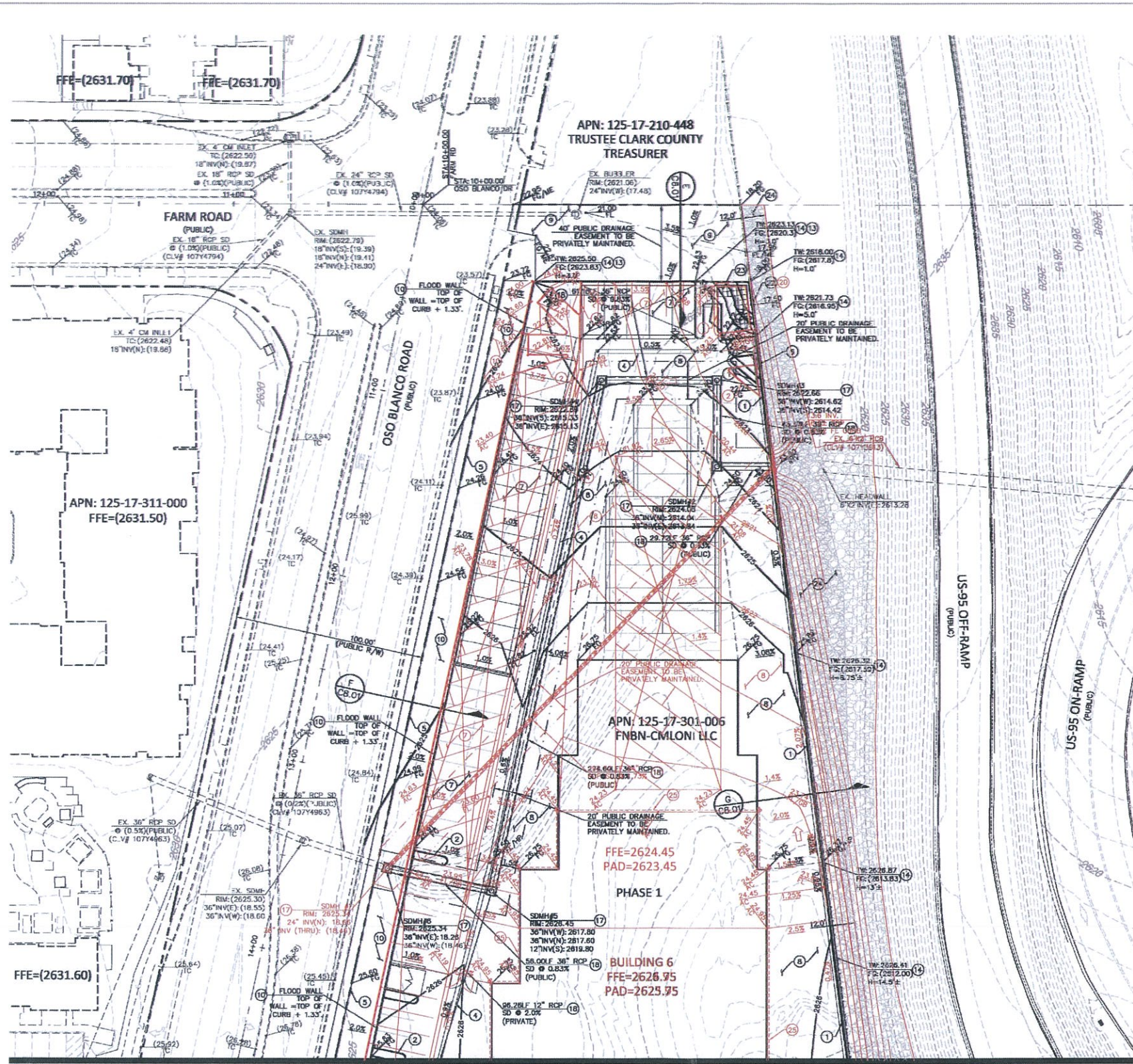
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
28	OND1	
	.	
41	OND2	
	.	
45	OND3	
	.	
49	OFX1	
	.	
53	OFX2	
	.	
57	CON1	
	.	
60	OND4	
	.	
64	OND5	
	.	
68	OFX3	
	.	
72	OFX4	
	.	
76	OFX5	
	.	
80	CON2	
	.	
83	OND6	
	.	
87	OFX6	
	.	
91	OFX7	
	.	
95	CON3	
	.	
98	OFD1	
	.	
102	OFD2	

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HYDROGRAPH AT +	OND3	.00	1	FLCW TIME	2. 3.50	4. 3.50
HYDROGRAPH AT +	OFX1	.00	1	FLOW TIME	0. 3.50	0. 3.50
HYDROGRAPH AT +	OFX2	.00	1	FLOW TIME	0. 3.50	1. 3.50
5 COMBINED AT +	CON1	.00	1	FLOW TIME	4. 3.50	9. 3.50
HYDROGRAPH AT +	OND4	.00	1	FLOW TIME	3. 3.50	6. 3.50
HYDROGRAPH AT +	OND5	.00	1	FLOW TIME	4. 3.50	8. 3.50
HYDROGRAPH AT +	OFX3	.00	1	FLOW TIME	0. 3.58	1. 3.58
HYDROGRAPH AT +	OFX4	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	OFX5	.00	1	FLOW TIME	2. 3.50	4. 3.50
5 COMBINED AT +	CON2	.01	1	FLOW TIME	9. 3.50	19. 3.50
HYDROGRAPH AT +	OND6	.00	1	FLOW TIME	3. 3.50	7. 3.50
HYDROGRAPH AT +	OFX6	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	OFX7	.00	1	FLOW TIME	0. 3.50	1. 3.50
3 COMBINED AT +	CON3	.00	1	FLOW TIME	4. 3.50	9. 3.50
HYDROGRAPH AT +	OFD1	.00	1	FLOW TIME	1. 3.50	1. 3.50
HYDROGRAPH AT +	OFD2	.00	1	FLOW TIME	0. 3.50	0. 3.50

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



BASIS OF BEARING
SOUTH 00°00'00" WEST, BEING THE WEST LINE OF THE GOVERNMENT LOT 11, LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS IN THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK # 51800 1758
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCO ROAD AND DURANGO DRIVE.
NAVD 88 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1988

CONSTRUCTION NOTES

- | NO. | ITEM | CAUSA: CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS |
|-----|---|--|
| 1 | CONSTRUCT TYPE 'L' CURB PER CAUSD NO. 216. | |
| 2 | CONSTRUCT TYPE 'A' CURB PER DETAIL 'A' SHEET C8.01. | |
| 3 | CONSTRUCT 0" TALL TYPE 'A' CURB PER DETAIL 'D' SHEET C8.01. | |
| 4 | CONSTRUCT 2" CONCRETE VALLEY GUTTER PER DETAIL 'B' SHEET C8.01. | |
| 5 | CONSTRUCT CONCRETE SIDEWALK PER CAUSD NO. 234. | |
| 6 | CONSTRUCT CONCRETE CHANNEL PER DETAIL 'C' SHEET C8.01. | |
| 7 | CONSTRUCT 3" AC PAVEMENT OVER 4" TYPE II A.B. (CAR TRAFFIC) | |
| 8 | CONSTRUCT 4" AC PAVEMENT OVER 6" TYPE II A.B. (TRUCK TRAFFIC) | |
| 9 | CONSTRUCT 6" CONCRETE OVER 6" TYPE II A.B. WITH #4 BAR @ 24" O.C. EACH WAY. | |
| 10 | LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS. | |
| 11 | CONSTRUCT COMMERCIAL DRIVEWAY PER CAUSD NO. 222.1 AND 228. | |
| 12 | CONSTRUCT SIDEWALK RAMP PER CAUSD NO. 235 CASE 1. | |
| 13 | FLOOD WALL (SOLID GROUT FILLED). SEE STRUCTURAL PLANS FOR DETAIL. | |
| 14 | RETAINING WALL. SEE STRUCTURAL PLANS FOR DETAILS. | |
| 15 | INSTALL METAL END SECTION (SAFETY TYPE) PER NDOT STD. DWG R-2.5. | |
| 16 | CONSTRUCT HEADWALL PER NDOT STD. DWG R-2.5.1.1. | |
| 17 | CONSTRUCT 60" TYPE III MANHOLE PER CAUSD NO. 408. | |
| 18 | INSTALL STORM DRAIN PIPE (SIZE/TYP PER PLAN) PER CAUSD NO. 50. | |
| 19 | CONSTRUCT SIDEWALK DRAIN PER CAUSD NO. 236. | |
| 20 | CONSTRUCT 1.5' CURB OPENING PER DETAIL 'U' SHEET C8.01. | |
| 21 | INSTALL 16" AREA DRAIN (JENSEN D1616-HD) OR APPROVED EQUIVALENT WITH STORMWATER QUALITY MANAGEMENT STAMP PER CAUSD NO. 421. | |
| 22 | 16"x48" WALL OPENING PER DETAIL 'Y' SHEET C8.01. | |
| 23 | LANDSCAPE SWALE. FINE, CLOSE GROWING, WATER RESISTANT GRASSES (APPROVED EQUIVALENT). | |
| 24 | CONSTRUCT RIPRAP PER NDOT STD. DWG R-3.1.5. | |
| 25 | "FLOOD PROOF WALL" 6" ABOVE ADJACENT FINISH GRADE OF BUILDING. | |

SIGHT VISIBILITY ZONE LEGEND
SIGHT VISIBILITY ZONE
NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES AND STREETLIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT. SIGHT VISIBILITY ZONES WERE DESIGNED USING USDOCA 201.2

FLOOD ZONE NOTE:
THE PROJECT SITE LIES WITHIN ZONE X AS PER FEMA FIRM PANEL 30003G1745E DATED NOVEMBER 16, 2011.

PUBLIC DRAINAGE QUANTITIES:

ITEM	QUANTITY
12" RCP STORM DRAIN	97 LF
36" RCP STORM DRAIN	890 LF
TYPE III STORM DRAIN MANHOLE	6 EA
NDOT HEADWALL (SINGLE OUTLET)	1 EA
NDOT PIPE SAFETY END SECTION	1 EA
HEADWALL REMOVAL	2 EA
RIP-RAP 18" x 36" / 18" x 18"	63,308 SF

GENERAL NOTE:
IT IS THE CONTRACTOR'S RESPONSIBILITY TO FILE A NOTICE OF INTENT/REQUEST TO BE INCLUDED IN THE STORM WATER GENERAL PERMIT, AND SUBMIT THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY FEDERAL AND MONITORED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.

NOTE TO CONTRACTOR:
CONTRACTOR SHALL PROVIDE EROSION CONTROL IN ALL LANDSCAPE AREAS WHERE ROOF DRAINS DISCHARGE TO GRADE UNLESS OTHERWISE NOTED HEREON.

NOTE:
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

NDOT NOTE:
NDOT PERMIT REQUIRED. CONTRACTOR TO OBTAIN NDOT OCCUPANCY PERMIT PRIOR TO CONSTRUCTION IN NDOT RIGHT OF WAY

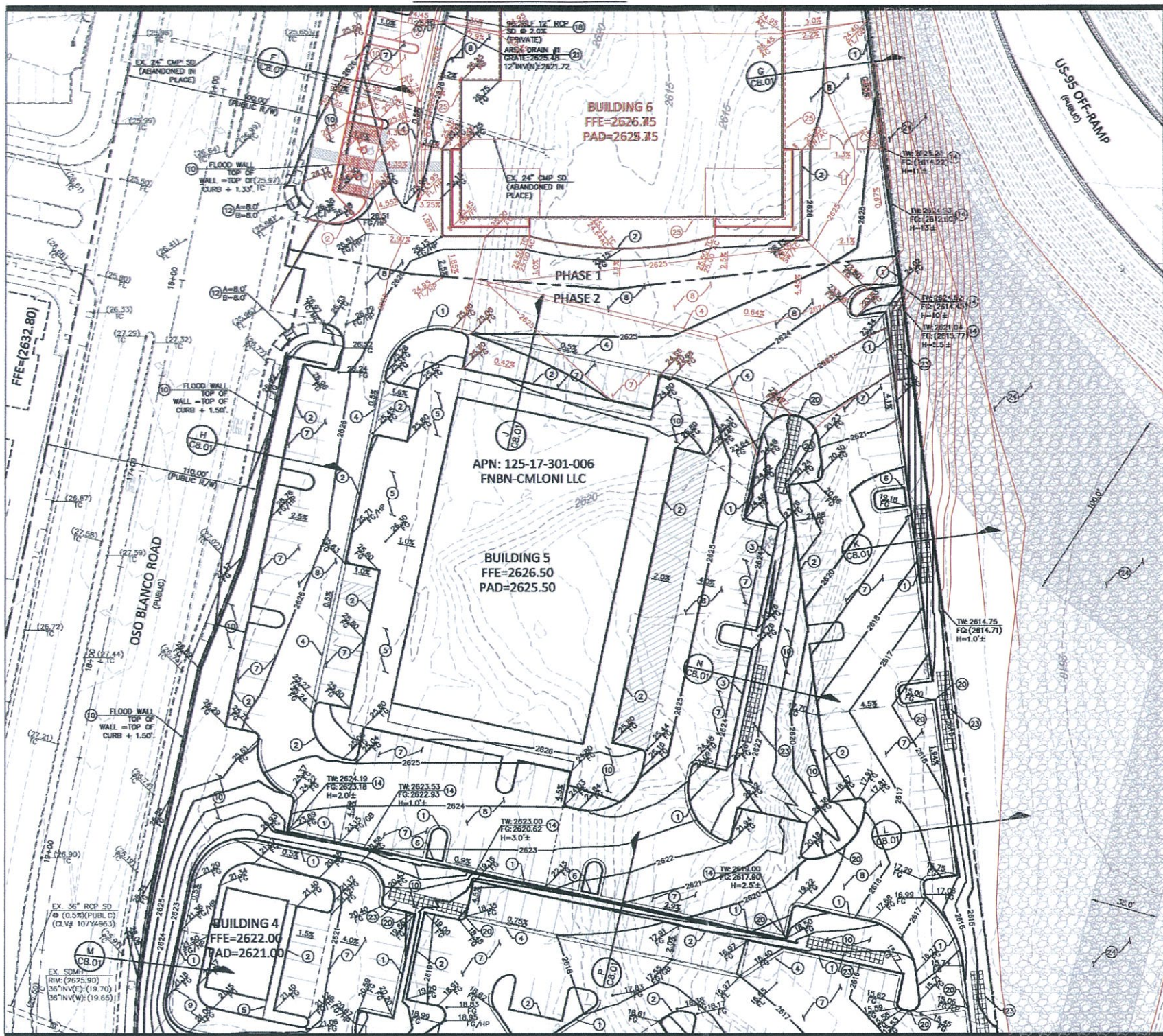
AVOID HITTING UNDERGROUND UTILITIES:
CALL BEFORE YOU DIG
CALL 1-702-438-7511
OR
CALL 1-702-438-5000

AVOID HITTING OVERHEAD POWER LINES:
CALL BEFORE YOU WORK
CALL 1-702-227-2929
OR
CALL 1-800-227-2900

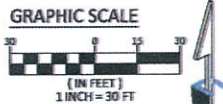
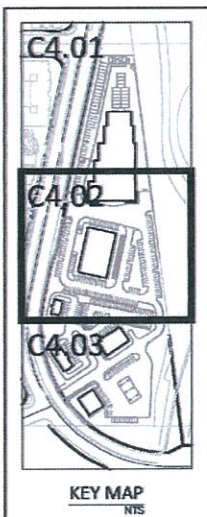
LEGEND
EXISTING: DRAINAGE, SLOPE, ELEVATION TAG, STORM MANHOLE, DRAIN INLET, CONTOUR, RETAINING WALL, SCREEN WALL
PROPOSED: PL-RIGHT-OF-WAY, PL-ADJACENT CENTERLINE, EASEMENT LINE, FLOW LINE, SIGN W/POLE, SANITARY LINE, AC PAVEMENT, 6" TYPE 'A' CURB, 8" TYPE 'L' CURB & GUTTER, 30" ROLL CURB, CONCRETE

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH THE CITY OF LAS VEGAS. (DS 4880A)
N/A
PAUL F. FRITZ, P.E. 16825
05/28/14
DATE

FOR CONTINUATION SEE SHEET C4.01



FOR CONTINUATION SEE SHEET C4.03



BASIS OF BEARING

SOUTH 07°05'57\"/>

BENCHMARK

CITY OF LAS VEGAS BENCHMARK # 51V90 1756

A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCA ROAD AND DURANGO DRIVE.

