

DS #:

4804-1

APN:

126-35-701.001 5 more

PROJECT:

Manvick's Washburn Residential Development

SUBMITTAL:

3rd Submittal

SCANNED BY/DATE:

CHECKED BY/DATE:



CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		September 28, 2016
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT: Drainage Study for: Maverick & Washburn Residential Development – Update #1 for Onsite Improvements		COPIES TO: Triton Engineering
Cross Streets:	SEC of Maverick Street & Washburn Avenue	D. R. Horton Inc.
File Number:	F:\Depot\DSMemos\DS4804C.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-35-701-001 & more	
Zoning Action:	TMP-63989, ZON-63988 & ZON-63987	
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	5/24/2016	6/15/2016	Not Approved	\$400.00	444949: \$400
2 nd Submittal & Supplement	7/18/2016 & 8/29/2016	9/1/2016	Approved	\$400.00	451510: \$400
3 rd Submittal	9/13/2016	9/28/2016	See Comments Below	\$100.00	458337: \$100
			TOTAL FEES (LDDRS):	\$900.00	----

REMARKS:

3rd Submittal: Update #1 for Onsite Developments

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.

- Sites with a grade difference of 2 feet above or below existing grades are required to have approval from the *City of Las Vegas Planning and Development Department*. The engineer must submit copies of the grading plans and detail sheet with a letter justifying the grade difference to the *City Planning Department* (229-6301). The engineer must provide *City Planning* approval with the next submittal.
- Figure 4 (Developed Conditions Drainage Map):** In the "Normal Depth Flow Calculations" Table, revise the street name of *Hydraulic Section B* to *Royal Indigo Street*.
- Per the drainage study, *La Madre Way* is the only street with 100-year flow depth above the back of curb ($d_{100} = 1.17'$) and erosive to the landscape area ($V_{100} = 5.4$ ft/s) behind the sidewalk. Revise **Detail Sections E/5, F/5 and G/5** on **Sheet 5** to provide erosion protection measures in the 6'-landscape common element. Review and revise accordingly in the next submittal.
- This drainage study assumes that the project will be constructed in one phase. If improvement plans are submitted to break the project into separate phases, a drainage study update will be required for each phase addressing the interim condition.

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/35
AREA G-35

*** FAX TX REPORT ***

TRANSMISSION OK

JOB NO. 1510
 DESTINATION ADDRESS 7022543062
 PSWD/SUBADDRESS
 DESTINATION ID
 ST. TIME 09/28 10:46
 USAGE T 00' 43
 PGS. 2
 RESULT OK

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TOTAL FEES (LDDRS):				\$900.00	----

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2. **Figure 4 (Developed Conditions Drainage Map):** In the "Normal Depth Flow Calculations" Table,

UPDATE #1
TO THE
TECHNICAL DRAINAGE STUDY
FOR
Maverick & Washburn
Residential Development
(aka Washburn & Maverick)

City of Las Vegas, Nevada

Prepared for:
DR Horton
1081 Whitney Ranch Drive, #141
Henderson, NV 89014
Office: (702)635-3600 - Fax: (702)538.0735

Prepared by:
Triton Engineering
6757 W. Charleston Blvd., Suite B
Las Vegas, NV 89146
Office: (702) 254-1480 - Fax: (702) 254-3062

APN 125-35-701-001; -002; -003, 125-35-701-005; -006; -007; -008; -009; -010

SEPTEMBER 2016

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Technical Drainage Study for Washburn & Maverick, Unit 1 Date: September 2016

Location of Development: a) Descriptive (Cross Streets) North/South: Maverick 60E
125-35-701-001; -002; -003; -004; -005; -006; -007; -008; -009; -010

b) Section: 35 Township: 19S Range: 60E
125-35-701-001; -002; -003; -004; -005; -006; -007; -008; -009; -010

Various Owners: DR Horton Developers
(702)672-1939 (702)538-0735 MEJones3@DRHorton.com

Name of Owner: Various Owners, - DR Horton, Developers

Telephone No.: (702)672-1939 Fax No.: (702) 538-0735 E-Mail Address: MEJones3@DRHorton.com

Address: 1081 Whitney Road, Henderson, NV 89014 (702)254-1480
KWittwer@tritoneng.com (702)254-3062

Contact: Triton Engineering, LLC Kelly J. Wittwer, P.E. Telephone No.: (702) 254-1480

* E-Mail Address: 6757 West Charleston Boulevard Suite B, Las Vegas, NV 89146 Fax No.: (702) 254-3062

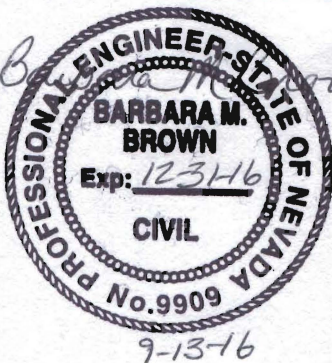
Firm: Triton Engineering, LLC

Address: 6757 West Charleston Boulevard, Suite B, Las Vegas, NV 89146

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		
	16.47				16.47

- Total Owned Land Area: At Site: 16.47 ac Being Developed/Disturbed: 16.47 ac. X
- Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☐ Yes** ☒ No X
- Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☐ Yes** ☒ No X
- Proposed type of development (Residential, Commercial, Etc.): Residential 60 acres + / -
- Approximate upstream land area which drains to the subject site: 60 acres + / - Technical Drainage
- Has the site drainage been evaluated in the past? ☐ YES ☒ NO If yes, please identify documentation: Study for Washburn & Maverick plus one addendum
Discharge to the east to Bronco Street
and to the south to La Madre Way
- If known, please briefly identify the proposed discharge point(s) of runoff from the site: ASAP
Discharge to the east to Bronco Street and to the south to La Madre Way
- Briefly describe your proposed schedule for the subject project: ASAP



Engineer's Seal

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

*New Required Field

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

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1



CITY OF LAS VEGAS

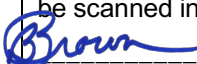
MINIMUM DRAINAGE STUDY CRITERIA STANDARD FORM 2 CHECKLIST SUPPLEMENT

(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 (CCRFCDD) 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 CCRFCDD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCDD 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	
	X	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.
X		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.)
	X	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.
X		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.
X		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	
	X	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.
	X	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.



September 13, 2016

Albert Sung, P.E.
Land Development Services
333 North Rancho Drive
Las Vegas, NV 89106

**Subject: Update #1 to the Technical Drainage Study for
Maverick & Washburn Residential Development (aka Washburn &
Maverick)
DS4804**

Mr. Sung:

This document and attachments will serve as an Update to the original Technical Drainage Study for Maverick & Washburn Residential Development (aka Washburn & Maverick), which was approved by the City of Las Vegas on September 1, 2016. The original drainage study was prepared to address drainage and grading improvements only for the offsite surrounding streets, showing the onsite area as one, single lot. This Update #1 supports the grading and drainage plans that show precise grading for the entire onsite area, which is planned for 55 single-family residential lots. The site plan has not changed since approval of this drainage study.

It is noted that the original drainage study for the subject site had been submitted to Clark County Public Works Department for review and approval, and an addendum submittal was also made to them. At this time, the written concurrence has not been obtained from Clark County. As a result, we respectfully ask that this update drainage study be conditionally approved based on the future concurrence by Clark County.

INTRODUCTION

The subject site is located in the northwest portion of the Las Vegas Valley at the southeastern corner of Maverick Street and Washburn Rd in the City of Las Vegas. The subject site is located in an area which is being developed at regular intervals with residential development. The subject site has existing residential developments on the north, west and a portion on the east side (Figure 2).

The subject site is not located adjacent to, nor crossed by any existing or planned CCRFCD Regional Drainage Facilities, as shown on Figure F-20 of the CCRFCD MPU updated 2013. Figures F20 and H20 of the MPU have been copied, annotated and are included in the appendix of this report.

The subject site is not located within a Federal Emergency Management Agency (FEMA) Special Flood Hazard Zone. According to the Flood Insurance Rate Map (FIRM) Map 32003C1765F, dated November 16, 2011, the subject site is located within "Zone X", which is described as "Areas determined to be outside the 0.2% annual chance floodplain". The FIRM panel has been annotated and included in the appendix of this report.

HYDROLOGY

Hydrologic analysis for the developed conditions was created in the original drainage study, and has not been revised for this update submittal. The hydrology has been reproduced in the Appendix of this submittal, under "Hydrology". Results of the analysis are shown on Figure 4, *Developed Conditions Drainage Map*, included in the Appendix of this submittal, under "Figures".

Under Developed conditions, the subject site is impacted by runoff flow in the bordering street sections of Washburn Road on the north, Maverick Street on the west, and La Madre Way on the south, as shown on *Figure 3, Existing Conditions Drainage Map*.

Runoff flow approaching from the west in the Washburn alignment is referenced from the *CLVNWNS* at the Maverick Street intersection as point WASH as 7 cfs and 23 cfs in the 10- and 100-year storm events, respectively. A flow split was performed at the intersection using the Pima County method resulting in a portion of the flows continuing east down Washburn and a portion flowing south down Maverick. Calculations are included in the appendix and summarized on Figures 3 and 4 of this submittal.

Runoff flow approaching from the west in the La Madre Way alignment is referenced from the *CLVNWNS* at the Maverick Street intersection as point LAMA as 62 cfs and 200 cfs in the 10- and 100-year storms, respectively. Flow from point CPMAY combines with LAMA in the La Madre/Maverick intersection, where it continues easterly in the La Madre Way street section, combining with flow from point CPDVR and street area LA at point LAMA1 just west of the Bronco Street alignment.

Runoff flow from area DOF2 and BR2 combine at point CPBR2 in the Bronco Street alignment, where flow continues southerly, entering street area BR1. Flow from point CPBR2 combines with flow from street area BR1 and onsite area DON3 at point CPBR1.

Flow from point LAMA1 combines with flow from point CPBR1 at the La Madre/Bronco intersection at point LAMA2.

Runoff flow from street area WBR flows easterly, combining with flow from offsite areas DOF4, DOF3, and BR3 at point CPWB.

HYDRAULICS

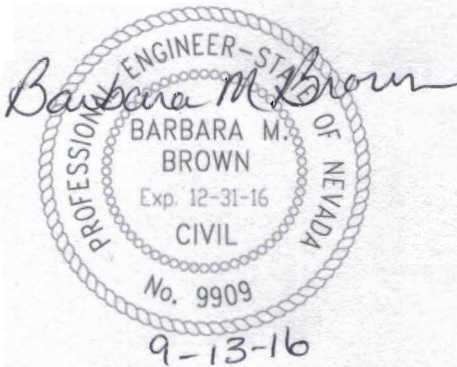
The hydraulic calculations for the subject project are the same as were submitted in Addendum #1, and have not been revised. Hydraulic analyses for the developed conditions from this addendum have been reproduced in the Appendix of this submittal, under "Hydraulics". Results of the analyses are shown on Figure 4, *Developed Conditions Drainage Map*, included in the Appendix of this submittal.

CONCLUSION

The intent of this Update drainage study and grading plans is to provide analysis for the onsite development of 55 individual residential lots, where the previous study was applicable only to the offsite streets. The attached grading plans have been revised to show the residential lots, with applicable details, which have been found to meet criteria specified by the City of Las Vegas, Clark County and the CCRFCD.

We hope that this document satisfies requirements for drainage concerning the project. If you have any questions, please contact me at 702-376-8801, email Momentum1@cox.net.

Sincerely,



Momentum Engineers, Ltd.
Barbara M. Brown, P. E.
Subcontractor for
Triton Engineering, LLC

APPENDIX & FIGURES

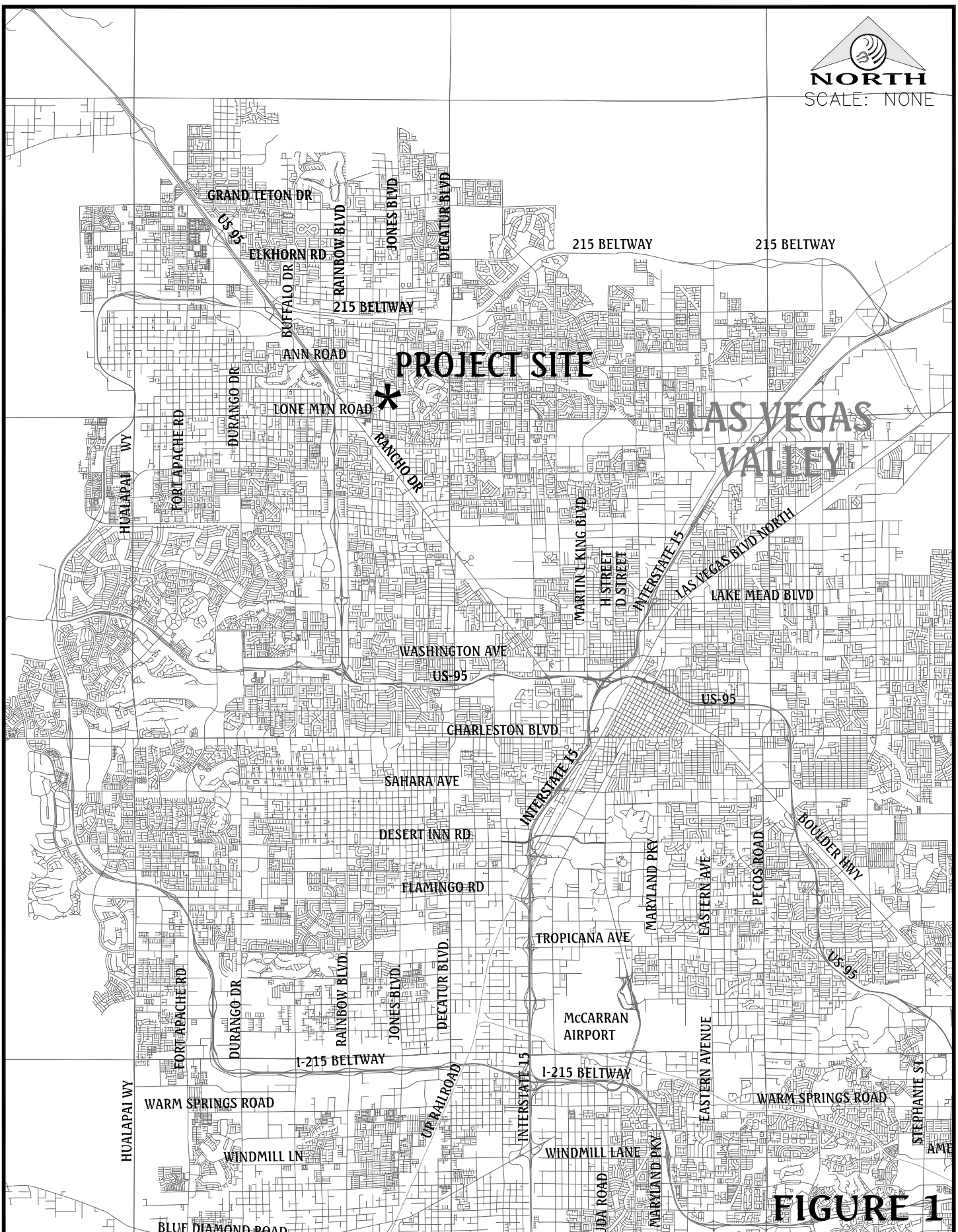


FIGURE 1



FIGURE 2



Source: Esri, DigitalGlobe, GeoEye, Earthstar
Getmapping, Aerogrid, IGN, IGP, swisstopo, a
Mannville, a, © OpenStreetMap contributors,

- NOTES: 1. FOR EXTENT OF OFFSITE BASINS, SEE REFERENCE MATERIAL.
2. HYDROLOGIC SOILS GROUPS ARE NOT MAPPED, SINCE ALL
AREAS STUDIED ARE IN THE WORST-CASE CONDITION,
SOILS GROUP "D".

NORTH

80080160

1 INCH = 80 FEET

DRAINAGE LEGEND

XT32

—

CPT4

→

BASIN IDENTIFICATION

BASIN BOUNDARY

CONCENTRATION POINT

FLOW PATH

SUMMARY OF PEAK FLOW RATES							
CONC. POINT/ DRAINAGE AREA	AREA, ACRES	PEAK FLOW, CFS		NOTES			
		10-YR	100-YR				
DOF1	4.26	3	8				
MAV	1.71	3	5				
CPMAV		8	19	3			
XON1	2.93	3	7				
DOF3	0.49	<1	1				
BR3	0.22	<1	1				
WB	0.95	2	3				
DOF4	1.26	1	2				
CPWB		11	31	5			
DOF2	0.47	<1	1				
BR2	0.22	<1	1				
CPBR2		1	2				
XON2	12.80	12	28				
WASH		7	23	1			
WSHE		5	17	4			
WSHS		2	6	4			
LA	0.90	2	3				
LAMA		62	200	1			
LAMA1		71	221	2			
Notes:		7/14/2016					
1. Referenced from City of Las Vegas, Northwest Neighborhood Study, by PBS & J, Revised September 1999, Existing Conditions							
2. Includes flow from WSHS and LAMA (7/15+62/200+2/6=71/221)							
3. Includes flow from WSHS (6/13+2/6=8/19)							
4. Flow split, WASH to WSHS and WSHE determined by Pima County methods.							
5. Includes flow from WSHE (6/14+5/17=11/31)							

FIGURE 3

Technical Drainage Study for Washburn & Maverick
EXISTING CONDITIONS DRAINAGE MAP

Triton
Engineering

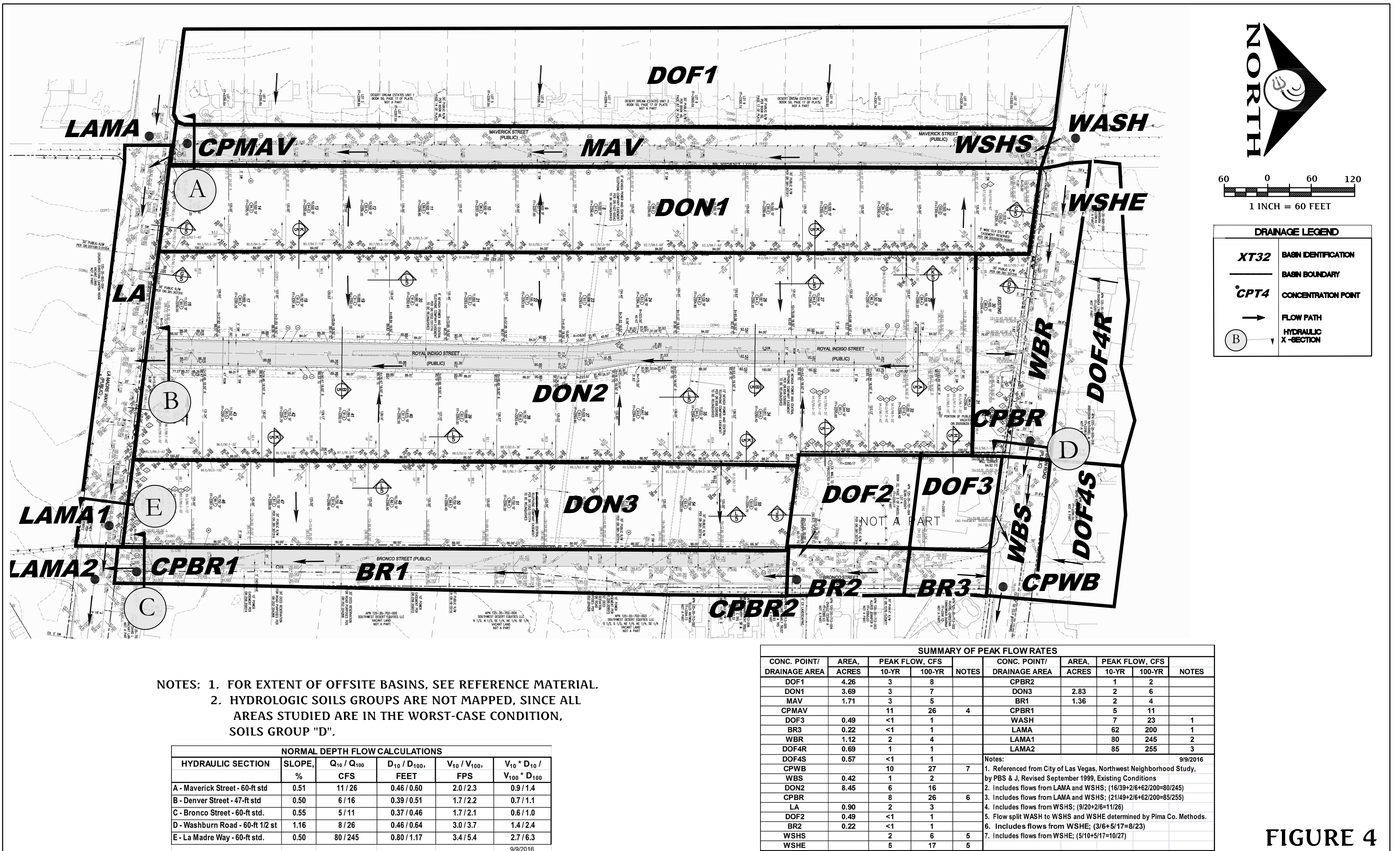


FIGURE 4

REFERENCES

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.