NAVD 83 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1983

CONSTRUCTION NOTES

- | NO. | ITEM | CAUSA: CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS |
|-----|--|--|
| 1 | CONSTRUCT TYPE "L" CURB PER CAUSD NO. 218. | |
| 2 | CONSTRUCT TYPE "A" CURB PER DETAIL "A" SHEET C8.01. | |
| 3 | CONSTRUCT 0' TALL TYPE "A" CURB PER DETAIL "D" SHEET C8.01 | |
| 4 | CONSTRUCT 2' CONCRETE VALLEY CUTTER PER DETAIL "B" SHEET C8.01. | |
| 5 | CONSTRUCT CONCRETE SIDEWALK PER CAUSD NO. 234. | |
| 6 | CONSTRUCT CONCRETE CHANNEL PER DETAIL "C" SHEET C8.01. | |
| 7 | CONSTRUCT 3\"/> | |
| 8 | CONSTRUCT 4\"/> | |
| 9 | CONSTRUCT 6\"/> | |
| 10 | LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS. | |
| 11 | CONSTRUCT COMMERCIAL DRIVEWAY PER CAUSD NO. 222.1 AND 228. | |
| 12 | CONSTRUCT SIDEWALK RAMP PER CAUSD NO. 235 CASE 1. | |
| 13 | FLOOD WALL (SOLID GROUT FILLED). SEE STRUCTURAL PLANS FOR DETAIL | |
| 14 | RETAINING WALL. SEE STRUCTURAL PLANS FOR DETAILS. | |
| 15 | INSTALL METAL END SECTION (SAFETY TYPE) PER NDOT STD. DWG R-2.2 | |
| 16 | CONSTRUCT HEADWALL PER NDOT STD. DWG R-2.5.1.1. | |
| 17 | CONSTRUCT 60\"/> | |
| 18 | INSTALL STORM DRAIN PIPE (SIZE/TYPE PER PLAN) PER CAUSD NO. 50 | |
| 19 | CONSTRUCT SIDEWALK DRAIN PER CAUSD NO. 236. | |
| 20 | CONSTRUCT 1.5\"/> | |
| 21 | INSTALL 18\"/> | |
| 22 | 18\"/> | |
| 23 | LANDSCAPE SWALE. FINE, CLOSE GROWING, WATER RESISTANT GRASSES (APPROVED EQUIVALENT). | |
| 24 | CONSTRUCT RIPRAP PER NDOT STD. DWG R-3.1.5. | |
| 25 | "FLOOD PROOF WALL" 6\"/> | |

SIGHT VISIBILITY ZONE LEGEND

NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES AND STREETLIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITH THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT. SIGHT VISIBILITY ZONE'S WERE DESIGNED USING USDOCA 201.2

SIGHT VISIBILITY ZONE

THE PROJECT SITE LIES WITHIN ZONE X AS PER FEMA FIRM PANEL 32003C745E DATED NOVEMBER 16, 2011.

FLOOD ZONE NOTE:

PUBLIC DRAINAGE QUANTITIES:

12\"/>	97 LF
36\"/>	880 LF
TYPE III STORM DRAIN MANHOLE	6 EA
NDOT HEADWALL (SINGLE OUTLET)	1 EA
NDOT PIPE SAFETY END SECTION	1 EA
HEADWALL REMOVAL	2 EA
RIP-RAP 24\"/>	63,332 SF

GENERAL NOTE:

IT IS THE CONTRACTOR'S RESPONSIBILITY TO FILE A NOTICE OF INTENT/REQUEST TO BE INCLUDED IN THE STORM WATER GENERAL PERMIT, AND SUBMIT THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY FEDERAL, AND MONITORED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.

NOTE TO CONTRACTOR:

CONTRACTOR SHALL PROVIDE EROSION CONTROL IN ALL LANDSCAPE AREAS WHERE ROOF DRAINS DISCHARGE TO GRADE UNLESS OTHERWISE NOTED HEREON.

NOTE:

PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

NDOT NOTE:

NDOT PERMIT REQUIRED. CONTRACTOR TO OBTAIN NDOT OCCUPANCY PERMIT PRIOR TO CONSTRUCTION IN NDOT RIGHT OF WAY



CIVIL SQUARED ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

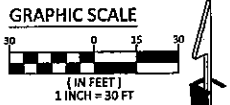
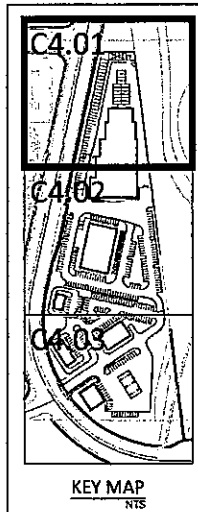
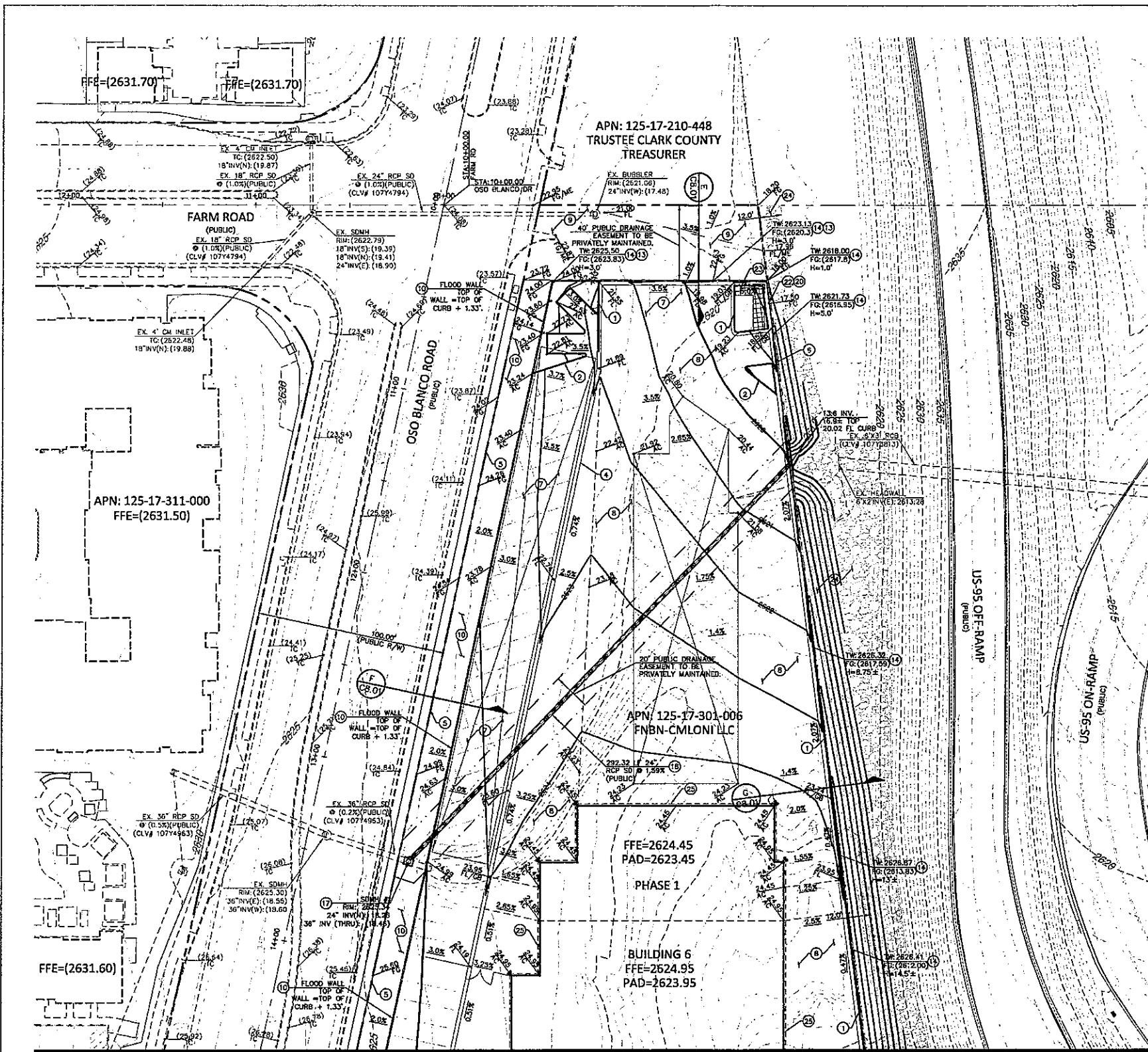
LEGEND

EXISTING	PROPOSED	EXISTING	PROPOSED
(0.00) 0.00% SLOPE	PL-RIGHT-OF-WAY	AC PAVEMENT	AC PAVEMENT
xx ELEVATION TAG	PL-ADJACENT CENTERLINE	6\"/>	6\"/>
① STORM MANHOLE	DASHED LINE	4\"/>	4\"/>
② DROP INLET	SOLID LINE	30\"/>	30\"/>
--- CONTOUR	SIGN W/POLE	CONCRETE	CONCRETE
--- RETAINING WALL	SAVING LINE		
--- SCREEN WALL			

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH THE CITY OF LAS VEGAS. (DS 4660A)

N/A
PAUL F. FRITZ, P.E. 16625

05/28/14
DATE



BASIS OF BEARING
SOUTH 00°05'57" WEST, BEING THE WEST LINE OF THE GOVERNMENT LOT 11, LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 12, TOWNSHIP 18 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS IN THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE.

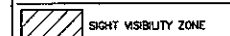
BENCHMARK
CITY OF LAS VEGAS BENCHMARK # SLV90 1756
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCA ROAD AND DURANGO DRIVE.

NAVD 88 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1988

CONSTRUCTION NOTES

NO.	ITEM	CCAUSS: CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS
1	CONSTRUCT TYPE '1' CURB PER CCAUSS NO. 216.	
2	CONSTRUCT TYPE 'A' CURB PER DETAIL 'A' SHEET CB.01.	
3	CONSTRUCT 0' TALL TYPE 'A' CURB PER DETAIL 'D' SHEET CB.01	
4	CONSTRUCT 2' CONCRETE VALLEY GUTTER PER DETAIL 'B' SHEET CB.01.	
5	CONSTRUCT CONCRETE SIDEWALK PER CCAUSS NO. 234.	
6	CONSTRUCT CONCRETE CHANNEL PER DETAIL 'C' SHEET CB.01.	
7	CONSTRUCT 3" AC PAVEMENT OVER 4" TYPE II A.B. (CAR TRAFFIC)	
8	CONSTRUCT 4" AC PAVEMENT OVER 6" TYPE II A.B. (TRUCK TRAFFIC)	
9	CONSTRUCT 6" CONCRETE OVER 8" TYPE II A.B. WITH #4 BAR @ 24" O.C. EACH WAY.	
10	LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS.	
11	CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSS NO. 222.1 AND 228.	
12	CONSTRUCT SIDEWALK RAMP PER CCAUSS NO. 235 CASE 1.	
13	FLOOD WALL (SOLID GROUT FILLED). SEE STRUCTURAL PLANS FOR DETAILS.	
14	RETAINING WALL. SEE STRUCTURAL PLANS FOR DETAILS.	
15	INSTALL METAL END SECTION (SAFETY TYPE) PER NDOT STD. DWG R-2.2.3.	
16	CONSTRUCT HEADWALL PER NDOT STD. DWG R-2.5.1.1.	
17	CONSTRUCT 60" TYPE II MANHOLE PER CCAUSS NO. 406.	
18	INSTALL STORM DRAIN PIPE (SIZE/TYPE PER PLAN) PER CCAUSS NO. 503.2.	
19	CONSTRUCT SIDEWALK DRAIN PER CCAUSS NO. 236.	
20	CONSTRUCT 1.5' CURB OPENING PER DETAIL 'V' SHEET CB.01.	
21	INSTALL 16" AREA DRAIN (GENSEN D1616-STD) OR APPROVED EQUIVALENT WITH STORMWATER QUALITY MANAGEMENT STAMP PER CCAUSS NO. 421.	
22	16"x48" WALL OPENING PER DETAIL 'T' SHEET CB.01.	
23	LANDSCAPE SWALE. FINE, CLOSE GROWING, WATER RESISTANT GRASSES OR APPROVED EQUIVALENT.	
24	CONSTRUCT RIPRAP PER NDOT STD. DWG R-3.1.5.	
25	"FLOOD PROOF WALL" 6" ABOVE ADJACENT FINISH GRADE OF BUILDING.	

SIGHT VISIBILITY ZONE LEGEND



SIGHT VISIBILITY ZONE

NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES AND STREETLIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT. SIGHT VISIBILITY ZONE IS MORE DESIGNED USING USDOCA 201.2

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN ZONE X AS PER FEMA FIRM PANEL 57000301745C DATED NOVEMBER 15, 2011.

PUBLIC DRAINAGE QUANTITIES:

12" RCP STORM DRAIN	0	LF
24" RCP STORM DRAIN	282	LF
TYPE III STORM DRAIN MANHOLE	1	EA
NDOT HEADWALL (SINGLE OUTLET)	1	EA
NDOT PIPE SAFETY END SECTION	1	EA
HEADWALL REMOVAL	2	EA
RIP-RAP 6" @ 2'x1.5'	68,129	SF

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH THE CITY OF LAS VEGAS. (DS 4860A)

PAUL F. FRITZ, P.E. 16825 07/11/14 DATE

GENERAL NOTE:

IT IS THE CONTRACTOR'S RESPONSIBILITY TO FILE A NOTICE OF INTENT/REQUEST TO BE INCLUDED IN THE STORM WATER GENERAL PERMIT, AND SUBMIT THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY FEDERAL AND MONITORED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.

NOTE TO CONTRACTOR:

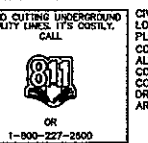
CONTRACTOR SHALL PROVIDE EROSION CONTROL IN ALL LANDSCAPE AREAS WHERE ROOF DRAINS DISCHARGE TO GRADE UNLESS OTHERWISE NOTED HEREON.

NOTE:

PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

NDOT NOTE:

NDOT PERMIT REQUIRED, CONTRACTOR TO OBTAIN NDOT OCCUPANCY PERMIT PRIOR TO CONSTRUCTION IN NDOT RIGHT OF WAY.



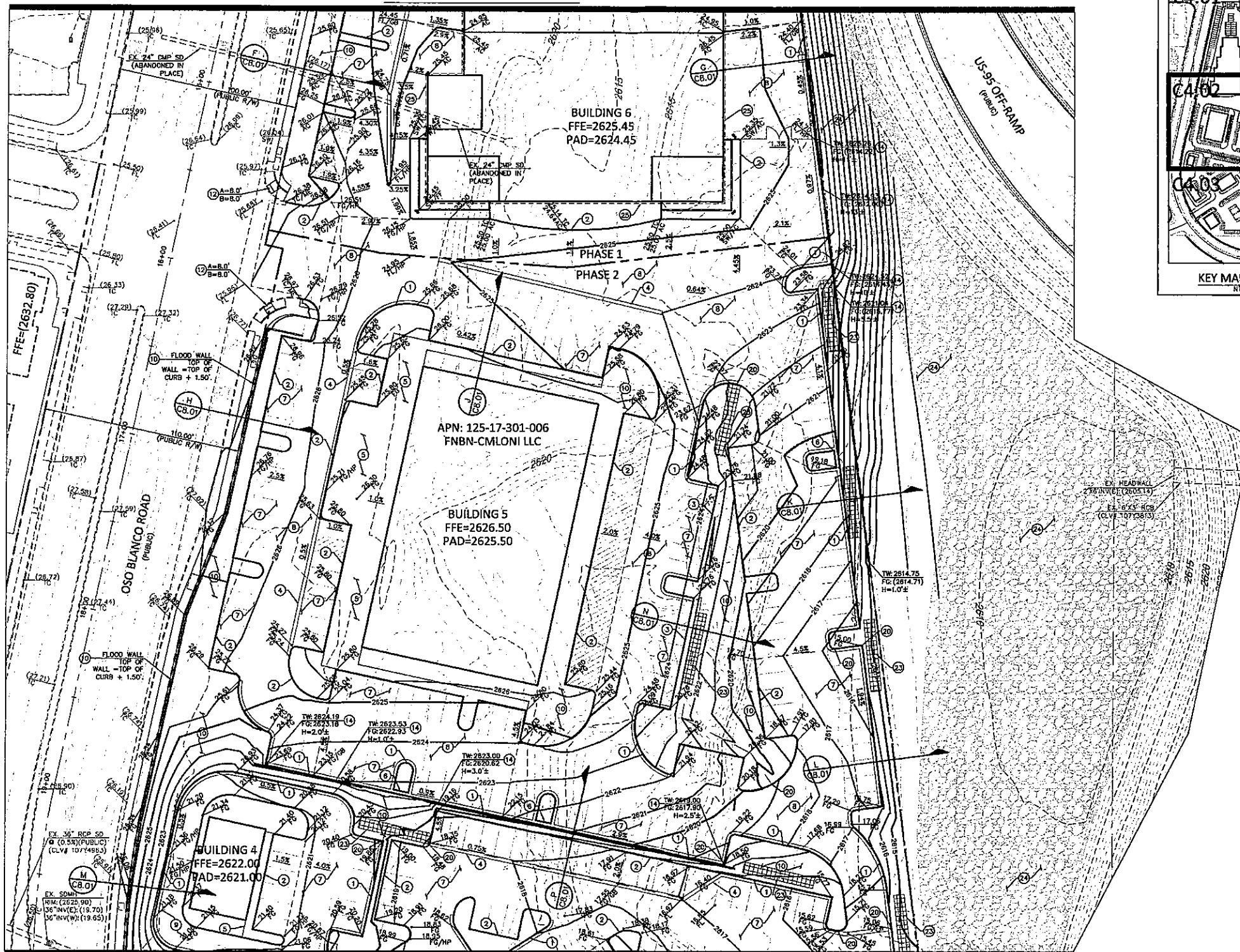
CIVIL SQUARED ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

LEGEND
EXISTING (Dashed line)
PROPOSED (Solid line)
SLOPE (0.00%)
ELEVATION TAG (10.00)
STORM MANHOLE (Circle with 'M')
DROP INLET (Circle with 'I')
CONTOUR (Dashed line with '10')
RETAINING WALL (Thick solid line)
SCREEN WALL (Thin solid line)

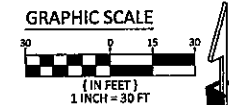
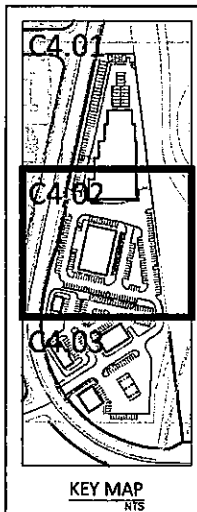
EXISTING
PROPOSED
PL-RIGHT-OF-WAY
PL-ADJACENT CENTERLINE
EASEMENT LINE
FLOW LINE
SIGN W/POLE
SAWTOOTH LINE

EXISTING
PROPOSED
AC PAVEMENT
6" TYPE 'A' CURB
8" TYPE 'A' CURB & GUTTER
30" ROLL CURB
CONCRETE

FOR CONTINUATION SEE SHEET C4.01



FOR CONTINUATION SEE SHEET C4.03



BASIS OF BEARING
SOUTH 000657 WEST, BEING THE WEST LINE OF THE GOVERNMENT LOT 11, LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS IN THE CLARK COUNTY, NEVADA, RECORDS' OFFICE.

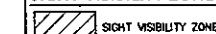
BENCHMARK
CITY OF LAS VEGAS BENCHMARK # 5LVS0 1758
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCA ROAD AND DURANGO DRIVE.

NAVD 88 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1988

CONSTRUCTION NOTES

NO.	ITEM	CCAUSS: CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS
1	CONSTRUCT TYPE 'L' CURB PER CCAUSS NO. 216.	
2	CONSTRUCT TYPE 'A' CURB PER DETAIL 'A' SHEET C8.01.	
3	CONSTRUCT 6" TALL TYPE 'A' CURB PER DETAIL 'D' SHEET C8.01.	
4	CONSTRUCT 2' CONCRETE VALLEY GUTTER PER DETAIL 'B' SHEET C8.01.	
5	CONSTRUCT CONCRETE SIDEWALK PER CCAUSS NO. 234.	
6	CONSTRUCT CONCRETE CHANNEL PER DETAIL 'C' SHEET C8.01.	
7	CONSTRUCT 3" AC PAVEMENT OVER 4" TYPE II A.B. (CAR TRAFFIC)	
8	CONSTRUCT 4" AC PAVEMENT OVER 6" TYPE II A.B. (TRUCK TRAFFIC)	
9	CONSTRUCT 6" CONCRETE OVER 6" TYPE II A.B. WITH #4 BAR @ 24" O.C. EACH WAY.	
10	LANDSCAPE AREA. SEE LANDSCAPE PLANS FOR DETAILS.	
11	CONSTRUCT COMMERCIAL DRIVEWAY PER CCAUSS NO. 222.1 AND 228.	
12	CONSTRUCT SIDEWALK RAMP PER CCAUSS NO. 235 CASE 1.	
13	FLOOD WALL (SOLID GROUT FILLED). SEE STRUCTURAL PLANS FOR DETAILS.	
14	RETAINING WALL. SEE STRUCTURAL PLANS FOR DETAILS.	
15	INSTALL METAL END SECTION (SAFETY TYPE) PER NDOT STD. DWG R-2.2.3.	
16	CONSTRUCT HEADWALL PER NDOT STD. DWG R-2.5.1.1.	
17	CONSTRUCT 60" TYPE II MANHOLE PER CCAUSS NO. 406.	
18	INSTALL STORM DRAIN PIPE (SIZE/TYPE PER PLAN) PER CCAUSS NO. 503.2.	
19	CONSTRUCT SIDEWALK DRAIN PER CCAUSS NO. 236.	
20	CONSTRUCT 1.5' CURB OPENING PER DETAIL 'U' SHEET C8.01.	
21	INSTALL 18" AREA DRAIN (JENSEN D1816-HOI) OR APPROVED EQUIVALENT WITH STORMWATER QUALITY MANAGEMENT STAMP PER CCAUSS NO. 421.	
22	18"x48" WALL OPENING PER DETAIL 'T' SHEET C8.01.	
23	LANDSCAPE SWALE. FINE, CLOSE GROWING, WATER RESISTANT GRASSES OR APPROVED EQUIVALENT.	
24	CONSTRUCT RIPRAP PER NDOT STD. DWG R-3.1.5.	
25	"FLOOD PROOF WALL" 6" ABOVE ADJACENT FINISH GRADE OF BUILDING.	

SIGHT VISIBILITY ZONE LEGEND



SIGHT VISIBILITY ZONE
NO WALLS, FENCES, TREES, SHRUBS, UTILITY APPURTENANCES OR ANY OTHER OBJECT, OTHER THAN TRAFFIC CONTROL DEVICES AND STREETLIGHT POLES, MAY BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE UNLESS SAID OBJECT IS MAINTAINED AT LESS THAN 24 INCHES IN HEIGHT. SIGHT VISIBILITY ZONES WERE DESIGNED USING VSDMCA 2012.

FLOOD ZONE NOTE:

THE PROJECT SITE LIES WITHIN ZONE X AS PER FEMA FIRM PANEL 32003C01745E DATED NOVEMBER 16, 2011.

PUBLIC DRAINAGE QUANTITIES:

12" RCP STORM DRAIN	0 LF
24" RCP STORM DRAIN	292 LF
TYPE II STORM DRAIN MANHOLE	1 EA
NDOT HEADWALL (SINGLE OUTLET)	1 EA
NDOT PIPE SAFETY END SECTION	1 EA
HEADWALL REMOVAL	2 EA
RP-RAP 12"x12" 1'-1.67'	68,129 SF

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH THE CITY OF LAS VEGAS (DS 4680A)

PAUL F. FRITZ, P.E. 1/16/2014
DATE

GENERAL NOTE:

IT IS THE CONTRACTOR'S RESPONSIBILITY TO FILE A NOTICE OF INTENT/REQUEST TO BE INCLUDED IN THE STORM WATER GENERAL PERMIT, AND SUBMIT THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY FEDERAL, AND MONITORED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.

NOTE TO CONTRACTOR:

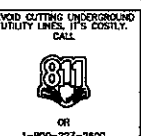
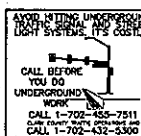
CONTRACTOR SHALL PROVIDE EROSION CONTROL IN ALL LANDSCAPE AREAS WHERE ROOF DRAINS DISCHARGE TO GRADE UNLESS OTHERWISE NOTED HEREON.

NOTE:

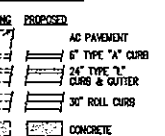
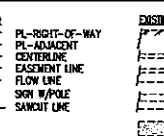
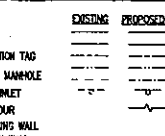
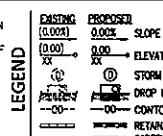
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

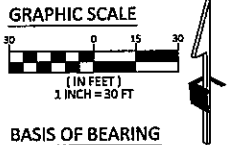
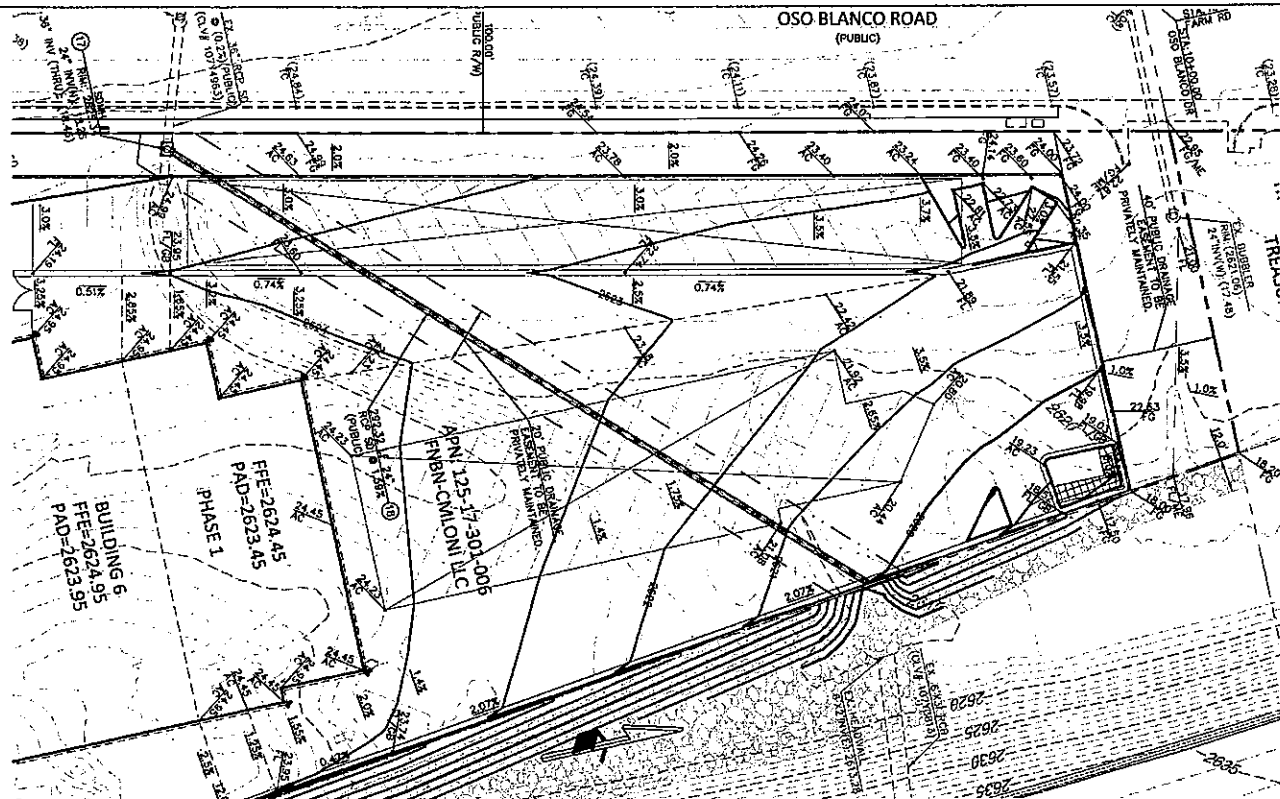
NDOT NOTE:

NDOT PERMIT REQUIRED. CONTRACTOR TO OBTAIN NDOT OCCUPANCY PERMIT PRIOR TO CONSTRUCTION IN NDOT RIGHT OF WAY.