USE THIS SCALE(FEET) WHEN MAP REDUCED FROM 11X17 ORIGINAL

ASSESSOR'S PARCELS - CLARK CO., NV.

Michele W. Shafe - Assessor

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 35

MAP N 2 SE 4

125-35-7

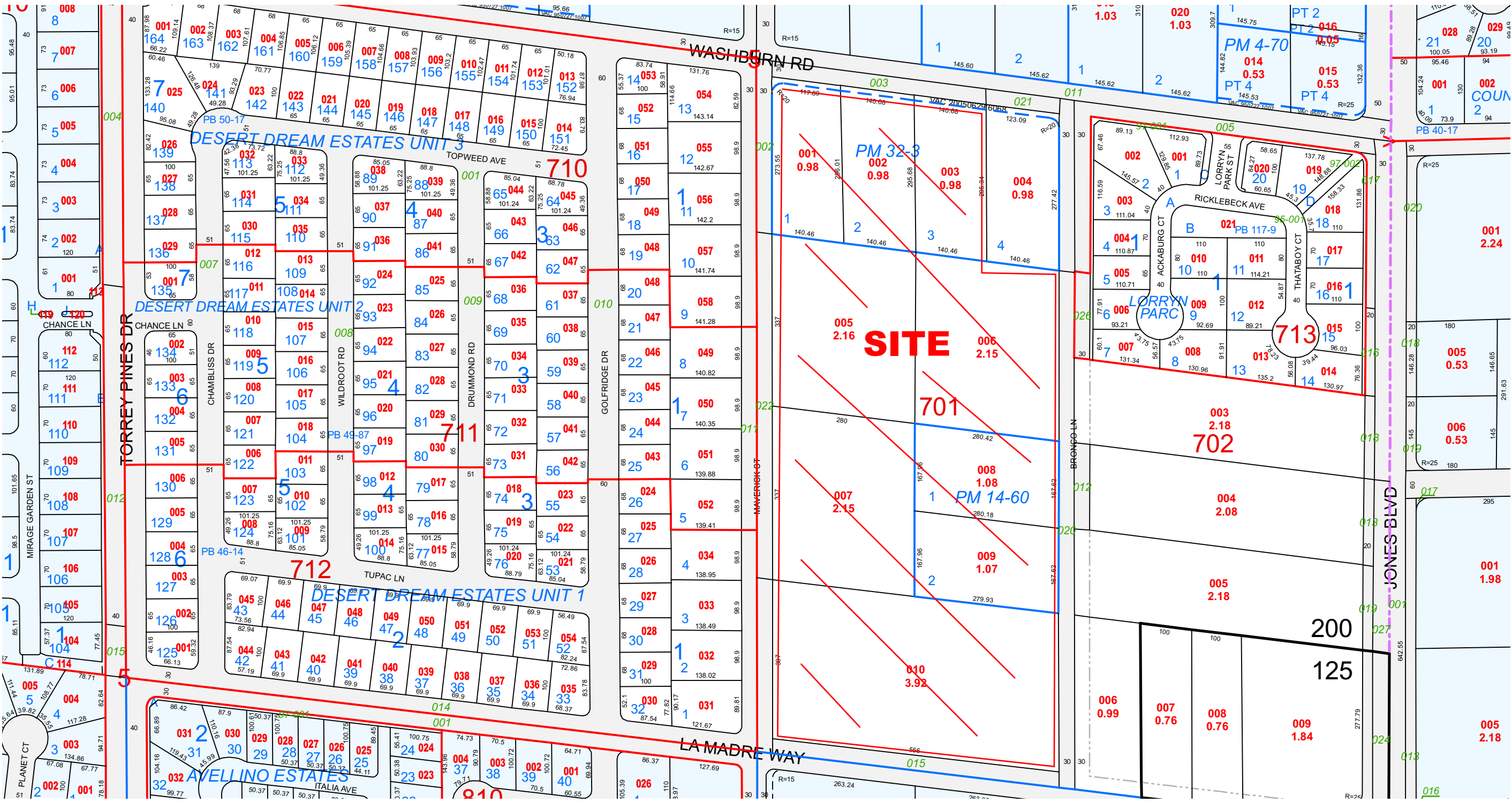
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126	125	124	123
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164	163	162	161

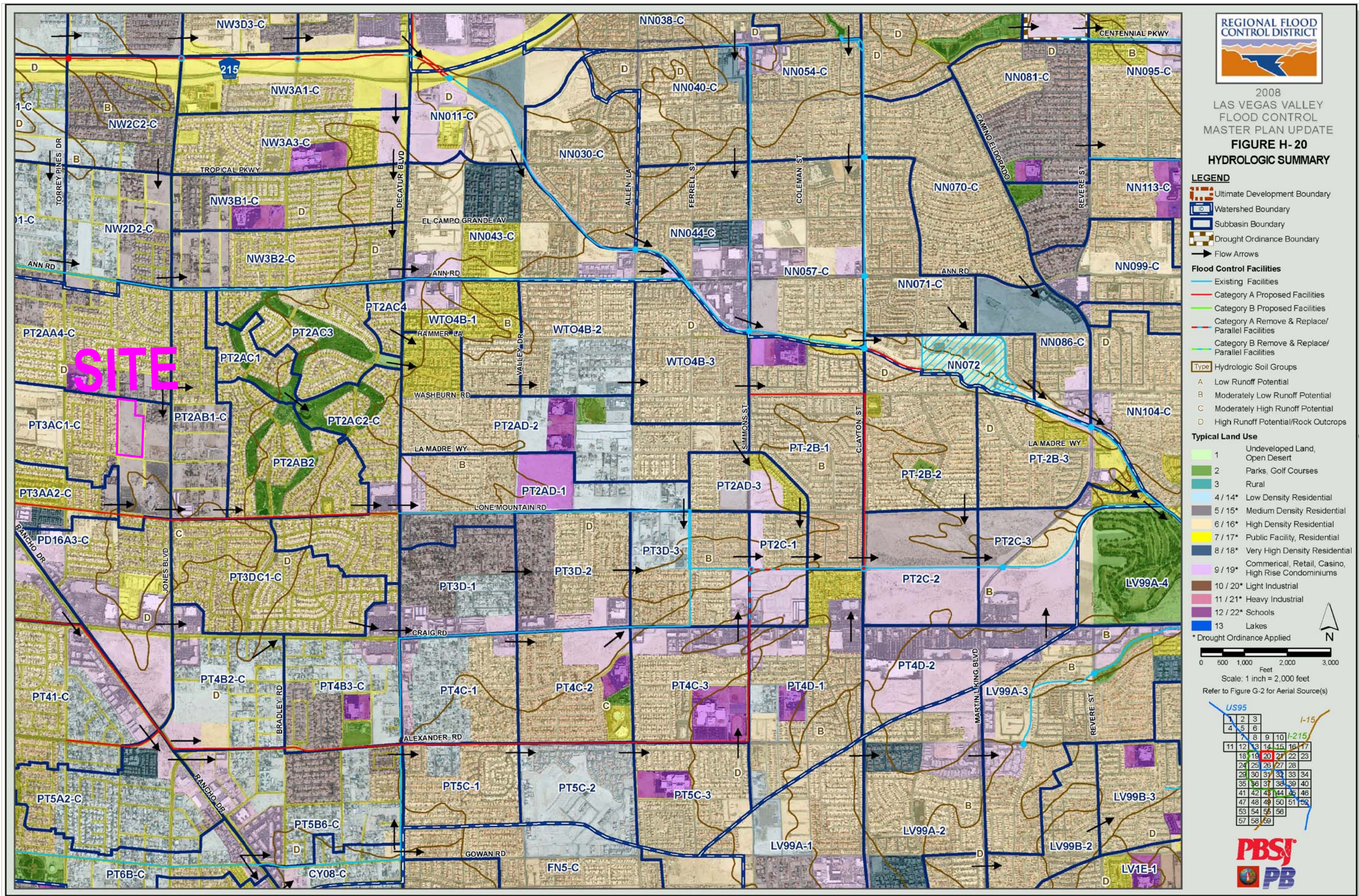
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18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

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

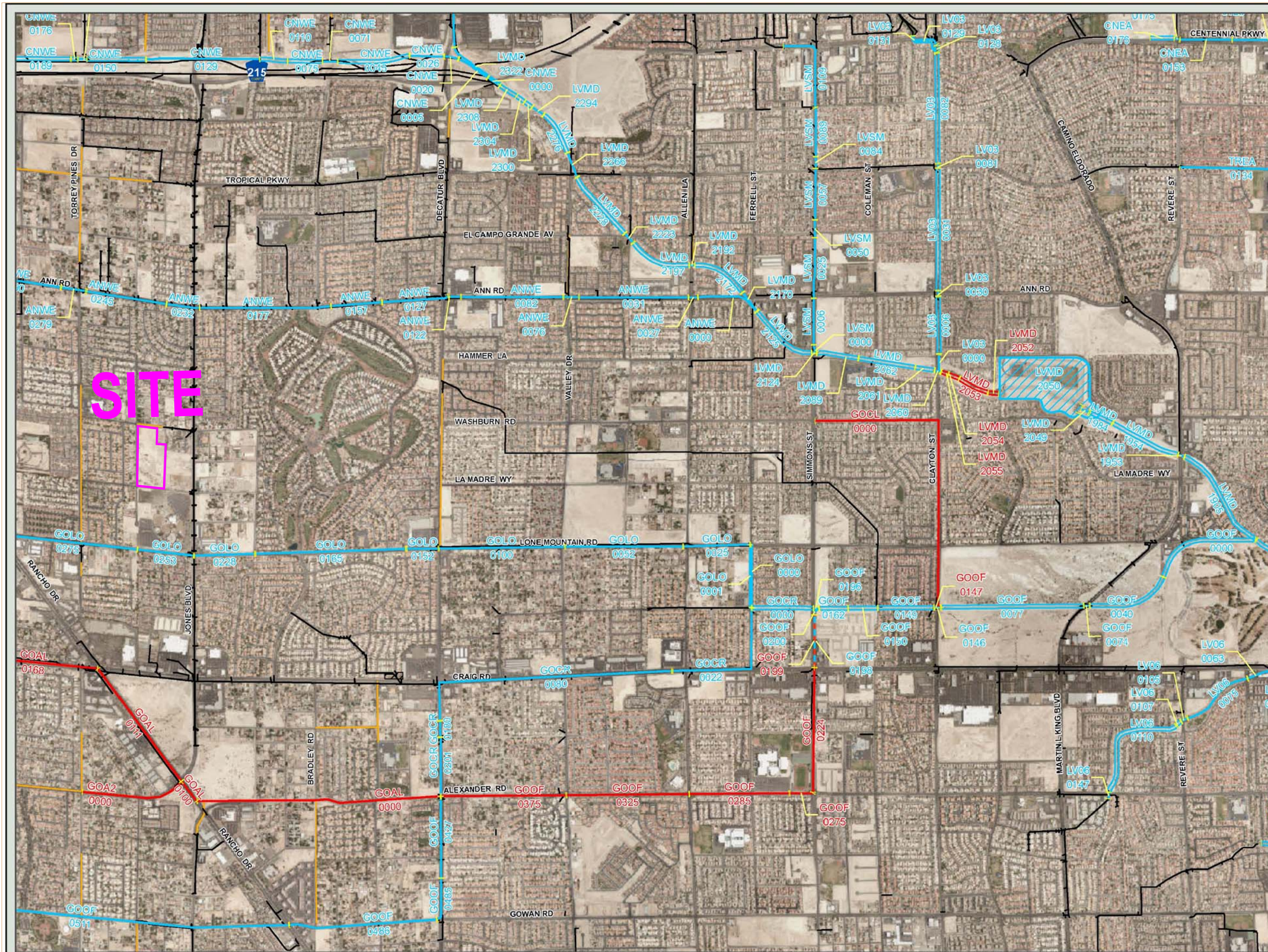
Scale: 1" = 200 '

Rev: 02/09/2011





Washburn & Maverick



2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 20
FLOOD CONTROL FACILITIES

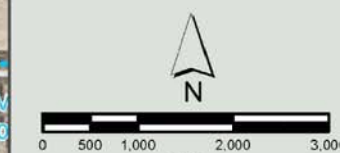
LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin

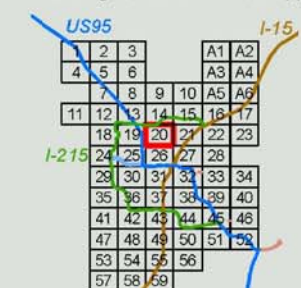
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

- | Category A | Category B |
|------------|------------|
| Channel | Channel |
| Stormdrain | Stormdrain |



Refer to Figure G-2 for Aerial Source(s)



Washburn & Maverick

**APPROVAL LETTER
FOR ORIGINAL STUDY**

CITY OF LAS VEGAS		DATE:
INTER-OFFICE MEMORANDUM		September 1, 2016
TO: Land Development Services Department of Building & Safety		FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for:	COPIES TO:
	Maverick & Washburn Residential Development	Triton Engineering
Cross Streets:	SEC of Maverick Street & Washburn Avenue	D. R. Horton Inc.
File Number:	F:\Depot\DSMemos\DS4804B.doc	Bart Anderson, P.E., DevCo
Parcel Number:	125-35-701-001 & more	
Zoning Action:	TMP-63989, ZON-63988 & ZON-63987	
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	5/24/2016	6/15/2016	Not Approved	\$400.00	444949: \$400
2 nd Submittal & Supplement	7/18/2016 & 8/29/2016	9/1/2016	See Comments Below	\$400.00	451510: \$400
TOTAL FEES (LDDRS):				\$800.00	----

REMARKS:

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

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

1. The rough graded onsite without any permanent cover such as paving, building construction or planting, is considered ongoing project under construction whereas a *Stormwater Pollution Prevention Plan* must be kept active under the NDEP Permit. In order to close out the permit, the developer must install permanent cover to the site to stabilize and control stormwater pollution to the satisfaction of NDEP.

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/35
AREA G-35

HYDROLOGY

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

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DEPTH-DURATION-FREQUENCY VALUES FOR McCARRAN AIRPORT RAINFALL AREA (IN INCHES)

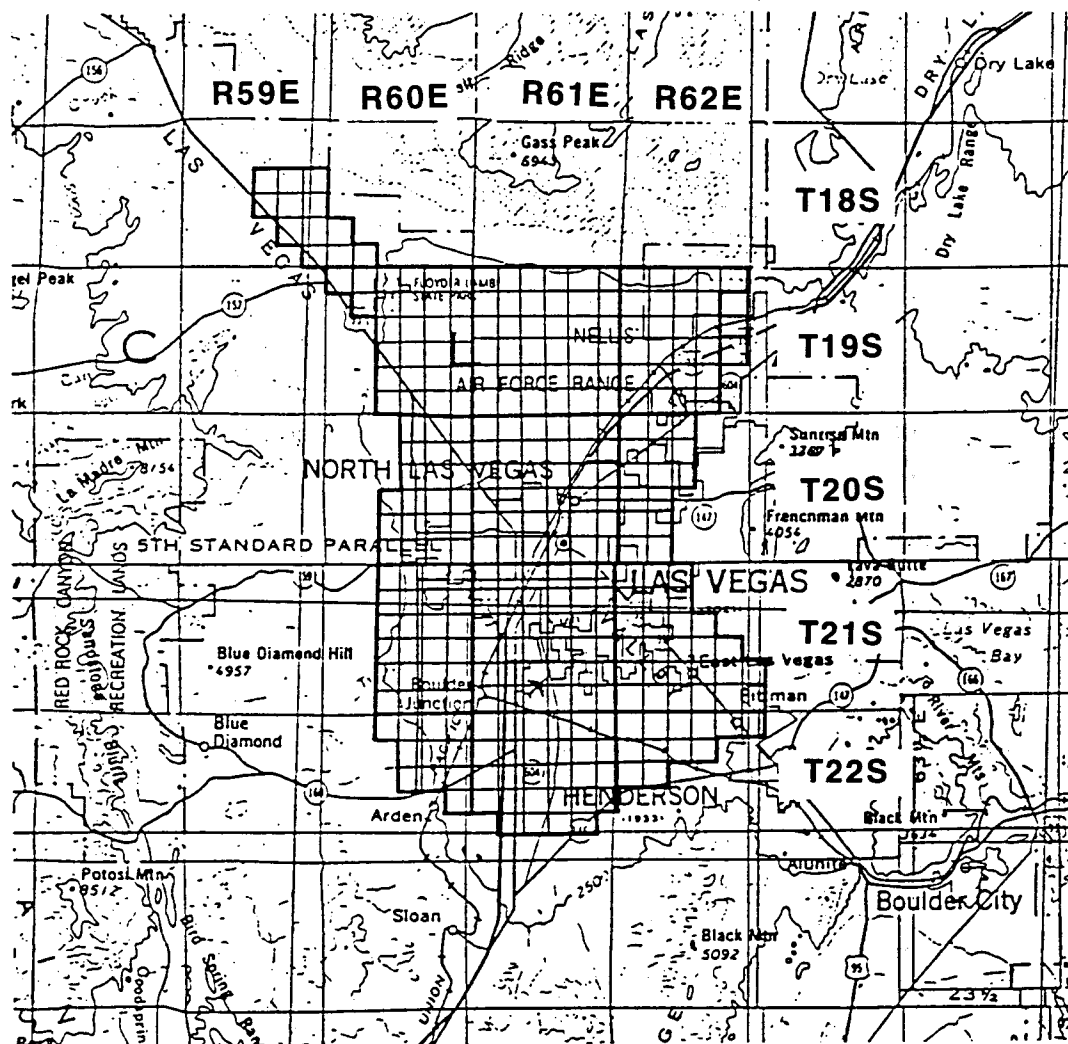
TIME	RECURRENCE INTERVAL					
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5 min.	0.15	0.27	0.35	0.46	0.54	0.63
10 min.	0.25	0.44	0.57	0.74	0.89	1.02
15 min.	0.33	0.57	0.74	0.97	1.15	1.32
30 min.	0.44	0.78	1.01	1.31	1.55	1.79
1 hour	0.52	0.89	1.15	1.50	1.78	2.06
2 hour	0.59	1.01	1.30	1.70	2.01	2.30
3 hour	0.64	1.08	1.39	1.82	2.15	2.48
6 hour	0.72	1.22	1.58	2.05	2.41	2.77
24 hour (TR-55)	1.20	1.60	1.80	2.40	2.70	2.96

- NOTE: 1. Refer to Figure 513 for a description and drawing of the area included in the McCarran Airport Rainfall Area.
2. The 24 hour values presented above are for use with TR-55 only.
3. Table 501 adjustments not required.