CIVIL SQUARED ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

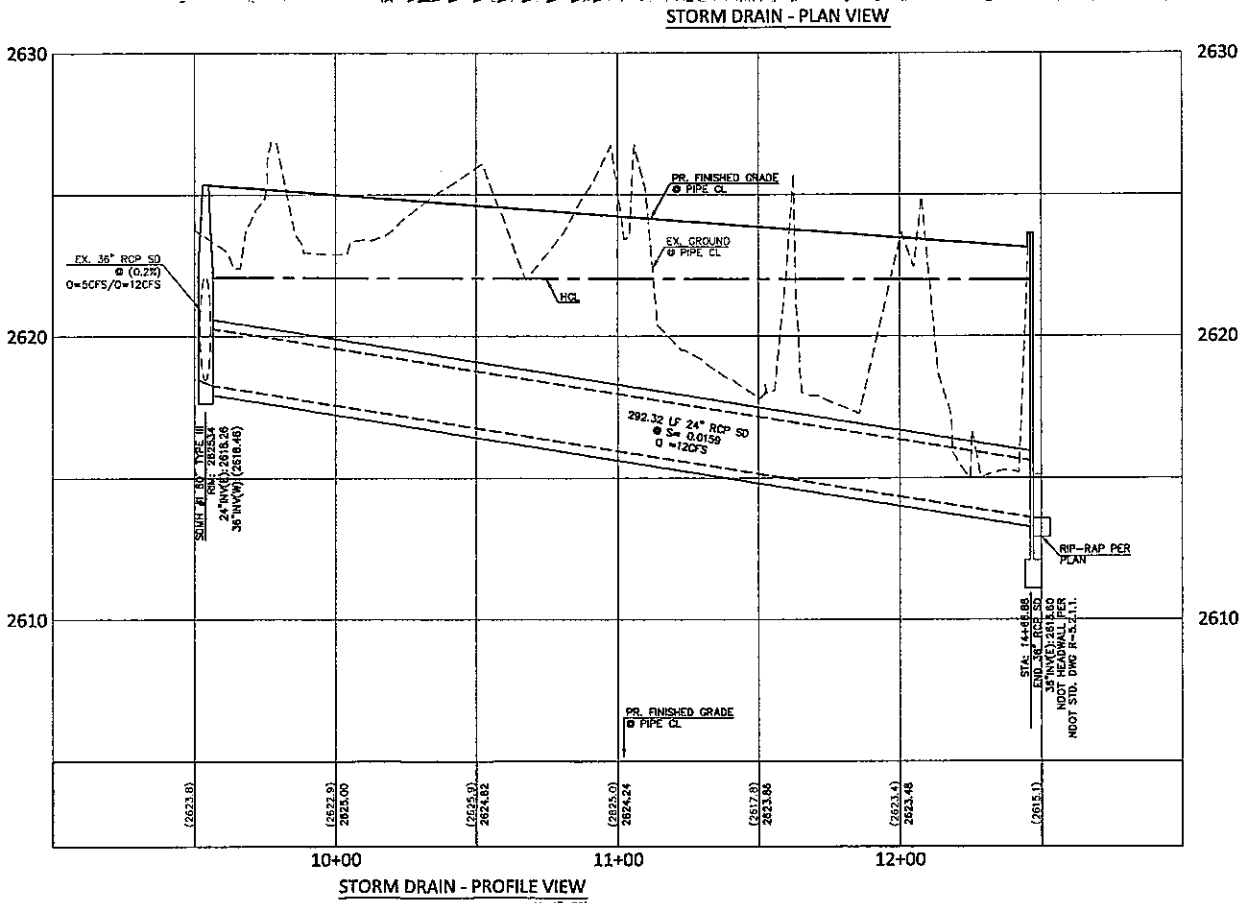




GRAPHIC SCALE
0 15 30
(IN FEET)
1 INCH = 30 FT

BASIS OF BEARING
SOUTH 00°05' WEST, BEING THE WEST LINE OF THE GOVERNMENT LOT 11, LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS IN THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE.

BENCHMARK
CITY OF LAS VEGAS BENCHMARK # 5LV90 1756
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCO ROAD AND DURANGO DRIVE.
NAVD 88 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1988



FLOOD ZONE NOTE:
THE PROJECT SITE LIES WITHIN ZONE X AS PER FEMA FIRM PANEL 32003C1745E DATED NOVEMBER 16, 2011.

PUBLIC DRAINAGE QUANTITIES:

12" RCP STORM DRAIN	0	LF
24" RCP STORM DRAIN	282	LF
TYPE III STORM DRAIN MANHOLE	1	EA
NDOT HEADWALL (SINGLE OUTLET)	1	EA
NDOT PIPE SAFETY END SECTION	1	EA
HEADWALL REMOVAL	2	EA
RIP-RAP D ₈₈ 5' / 1=1.67	69,129	SF

GENERAL NOTE:
IT IS THE CONTRACTOR'S RESPONSIBILITY TO FILE A NOTICE OF INTENT/REQUEST TO BE INCLUDED IN THE STORM WATER GENERAL PERMIT, AND SUBMIT THE ASSOCIATED STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AS REQUIRED BY FEDERAL, AND MONITORED BY THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION.

NOTE TO CONTRACTOR:
CONTRACTOR SHALL PROVIDE EROSION CONTROL IN ALL LANDSCAPE AREAS WHERE ROOF DRAINS DISCHARGE TO GRADE UNLESS OTHERWISE NOTED HEREON.

NOTE:
PROPERTY OWNER IS RESPONSIBLE TO MAINTAIN THE BEST MANAGEMENT PRACTICES SUCH AS BUT NOT LIMITED TO THE REMOVAL OF ACCUMULATED SEDIMENT AND DEBRIS AND CARE OF THE VEGETATION.

NDOT NOTE:
NDOT PERMIT REQUIRED. CONTRACTOR TO OBTAIN NDOT OCCUPANCY PERMIT PRIOR TO CONSTRUCTION IN NDOT RIGHT OF WAY.

AVOID HITTING UNDERGROUND WORKING SIGNAL AND STREET LIGHT SYSTEMS. IT'S COSTLY.

CALL BEFORE YOU DO UNDERGROUND WORK
CALL 1-702-455-7511
OR
CALL 1-702-455-3300

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.

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

AVOID CUTTING UNDERGROUND UTILITY LINES. IT'S COSTLY.

CALL
OR
1-800-227-2630

CIVIL SQUARED ENGINEERING ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS AND ELEVATIONS. THE UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE LOCATION AND ELEVATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO FIELD VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION. IF A CONFLICT EXISTS BETWEEN WHAT IS SHOWN ON THESE DRAWINGS AND WHAT EXISTS IN THE FIELD, THE CONTRACTOR IS TO NOTIFY THE ARCHITECT OR ENGINEER IMMEDIATELY.

LEGEND

EXISTING	PROPOSED
(0.00%)	0.00% SLOPE
XX	ELEVATION TAG
①	STORM MANHOLE
②	DROP INLET
---	CONTOUR
---	RETAINING WALL
---	SCREEN WALL

EXISTING

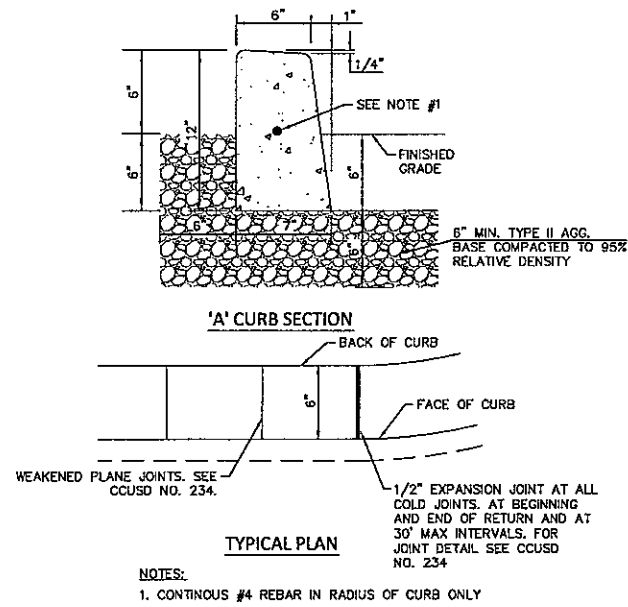
---	PL-RIGHT-OF-WAY
---	PL-ADJACENT CENTERLINE
---	EASEMENT LINE
---	FLOW LINE
---	SIGN W/Pole
---	SAROUT LINE

PROPOSED

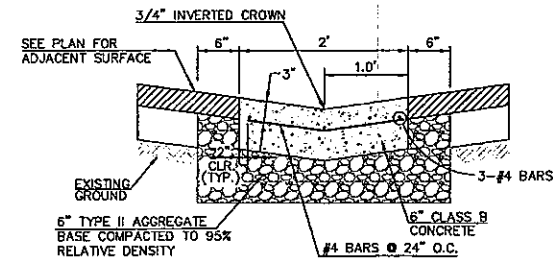
---	AC PAVEMENT
---	5" TYPE "A" CURB
---	24" TYPE "A" CURB & GUTTER
---	30" ROLL CURB
---	CONCRETE

I CERTIFY THAT THIS GRADING PLAN CONFORMS TO THE THE APPROVED DRAINAGE STUDY FOR THIS SITE ON FILE WITH THE CITY OF LAS VEGAS. (DS 4660A)

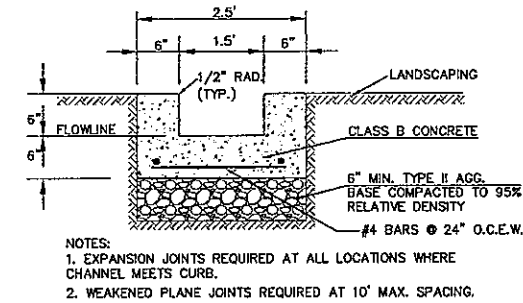
Paul F. Fritz, P.E. 07/11/14
DATE



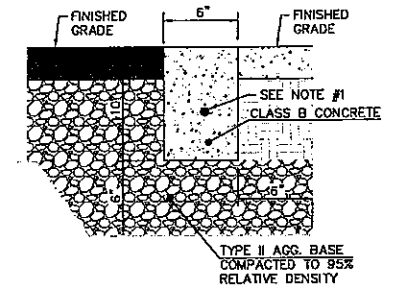
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C8.01 TYPE 'A' CURB (ONSITE) NTS



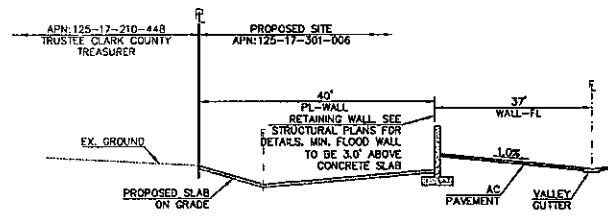
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C8.01 2' CONCRETE VALLEY GUTTER NTS



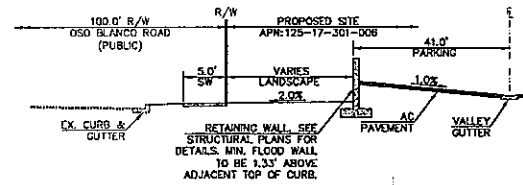
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C8.01 2.5' CONCRETE CHANNEL NTS



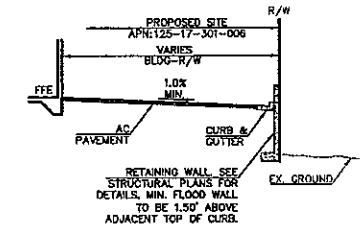
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C8.01 0" TALL TYPE 'A' CURB (ONSITE) NTS



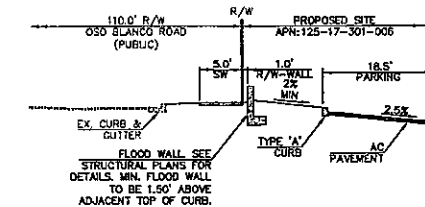
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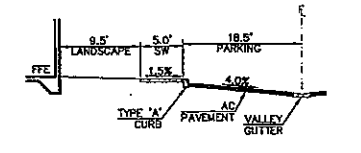
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C8.01 CROSS SECTION NTS



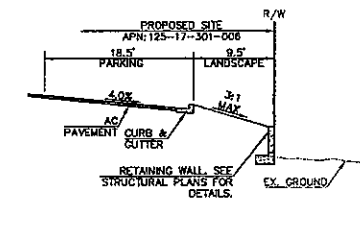
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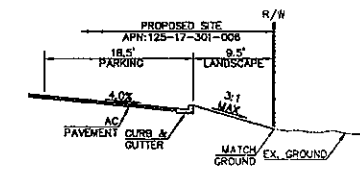
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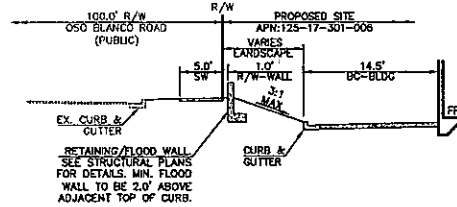
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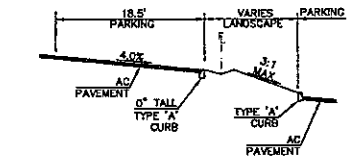
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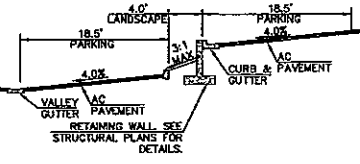
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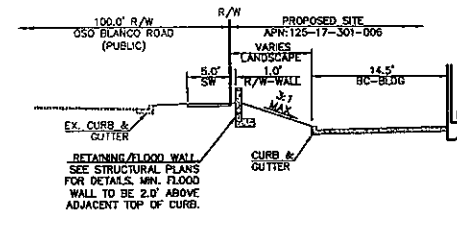
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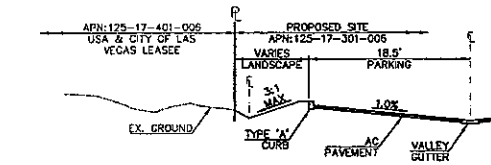
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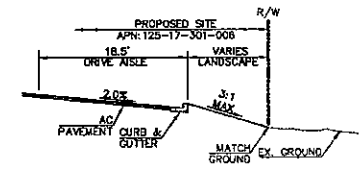
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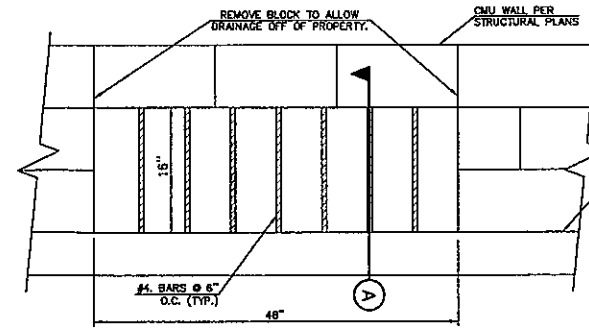
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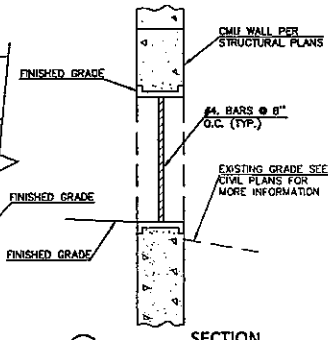
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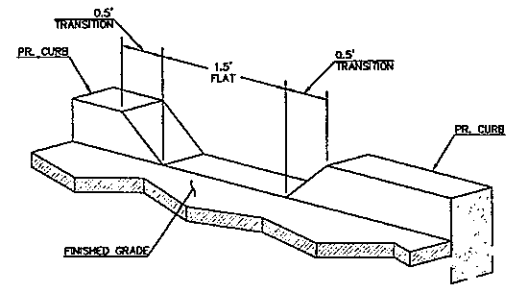
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C8.01 CROSS SECTION NTS



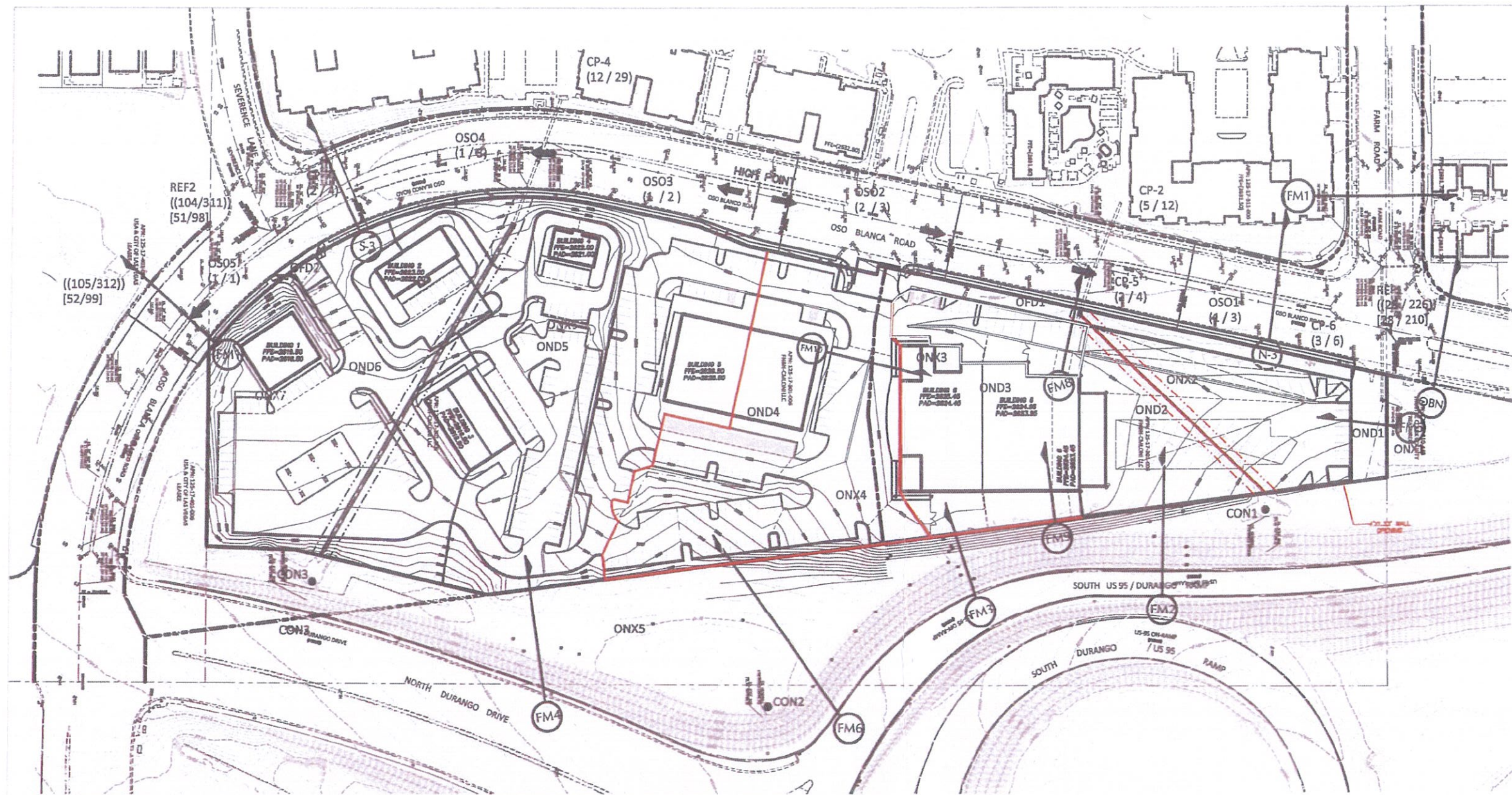
S
C8.01 WALL OPENING NTS



T
C8.01 SECTION NTS



U
C8.01 1.5' CURB OPENING NTS



DRAINAGE AREA SUMMARY TABLE

BASIN ID	AREA (ACRES)	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
OND1	0.11	<1*	<1*
OND2	1.18	2	4
OND3	1.18	2	4
OND4	1.78	3	6
OND5	2.63	4	8
OND6	2.24	3	7
OFD1	0.40	1	1
OFD2	0.15	<1*	<1*
OFX1	0.66	<1*	<1*
OFX2	0.36	<1*	1
OFX3	0.34	<1*	1
OFX4	0.25	<1*	1
OFX5	1.62	2	4
OFX6	0.35	<1*	1
OFX7	0.65	<1*	1

*A 0.5 CFS DURING THE 100-YEAR STORM EVENT IS ASSUMED FOR CALCULATIONS.

FLOW DEPTH ANALYSIS SUMMARY

SECTION	STREET WIDTH (FT)	Q ₁₀₀ (CFS)	SLOPE (%)	D ₁₀₀ (ft)	V ₁₀₀ (ft/sec)	D ₁₀₀ × V ₁₀₀
(FM1)	80	209	3.4	0.81	8.28	6.71
FM1	90	312	0.61	1.16	5.92	6.87
FM2	-	321	1.17	3.97	4.10	-
FM3	-	322	2.20	4.5	5.41	-
FM4	-	115	1.60	0.89	2.36	-
FM5	-	494	6.35	2.80	2.76	-
FM6	-	340	5.40	1.37	4.76	-
FM8	-	1	0.5	0.18	1.19	-
FM9	-	0.7	0.47	0.28	1.36	-
FM10	-	0.8	0.83	0.13	1.09	-
OSO OBN	90	4	0.61	0.34	1.72	7.70
OSO S-3	90	4	0.61	0.34	1.72	0.58
OSO N-3	90	6	0.51	0.37	1.99	0.74

CONCENTRATION POINT SUMMARY TABLE

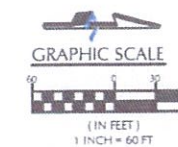
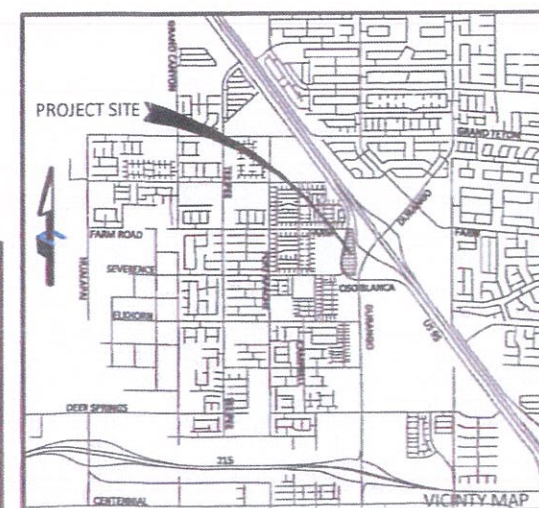
CONCENTRATION POINT	Q ₁₀ (CFS)	Q ₁₀₀ (CFS)
CON1	35	545
CON2	9	340
CON3	16	153

CON1 = (OND1 + OND2 + OND3 + OFX1 + OFX2) + NORTH FLOW + CP-2
 CON2 = (OND4 + OND5 + OFX3 + OFX4 + OFX5) + OVERFLOW
 CON3 = (OND6 + OFX6 + OFX7) + CP-4 + OVERFLOW

BOX CULVERT FLOW

BOX	Q ₁₀₀ (CFS)
NORTH	224
MIDDLE	225
SOUTH	153

Q _{10/100}	PEAK 10 YR FLOW / PEAK 100 YR FLOW
—	DRAINAGE AREA BOUNDARY
→	DRAINAGE AREA FLOW DIRECTION
OND1	AREA DESIGNATION
CP-1	EXISTING CONCENTRATION POINT
CON	PROPOSED CONCENTRATION POINT
FM1	LOCATION OF HYDRAULIC CROSS SECTION



civil squared
 engineering
 3130 S. DURANGO DR., SUITE 404
 LAS VEGAS, NV 89117
 PHONE: (702) 248-8000
 FAX: (702) 248-8070
 www.civilsquared.com



DATE	APPROVAL
NO.	DESCRIPTION OF REVISIONS

DURANGO & 95 COMMERCIAL
 APN: 125-17-301-006
DEVELOPED CONDITION DRAINAGE BASIN MAP

DATE: 5/28/2014
 JOB NUMBER: 4114
 DESIGNED: B. ZAHEDI, P.E.
 DRAWN: P. FRITZ, P.E.
 CHECKED: P. FRITZ, P.E.

FIGURE 12

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		March 3, 2015
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	COPIES TO:	
Drainage Study for:	CivilWorks Inc.	
Storage One at 7422 Oso Blanca	Westar Development	
Cross Streets:	SEC of Oso Blanca Road & Farm Road	Bart Anderson, P.E., DevCo
File Number:	F:\Depot\DSMemos\DS4719A.doc	NDOT
Parcel Number:	125-17-301-011	
Zoning Action:	PM 119	
FEMA Flood Zone	YES NO X	
Proposed Storm Drain	YES NO X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1 st Submittal & Supplement	1/27/2015 & 2/18/2015	3/3/2015	See Comments Below	\$400.00	383805: \$400
			TOTAL FEES (LDDRS):	\$400.00	----

REMARKS:

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:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
X	is conditionally approved subject to final concurrence from NDOT

1. A parcel map has been recorded with a public drainage easement (privately maintained) alignment that is different from the proposed one in the subject study. Vacate the existing drainage easement and re-dedicate the proposed drainage easement prior to the final acceptance of the improvement plans.
2. It is understood that NDOT has conceptually accepted the subject drainage study with some comments need to be satisfied. The engineer/developer must obtain final approval of the drainage study from NDOT prior to the final acceptance of the drainage study by the City.
3. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

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

END OF REMARKS
ays

T/R/S: T19S/R60E/17
AREA G-17

TECHNICAL DRAINAGE STUDY FOR STORAGE ONE

AT

7422 OSO BLANCA

(aka Update to the Technical Drainage Study for Durango & 95 Commercial)

Project No. 109614001.00

January 2015

Prepared for:

Westar Development
2990 S. Durango Road
Las Vegas, NV 89117

Prepared by:

CivilWorksInc
Engineering with "sensible" solutions tailored to your "specific" needs.

4945 W. Patrick Lane Las Vegas, NV 89118
Office: (702) 534-7555 Fax: (702) 534-1825

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE STUDY INFORMATION FORM

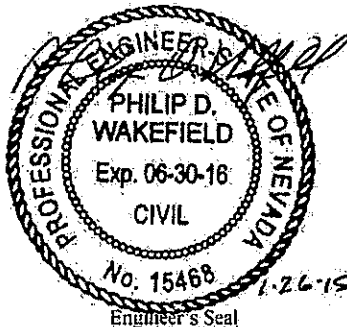
Name of Development: Storage One @ 7422 Oso Blanca DATE: January 25, 2015Location of development: a) Descriptive (Cross Streets) North/South Oso Blanca Road East/West Farm Roadb) Sect. 17 Twn. 19S Rng. 60EName of Owner: Westar DevelopmentAssessors Parcel No.: 125-17-301-011Telephone No.: (702) 658-9800Facsimile No.: (702) 463-4855Address: 2990 S. Durango RoadLas Vegas, NV 89117Contact Person-Name: Philip D. Wakefield, P.E.Telephone No.: 702-534-1800Email: pdw@civilworksonline.comFirm: CivilworksAddress: 4945 W. Patrick Lane, Las Vegas, Nevada 89118

Type of Land Development/Land Disturbance Process:

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

1. Total Owned Land Area: At Site: 2.9 acres Being Developed/Disturbed: 2.9 acres2. 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.)? Commercial5. Approximate upstream land area, which drains to the subject site? 0 acres6. Has the site drainage been evaluated in the past? YES ☒ NO ☐ If yes, please documentation:TDS for Durango & 95 Commercial (DS#4660)

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

Flow drains east towards US95 and is intercepted by 3 (6' x 3') box culverts.8. Briefly describe your proposed schedule for the subject project: ASAP

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

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

Local Entity File No.

Revision

Date

REFERENCE:

STANDARD FORM 1

January 25, 2015

Albert Sung, P.E.
City of Las Vegas Flood Control
333 N. Rancho Drive
Las Vegas, Nevada 89106

**Re: Technical Drainage Study for Storage One @ 7422 Oso Blanca
(aka Update to the Technical Drainage Study for Durango & 95 Commercial)**

Mr. Sung:

Civilworks has prepared this drainage study as an update to the approved Technical Drainage Study for Durango & 95 Commercial. This study addresses the improvements for the storage unit proposed for northern portion of the original study. The original study was approved on July 29, 2014. The study was also approved by NDOT on May 19, 2014. The onsite grading has been revised to lower the finished floor elevations. This study analyzes the flows along the eastern boundary that enters the three box culverts adjacent to the project.

Location

The project area is within the Southwest Quarter (SW 1/4) of Section 17, Township 19 South, Range 60 East, Mount Diablo Meridian, City of Las Vegas, Nevada. The site is located on the southeast corner of Farm Road and Oso Blanca Road (APN 125-17-301-011). See Figure 1, 1A, and 2 (Vicinity Map, APN Map, and Site Description Map).

FEMA Floodplain Information

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) Community-Panel Number 32003C1745E, effective date September 27, 2002 indicates the site is located within a FEMA Zone 'X'. A Zone 'X' is described by FEMA as areas outside of the 0.2% annual chance floodplain. A map depicting the FEMA flood zones in the vicinity of the site is included in the appendix of this study. (Figure 3- FIRM Map)

CCRFCD Master Plan Information

As shown on Figure F-13 from the Flood Control Master Plan Update of the Las Vegas Valley (see Figures 4 and 5 in the Appendix), prepared by PBS&J, Louis Berger Group, etc., the subject site is not adjacent to a proposed Master Plan Flood Control Facility. Figure H-13 has also been provided (see Figure 6 in the appendix) and the site is a part of basin NW103-C.

Drainage Description

This study was prepared to reanalyze the developed condition shown in the approved study. The developed offsite flows impacting the site come from the west and there are no changes to the approved study shown in the approved *Technical Drainage Study for Durango & 95 Commercial*. The flows in Oso Blanca Road and the drainage easement along the north side of the project remain the same. The flow determined at the east side of the northern drainage easement was determined to be 524 cfs in the 100-year condition from the approved study (see NORTH FLOW in reference material). The storage unit site is part of three onsite basins labeled OND2, OND3, and a portion of OND4 (see reference material). The onsite grading has been revised to lower the finished floor elevations and to remove the

eastern wall to allow the flow to enter directly in to the adjacent parcel. Additionally, the existing 36" stormdrain will be allowed to bubble out of a proposed grated manhole and surface drain across the property. Flows in the stormdrain have been quantified as 12 cfs (see CP-2 in reference material). An 8-inch PVC pipe has been provided as a bleeder line to drain the manhole. Basins OND2 and OND3 from the original approved study have been revised and delineated as basins OND2, OND3, and OND3A based on the revised grading plan. The following table is a summary of the revised basins:

**10-YEAR / 100-YEAR, 6-HOUR STORM EVENT
FUTURE RUNOFF AMOUNTS**

BASIN NAME/ CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
OND2	0.95	2	3
OND3	0.89	2	3
OND3A	0.59	1	2
CON1	--	--	544

CON1=OND1 + OND2 + OND3 + OFX1 + OFX2 + NORTH FLOW + CP-2

Flows from basins OND1, OND2, OND3, OFX1, OFX2, flows from NORTH FLOW, and flows from concentration point CP-2 are all concentrated at point CON1. The total summation of the flow yields 544 cfs in the 100-year condition. The orifice calculation for the 6' x 3' RCB at CON1 and the overflow path was revised and included in the appendix. The invert of the 6' x 3' RCB is at an existing elevation of 13.28 feet and the invert of the overflow path is 17.00 feet. Multiple iterations were performed to equalize the depth in the overflow path and the head above the 6' x 3' RCB as was done in the original approved study. The water surface elevation was determined to be 19.62 feet with 207 cfs entering the 6' x 3' RCB and 337 cfs continuing south in the overflow path. Flows from basins OND3A, OND4, OND5, OFX3, OFX4, OFX5, and the overflow from CON1 are all concentrated at concentration point CON2. The total summation of the flow yields 355 cfs in the 100-year condition. The orifice calculation for the 6' x 3' RCB at CON2 and the overflow path was revised and included in the appendix. The invert of the 6' x 3' RCB is at an existing elevation of 5.14 feet and the invert of the overflow path is 13.00 feet. Multiple iterations were performed to equalize the depth in the overflow path and the head above the 6' x 3' RCB as was done in the original approved study. The water surface elevation was determined to be 13.85 feet with 252 cfs entering the 6' x 3' RCB and 103 cfs continuing south in the overflow path. Flows from basins OND6, OFX6, OFX7, flows from concentration point CP-4, and the overflow from CON2 are all concentrated at point CON3. The total summation of the flow yields 141 cfs in the 100-year condition. The orifice calculation for the 6' x 3' RCB at CON3 is revised and included in the appendix. The invert of the 6' x 3' RCB is at an existing elevation of 8.36 feet. The water surface elevation was determined to be 12.12 feet with 141 cfs entering the 6' x 3' RCB. Figure 7 has been provided in the appendix showing the onsite basins, sections, concentration points, and flows. Figure 8 has also been provided in the appendix showing the previously approved basin map with all the revisions per this study.