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

McCARRAN AIRPORT RAINFALL AREA



TOWNSHIP RANGE SECTIONS

18 South 59 East 13-15,22-26,36

18 South 60 East 30-32

19 South 60 East 1-6,8-16,21-28,33-36

19 South 61 East ALL SECTIONS

19 South 62 East 2-11,14-23,27-34

20 South 60 East 1-3,10-15,21-28,33-36

20 South 61 East ALL SECTIONS

TOWNSHIP RANGE SECTIONS

20 South 62 East 4-9,16-20,29-32

21 South 60 East 1-4,9-16,21-28,33-36

21 South 61 East ALL SECTIONS

21 South 62 East 4-9,15-23, 25-36

22 South 60 East 1-4,10-15,24

22 South 61 East 1-24,26-29

22 South 62 East 1-10,17-18

Notes:

1. Refer to Table 505 and Figure 516 Depth-Duration- Frequency values in the McCarran Airport Rainfall Area.
2. Refer to Table 506 and Figure 517 for Time-Intensity-Frequency values on the McCarran Airport Rainfall Area.

Revision	Date

WRC
ENGINEERING

REFERENCE:

USACE, Los Angeles District, 1988

FIGURE 513

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.): ³					
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) ⁴ ...		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

Developing urban areas

Newly graded areas (pervious areas only, no vegetation) ⁵	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

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.

Revision	Date

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

RUNOFF CURVE NUMBERS - RESIDENTIAL DISTRICTS

Average Lot Size or Usage ¹	Percent Impervious ²	Curve Number for Hydrologic Soil Groups			
		A	B	C	D
Apartments/Condos	72	81	88	91	93
Townhouses/6,000 sq ft lots or less ³	69	80	87	90	92
7,000 sq ft lots	63	76	84	89	91
8,000 sq ft lots	58	73	82	88	90
10,000 sq ft lots	38	61	75	83	87
14,000 sq ft lots	30	57	72	81	86
20,000 sq ft lots	25	54	70	80	85
40,000 sq ft lots	20	51	68	79	84
80,000 sq ft lots	12	46	65	77	82

1 Lot size should represent the size of the average lot and not the gross acreage divided by the number of lots.

2 Actual percent impervious value should be compared to selected land use type.

3 In cases where average residential lots are smaller than 6,000 sq ft, commercial/business/industrial land use should be used.

Revision	Date

REFERENCE:

TABLE 602A

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL - STANDARD FORM 4

Momentum Engineers, Ltd.

6101 Kings Brook Cl.
Las Vegas NV 89149

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 (1)	CN (2)	K (3)	AREA (acres) (4)	AREA (mi ²) (5)	LENGTH (ft) (6)	SLOPE (%) (7)	T _i (min) (8)	LENGTH (ft) (9)	SLOPE (%) (10)	V ₁ (fps) (11)	V ₂ (fps) (12)	T _t (min) (13)	T _c =T _i +T _t (min) (14)	TOTAL (ft) (15)	T _c (min) (16)	T _c (min) (17)	T _{lag} (hrs) (18)	Remarks (19)
DEVELOPED CONDITION																		
DOF1	86	0.75	4.26	0.0067	120	1.0	7.0	1200	0.6	1.6	2.4	10.2	17.2	1320	17.3	17.2	0.172	
DOF2	84	0.72	0.47	0.0007	50	1.0	4.9	50	1.0	2.0	N/A	0.4	5.3	100	10.6	5.3	0.053	
DOF3	84	0.72	0.49	0.0008	50	1.0	4.9	50	1.0	2.0	N/A	0.4	5.3	100	10.6	5.3	0.053	
DOF4	84	0.72	1.26	0.0020	50	1.0	4.9	650	1.1	2.1	3.2	4.7	9.6	700	13.9	9.6	0.096	
DON1	87	0.76	3.69	0.0058	125	1.0	6.9	1200	0.6	1.6	2.4	10.2	17.1	1325	17.4	17.1	0.171	
DON2	87	0.76	8.85	0.0138	120	1.0	6.7	1200	0.5	1.4	2.2	11.2	18.0	1320	17.3	17.3	0.173	
DON3	87	0.76	2.83	0.0044	125	1.0	6.9	970	0.7	1.7	2.6	8.0	14.9	1095	16.1	14.9	0.149	
WB	98	0.9	0.50	0.0008	23	2.0	1.3	650	1.1	2.1	3.2	4.7	6.1	673	13.7	6.1	0.061	
WBR	98	0.9	0.78	0.0012	23	2.0	1.3	640	1.1	2.1	3.2	4.7	6.0	663	13.7	6.0	0.060	
WBS	98	0.9	0.26	0.0004	23	2.0	1.3	260	1.1	2.1	N/A	2.0	3.4	283	11.6	3.4	0.050	
MAV	98	0.9	1.71	0.0027	23	2.0	1.3	1200	0.6	1.6	2.4	10.2	11.6	1223	16.8	11.6	0.116	
BR1	98	0.9	1.36	0.0021	23	2.0	1.3	970	0.7	1.7	2.6	8.0	9.3	993	15.5	9.3	0.093	
BR2	98	0.9	0.22	0.0003	23	2.0	1.3	120	0.5	1.4	N/A	1.4	2.7	143	10.8	2.7	0.050	
BR3	98	0.9	0.22	0.0003	23	2.0	1.3	120	0.5	1.4	N/A	1.4	2.7	143	10.8	2.7	0.050	
LA	98	0.9	0.90	0.0014	23	2.0	1.3	650	0.8	1.8	2.7	5.5	6.9	673	13.7	6.9	0.069	
UNDEVELOPED CONDITION																		
XON1	88	0.77	2.93	0.0046	100	0.6	7.0	160	0.9	1.4	N/A	1.9	8.9	N/A	N/A	8.9	0.100	
XON2	88	0.77	12.80	0.0200	100	0.9	6.1	780	1.6	1.9	3.7	5.7	11.8	N/A	N/A	11.8	0.118	
$T_i = (1.48(1-K)L^{0.76}) / (S^{0.48})$ For the travel time (T _i) calculations, T _c = T _i + T _t K = 0.0132(CN) - 0.39 T _{lag} = 0.6T _c										Travel Time Velocity Formulas Existing $V_1 = 14.8(S/100)^{1/2}$ $V_2 = 29.4(S/100)^{1/2}$				All basins over one square mile are calculated by the equation $T_{lag} = 20Kn(L \cdot L_e / S^{0.5})^{0.33}$				
REFERENCE:									CCRFCD HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL									
STANDARD FORM 4																		

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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  XXXXXXXX  XXXXXX  X
X      X  X      X      X  XX
X      X  X      X      X  X
XXXXXXXXX XXXX  X      XXXXXX  X
X      X  X      X      X      X
X      X  X      X      X      X
X      X  XXXXXXXX  XXXXXX  XXXX

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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

PAGE 1

EXISTING +
DEVELOPED
CONDITIONS

21	PC	0.000	0.020	0.057	0.070	0.087	0.108	0.124	0.130	0.130	0.130
22	PC	0.130	0.130	0.130	0.133	0.140	0.142	0.148	0.158	0.172	0.181
23	PC	0.190	0.197	0.199	0.200	0.201	0.204	0.214	0.229	0.241	0.249
24	PC	0.251	0.256	0.270	0.278	0.281	0.283	0.295	0.322	0.352	0.409
25	PC	0.499	0.590	0.710	0.744	0.781	0.812	0.819	0.835	0.851	0.856
26	PC	0.860	0.868	0.876	0.888	0.910	0.926	0.937	0.950	0.970	0.976
27	PC	0.982	0.985	0.987	0.989	0.990	0.993	0.993	0.994	0.995	0.998
28	PC	0.998	0.999	1.000							
29	LS	0	86								
30	UD	0.1720									
	*										
31	KK	MAV									
32	BA	.0027									
33	LS	0	98								
34	UD	0.1160									
	*										
35	KK	CEMAV									
36	HC	2									
	*										
37	KK	LA									
38	BA	.0014									
39	LS	0	98								
40	UD	0.0690									
	*										

1

HEC-1 INPUT

PAGE 2

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
41	KK LAMA1
42	HC 2
	*
43	KK XON1
44	BA .0046
45	LS 0 88
46	UD 0.1000
	*
47	KK DOF3
48	BA .0008
49	LS 0 84
50	UD 0.0530
	*
51	KK BR3
52	BA .0003
53	LS 0 98
54	UD 0.0500
	*
55	KK WB
56	BA .0015
57	LS 0 98
58	UD 0.0610
	*

1

PAGE 3

73	KK	CPBR2	
74	HC	2	
	*		
75	KK	XON2	
76	BA	.0200	
77	LS	0	88
78	UD	0.1180	
	*		
79	KK	DUMMY	
80	HC	4	
	*		
81	KK	DOF1	
82	KM		
83	BA	.0067	
84	LS	0	86
85	UD	0.1720	
	*		
86	KK	DON1	
87	BA	.0058	
88	LS	0	87
89	UD	0.1710	
	*		
90	KK	MAV	
91	BA	.0027	
92	LS	0	98
93	UD	0.1160	
	*		
94	KK	CPMAV	

100	KK	LA	
101	BA	.0014	
102	LS	0	98
103	UD	0.0690	
	*		

PAGE 4

128 KK WBR

129	BA	.0018	
130	LS	0	98
131	UD	0.0500	
	*		
132	KK	DOF4R	
133	BA	.0011	
134	LS	0	84
135	UD	0.0840	
	*		

1

HEC-1 INPUT

PAGE 5

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

136	KK	CPBR	
137	HC	2	
	*		
138	KK	DOF3	
139	BA	.0008	
140	LS	0	84
141	UD	0.0530	
	*		
142	KK	BR3	
143	BA	.0003	
144	LS	0	98
145	UD	0.0500	
	*		
146	KK	WBS	
147	BA	.0007	
148	LS	0	98
149	UD	0.0500	
	*		
150	KK	DOF4S	
151	BA	.0009	
152	LS	0	84
153	UD	0.0670	
	*		
154	KK	CPWB	
155	HC	5	
	*		
156	ZZ		

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE	(V) ROUTING	(--->) DIVERSION OR PUMP FLOW
NO.	(.) CONNECTOR	(<---) RETURN OF DIVERTED OR PUMPED FLOW
16	DOF1	
	.	
	.	
31	MAV	
	.	
	.	

35	CPMAV.....				
	.				
37	.	LA			
	.				
41	LAMA1.....				
	.				
43	.	XON1			
	.				
47	.		DOF3		
	.		.		
51	.			BR3	
	.			.	
55	.				WB
	.				.
59	.				
	.				DOF4
	.				.
63	.	CFWB.....			
	.				
65	.		DOF2		
	.		.		
69	.			BR2	
	.			.	
73	.		CPBR2.....		
	.		.		
75	.			XON2	
	.			.	
79	.				
	DUMMY.....				
	.				
81	.	DOF1			
	.				
86	.		DON1		
	.		.		
90	.			MAV	
	.			.	
94	.	CPMAV.....			
	.				
96	.		DON2		
	.		.		
100	.			LA	
	.			.	
	.			.	

```

104      .      LAMA1.....
      .
      .
106      .      .      DOF2
      .      .
      .      .      BR2
110      .      .      .
      .      .      .
      .      .      .
114      .      .      CPBR2.....
      .      .
      .      .      DON3
116      .      .      .
      .      .      .
120      .      .      .      BR1
      .      .      .
      .      .      .
124      .      .      CPBR1.....
      .      .
      .      .
126      .      LAMA2.....
      .      .
      .      .      WBR
128      .      .      .
      .      .      .
132      .      .      .      DOF4R
      .      .      .
      .      .      .
136      .      .      CPBR.....
      .      .
      .      .      .
138      .      .      .      DOF3
      .      .      .
      .      .      .
142      .      .      .      BR3
      .      .      .
      .      .      .
146      .      .      .      .      WBS
      .      .      .      .
      .      .      .      .
150      .      .      .      .      .      DOF4S
      .      .      .      .      .
      .      .      .      .
154      .      .      CPWB.....