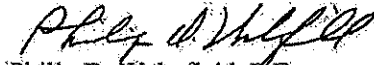
Conclusions

The finished floor elevations have been lowered as shown on the proposed grading plan. The finished floor elevations are twice the depth of up to 18 inches above the adjacent water surface elevations. The existing 36" RCP will bubble out on to the site and continue through the site to the east property line. An 8-inch bleeder line has been provided to drain the manhole.

I trust this satisfies your concerns regarding this project. If there are any questions, or additional information necessary, please contact this office.

Sincerely,

Civilworks

A handwritten signature in black ink, appearing to read "Philip D. Wakefield". The signature is stylized with a large, looped "P" and "W".

Philip D. Wakefield, P.E.
Project Engineer

HYDROLOGIC PARAMETERS

TIME OF CONCENTRATION

DEVELOPMENT : Storage One @ Oso Blanca
Future Conditions
CALCULATED BY : PDW

DATE: January 2015

*The velocity in column 9 was computed using the equation $V = CS^{0.5}$. C is a coefficient and S is the travel slope, as outlined in section 602.1 of the CCRFCD Manual.

$$T_i = 1.8 (1.1 - K) L^{1/2} / S^{1/3}$$

$$T_c = T_i + T_t$$

*As recommended in the CCRFD Manual, C = 30.6 under developed conditions and C = 29.4 under undeveloped conditions.

REFERENCE:

STANDARD FORM 4

REVISED HEC-1 MODEL


```

*****
FLOOD HYDROGRAPH PACKAGE (HEC-1)
JUN 1998
VERSION 4.1
*****
RUN DATE 25JAN15 TIME 17:10:10
*****

```

```

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

```

```

X X XXXXXX XXXX X
X X X X X XX
X X X X X Y
XXXXXX XXXX X XXXX X
X X X X X X
X X X X X X
X X XXXXXX XXXX XXXX

```

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

THE DEFINITIONS OF VARIABLES -RTIME- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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      TECHNICAL DRAINAGE STUDY FOR STORAGE ONE @ OSO BLANCH
3          ID      CITY OF LAS VEGAS, NEVADA
4          ID
5          ID      PREPARED FOR:
6          ID
7          ID      PREPARED BY:
8          ID      CIVILWORKS
9          ID      4845 W. PATRICK LANE
10         ID      LAS VEGAS, NV 89118
11         ID
12         ID
13         ID      FUTURE 100- & 10-YEAR MODEL
14         ID      FILENAME: S10B-FUTA.DAT
15         ID      JOB#109614011.00
16         ID
17         ID
18         ID
19         ID      *DIAGRAM
20         ID      IT      5      0      0      100
21         ID      IO      5
22         ID      IN      5
23         ID      JR      PREC      1.0      0.57
24         ID
25         ID      *KK      OND1
26         ID      RM      TAKEN FROM THE APPROVED TDS FOR DURANGO & 95 COMMERCIAL
27         ID      BA      .0002
28         ID      PE      2.86
29         ID      PC      .000      .020      .057      .070      .087      .108      .124      .130      .130      .130
30         ID      PC      .110      .130      .130      .133      .140      .142      .148      .158      .172      .181
31         ID      PC      .190      .197      .199      .200      .201      .204      .214      .229      .241      .249
32         ID      PC      .251      .256      .270      .278      .281      .283      .295      .322      .352      .409
33         ID      PC      .499      .590      .710      .744      .781      .812      .819      .835      .851      .856
34         ID      PC      .660      .668      .676      .688      .910      .926      .937      .950      .970      .976
35         ID      LS      .982      .985      .987      .989      .990      .993      .993      .994      .995      .998
36         ID      UD      .998      .999      1.00      .989      .990      .993      .993      .994      .995      .998
37         ID
38         ID      *
39         ID      *KK      OFX1
40         ID      RM      TAKEN FROM THE APPROVED TDS FOR DURANGO & 95 COMMERCIAL
41         ID      BA      .0001
42         ID      LS      0      77.0
43         ID      UD      .0500
44         ID
45         ID      *KK      OFX2
46         ID      RM      TAKEN FROM THE APPROVED TDS FOR DURANGO & 95 COMMERCIAL
47         ID      BA      .0006
48         ID      LS      0      77.0
49         ID      UD      .0500
50         ID

```

1

HEC-1 INPUT

PAGE 2

```

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

```

```

47      KK  OND3
48      KM  DEVELOPED ONSITE BASIN OND3
49      BA  .0014
50      LS  0    94.0
51      UD  .0500
      *

52      KK  OND2
53      KM  DEVELOPED ONSITE BASIN OND2
54      BA  .0015
55      LS  0    93.0
56      UD  .0500
      *

57      KK  CON1
58      KM  COMBINE OND1, OFX1, OFX2, OND3, AND OND2
59      HC  5
      *

60      KK  OND3A
61      KM  DEVELOPED ONSITE BASIN OND3A
62      BA  .0009
63      LS  0    94.0
64      UD  .0500
      *

65      ZZ

```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```

INPUT  (V) ROUTING      (---X) DIVERSION OR PUMP FLOW
LINE
NO.    (.) CONNECTOR    (X---X) RETURN OF DIVERTED OR PUMPED FLOW

23      OND1
      .
      .
37      .      OFX1
      .
      .
42      .      .      OFX2
      .
      .
47      .      .      .      OND3
      .
      .
52      .      .      .      .      OND2
      .
      .
57      CON1 .....
      .
      .
60      .      OND3A

```

***** RUNOFF ALSO COMPUTED AT THIS LOCATION *****

```

*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 25JAN15 TIME 17:10:10 *
*****

```

```

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

```

TECHNICAL DRAINAGE STUDY FOR STORAGE ONE @ OSO BLANCA CITY OF LAS VEGAS, NEVADA

PREPARED FOR:

PREPARED BY:
CIVILWORKS
4845 W. PATRICK LANE
LAS VEGAS, NV 89118

FUTURE 100- & 10-YEAR MODEL
FILENAME: S10B-FUTA.DAT
JOB#109614011.00

```

20 IQ      OUTPUT CONTROL VARIABLES
          IPRINT      5  PRINT CONTROL
          IPLOT       0  PLOT CONTROL
          QSCAL       0.  HYDROGRAPH PLOT SCALE

IT      HYDROGRAPH TIME DATA

```


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

COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 1.00 .57

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 .57
HYDROGRAPH AT	OND1	.00	1 FLOW TIME	0. 3.50	0. 3.50
HYDROGRAPH AT	OPX1	.00	1 FLOW TIME	0. 3.50	0. 3.50
HYDROGRAPH AT	OPX2	.00	1 FLOW TIME	1. 3.50	0. 3.50
HYDROGRAPH AT	OND3	.00	1 FLOW TIME	3. 3.50	2. 3.50
HYDROGRAPH AT	OND2	.00	1 FLOW TIME	3. 3.50	2. 3.50
5 COMBINED AT	CON1	.00	1 FLOW TIME	3. 3.50	4. 3.50
HYDROGRAPH AT	OND3A	.00	1 FLOW TIME	2. 3.50	1. 3.50

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

HYDRAULIC CALCULATIONS

Worksheet for Revised South Box

Project Description

Solve For Headwater Elevation

Input Data

Discharge	141.00	ft ³ /s
Centroid Elevation	1.50	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.65	
Opening Width	6.00	ft
Opening Height	3.00	ft

Results

Headwater Elevation	3.76	ft
Headwater Height Above Centroid	2.26	ft
Tailwater Height Above Centroid	-1.50	ft
Flow Area	18.00	ft ²
Velocity	7.83	ft/s

Cross Section for Revised South Box

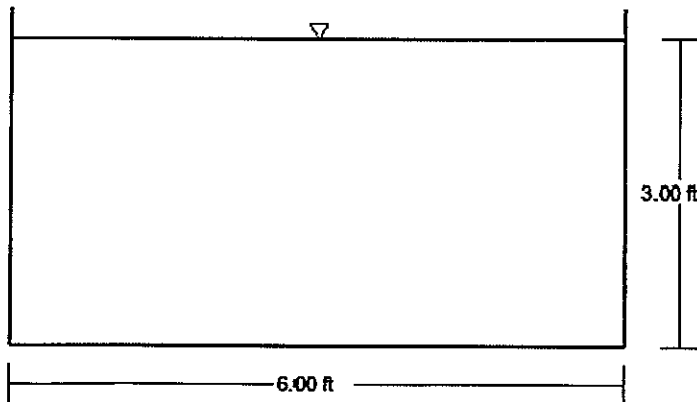
Project Description

Solve For Headwater Elevation

Input Data

Discharge	141.00	ft ³ /s
Headwater Elevation	3.76	ft
Centroid Elevation	1.50	ft
Tailwater Elevation	0.00	ft
Discharge Coefficient	0.65	
Opening Width	6.00	ft
Opening Height	3.00	ft

Cross Section Image



V: 1
H: 1

RIPRAP CALCULATION

$$D_{50} = ((V*(S)^{0.17})/(3*(S_s-1)))^2 \quad (\text{Equation 734 from the CCRFCD HC\&DDM})$$

Where:

D_{50} = Rock size for which 50 percent of the riprap weight is smaller (ft)

V = Mean Channel Velocity (fps)

S_s = Specific gravity of Rock (Minimum $S_s = 2.50$)

S = Longitudinal Channel Slope (ft/ft)

Input:

$V = 8.43$ ft/s

$S_s = 2.5$

$S = 0.0175$ ft/ft

$$D_{50} = \underline{\underline{0.89 \text{ ft}}} \quad @ \text{ Section FM2}$$

Input:

$V = 6.08$ ft/s

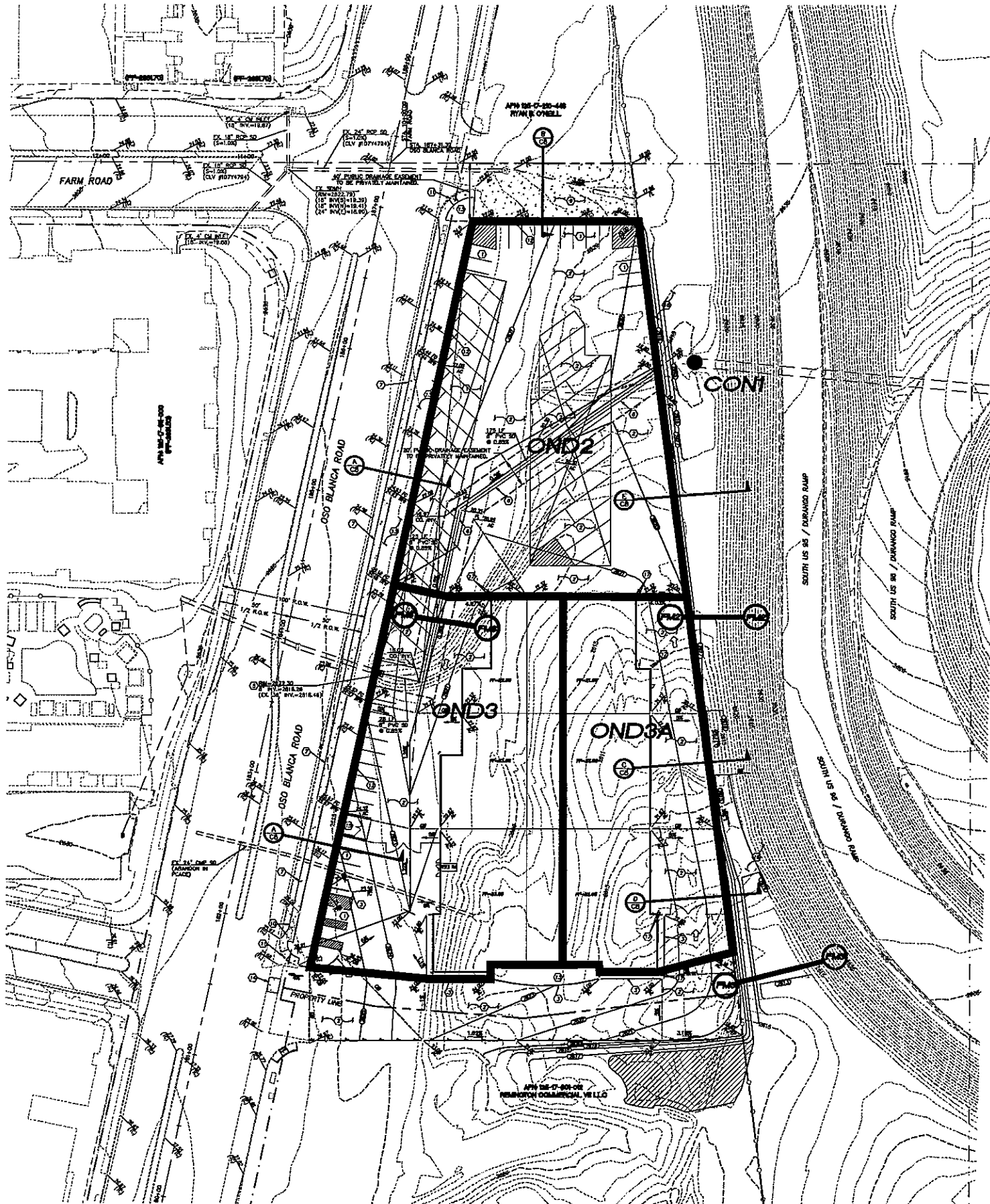
$S_s = 2.5$

$S = 0.0139$ ft/ft

$$D_{50} = \underline{\underline{0.43 \text{ ft}}} \quad @ \text{ Section FM3}$$

AC	ASPHALTIC CONCRETE
ADJ	ADJUST
AGG	AGGREGATE
BC	BACK OF CURB
BOR	BEGINNING OF CURB RETURN
BEG	BEGIN
BSW	BACK OF SIDEWALK
BVC	BEGINNING OF VERTICAL CURVE
CATV	CABLE TV
CCAUSSD	CLARK COUNTY AREA UNIFORM STANDARD DRAWING
CCRFCD	CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT
CL	CENTERLINE
CLV	CITY OF LAS VEGAS
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COMM	COMMUNICATIONS
CONC	CONCRETE
CONDUIT	CONDUIT
CULV	CULVERT
DC	DEPRESSED CURB
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DOM	DOMESTIC
ELEC	ELECTRIC
EAC	EDGE OF AC
EC	END OF CURVE
ECR	END OF CURB RETURN
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EV	END OF VERTICAL CURVE
EX	EXISTING
FAST	FREWAY & ARTERIAL SYSTEM OF TRANSPORTATION
FF	FINISH FLOOR
FG	FINISH GRADE
PH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTICS
FS	FINISHED SURFACE
GB	GRADE BREAK
HDPE	HIGH DENSITY POLYETHYLENE
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HP	HIGH POINT
INV	INVERT
IRR	IRRIGATION
LAT	LATERAL
LF	LINEAL FEET
LS	LANDSCAPE
LT	LEFT
L.V.W.D.	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MTR	METER
PB	PULL BOX
PL	PROPERTY LINE
PP	POWER POLE
PROP	PROPOSED
PVC	POLY VINYL CHLORIDE PIPE
PWMT	PAVEMENT
RM	TOP OF MANHOLE OR CLEANOUT
RT	RIGHT-OF-WAY
ROW	RIGHT-OF-WAY
SS	SANITARY SEWER
SD	STORM DRAIN
SNWA	SOUTHERN NEVADA WATER AUTHORITY
STA	STATION
STLT	STREET LIGHT
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
TEL	TELEPHONE
TC	TOP OF CURB
TF	TOP OF FOOTING
TW	TOP OF WALL
TYP	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS
VG	VALLEY GUTTER
WL	WATER LINE

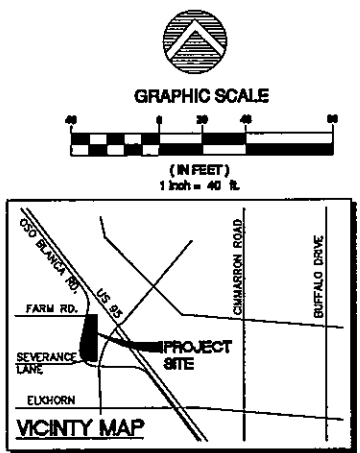
LEGEND		
DESCRIPTION	EXISTING	PROPOSED
UTILITIES		
B.S. VALVE		
FIRE HYDRANTS		
CLEAN OUT		
GATE VALVE		
METER		
REDUCER		
CAP		
11.25' ELBOW		
22.5' ELBOW		
45' ELBOW		
90' ELBOW		
CROSS		
TEE		
MANHOLES		
ELECTRICAL		
SANITARY SEWER		
STORM DRAIN		
TELEPHONE		
STREET LIGHTS		
100W HPS STL.		
150W HPS STL.		
200W HPS STL.		
250W HPS STL.		
400W HPS STL.		
GRADING		
SPOT ELEV.		
SLOPE		
5' CONT.		
1' CONT.		
SITE		
SIGN		
1" CURB		
4" CURB		
EDGE OF PAVT.		
WALL		
LINE TYPES		
CL OR SECTION LINE		
RIGHT OF WAY LINE		
PROPERTY LINE		
SAWTOOTH LINE		
FLOW LINE		
SHADES		
HEAVY AC PAVEMENT		
LIGHT AC PAVEMENT		
CONCRETE PAVEMENT		



SECTION	Q ₁₀ (cfs)	D ₁₀ (ft)	V ₁₀ (ft/s)
FA2	337	2.62	8.43
FA3	339	1.47	6.08
FA8	15	0.49	3.10

10-YEAR / 100-YEAR, 6-HOUR STORM EVENT FUTURE RUNOFF AMOUNTS			
BASIN NAME / CONCENTRATION POINT	AREA (acres)	10-YEAR FLOW (cfs)	100-YEAR FLOW (cfs)
OND2	0.95	2	3
OND3	0.89	2	3
OND3A	0.59	1	2
CON1	-	-	544

CON1 = OND1 + OND2 + OND3 + OND4 + OND5 + OND6 + OND7 + OND8 + OND9 + OND10



BENCHMARK
SOUTH 00°08'57" WEST, BEING THE WEST LINE OF THE GOVERNMENT LOT 11, LYING WITHIN THE SOUTHWEST QUARTER (SW 1/4) OF SECTION 17, TOWNSHIP 19 SOUTH, RANGE 80 EAST, M.D.N., AS SHOWN IN BOOK 140, PAGE 12 OF PLATS IN THE CLARK COUNTY, NEVADA, RECORDER'S OFFICE.

BASIS OF BEARING
CITY OF LAS VEGAS BENCHMARK # 5LV90 1758
A RIVET AND PLATE IN THE TOP OF CURB AT THE NORTHWEST CORNER OF OSO BLANCA ROAD AND DURANGO DRIVE.
NAVD 88 ELEVATION = 798.4331 METERS / 2619.53 FEET
NORTH AMERICAN DATUM OF 1988

- CONSTRUCTION NOTES:**
- ALL CONSTRUCTION TO BE DONE IN ACCORDANCE WITH "CLARK COUNTY AREA UNIFORM STANDARD DRAWINGS (C.C.A.U.S.D.)" LATEST EDITION AND/OR REGULATING ENTITY HAVING JURISDICTION.
- CONSTRUCT 2" AC PAVEMENT OVER 4" TYPE II AGGREGATE BASE.
 - CONSTRUCT 3" AC PAVEMENT OVER 6" TYPE II AGGREGATE BASE.
 - CONSTRUCT "A" TYPE CURB PER DETAIL ON SHEET CB.
 - CONSTRUCT 1" TYPE CURB PER CCAUSD #216.
 - CONSTRUCT 60" TYPE II MANHOLE WITH BOLTED DOWN GRATE MANHOLE COVER PER CCAUSD #408.
 - CONSTRUCT 2" CONCRETE VALLEY GUTTER PER DETAIL ON SHEET CB.
 - CONSTRUCT CONCRETE SIDEWALK PER CCAUSD #234.
 - CONSTRUCT U-GUTTER PER DETAIL ON SHEET CB.
 - CONSTRUCT 6" CONCRETE OVER 6" TYPE II AGGREGATE BASE WITH #4 REBAR @ 24" O.C. EACH WAY.
 - ADJUST TO GRADE.
 - CONSTRUCT CONCRETE SIDEWALK RAMP PER CCAUSD #235, CASE I.
 - RETAINING WALL. SEE STRUCTURAL PLANS.
 - LANDSCAPE AREA. SEE LANDSCAPE PLANS.
 - REMOVE AND REPLACE SECTION OF CROSS GUTTER PER CCAUSD #228.
 - TRASH ENCLOSURE. SEE ARCHITECT'S PLANS.
 - CONSTRUCT RIPRAP PER NDOT STD. DWG. R-31.5.
 - CONSTRUCT BOLLARDS. SEE DETAIL ON SHEET CB.

FIGURE 7

STORAGEONE
@ 7422 OSO BLANCA ROAD
NEW COMMERCIAL CONSTRUCTION
FOR: WESTAR/STORAGEONE
LAS VEGAS, NEVADA

PROJ. NO. 14981320.00
PRIN. ARCH. G.G. WILSON, AIA
PROJ. ARCH. -
JOB CAPT. MML
DESIGNER TND
ENGINEER PDW
PH-2/3 -
PH-4 -
PH-5 -

REVISIONS

FIGURE 7

SHT. NO.

planning/interior design
AA ARCHITECTS, PC
(702) 876-0668
professional corp / certified n.e.e.c.b.
4945 West Patrick Lane
Las Vegas, Nevada 89118

CONSULTANTS:
CivilWorks
ARCHITECTS, INC.
4945 West Patrick Lane
Las Vegas, NV 89118
CONTACT: (702) 876-0668 Fax: (702) 876-0668

ELEC: N/A
MECH: N/A



Memorandum

Department of Public Works
City Engineer Division
Survey Section

Phone (702) 229-6217
Fax (702) 804-8582
www.lasvegasnevada.gov

From: ALAN R RIEKKI, PLS - CITY SURVEYOR
To: PETER LOWENSTEIN - DEPARTMENT OF PLANNING
STEVE SWANTON - DEPARTMENT OF PLANNING
HERITAGE SURVEYING
F N B N-C M L O N I L L C - % SORENSON GROUP MGT
LAND DEV ASSOCIATES INC
DENNIS LAYTON, PLS - HERITAGE SURVEYING
CC: BART ANDERSON, P.E. - Engineering Project Manager
Date: February 11, 2014

RE: **PARCEL MAP 52656 - OSO BLANCA & DURANGO PARCEL MAP**

Attached is a redlined drawing delineating comments for the above map. **THE REDLINED PRINT MUST BE RETURNED TO SURVEY ALONG WITH A CORRECTED DRAWING FOR APPROVAL.**

603415 CURRENT PL Status: Conditional Approval February 04, 2014

If you have any questions regarding the following Planning comments please call 229-6301
Department of Planning staff has administratively approved your request for technical review of the subject parcel map, subject to the changes and corrections noted as follows:

1. The parcel file number "PMP-52656" shall be placed above the Recorder's block in the lower right hand corner of the cover sheet.
2. Change the title of the planning jurat from "Director of Planning" to "Certificate of Director of Planning Approval."
3. Please remove the word "DATE" on the Director's signature line.
4. Add the name of the Director of Planning as "Flinn Fagg, AICP."

606862 DEVCO Status: Conditional Approval February 11, 2014

If you have any questions regarding the following Development Coordination comments please call 229-6541

REVISED COMMENTS: -- These comments supersede all previous memos/comments:

We note that normally off-site improvements are required with Parcel Map applications, however this site has an associated Site Development Plan Review (SDR-52440) in which off-site improvements are proposed to coincide with phased development. Therefore, no improvements or bonds are required with the recordation of this Parcel Map.

We also note that the City has received several requests similar to this Parcel Map which were later modified at the applicant's request to be turned into commercial subdivisions. While we can

approve this Parcel Map request, we suggest that the commercial subdivision option be explored prior the resubmittal of this Parcel Map.

CONDITIONS OF APPROVAL:

1. Provide a note on the mylar of this map that states "All lots within this Parcel Map shall have perpetual inter-site access rights. No barriers (e.g. curbs, wall, etc.) shall be erected within the boundaries of the overall Parcel Map which would prohibit any vehicle on this site from utilizing any driveway connecting this commercial development site to the abutting public streets unless incompatible uses can be demonstrated to the satisfaction of the City Engineer."
2. The boundary of this Parcel map shall be revised to match what is shown as the legal parcel on the Clark County Assessor's Map. Alternatively, provide documentation to the satisfaction of the City Surveyor that the "not a part" portions of this Parcel Map are separate legal Parcels.
3. Prior to the recordation of this Parcel Map or the submittal of any construction drawings, a Drainage Plan and Technical Drainage Study must be submitted to and approved by the Department of Public Works. No building or grading permit can be issued until this drainage plan/study is received and approved. The drainage plan/study is required at this time to determine what elevation structures should be built at to achieve a minimum protection from floodwater damages, and also to determine what drainage easements, if any, are necessary and are needed to be noted on this parcel map prior to recordation. Provide and improve all drainageways as recommended in the City of Las Vegas Neighborhood Drainage Studies and in the approved drainage plan/study. The Drainage Study required by SDR-52440 maybe used to satisfy this condition provided that it addresses the areas covered by this Parcel Map.
4. These conditions of approval are valid only for a period of one year. The City of Las Vegas reserves the right to modify or add conditions of approval if this parcel map is not recorded within one year of the date of this memo. Construction plans approved subsequently are valid only for a one year period following the date of this memo unless Public Works allows the plans to be valid for a longer period of time.
5. Comply with all applicable condition of SDR-52440 and any other site related actions. If SDR 52440 is not approved, these conditions are not valid and new conditions must be issued which address only this Parcel Map.

603416 SURVEY Status: Denied February 05, 2014

If you have any questions regarding the following Survey comments please call 229-6217

Please provide a Las Vegas Valley Water District jurat concerning water service for the proposed parcel split. A submittal should be made to the Las Vegas Valley Water District in order to determine which jurat is appropriate for this property.

Please provide a total acreage for the property.

Please correct minor labeling issues as marked.

End of Comments.





LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
RICKI Y. BARLOW
BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301

FAX 702.474.0352

TTY 702.386.9108

www.lasvegasnevada.gov

February 12, 2014

Sorenson Group Mgt.
FNBC-CMLON I, LLC
299 South Main Street, #2200
Salt Lake City, Utah 84111-2288

**RE: SDR-52440 [PRJ-52157] - SITE DEVELOPMENT PLAN REVIEW RELATED TO
SUP-52437 AND SUP-52438
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Site Development Plan Review FOR A PROPOSED THREE-STORY, 122,325 SQUARE-FOOT MINI-STORAGE FACILITY WITH A WAIVER OF THE TOWN CENTER DEVELOPMENT STANDARDS TO ALLOW 10% OPEN SPACE WHERE 20% OPEN SPACE IS REQUIRED on 2.90 acres at the southeast corner of Farm Road and Oso Blanca Road (portion of APN 125-17-301-006), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-52157], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

1. Approval of and conformance to the Conditions of Approval for Special Use Permit (SUP-52437) and Special Use Permit (SUP-52438) 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 combined site plan and landscape plan, date stamped 01/14/14, and the building elevations and floor plans, dated stamped 12/26/13, except as amended by conditions herein.
4. A Waiver from the Town Center Development Standards Manual is hereby approved, to allow 10% open space where 20% open space is required.
5. All recreational vehicles shall be completely screened from view from surrounding properties and abutting streets by exterior walls.
6. 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.

7. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
8. The applicant shall coordinate with the City Surveyor and other city staff to determine the most appropriate mapping action necessary to consolidate the existing lots. The mapping action shall be completed and recorded prior to the issuance of any building permits.
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, and 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.
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. In accordance with code requirements of Title 13.56, construct all incomplete half-street improvements on Oso Blanca Road adjacent to this site concurrent with development of this site as required by the Department of Public Works. Construction of off-site improvements may be phased so that off-site improvements will be required concurrent with adjacent onsite development activities. All existing paving damaged or removed by this development shall be restored at its original location and to its original width concurrent with development of this site.
13. Obtain an Occupancy Permit from the Nevada Department of Transportation (NDOT) for all driveways or other private improvements in the Oso Blanca Road public right-of-way adjacent to this site prior to constructing any improvements within NDOT jurisdiction.
14. Meet with the Fire Protection Engineering Section of the Department of Fire Services to discuss fire requirements for this site.
15. 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.
16. As appropriate, submit an Encroachment Agreement to the City of Las Vegas or obtain an Occupancy Permit from the Nevada Department of Transportation for all landscaping and private improvements in the Oso Blanca Road public right-of-way adjacent to this site.

Sorenson Group Mgt.
FNBC-CMLON I, LLC
SDR-52440 [PRJ-52157] - Page Three
February 12, 2014

17. 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 **February 11, 2014** 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 please access <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after **February 24, 2014**. 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,



Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. James Meservey
StorageOne
2990 South Durango Drive
Las Vegas, Nevada 89117-4412

Mr. Bob Genzer
Genzer Consulting
9612 Hawksbill Court
Las Vegas, Nevada 89117-0646

John Martinez, Jr.