```

{***} RUNOFF ALSO COMPUTED AT THIS LOCATION

```

1*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* JUN 1998 *
* VERSION 4.1 *
* RUN DATE 14JUL16 TIME 19:34:48 *
*
*****

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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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EXISTING AND DEVELOPED CONDITIONS MODEL
 WASHBURN & MAVERICK
 MOMENTUM ENGINEERS FOR TRITON ENGINEERING - B BROWN

6-HOUR STORM DISTRIBUTION #3
 10- AND 100-YEAR STORM EVENTS
 NO REDUCTION FOR DEPTH AREA
 NO HYDROGRAPH ROUTING LOSSES

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

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

 COMPUTATION INTERVAL .08 HOURS
 TOTAL TIME BASE 24.92 HOURS

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

JP MULTI-PLAN OPTION
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
 RATIOS OF PRECIPITATION
 .57 1.00

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
				.57	1.00
HYDROGRAPH AT					
+	DOF1	.01	1	FLOW	3.
				TIME	3.58

HYDROGRAPH AT +	MAV	.00	1	FLOW TIME	3. 3.50	5. 3.50
2 COMBINED AT +	CPMAV	.01	1	FLOW TIME	6. 3.58	13. 3.58
HYDROGRAPH AT +	LA	.00	1	FLOW TIME	2. 3.50	3. 3.50
2 COMBINED AT +	LAMA1	.01	1	FLOW TIME	7. 3.58	15. 3.58
HYDROGRAPH AT +	XON1	.00	1	FLOW TIME	3. 3.50	7. 3.50
HYDROGRAPH AT +	DOF3	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	BR3	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	WB	.00	1	FLOW TIME	2. 3.50	3. 3.50
HYDROGRAPH AT +	DOF4	.00	1	FLOW TIME	1. 3.50	2. 3.50
5 COMBINED AT +	CPWB	.01	1	FLOW TIME	6. 3.50	14. 3.50
HYDROGRAPH AT +	DOF2	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	BR2	.00	1	FLOW TIME	0. 3.50	1. 3.50
2 COMBINED AT +	CPBR2	.00	1	FLOW TIME	1. 3.50	2. 3.50
HYDROGRAPH AT +	XON2	.02	1	FLOW TIME	12. 3.58	28. 3.58
4 COMBINED AT +	DUMMY	.04	1	FLOW TIME	25. 3.50	58. 3.50

[WSHS]

$$+ 2/6 = 8/19$$

[WSHS]

[LAMA]

$$+ 2/6 + 62/200 = 71/221$$

[WSHE]

$$+ 5/17 = 11/31$$

HYDROGRAPH AT +	DOF1	.01	1	FLOW TIME	3. 3.58	8. 3.58
HYDROGRAPH AT +	DON1	.01	1	FLOW TIME	3. 3.58	7. 3.58
HYDROGRAPH AT +	MAV	.00	1	FLOW TIME	3. 3.50	5. 3.50
3 COMBINED AT +	CPMAV	.02	1	FLOW TIME	9. 3.58	20. 3.58
HYDROGRAPH AT +	DON2	.01	1	FLOW TIME	6. 3.58	16. 3.58
HYDROGRAPH AT +	LA	.00	1	FLOW TIME	2. 3.50	3. 3.50
3 COMBINED AT +	LAMA1	.03	1	FLOW TIME	16. 3.58	39. 3.58
HYDROGRAPH AT +	DOF2	.00	1	FLOW TIME	0. 3.50	1. 3.50
HYDROGRAPH AT +	BR2	.00	1	FLOW TIME	0. 3.50	1. 3.50
2 COMBINED AT +	CPBR2	.00	1	FLOW TIME	1. 3.50	2. 3.50
HYDROGRAPH AT +	DON3	.00	1	FLOW TIME	2. 3.58	6. 3.58
HYDROGRAPH AT +	BR1	.00	1	FLOW TIME	2. 3.50	4. 3.50
3 COMBINED AT +	CPBR1	.01	1	FLOW TIME	5. 3.50	11. 3.50
2 COMBINED AT +	LAMA2	.04	1	FLOW TIME	21. 3.58	49. 3.58
HYDROGRAPH AT +	WER	.00	1	FLOW TIME	2. 3.50	4. 3.50

$$[WISHS] + 2/6 = 11/26$$

$$[WISHS] + 2/6 + [LAMA] 62/200 = 80/295$$

$$[WISHS] + 2/6 + [LAMA] 62/200 = 85/255$$

HYDROGRAPH AT						
+	DOF4R	.00	1	FLOW	1.	1.
				TIME	3.50	3.50
2 COMBINED AT						
+	CPBR	.00	1	FLOW	3.	6.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DOF3	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	BR3	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	WBS	.00	1	FLOW	1.	2.
				TIME	3.50	3.50
HYDROGRAPH AT						
+	DOF4S	.00	1	FLOW	0.	1.
				TIME	3.50	3.50
5 COMBINED AT						
+	CPWB	.01	1	FLOW	5.	10.
				TIME	3.50	3.50

[WSHE]
+ 5/17 = 8/23

[WSHE]
+ 5/17 = 10/27

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

HYDRAULICS

FLOW SPLIT CALCULATION

FLOW SPLIT ESTIMATE BY PIMA COUNTY METHODOLOGY

Assumptions:

5.5-foot sidewalks on left and right sides of curb faces
0.5-foot curb depth
sidewalk slope of 2%
Normal depth flow in the street section

Boxed cells must be input for proper computation, results are double-underlined
Normal crown configuration in both streets
No crest to impede flow to lateral street
Nearly constant velocity across the entire street section and overbanks

MAIN STREET:

WASHBURN RIGHT-OF-WAY WIDTH:
LONGITUDINAL SLOPE:

60 FEET
0.01 FEET/FOOT

FLOW SPLITS TO THE:

RIGHT or SOUTH

LATERAL STREET:

MAVERICK RIGHT-OF-WAY WIDTH:
LONGITUDINAL SLOPE:

60 FEET
0.004 FEET/FOOT

10-YEAR FLOW SPLIT

Q₁₀=10-Year peak flow rate in main street

7 cfs
0.37 ft.

D₁₀=10-Year normal depth determined by other means:

$$Q_L = 0.042 \{ Q_m^{0.93} \cdot W_{ss}^{0.85} / S_m^{0.41} \cdot W_m^{0.75} \}$$

A_m=Approximate area of flow between curbs

18.1 sf

A_{ob}=Approximate total flow area on overbanks

0.0 sf

Q_m = Main street flow between curbs

7 cfs

Q_{ob}=Total flow in both overbanks

0

W_{ss} = Width of side street between curbs

49 ft.

S_m = Longitudinal slope of main street

0.01 ft/ft

W_m = Width of main street between curbs

49 ft.

Q_L = Lateral flow in side street (cfs)

2 cfs

$$Q_o = 46.8 \{ Y_o \cdot W_{ss} \cdot S_s^{0.5} \} - Q_L$$

Y_o=Average flow depth in overbank area

0 ft.

S_s = Longitudinal slope of the side street

0.004 ft/ft

Q_o = Allowable overbank flow laterally to side street

0 cfs

Q_{aob} = Actual overbank flow available for split

0 cfs

If Q_o is greater than Q_{aob}, all of the actual overbank flow turns and flows down the side street and total Q that splits to side street is Q_L+Q_{aob}

2 cfs

If Q_o is negative, assume zero overbank flow turns and flows down the side street, so the total Q that splits to side street is Q_L

N/A cfs

100-YEAR FLOW SPLIT

Q₁₀₀=100-Year peak flow rate in main street

23 cfs
0.53 ft.

D₁₀₀=100-Year normal depth determined by other means:

$$Q_L = 0.042 \{ Q_m^{0.93} \cdot W_{ss}^{0.85} / S_m^{0.41} \cdot W_m^{0.75} \}$$

A_m=Approximate area of flow between curbs

26.0 sf

A_{ob}=Approximate total flow area on overbanks

0.0 sf

Q_m = Main street flow between curbs

23 cfs

Q_{ob}=Total flow in both overbanks

0

W_{ss} = Width of side street between curbs

49 ft.

S_m = Longitudinal slope of main street

0.01 ft/ft

W_m = Width of main street between curbs

49 ft.

Q_L = Lateral flow in side street (cfs)

6 cfs

$$Q_o = 46.8 \{ Y_o \cdot W_{ss} \cdot S_s^{0.5} \} - Q_L$$

Y_o=Average flow depth in overbank area

0 ft.

S_s = Longitudinal slope of the side street

0.004 ft/ft

Q_o = Allowable overbank flow laterally to side street

0 cfs

Q_{aob} = Actual overbank flow available for split

0 cfs

If Q_o is greater than Q_{aob}, all of the actual overbank flow turns and flows down the side street and total Q that splits to side street is Q_L+Q_{aob}

6 cfs

If Q_o is negative, assume zero overbank flow turns and flows down the side street, so the total Q that splits to side street is Q_L

N/A cfs

WASHBURN

WSHS ↓ .4%

2/6

7/23

1%

MAVERICK

5/17
WSHE

SITE

Worksheet for A - Maverick Street - 10yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Discharge 11 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current roughness weighted Improved Lotter's Method
Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for A - Maverick Street - 10yr

Results

Normal Depth	0.46	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	5.51	ft ²
Wetted Perimeter	33.39	ft
Hydraulic Radius	0.16	ft
Top Width	32.37	ft
Normal Depth	0.46	ft
Critical Depth	0.44	ft
Critical Slope	0.00717	ft/ft
Velocity	2.00	ft/s
Velocity Head	0.06	ft
Specific Energy	0.53	ft
Froude Number	0.85	
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	0.46	ft
Critical Depth	0.44	ft
Channel Slope	0.00510	ft/ft
Critical Slope	0.00717	ft/ft

Cross Section for A - Maverick Street - 10yr

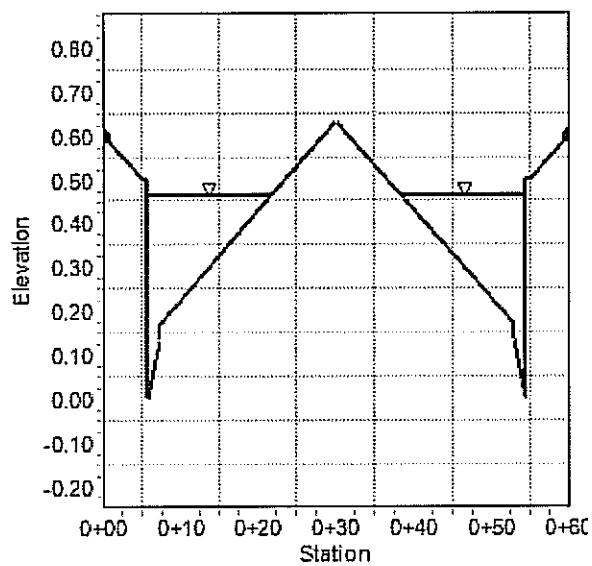
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Normal Depth 0.46 ft
Discharge 11 ft³/s

Cross Section Image



Worksheet for A - Maverick Street - 100yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Discharge 26 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for A - Maverick Street - 100yr

Results

Normal Depth	0.60	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	11.55	ft ²
Wetted Perimeter	58.27	ft
Hydraulic Radius	0.20	ft
Top Width	57.17	ft
Normal Depth	0.60	ft
Critical Depth	0.58	ft
Critical Slope	0.00661	ft/ft
Velocity	2.25	ft/s
Velocity Head	0.08	ft
Specific Energy	0.68	ft
Froude Number	0.88	
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	0.60	ft
Critical Depth	0.58	ft
Channel Slope	0.00510	ft/ft
Critical Slope	0.00661	ft/ft

Cross Section for A - Maverick Street - 100yr

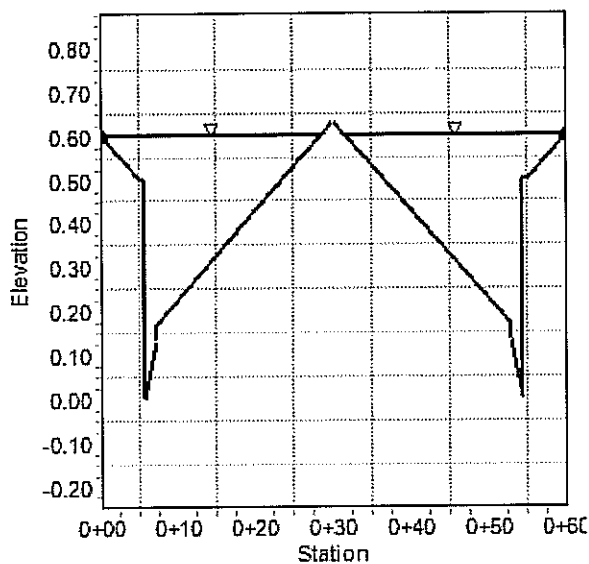
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00510 ft/ft
Normal Depth 0.60 ft
Discharge 26 ft³/s

Cross Section Image



Worksheet for B - Denver 10yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Discharge 6 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
-0+05.00	0.60
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+18.50	0.50
0+34.50	0.17
0+34.50	0.13
0+36.50	0.00
0+36.50	0.50
0+37.00	0.50
0+42.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+05.00, 0.60)	(0+42.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for B - Denver 10yr

Results

Normal Depth	0.39	ft
Elevation Range	0.00 to 0.60 ft	
Flow Area	3.48	ft ²
Wetted Perimeter	25.89	ft
Hydraulic Radius	0.13	ft
Top Width	25.02	ft
Normal Depth	0.39	ft
Critical Depth	0.37	ft
Critical Slope	0.00774	ft/ft
Velocity	1.72	ft/s
Velocity Head	0.05	ft
Specific Energy	0.43	ft
Froude Number	0.81	
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	0.39	ft
Critical Depth	0.37	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00774	ft/ft

Cross Section for B - Denver 10yr

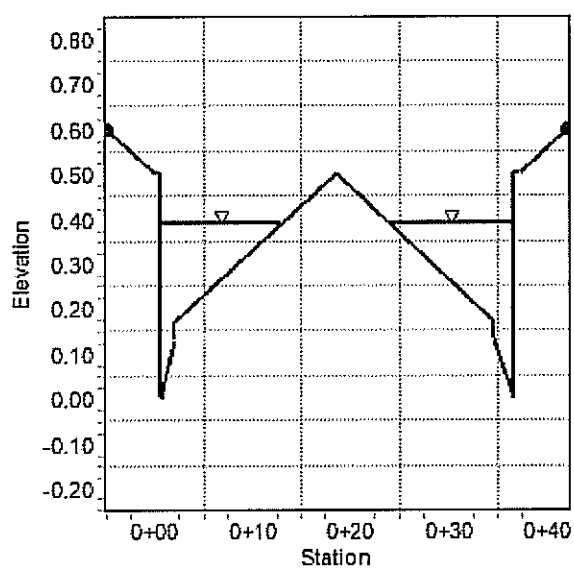
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 0.39 ft
Discharge 6 ft³/s

Cross Section Image



Worksheet for B - Denver 100yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Discharge 16 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
-0+05.00	0.60
0+00.00	0.50
0+00.50	0.50
0+00.50	0.00
0+02.00	0.13
0+02.00	0.17
0+18.50	0.50
0+34.50	0.17
0+34.50	0.13
0+36.50	0.00
0+36.50	0.50
0+37.00	0.50
0+42.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+05.00, 0.60)	(0+42.00, 0.60)	0.016

Options

Current roughness weighted Improved Lotter's Method
Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for B - Denver 100yr

Results

Normal Depth	0.51	ft
Elevation Range	0.00 to 0.60 ft	
Flow Area	7.44	ft ²
Wetted Perimeter	39.56	ft
Hydraulic Radius	0.19	ft
Top Width	38.46	ft
Normal Depth	0.51	ft
Critical Depth	0.49	ft
Critical Slope	0.00680	ft/ft
Velocity	2.15	ft/s
Velocity Head	0.07	ft
Specific Energy	0.59	ft
Froude Number	0.86	
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	0.51	ft
Critical Depth	0.49	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00680	ft/ft

Cross Section for B - Denver 100yr

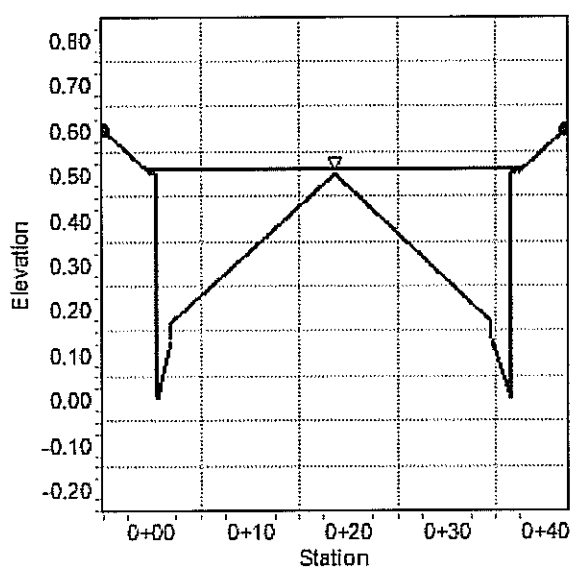
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 0.51 ft
Discharge 16 ft³/s

Cross Section Image



Worksheet for C - Bronco Street - 10yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00550 ft/ft
Discharge 5 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for C - Bronco Street - 10yr

Results

Normal Depth	0.37	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	2.94	ft ²
Wetted Perimeter	23.96	ft
Hydraulic Radius	0.12	ft
Top Width	23.12	ft
Normal Depth	0.37	ft
Critical Depth	0.35	ft
Critical Slope	0.00796	ft/ft
Velocity	1.70	ft/s
Velocity Head	0.04	ft
Specific Energy	0.42	ft
Froude Number	0.84	
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	0.37	ft
Critical Depth	0.35	ft
Channel Slope	0.00550	ft/ft
Critical Slope	0.00796	ft/ft

Cross Section for C - Bronco Street - 10yr

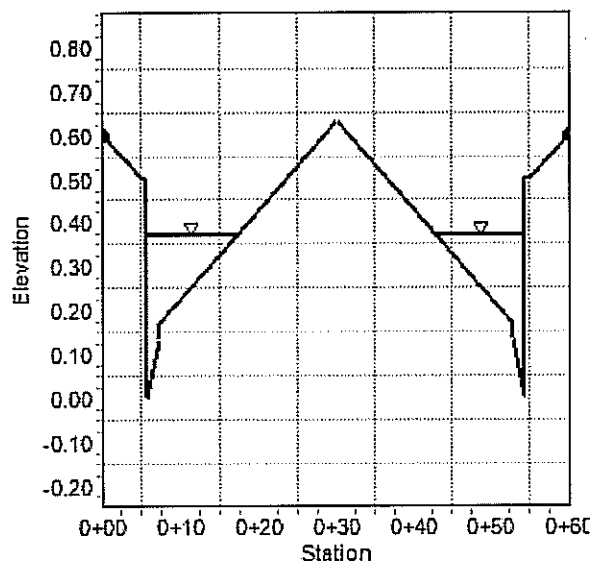
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00550 ft/ft
Normal Depth 0.37 ft
Discharge 5 ft³/s

Cross Section Image



Worksheet for C - Bronco Street - 100yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00550 ft/ft
Discharge 11 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for C - Bronco Street - 100yr