From: James Marshall <jmarshall@LasVegasNevada.GOV>
Sent: Monday, April 21, 2014 9:51 AM
To: John Martinez, Jr.
Subject: 125-17-301-006
Attachments: SDR-52440.pdf; SUP-52438.pdf; SUP-52437.pdf; PMP-52656.pdf

Attached are the conditions of approval for SDR-52440, SUP-52438 and SUP-52437.

VAR-52439 was removed and not needed.

PMP – 52656 – conditions of approval are administrative.

Jim Marshall
Senior Planner
333 N. Rancho Drive
Ph: 229-5274



LAS VEGAS
CITY COUNCIL

CAROLYN G. GOODMAN
MAYOR

STAVROS S. ANTHONY
MAYOR PRO TEM

LOIS TARKANIAN
STEVEN D. ROSS
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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

February 12, 2014

Sorenson Group Mgt.
FNBC-CMLON I, LLC
299 South Main Street, #2200
Salt Lake City, Utah 84111-2288

**RE: SUP-52437 [PRJ-52157] - SPECIAL USE PERMIT RELATED TO SUP-52438 AND
SDR-52440
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Special Use Permit FOR A PROPOSED MINI-STORAGE FACILITY WITH A WAIVER OF THE REQUIREMENT TO PROVIDE A RETAIL OR OFFICE FACADE ON ALL EXTERIOR WALLS at the southeast corner of Farm Road and Oso Blanca Road (portion of APN 125-17-301-006), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-52157], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

1. Conformance to all Minimum Requirements under Town Center Development Standards Manual for a Mini-Storage Facility use.
2. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-52440) 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. A Waiver from Town Center Development Standards Manual is hereby approved, to allow no retail façade where such is required.
5. 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.
6. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.
7. All City Code requirements and design standards of all City departments must be satisfied, except as modified herein.

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301

FAX 702.474.0352

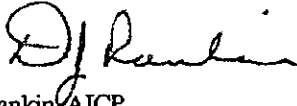
TTY 702.386.9108

www.lasvegasnevada.gov

Sorenson Group Mgt
FNBC-CMLON I, LLC
SUP-52437 [PRJ-52157] - Page Two
February 12, 2014

This action by the Planning Commission on February 11, 2014 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 please access <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after February 24, 2014. 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,



Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. James Meservey
StorageOne
2990 South Durango Drive
Las Vegas, Nevada 89117-4412

Mr. Bob Genzer
Genzer Consulting
9612 Hawksbill Court
Las Vegas, Nevada 89117-0646



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February 12, 2014

Sorenson Group Mgt.
FNBC-CMLON I, LLC
299 South Main Street, #2200
Salt Lake City, Utah 84111-2288

**RE: SUP-52438 [PRJ-52157] - SPECIAL USE PERMIT RELATED TO SUP-52437 AND
SDR-52440
PLANNING COMMISSION MEETING OF FEBRUARY 11, 2014**

Dear Applicant:

Your request for a Special Use Permit FOR A PROPOSED TRUCK RENTAL USE WITH A WAIVER TO ALLOW A 130-FOOT DISTANCE SEPARATION FROM A SINGLE-FAMILY DETACHED DWELLING WHERE 330 FEET IS REQUIRED at the southeast corner of Farm Road and Oso Blanca Road (portion of APN 125-17-301-006), T-C (Town Center) Zone [GC-TC (General Commercial - Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-52157], was considered by the Planning Commission on February 11, 2014.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

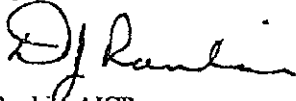
1. Conformance to all Minimum Requirements under Town Center Development Standards Manual for a Truck Rental use.
2. Approval of and conformance to the Conditions of Approval for Site Development Plan Review (SDR-52438) shall be required.
3. This approval shall be void two years from the date of final 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. A Waiver from Town Center Development Standards Manual is hereby approved to allow a 130-foot distance separation from a single-family detached dwelling where a 330-foot distance separation is required.
5. 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.
6. These Conditions of Approval shall be affixed to the cover sheet of any plan set submitted for building permit.

Sorenson Group Mgt.
FNBC-CMLON I, LLC
SUP-52438 [PRJ-52157] - Page Two
February 12, 2014

7. 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 **February 11, 2014** 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 please access <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after **February 24, 2014**. 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,



Doug Rankin, AICP
Planning Manager
Case Planning Division

DR:nl

cc:

Mr. James Meservey
StorageOne
2990 South Durango Drive
Las Vegas, Nevada 89117-4412

Mr. Bob Genzer
Genzer Consulting
9612 Hawksbill Court
Las Vegas, Nevada 89117-0646

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: <u>95 & Durango Commer.</u>		Map ID:
Firm Name: <u>Baughman & Turner</u>		Engineer: <u>John Gustafson</u>
Address: <u>1210 Hinson St</u>		
City: <u>Las Vegas</u>	State: <u>NV</u>	Zip: <u>89102</u>
Phone Number: <u>702-870-8771</u>		Fax Number: <u>702-878-2695</u>
Property Owner: <u>Remington Commercial Development</u>		
Address: <u>5920 S. Rainbow Blvd., Suite 11</u>		
City: <u>Las Vegas</u>	State: <u>NV</u>	Zip: <u>89118</u>
Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

- | Yes | No | |
|-------------------------------------|--------------------------|--|
| ☒ | ☐ | Design Manual Standard Form 1 with the engineer's seal and signature. |
| ☒ | ☐ | Design Manual Standard Form 4 . |
| ☒ | ☐ | 2 copies of the 24" x 36" Drainage Plan. |
| ☐ | ☐ | A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge. |

II. MAPS AND EXHIBITS

- | Yes | No | |
|-------------------------------------|--------------------------|---|
| ☒ | ☐ | A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated. |
| ☒ | ☐ | A copy of the current CCRFCD Master Plan Update Figure, (F-x), for Flood Control Facilities and Environmental areas with the site delineated. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

- | Yes | No | |
|----------|---------------|--|
| <u>X</u> | <u> </u> | Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs. |
| <u>X</u> | <u> </u> | On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs. |
| <u>X</u> | <u> </u> | Vicinity Map with local and major cross streets identified and a north arrow. |

III. DRAINAGE PLAN

- | Yes | No | |
|----------|---------------|---|
| <u>X</u> | <u> </u> | Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada. |
| <u>X</u> | <u> </u> | Minimum scale: 1" = 60'. |
| <u>X</u> | <u> </u> | Project name. |
| <u>X</u> | <u> </u> | Vicinity Map with local and major cross streets. |
| <u>X</u> | <u> </u> | Revision box. |
| <u>X</u> | <u> </u> | North arrow and bar scale. |
| <u>X</u> | <u> </u> | Engineer's/consultant's address and phone number. |
| <u>X</u> | <u> </u> | Elevation datum and benchmark. |
| <u>X</u> | <u> </u> | Legend for symbols and abbreviations. |
| <u>X</u> | <u> </u> | Cut/fill scarps, where applicable. |
| <u>X</u> | <u> </u> | Street names, grades, widths. |
| <u>X</u> | <u> </u> | Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. |
| <u>X</u> | <u> </u> | Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate. |
| <u>X</u> | <u> </u> | Minimum finish floor elevations with top-of-curb elevations at upstream end of lot. |
| <u>X</u> | <u> </u> | Proposed typical street sections. |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
<u>N/A</u>	☐	Streets with off-set crowns.
<u>X</u>	☐	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
<u>X</u>	☐	Property lines.
<u>X</u>	☐	Right-of-way lines and widths, existing and proposed.
<u>X</u>	☐	Existing improvements and their elevations.
<u>X</u>	☐	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
<u>X</u>	☐	Concentration points and drainage flow direction with Q_{100} and V_{100} and D_{100} in streets.
<u>X</u>	☐	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
<u>X</u>	☐	Location and cross-section of street capacity calculations.
<u>X</u>	☐	Cross-sectional detail for channels, including cutoff wall locations.
<u>X</u>	☐	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
<u>X</u>	☐	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
<u>N/A</u>	☐	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
<u>X</u>	☐	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
<u>X</u>	☐	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
<u>X</u>	☐	Building and/or lot numbers.
<u>X</u>	☐	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
<u>X</u>	☐	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

- | Yes | No | |
|-------------------------------------|--------------------------|--|
| ☒ | ☐ | For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE. |
| ☒ | ☐ | Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q_{100} flows. |
| ☒ | ☐ | Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent. |
| ☒ | ☐ | Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required). |

IV. HYDROLOGIC ANALYSIS

- | Yes | No | |
|-------------------------------------|--------------------------|--|
| ☒ | ☐ | Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated. |
| ☒ | ☐ | Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| ☒ | ☐ | Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models. |
| ☒ | ☐ | Use of correct precipitation values in and around the McCarran Airport rainfall area. |
| ☒ | ☐ | A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations. |
| ☒ | ☐ | A summary table of stormwater flows showing basin area, Q_{10} and Q_{100} for both individual basins and combined basin flows, where applicable. |
| ☒ | ☐ | Copies of supporting technical information referenced from a previously approved study and a statement accepting these results. |
| ☒ | ☐ | On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law. |
| ☐ | ☐ | Calculation for impervious area for parking lots and LIDs (if required). |

REFERENCE:

STANDARD FORM 2

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
<u>N/A</u>		Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
<u>X</u>		Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q_{100} and Q_{10} flows representing the worst case for interior and all perimeter streets. $Q_{100} d \times v \leq 8$. $Q_{10} d \times v \leq 6$ and 12 foot dry lane for rights-of-way ≥ 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
<u>X</u>		A summary table of interior and exterior street capacity calculations showing the street name, Q_{100} flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
<u>N/A</u>		Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
<u>N/A</u>		Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
<u>X</u>		Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings, 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q_{100} weir height or flow depth, whichever is greater.
<u>N/A</u>		A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
<u>N/A</u>		Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
<u>X</u>		Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
<u>X</u>		The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
<u>X</u>		Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:

STANDARD FORM 2



CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
		A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
X		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
X		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
X		Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
N/A		Back of lot elevations and lot drainage pattern for all lots including common lots.
X		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
		This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
X		Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas -- Manual Section 1600		
Yes	No	
X		Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
N/A		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
X		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
X		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
N/A		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

CITY OF LAS VEGAS MINIMUM DRAINAGE STUDY CRITERIA CHECKLIST

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
N/A		Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
N/A		Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an aid in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.



**LAS VEGAS
CITY COUNCIL**

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BOB COFFIN
BOB BEERS

ELIZABETH N. FRETWELL
CITY MANAGER

July 15, 2015

RECEIVED JUL 20 2015

Mr. David Delzotto
Remington Commercial VIII, LLC
5920 South Rainbow Blvd., Suite 11
Las Vegas, Nevada 89118

**RE: TMP-59501 [PRJ-59484] - TENTATIVE MAP
PLANNING COMMISSION MEETING OF JULY 14, 2015**

Dear Applicant:

Your request for a Tentative Map FOR A ONE-LOT COMMERCIAL SUBDIVISION on the northwest corner of Oso Blanca Road and Durango Drive (APN 125-17-301-012), T-C (Town Center) Zone [GC-TC (General Commercial-Town Center) Special Land Use Designation], Ward 6 (Ross) [PRJ-59484], was considered by the Planning Commission on July 14, 2015.

The Planning Commission voted to **APPROVE** of your request, subject to the following:

Planning

1. Approval of the Tentative Map shall be for no more than four (4) years. If a Final Map is not recorded on all or a portion of the area embraced by the Tentative Map with four (4) years of the approval of the Tentative Map, this action is void.
2. All development shall conform to the Conditions of Approval for Site Development Plan Review (SDR-58128).
3. A note shall be added to the final map to provide irrevocable, perpetual common access and parking to all driveways, drive aisles and parking spaces for all sites located within the boundaries of the commercial subdivision.
4. In conjunction with creation, declaration and recordation of the subject common-interest community, and prior to recordation of the Covenants, Codes and Restrictions ("CC&R"), or conveyance of any unit within the community, the Developer is required to record a Declaration of Private Maintenance Requirements ("DPMR") as a covenant on all associated properties, and on behalf of all current and future property owners. The DPMR is to include a listing of all privately owned and/or maintained infrastructure improvements, along with assignment of maintenance responsibility for each to the common interest community or the respective individual property owners, and is to provide a brief description of the required level of maintenance for privately

CITY OF LAS VEGAS
DEPARTMENT OF PLANNING
DEVELOPMENT SERVICES CENTER
333 NORTH RANCHO DRIVE
3RD FLOOR
LAS VEGAS, NEVADA 89106

VOICE 702.229.6301
FAX 702.474.7463
TTY 7-1-1
www.lasvegasnevada.gov



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maintained components. The DPMR must be reviewed and approved by the City of Las Vegas Department of Field Operations prior to recordation, and must include a statement that all properties within the community are subject to assessment for all associated costs should private maintenance obligations not be met, and the City of Las Vegas be required to provide for said maintenance. Also, the CC&R are to include a statement of obligation of compliance with the DPMR. Following recordation, the Developer is to submit copies of the recorded DPMR and CC&R documents to the City of Las Vegas Department of Field Operations.

5. A fully operational fire protection system, including fire apparatus roads, fire hydrants and water supply, shall be installed and functioning prior to construction of any combustible structures.
6. All development is subject to the conditions of City Departments and State Subdivision Statutes.

Public Works

7. Per Title 19.16.060.W.1, provide a note on the Final Map that states "All parcels created through this map shall have perpetual unobstructed access to all driveways servicing the overall subdivision unless incompatible uses can be demonstrated to the satisfaction of the City Engineer."
8. Per Title 19.16.060.W.3, provide a note on the Final Map that states "All subdivided lots within this Final Map shall provide perpetual inter-lot drainage rights across all existing and future parcel limits." This condition shall not be enforced if the Owner demonstrates to the satisfaction of the Flood Control Section of Public Works that each lot can drain independently to abutting public roadways.
9. 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, submittal of any construction drawings or the submittal of a Map subdividing this site, 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. The Drainage Study required by SDR-58128 may be used to satisfy this condition.
10. As per Unified Development Code (UDC) 19.16.060.G, all requirements must be complied with or such future compliance must be guaranteed by an approved performance security method in accordance with UDC sections 19.02.130.C and 19.02.130.E.

11. The approval of all Public Works related improvements shown on this Tentative Map is in concept only. Specific design and construction details relating to size, type and/or alignment of improvements, including but not limited to street, sewer and drainage improvements, shall be resolved prior to approval of the construction plans by the City. No deviations from adopted City Standards shall be allowed unless specific written approval for such is received from the City Engineer prior to the recordation of a Final Map or the approval of subdivision-related construction plans, whichever may occur first. Approval of this Tentative Map does not constitute approval of any deviations. If such approval cannot be obtained, a revised Tentative Map must be submitted showing elimination of such deviations.
12. Site Development to comply with all applicable conditions of approval for SDR-58128 and all other site-related actions.

This action by the Planning Commission on **July 14, 2015** is final unless a written appeal is filed with the City Clerk within seven 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 <http://www.lasvegasnevada.gov/CheckStatus/DevelopmentApp.htm>, or contact the Department of Planning and Development at 702.229.6301 after **July 21, 2015**. 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,



Andrew P. Reed, AICP
Planning Supervisor
Case Planning Division

AR:nl

cc:

Mr. David Turner
Baughman & Turner, Inc.
1210 Hinson Street
Las Vegas, Nevada 89102