Results

Normal Depth	0.46	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	5.36	ft²
Wetted Perimeter	32.93	ft
Hydraulic Radius	0.16	ft
Top Width	31.91	ft
Normal Depth	0.46	ft
Critical Depth	0.44	ft
Critical Slope	0.00717	ft/ft
Velocity	2.05	ft/s
Velocity Head	0.07	ft
Specific Energy	0.52	ft
Froude Number	0.88	
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	0.46	ft
Critical Depth	0.44	ft
Channel Slope	0.00550	ft/ft
Critical Slope	0.00717	ft/ft

Cross Section for C - Bronco Street - 100yr

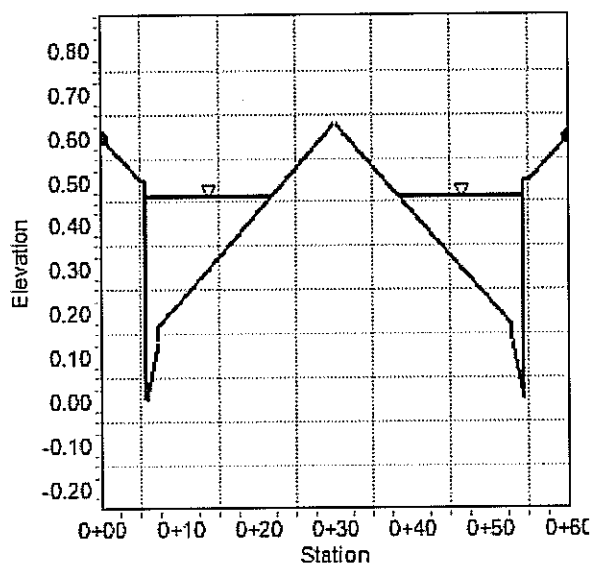
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00550 ft/ft
Normal Depth 0.46 ft
Discharge 11 ft³/s

Cross Section Image



Worksheet for D - Washburn Road 1/2 st 10 yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01160 ft/ft
Discharge 8 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+30.00, 0.63)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.46 ft
Elevation Range 0.00 to 0.63 ft
Flow Area 2.68 ft²
Wetted Perimeter 16.48 ft
Hydraulic Radius 0.16 ft
Top Width 15.97 ft

Worksheet for D - Washburn Road 1/2 st 10 yr

Results

Normal Depth	0.46	ft
Critical Depth	0.49	ft
Critical Slope	0.00682	ft/ft
Velocity	2.98	ft/s
Velocity Head	0.14	ft
Specific Energy	0.60	ft
Froude Number	1.28	
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	0.46	ft
Critical Depth	0.49	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.00682	ft/ft

Cross Section for D - Washburn Road 1/2 st 10 yr

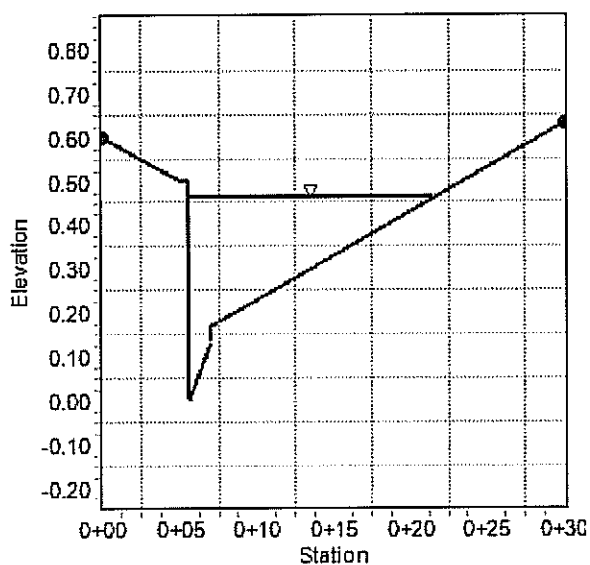
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01160 ft/ft
Normal Depth 0.46 ft
Discharge 8 ft³/s

Cross Section Image



Worksheet for D - Washburn Road 1/2 st 100 yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01160 ft/ft
Discharge 26 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+30.00, 0.63)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Results

Normal Depth 0.64 ft
Elevation Range 0.00 to 0.63 ft
Flow Area 6.97 ft²
Wetted Perimeter 30.61 ft
Hydraulic Radius 0.23 ft
Top Width 30.00 ft

Worksheet for D - Washburn Road 1/2 st 100 yr

Results

Normal Depth	0.64	ft
Critical Depth	0.70	ft
Critical Slope	0.00584	ft/ft
Velocity	3.73	ft/s
Velocity Head	0.22	ft
Specific Energy	0.86	ft
Froude Number	1.37	
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	0.64	ft
Critical Depth	0.70	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.00584	ft/ft

Cross Section for D - Washburn Road 1/2 st 100 yr

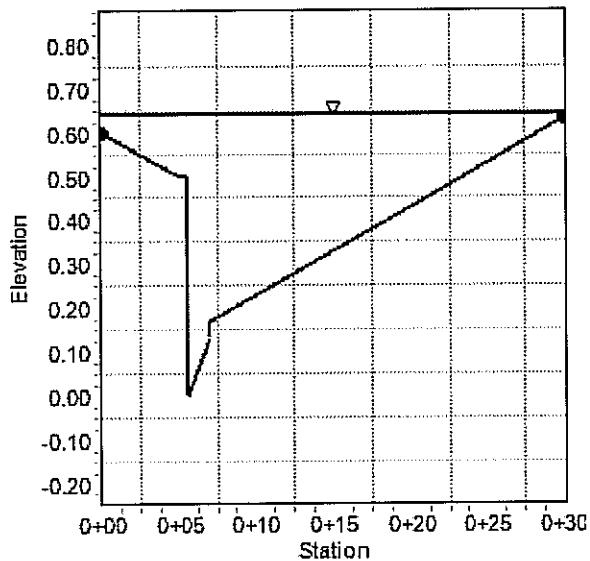
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.01160 ft/ft
Normal Depth 0.64 ft
Discharge 26 ft³/s

Cross Section Image



Worksheet for E - La Madre Way - 10yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Discharge 80 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for E - La Madre Way - 10yr

Results

Normal Depth	0.80	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	23.28	ft ²
Wetted Perimeter	61.50	ft
Hydraulic Radius	0.38	ft
Top Width	60.00	ft
Normal Depth	0.80	ft
Critical Depth	0.79	ft
Critical Slope	0.00532	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energy	0.98	ft
Froude Number	0.97	
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	0.80	ft
Critical Depth	0.79	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00532	ft/ft

Cross Section for E - La Madre Way - 10yr

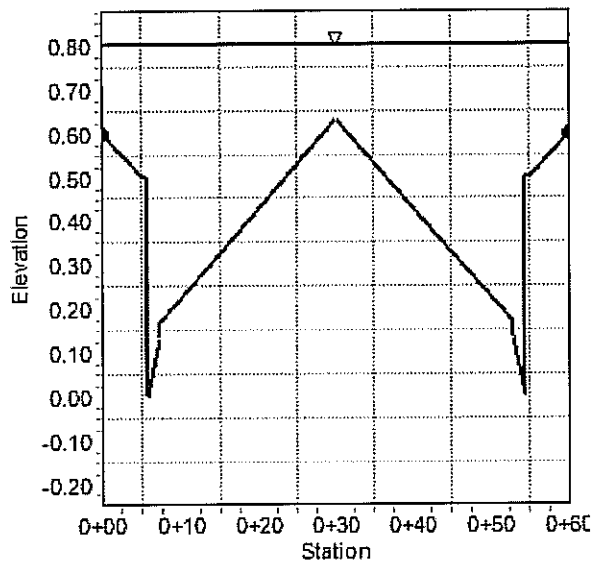
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 0.80 ft
Discharge 80 ft³/s

Cross Section Image



Worksheet for E - La Madre Way - 100yr

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Discharge 245 ft³/s
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.60
0+05.00	0.50
0+05.50	0.50
0+05.50	0.00
0+07.00	0.13
0+07.00	0.17
0+30.00	0.63
0+53.00	0.17
0+53.00	0.13
0+54.50	0.00
0+54.50	0.50
0+55.00	0.50
0+60.00	0.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.60)	(0+60.00, 0.60)	0.016

Options

Current Roughness Weighted Method Improved Lotter's Method
Open Channel Weighting Method Improved Lotter's Method
Closed Channel Weighting Method Horton's Method

Worksheet for E - La Madre Way - 100yr

Results

Normal Depth	1.17	ft
Elevation Range	0.00 to 0.63 ft	
Flow Area	45.79	ft²
Wetted Perimeter	62.25	ft
Hydraulic Radius	0.74	ft
Top Width	60.00	ft
Normal Depth	1.17	ft
Critical Depth	1.21	ft
Critical Slope	0.00422	ft/ft
Velocity	5.35	ft/s
Velocity Head	0.44	ft
Specific Energy	1.62	ft
Froude Number	1.08	
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	1.17	ft
Critical Depth	1.21	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00422	ft/ft

GRADING PLANS

Cross Section for E - La Madre Way - 100yr

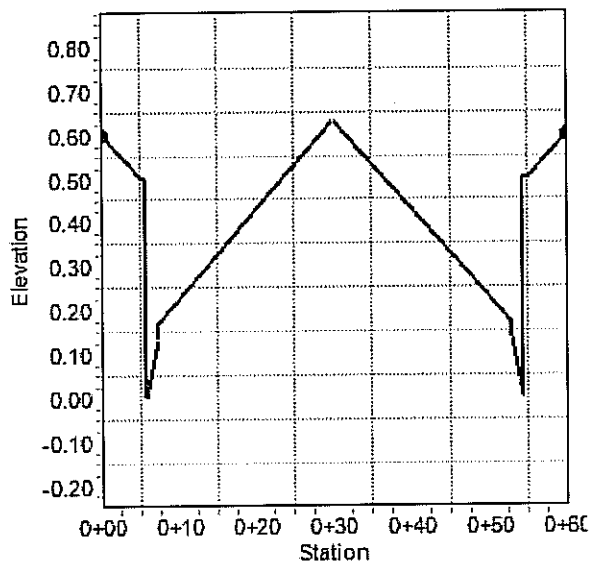
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 1.17 ft
Discharge 245 ft³/s

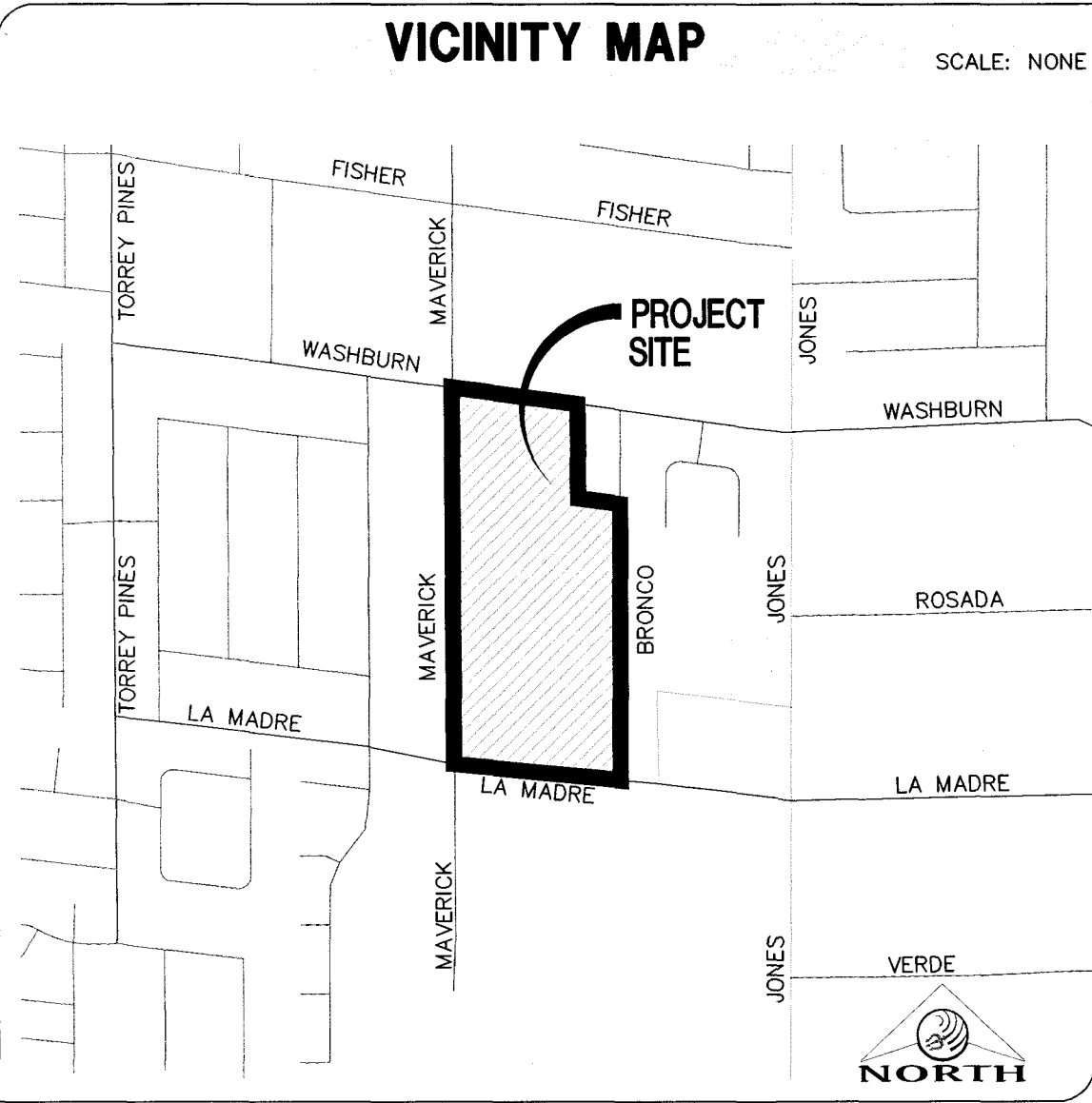
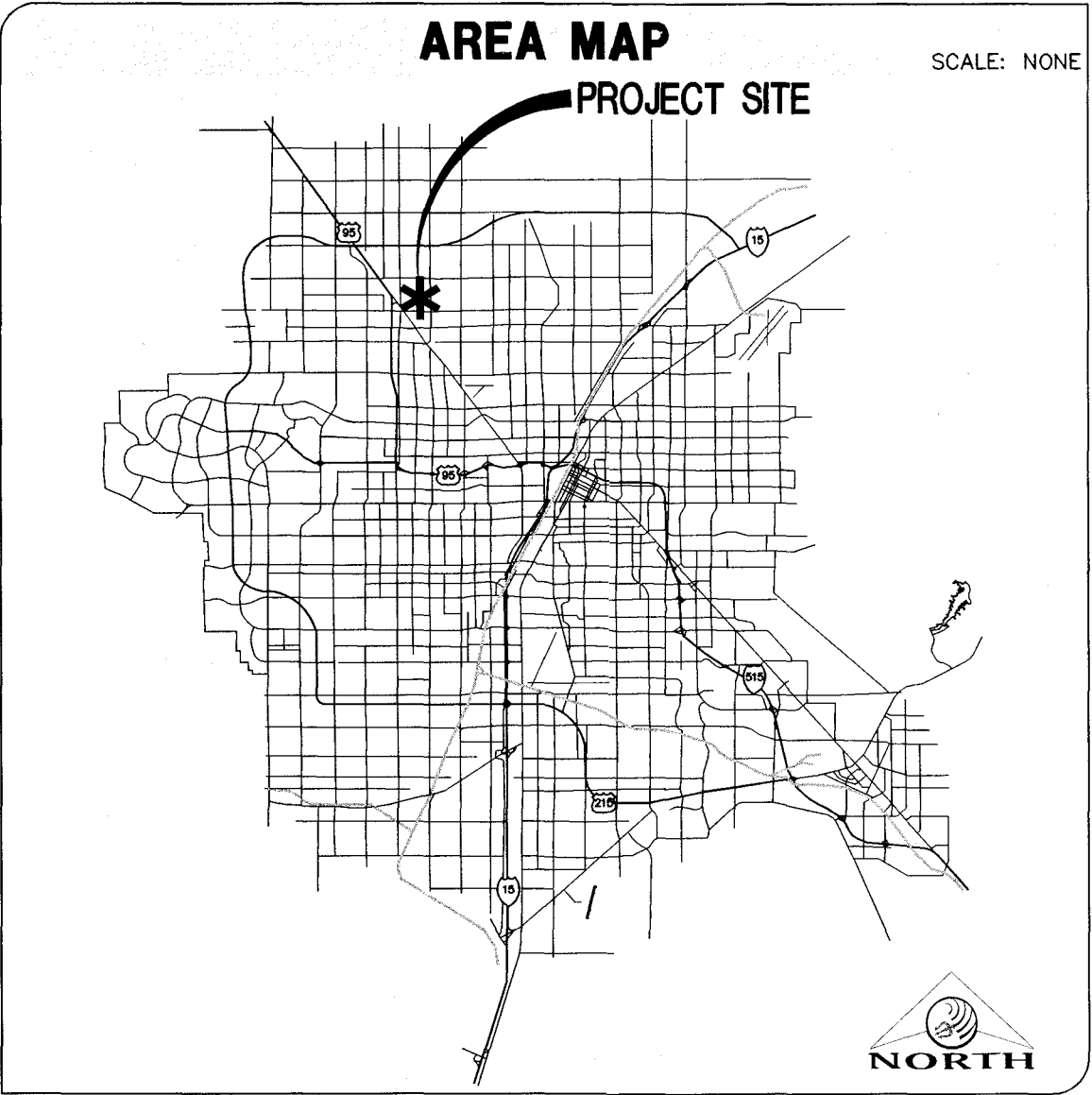
Cross Section Image



APN: 125-35-701-001 THRU 003; 125-35-701-005 THRU 010

MAVERICK & WASHBURN ON-SITE DRAINAGE PLANS

A RESIDENTIAL SUBDIVISION
CITY OF LAS VEGAS, NEVADA



FOR

DR HORTON

1081 WHITNEY RANCH DRIVE #141

HENDERSON, NEVADA 89014

OFFICE: (702) 635-3600

FAX: (800) 538-0735

BY



Triton
Engineering

6757 W. Charleston Boulevard
Suite B
Las Vegas, Nevada 89146

Office: (702) 254-1480
Fax: (702) 254-3062
www.tritoneng.com

SHEET INDEX

- 1 COVER SHEET
- 2 GENERAL NOTES AND LEGEND
- 3 GRADING PLAN I
- 4 GRADING PLAN II
- 5 GRADING DETAILS
- 6 ROYAL INDIGO STREET PLAN AND PROFILE
STA 1+00 TO STA 9+00
- 7 ROYAL INDIGO STREET PLAN AND PROFILE
STA 9+00 TO STA 15+00

OWNER

125-35-701-001 THRU 003
REMARK REVOCABLE TRUST ETAL MOSAIC FIVE L L C
9500 HILLWOOD DR #201
LAS VEGAS, NV 89134

125-35-701-005 & 007
S W D E 13009 L L C ETAL MAUPERTUIS FRED & JANICE
2056 GLENVIEW DR
LAS VEGAS, NV 89134

125-35-701-006
BIG T L P ETAL CUSUMANO SHARON
8375 W FLAMINGO RD #4200
LAS VEGAS, NV 89147

125-35-701-008
SAGUARO EQUITIES L L C
3455 CLIFF SHADOWS PKWY #220
LAS VEGAS, NV 89129-1077

125-35-701-009
SOUTHWEST DESERT EQUITIES L L C
3455 CLIFF SHADOWS PKWY #220
LAS VEGAS, NV 89129-1077

125-35-701-010
INVESTOR EQUITY HOMES L L C AND MOSAIC LAND 2 L L C
3960 HOWARD HUGHES PKWY #150
LAS VEGAS, NV 89169

ASSESSOR'S PARCEL NUMBERS

125-35-701-001 THRU 003
125-35-701-005 THRU 010

LAND USE TABULATION

LAND USE DESIGNATION	
EXISTING CLV ZONING	U/R
PROPOSED CLV ZONING	U/R
MINIMUM LOT SIZE (SF)	10,129 SF
SITE SUMMARY	
TOTAL UNITS	55 UNITS
GROSS ACREAGE	15.44 ACRES
GROSS DENSITY	3.6 UNITS/ACRE
OPEN SPACE PROVIDED	
COMMON LOT A	1,428 SF
COMMON LOT B	687 SF
COMMON LOT C	1,432 SF
COMMON LOT D	1,473 SF
TOTAL	5,020 SF

DEVELOPER

DR HORTON
1081 WHITNEY RANCH DRIVE, SUITE #141
HENDERSON, NEVADA 89014
OFFICE: (702) 635-3600

ENGINEER

TRITON ENGINEERING
6757 WEST CHARLESTON BOULEVARD, SUITE B
LAS VEGAS, NV 89146
OFFICE: (702) 254-1480
FAX: (702) 254-3062

SURVEYOR

TRI-CORE SURVEYING
6755 W. CHARLESTON BLVD STE A
LAS VEGAS, NV 89146
OFFICE: (702) 524-4085

BASIS OF BEARING

NORTH 82°59'56" WEST, BEING THE BEARING OF THE
SOUTH LINE OF THE NORTH HALF (N 1/2) OF THE
SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP
19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS,
CLARK COUNTY, NEVADA AS SHOWN ON THAT CERTAIN
MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE
IN BOOK 117, PAGE 9 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK No. BLV9035E6
RIVET & PLATE IN TOP OF CURB AT THE SOUTHWEST
CORNER OF WASHBURN ROAD & MAVERICK STREET.
ELEVATION = 700.720 METERS (NAVD'88 2008 ADJ.)
ELEVATION = 2298.95 U.S. FEET (NAVD'88 2008 ADJ.)

LEGAL DESCRIPTION

APN'S: 125-35-701-001, 002 & 003:

THAT PORTION OF THE NORTHEAST QUARTER (NE 1/4) OF THE
SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19
SOUTH, RANGE 60 EAST, M.D.M., DESCRIBED AS FOLLOWS:

LOTS ONE (1), TWO (2) AND THREE (3), AS SHOWN BY MAP
THEREOF ON FILE IN FILE 32 OF PARCEL MAPS, PAGE 3, IN THE
OFFICE OF THE COUNTY RECORDER OF CLARK COUNTY, NEVADA.

TOGETHER WITH THAT PORTION OF WASHBURN ROAD, THAT WOULD
PASS BY OPERATION OF LAW, AS VACATED BY THAT CERTAIN
ORDER OF VACATION RECORDED JUNE 29, 2005 IN BOOK 20050629
AS INSTRUMENT NO. 0006068 OF OFFICIAL RECORDS.

APN'S: 125-35-701-005 & 007:

PARCEL 1 (APN 125-35-701-005):

THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHWEST QUARTER
(NW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE
SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19
SOUTH, RANGE 60 EAST, M.D.B. & M., CLARK COUNTY, NEVADA.

EXCEPTING THAT PORTION AS CONVEYED IN DEED RECORDED
AUGUST 17, 1966 IN BOOK 381 AS INSTRUMENT NO. 307317 CLARK
COUNTY, NEVADA.

PARCEL 2 (125-35-701-007):

NORTHWEST QUARTER (NW 1/4) OF THE SOUTHWEST QUARTER (SW
1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST
QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19 SOUTH, RANGE 60
EAST, M.D.B. & M.

EXCEPTING THAT PORTION AS CONVEYED IN DEED RECORDED
AUGUST 17, 1966 IN BOOK 381 AS INSTRUMENT NO. 307317 CLARK
COUNTY NEVADA.

APN: 125-35-701-008

THE EAST HALF (E 1/2) OF THE SOUTH HALF (S 1/2) OF THE
NORTHWEST QUARTER (NW 1/4) OF THE NORTHEAST QUARTER (NE
1/4) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 35,
TOWNSHIP 19 SOUTH, RANGE 60 EAST M.D.M.

EXCEPTING THEREFROM THE EASTERLY THIRTY (30.00) FEET FOR
ROAD PURPOSES AS CONVEYED TO CLARK COUNTY BY DEED
RECORDED AUGUST 17, 1962 IN BOOK 381 AS DOCUMENT NO.
307314, OFFICIAL RECORDS.

APN'S: 125-35-701-008 & 009:

THAT PORTION OF THE NORTHEAST QUARTER (NE 1/4) OF THE
SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19
SOUTH, RANGE 60 EAST M.D.M., MORE PARTICULARLY DESCRIBED AS
FOLLOWS:

PARCELS ONE (1) AND TWO (2) AS SHOWN BY MAP THEREOF OF
FILE IN FILE 14 OF PARCEL MAPS, PAGE 60 IN THE OFFICE OF THE
COUNTY RECORDER OF CLARK COUNTY, NEVADA.

APN: 125-35-701-010:

THE SOUTH HALF (S 1/2) OF THE SOUTHWEST QUARTER (SW 1/4)
OF THE NORTHEAST QUARTER (NE 1/4) OF THE SOUTHEAST
QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19 SOUTH, RANGE 60
EAST M.D.M.

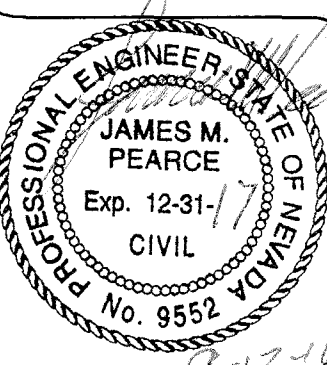
EXCEPTING THEREFROM THOSE PORTIONS AS CONVEYED TO CLARK
COUNTY BY THOSE CERTAIN GRANT DEEDS RECORDED AUGUST 17,
1962 IN BOOK 381 AS INSTRUMENT NOS. 307314, 307316 AND
307317 OF OFFICIAL RECORDS.

Triton
Engineering

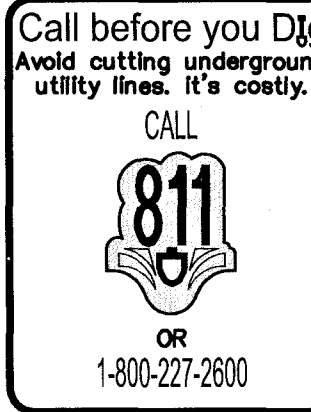


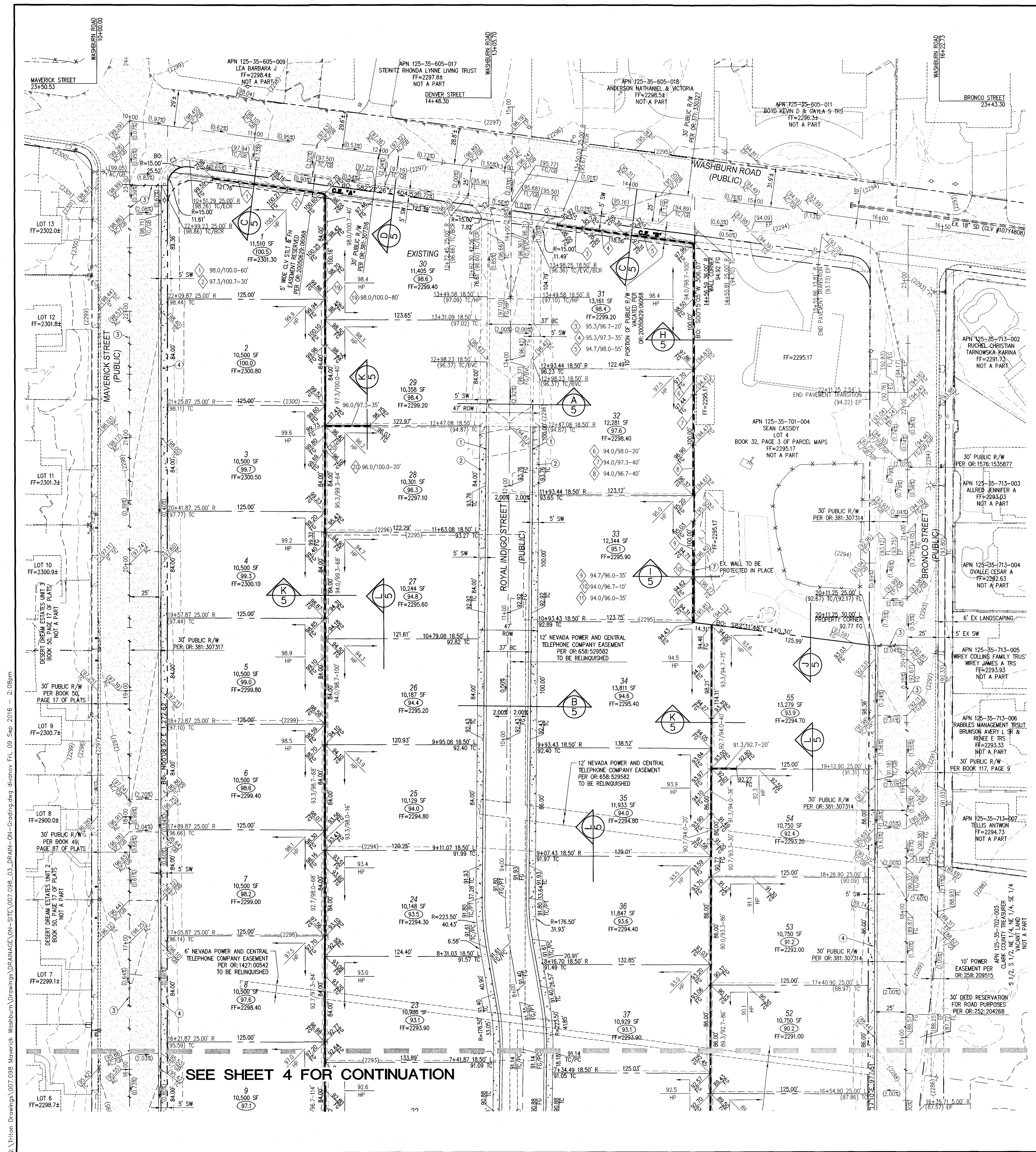
DR HORTON
MAVERICK & WASHBURN

COVER SHEET



SHEET **1** OF 7
C.L.V. DWG.#



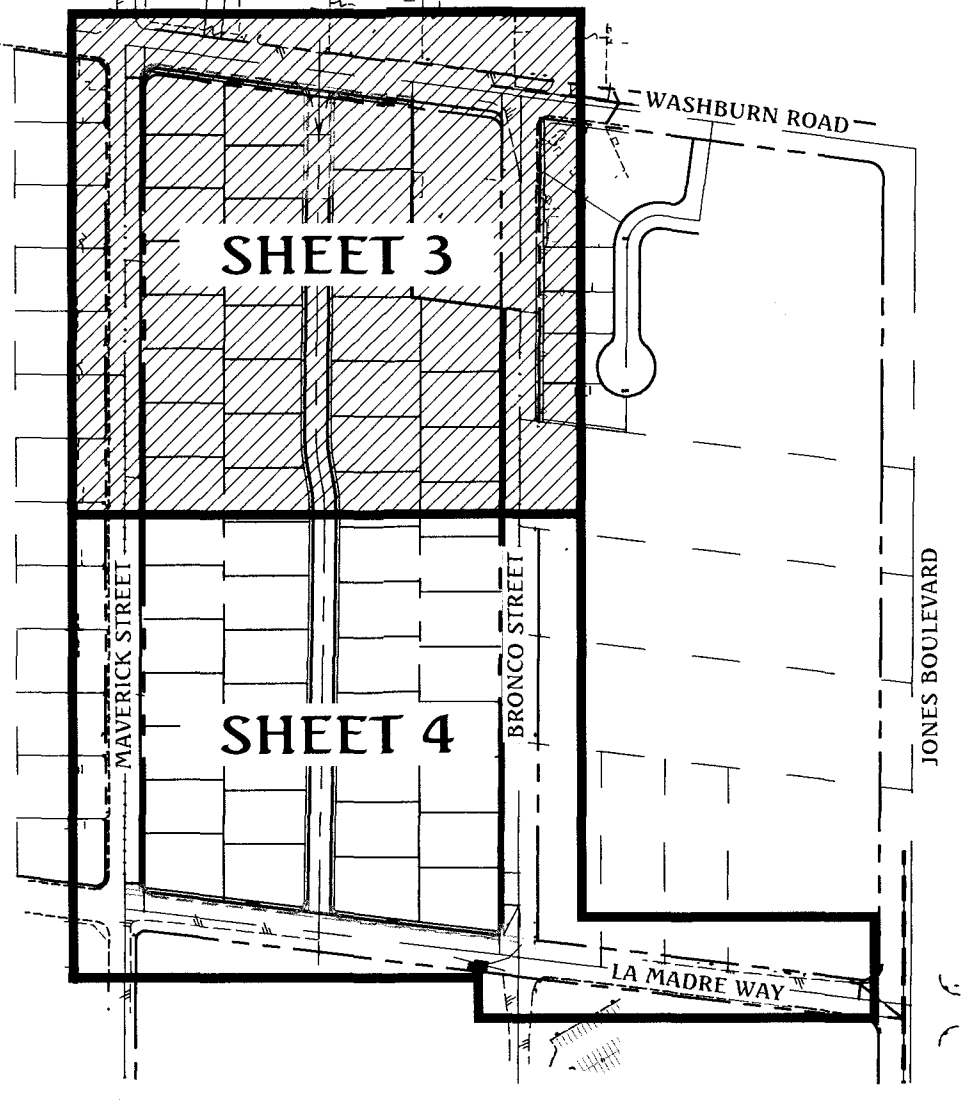


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line contact. It's costly.
Call before you
Overhead
1-702-227-2929

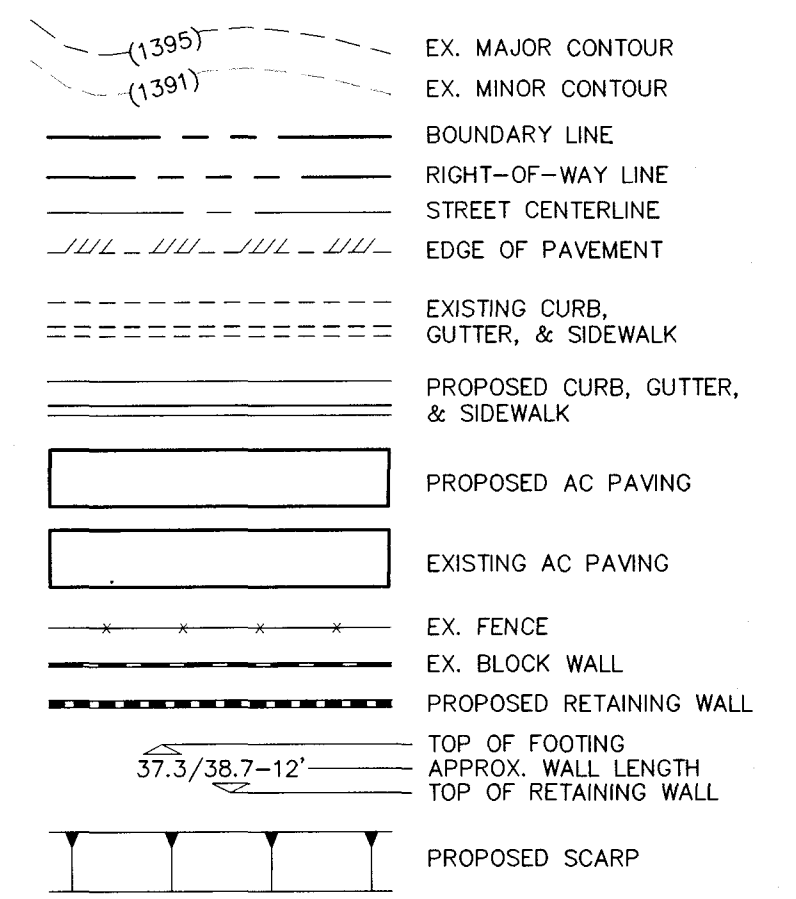
Call before you Dig
Avoid cutting underground
utility lines. It's costly.
CALL
811
OR
1-800-227-2600

KEY MAP



SCALE: NONE

GRADING LEGEND



BASIS OF BEARING

NORTH 82°59'56" WEST, BEING THE BEARING OF THE SOUTH LINE OF THE NORTH HALF (N 1/2) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN ON THAT CERTAIN MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN BOOK 117, PAGE 9 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK No. 8LV90356E
RIVET & PLATE IN TOP OF CURB AT THE SOUTHWEST CORNER OF WASHBURN ROAD & MAVERICK STREET
ELEVATION = 700.720 METERS (NAVD'88 2008 ADJ.)
ELEVATION = 2298.95 U.S. FEET (NAVD'88 2008 ADJ.)

FLOOD ZONE NOTE

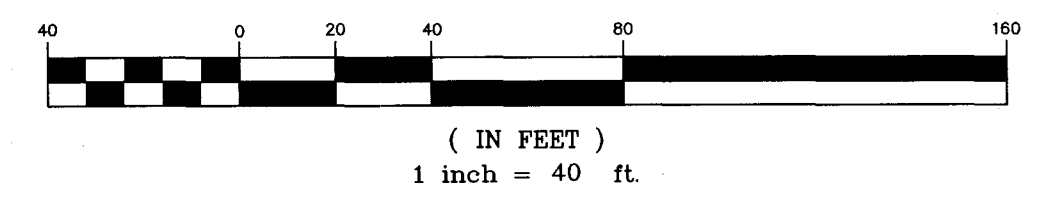
THE PROJECT SITE IS LOCATED ON FEMA FLOOD INSURANCE RATE MAP #32003C1765F. THE SITE IS LOCATED WITHIN DESIGNATED FLOOD HAZARD ZONE X BEING AN AREA DETERMINED TO BE OUTSIDE THE 100 YEAR FLOOD PLAIN.

SOILS INFORMATION

- 1. SOILS REPORT BY: GEOTEK RESIDENTIAL, LLC
PROJECT No. 12565-LVR
DATED: SEPTEMBER 14, 2015
- 2. CUT TOTAL: 18,765 C.Y.
FILL TOTAL: 23,237 C.Y.
NET: 4,472 C.Y. (FILL)



GRAPHIC SCALE



GRADING NOTES

- 1. ALL PROPOSED PAD ELEVATIONS AND SWALE ELEVATIONS ARE ROUGH GRADES. ALL OTHER PROPOSED ELEVATIONS ARE FINISHED GRADES.
- 2. THE GRADING PLANS SHALL BE AT THE PROJECT SITE THROUGHOUT THE COURSE OF CONSTRUCTION.
- 3. ALL GRADING SHALL BE PERFORMED IN CONFORMANCE WITH THE LINES, GRADES AND DETAILS AS SHOWN ON THESE PLANS. ANY DEVIATION FROM THESE PLANS WILL ONLY BE PERMITTED UPON WRITTEN APPROVAL FROM THE ENGINEER.
- 4. ALL PADS ARE TO BE GRADED WITHIN ±0.3' OF THE ELEVATIONS AS SHOWN ON THE PLANS. GRADING IS NOT COMPLETE UNTIL THE ENGINEER HAS CERTIFIED THAT THE PADS HAVE BEEN GRADED IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
- 5. ALL PLACEMENT OF OVERSIZED MATERIALS AND/OR FILL MATERIALS SHALL BE PER THE SOILS REPORT REFERENCED ON THIS PLAN.
- 6. ADD 2200 TO ALL SPOT GRADES AND TOP OF CURB, FLOW LINE AND FINISH GRADE ELEVATIONS.
- 7. ANY CURVED CURB LESS THAN 1% MUST BE WATER TESTED BY CONTRACTOR AS REQUIRED BY CITY INSPECTOR.

CONSTRUCTION NOTES

- 1. CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
- 2. CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234.
- 3. SAWCUT AND MATCH EXISTING ASPHALT.
- 4. EXISTING "L" CURB, GUTTER AND SIDEWALK TO BE REMOVED & REPLACED PER CCAUSD #216 AND #234.

CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	TANGENT
C1	097°00'52"	20.00'	33.86'	22.61'
C2	082°59'08"	20.00'	28.97'	17.69'
C3	097°28'44"	20.00'	34.03'	22.80'
C4	083°08'46"	20.00'	29.02'	17.74'
C5	096°01'31"	20.00'	33.52'	22.22'
C6	083°58'29"	20.00'	29.31'	18.00'
C7	096°42'54"	20.00'	33.76'	22.49'
C8	010°43'47"	200.00'	37.45'	18.78'
C9	010°21'56"	200.00'	36.18'	18.14'

SEE SHEET 4 FOR CONTINUATION

DATE: 09/09/2016
PM: J. PEARCE
DRAWN BY: D.L.
DESIGNED BY: D.L.
CHECKED BY: A.G.
JOB NO.: 007.098
SCALE: 1" = 40'

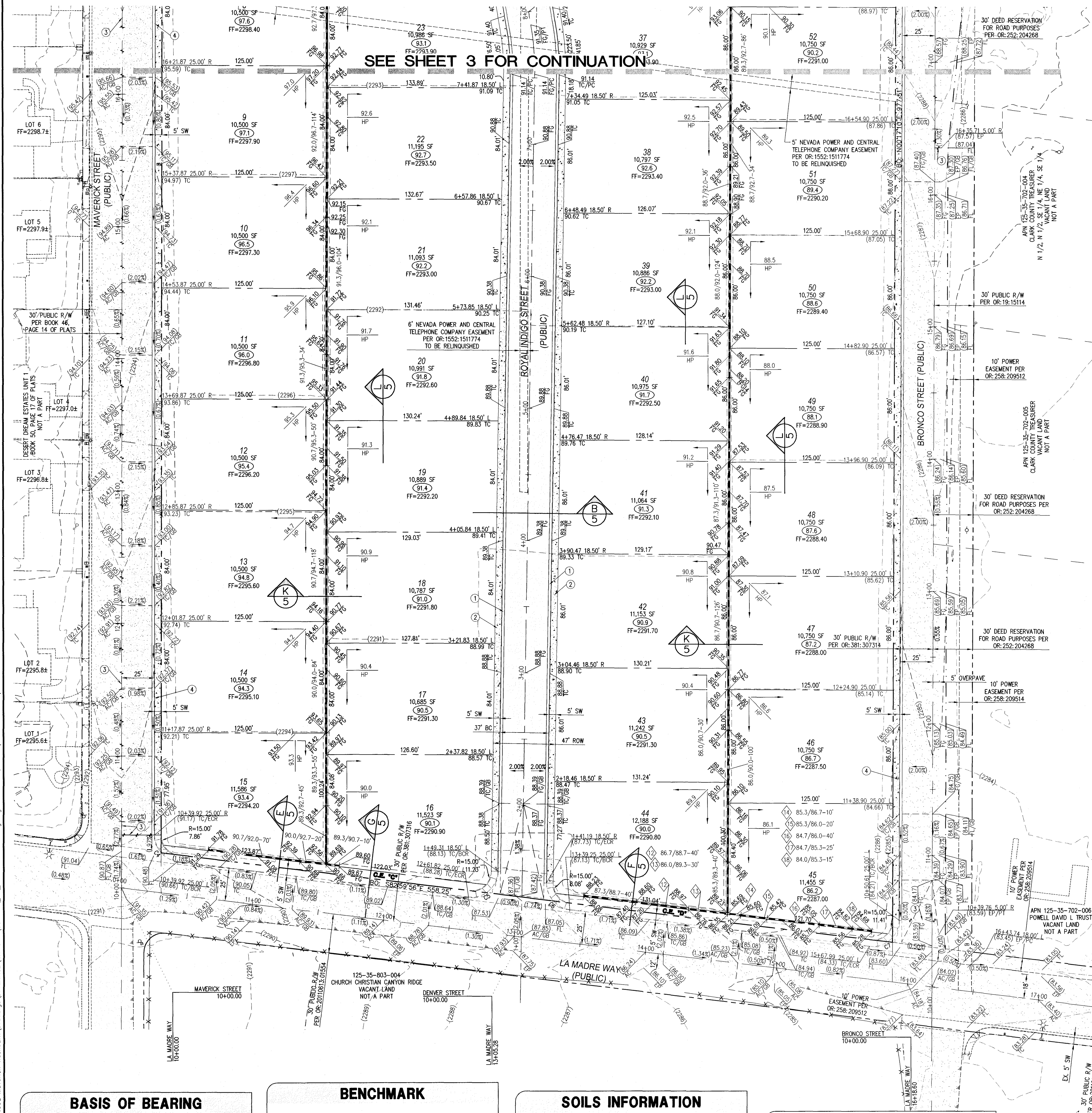
Triton Engineering
6757 W. Charleston Blvd.
Suite B
Las Vegas, Nevada 89146
Office: (702) 254-4800
Fax: (702) 254-5062
www.tritoneng.com

DR. HORTON
MAVERICK & WASHBURN
GRADING PLAN 1

PROFESSIONAL ENGINEER
JAMES M. PEARCE
Exp. 12-31-
CIVIL
No. 9552

SHEET 3 OF 7
C.L.V. DWG.#

Q:\Triton Drawings\007-098 MAVERICK\Drawings\007-098-03-DRAIN-ON-SITE\007-098-03-DRAIN-ON-SITE.dwg Drawn: J. Pearce, 09 Sep 2016 - 2:09pm



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

GRADING LEGEND

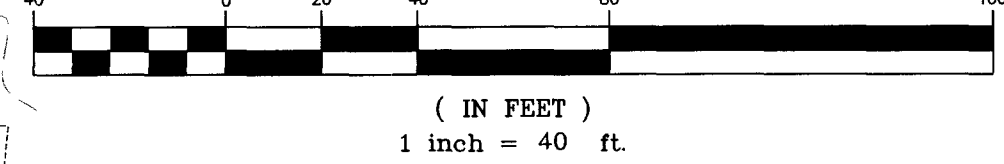
(1395)	EX. MAJOR CONTOUR
(1391)	EX. MINOR CONTOUR
---	BOUNDARY LINE
---	RIGHT-OF-WAY LINE
---	STREET CENTERLINE
---	EDGE OF PAVEMENT
---	EXISTING CURB, GUTTER, & SIDEWALK
---	PROPOSED CURB, GUTTER, & SIDEWALK
---	PROPOSED AC PAVING
---	EXISTING AC PAVING
---	EX. FENCE
---	EX. BLOCK WALL
---	PROPOSED RETAINING WALL
---	TOP OF FOOTING
---	APPROX. WALL LENGTH
---	TOP OF RETAINING WALL
---	PROPOSED SCARP

- GRADING NOTES**
- ALL PROPOSED PAD ELEVATIONS AND SWALE ELEVATIONS ARE ROUGH GRADES. ALL OTHER PROPOSED ELEVATIONS ARE FINISHED GRADES.
 - THE GRADING PLANS SHALL BE AT THE PROJECT SITE THROUGHOUT THE COURSE OF CONSTRUCTION.
 - ALL GRADING SHALL BE PERFORMED IN CONFORMANCE WITH THE LINES, GRADES AND DETAILS AS SHOWN ON THESE PLANS. ANY DEVIATION FROM THESE PLANS WILL ONLY BE PERMITTED UPON WRITTEN APPROVAL FROM THE ENGINEER.
 - ALL PADS ARE TO BE GRADED WITHIN $\pm 0.3'$ OF THE ELEVATIONS AS SHOWN ON THE PLANS. GRADING IS NOT COMPLETE UNTIL THE ENGINEER HAS CERTIFIED THAT THE PADS HAVE BEEN GRADED IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
 - ALL PLACEMENT OF OVERSIZED MATERIALS AND/OR FILL MATERIALS SHALL BE PER THE SOILS REPORT REFERENCED ON THIS PLAN.
 - ADD 2200 TO ALL SPOT GRADES AND TOP OF CURB, FLOW LINE AND FINISH GRADE ELEVATIONS.
 - ANY CURVED CURB LESS THAN 12' MUST BE WATER TESTED BY CONTRACTOR AS REQUIRED BY CITY INSPECTOR.

- CONSTRUCTION NOTES**
- CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
 - CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234.
 - SAWCUT AND MATCH EXISTING ASPHALT.
 - EXISTING "L" CURB, GUTTER AND SIDEWALK TO BE REMOVED & REPLACED PER CCAUSD #216 AND #234.



GRAPHIC SCALE



CURVE TABLE				
CURVE	DELTA	RADIUS	LENGTH	TANGENT
C1	09°00'52"	20.00'	33.86'	22.61'
C2	08°25'08"	20.00'	28.97'	17.69'
C3	09°28'44"	20.00'	34.03'	22.80'
C4	08°30'46"	20.00'	29.02'	17.74'
C5	09°01'31"	20.00'	33.52'	22.22'
C6	08°35'29"	20.00'	29.31'	18.00'
C7	09°42'54"	20.00'	33.76'	22.49'
C8	01°43'47"	200.00'	37.45'	18.78'
C9	01°21'56"	200.00'	36.18'	18.14'

BASIS OF BEARING

NORTH 82°59'56" WEST, BEING THE BEARING OF THE SOUTH LINE OF THE NORTH HALF (N 1/2) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN ON THAT CERTAIN MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN BOOK 117, PAGE 9 OF PLATS.

BENCHMARK

CITY OF LAS VEGAS BENCHMARK No. 8LV9035E6
RIVET & PLATE IN TOP OF CURB AT THE SOUTHWEST CORNER OF WASHBURN ROAD & MAVERICK STREET.
ELEVATION = 700.720 METERS (NAVD'88 2008 ADJ.)
ELEVATION = 2298.95 U.S. FEET (NAVD'88 2008 ADJ.)

SOILS INFORMATION

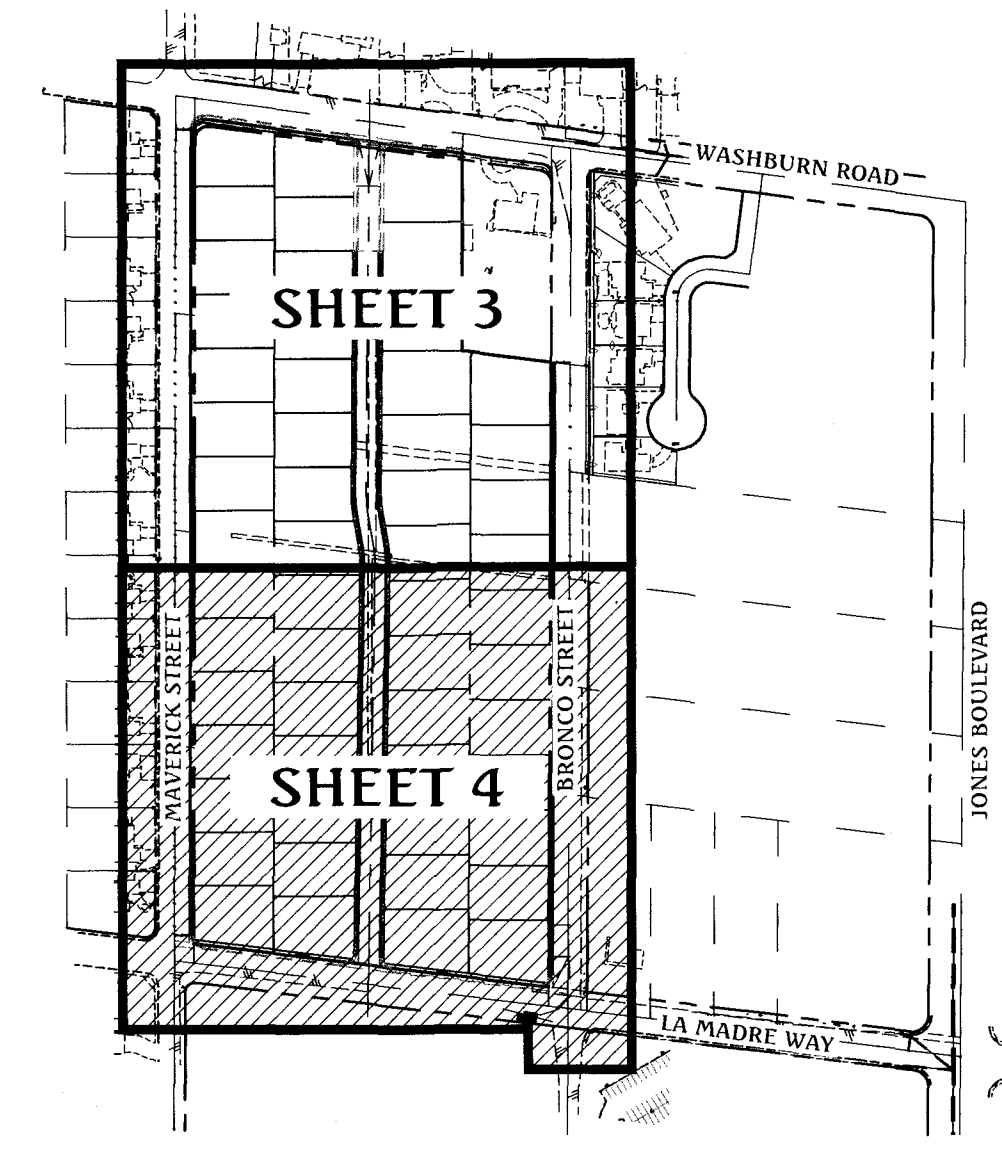
- SOILS REPORT BY: GEOTEK RESIDENTIAL, LLC
PROJECT No. 12565-LVR
DATED: SEPTEMBER 14, 2015
- CUT TOTAL: 18,765 C.Y.
FILL TOTAL: 23,237 C.Y.
NET: 4,472 C.Y. (FILL)

FLOOD ZONE NOTE

THE PROJECT SITE IS LOCATED ON FEMA FLOOD INSURANCE RATE MAP #32003C1765F. THE SITE IS LOCATED WITHIN DESIGNATED FLOOD HAZARD ZONE X BEING AN AREA DETERMINED TO BE OUTSIDE THE 100 YEAR FLOOD PLAIN.

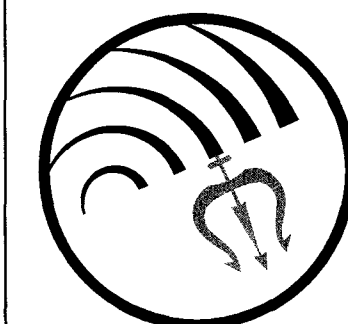
KEY MAP

SCALE: NONE



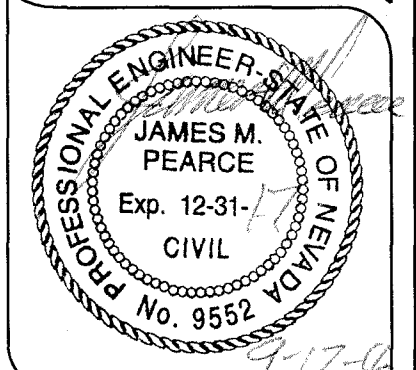
DATE	NO.	DESCRIPTION	DATE	NO.	DESCRIPTION
09/09/2016	J. PEARCE				
DRAWN BY:	D.L.	DESIGNED BY:	D.L.	ADA CHECKED BY:	
CHECKED BY:		JOB NO.:	007,098	SCALE:	1" = 40'

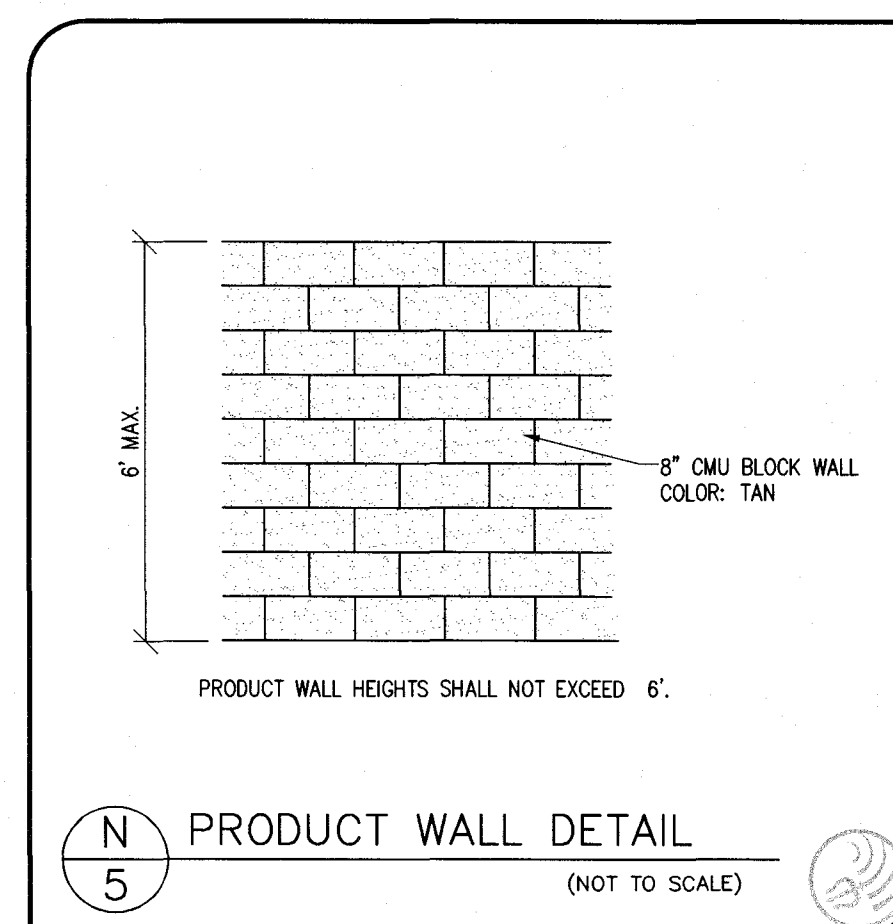
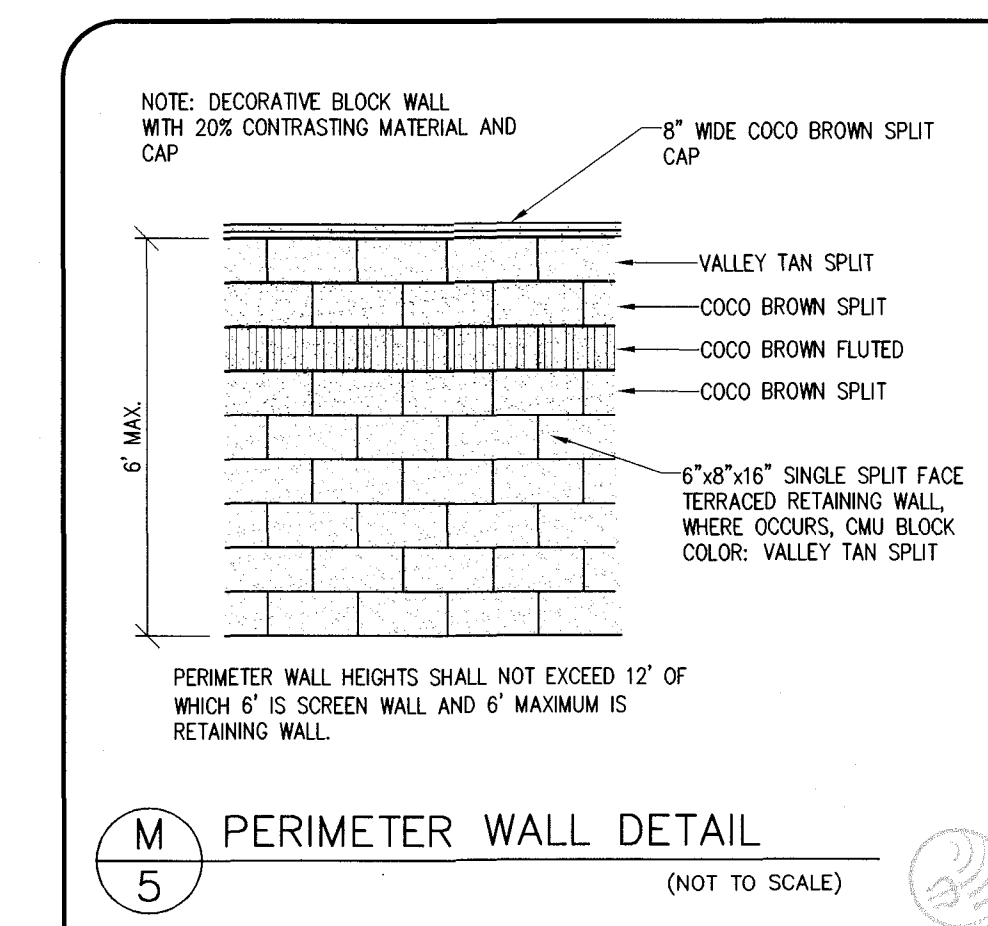
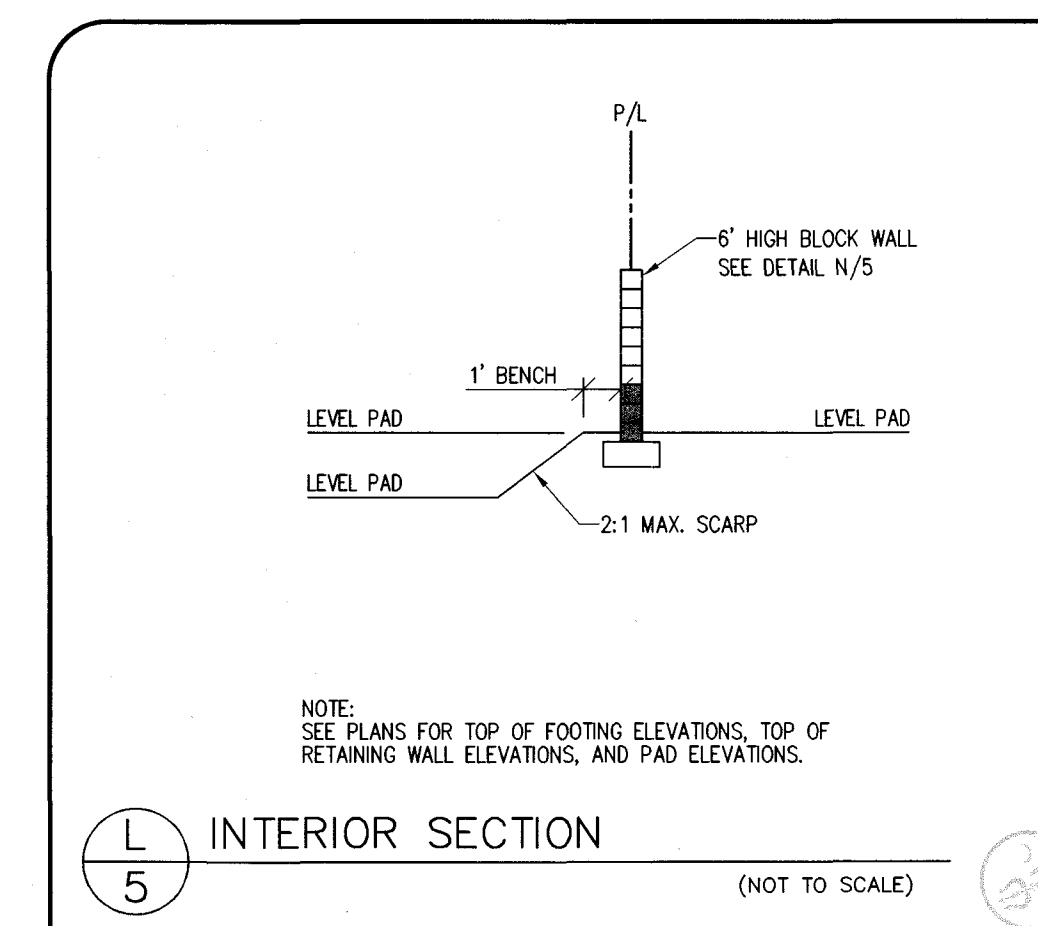
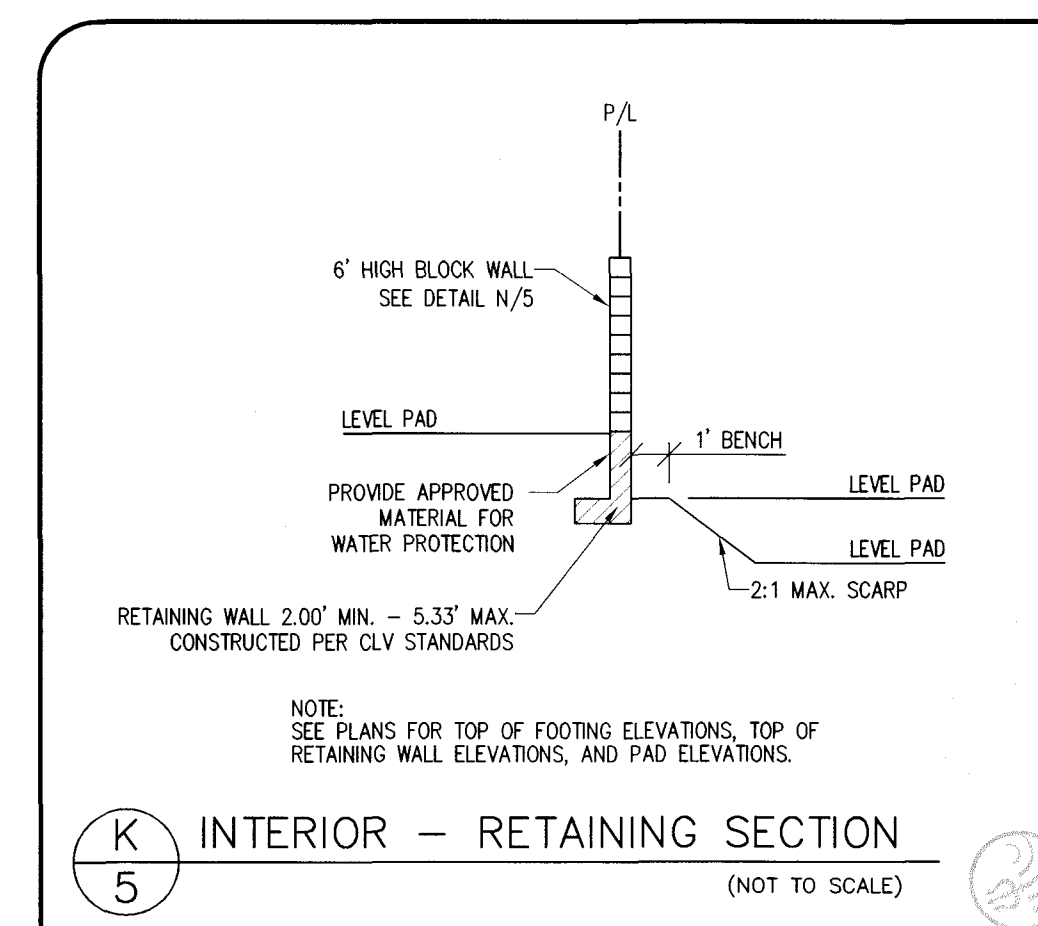
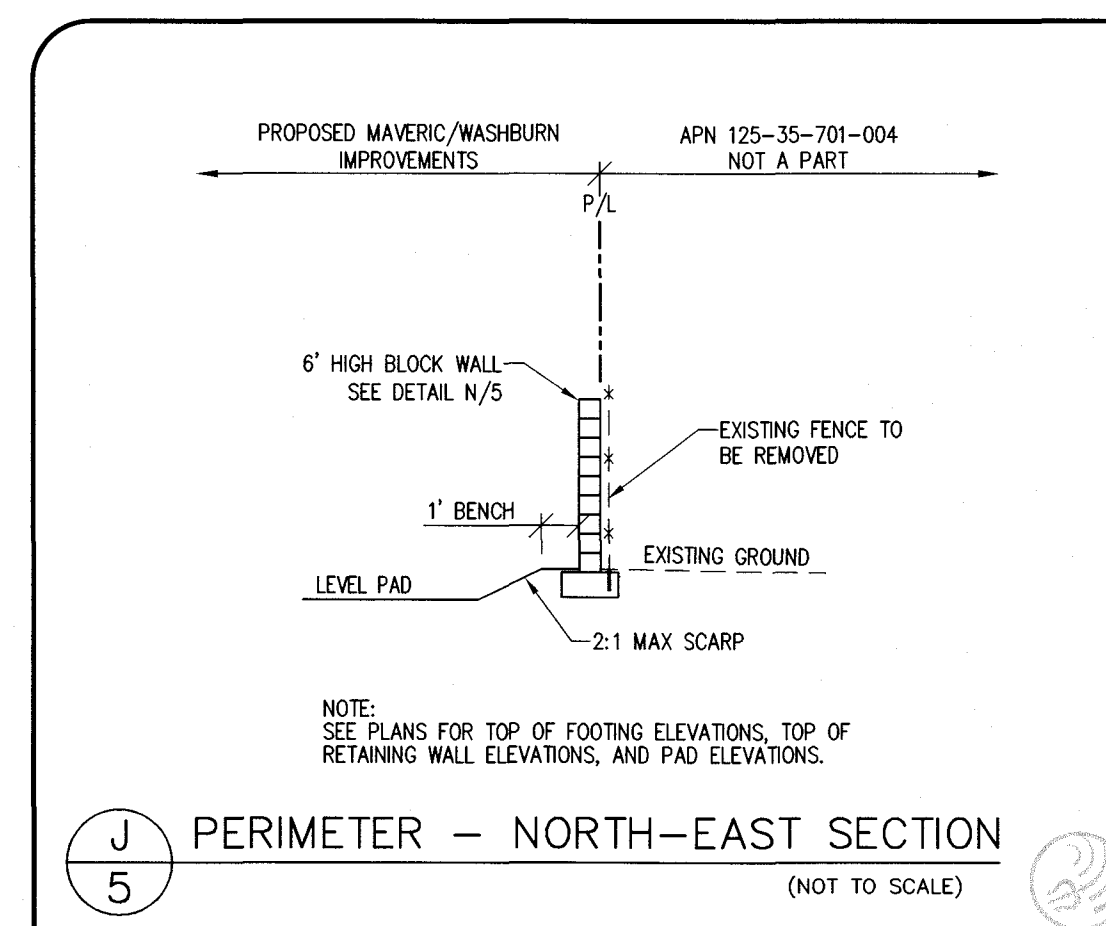
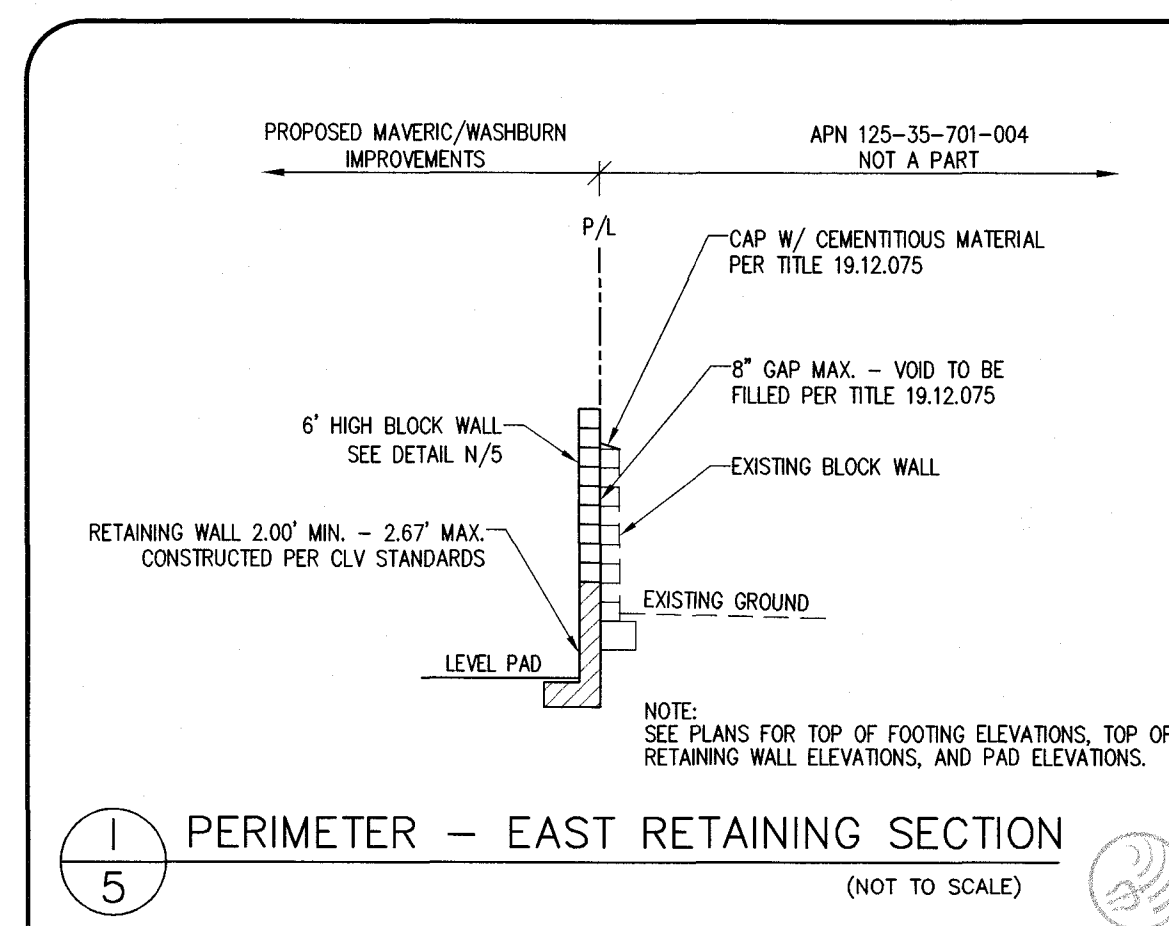
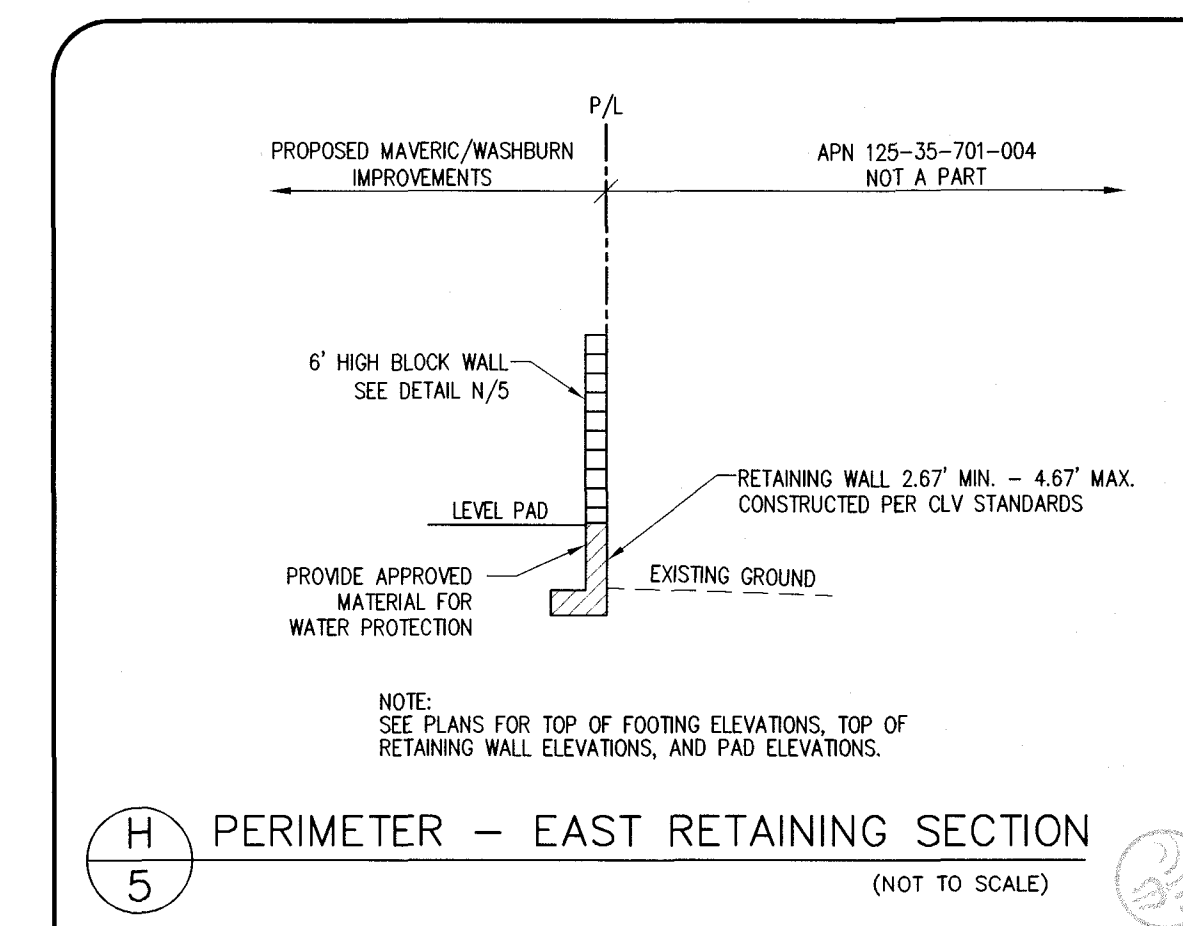
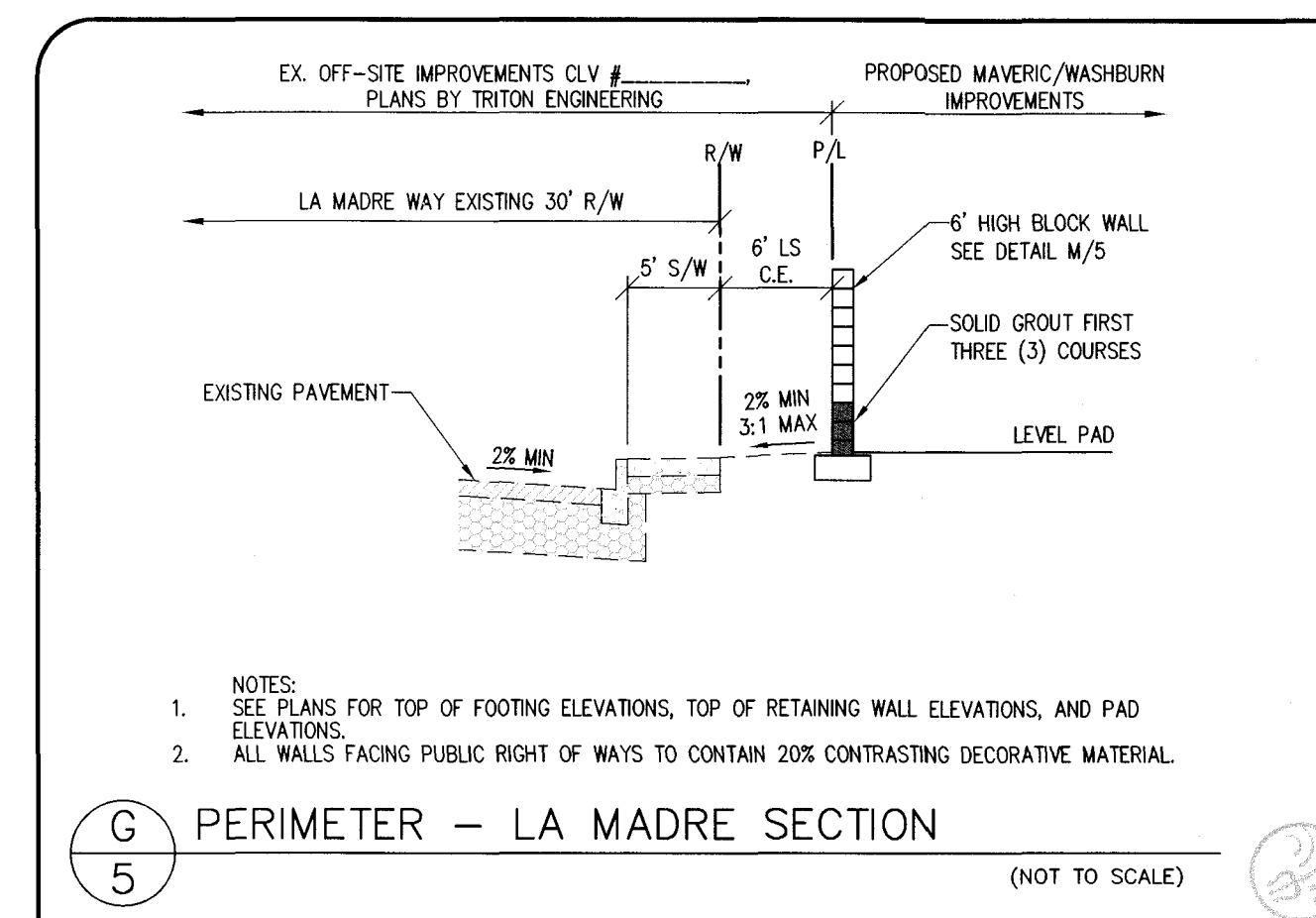
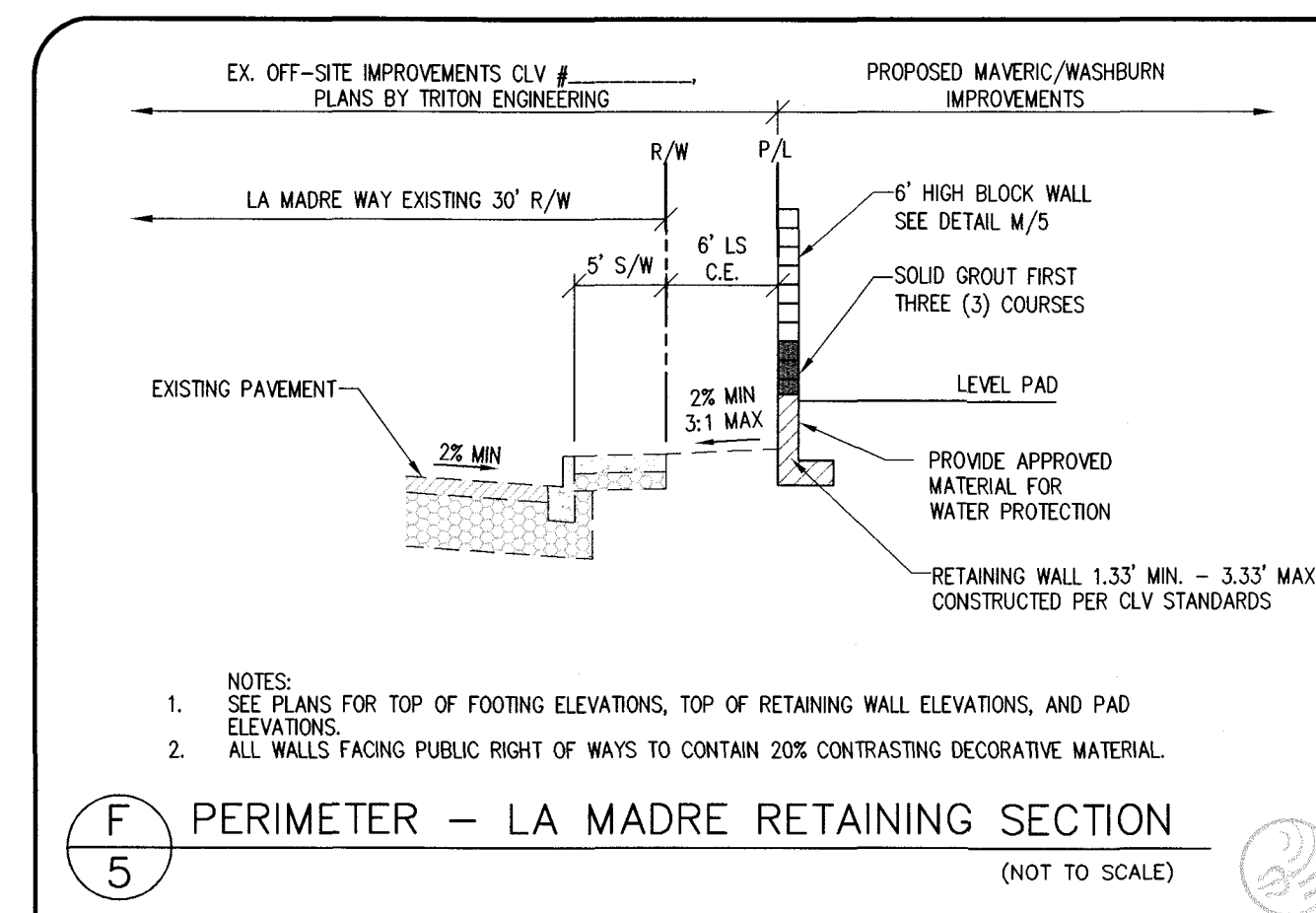
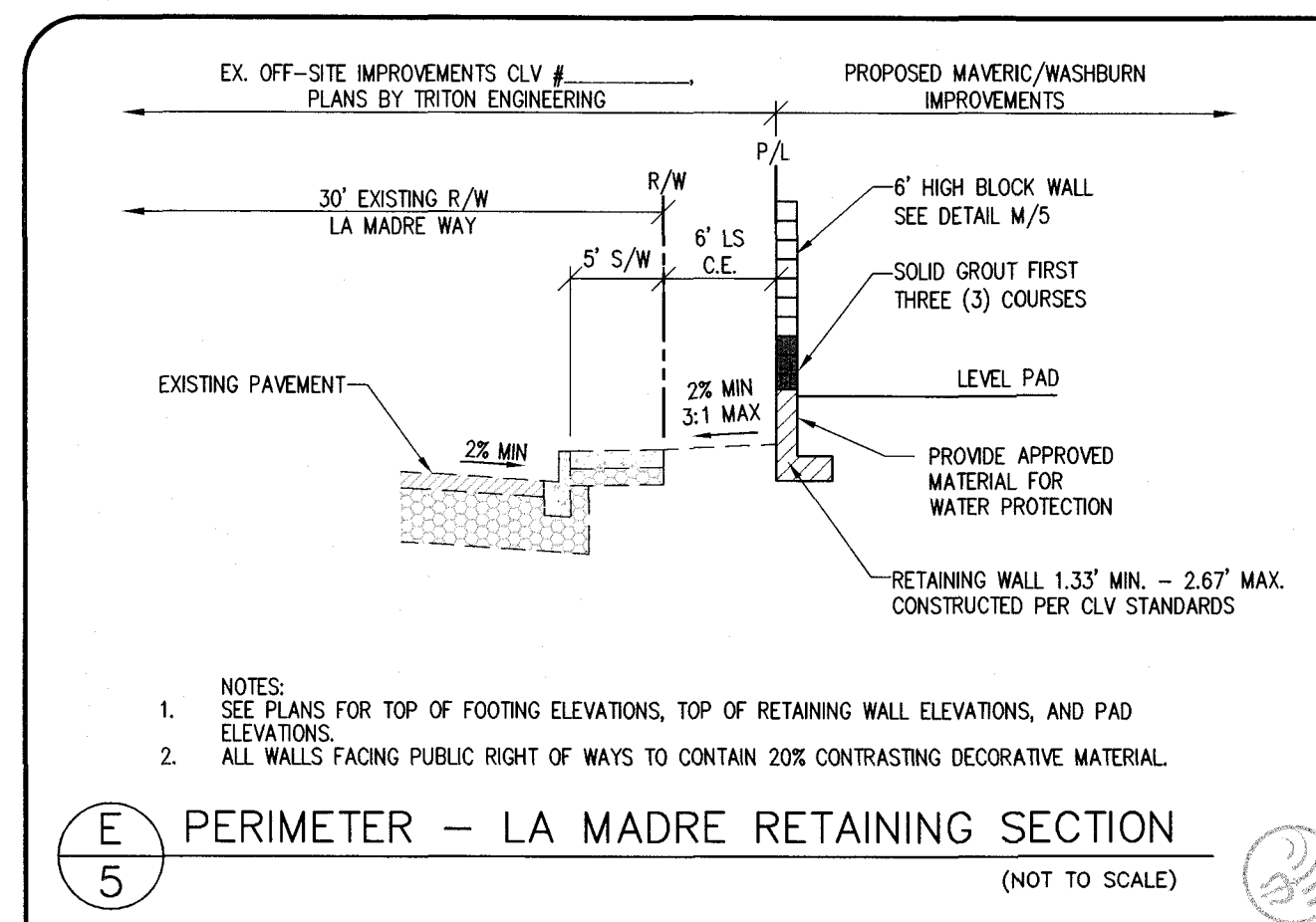
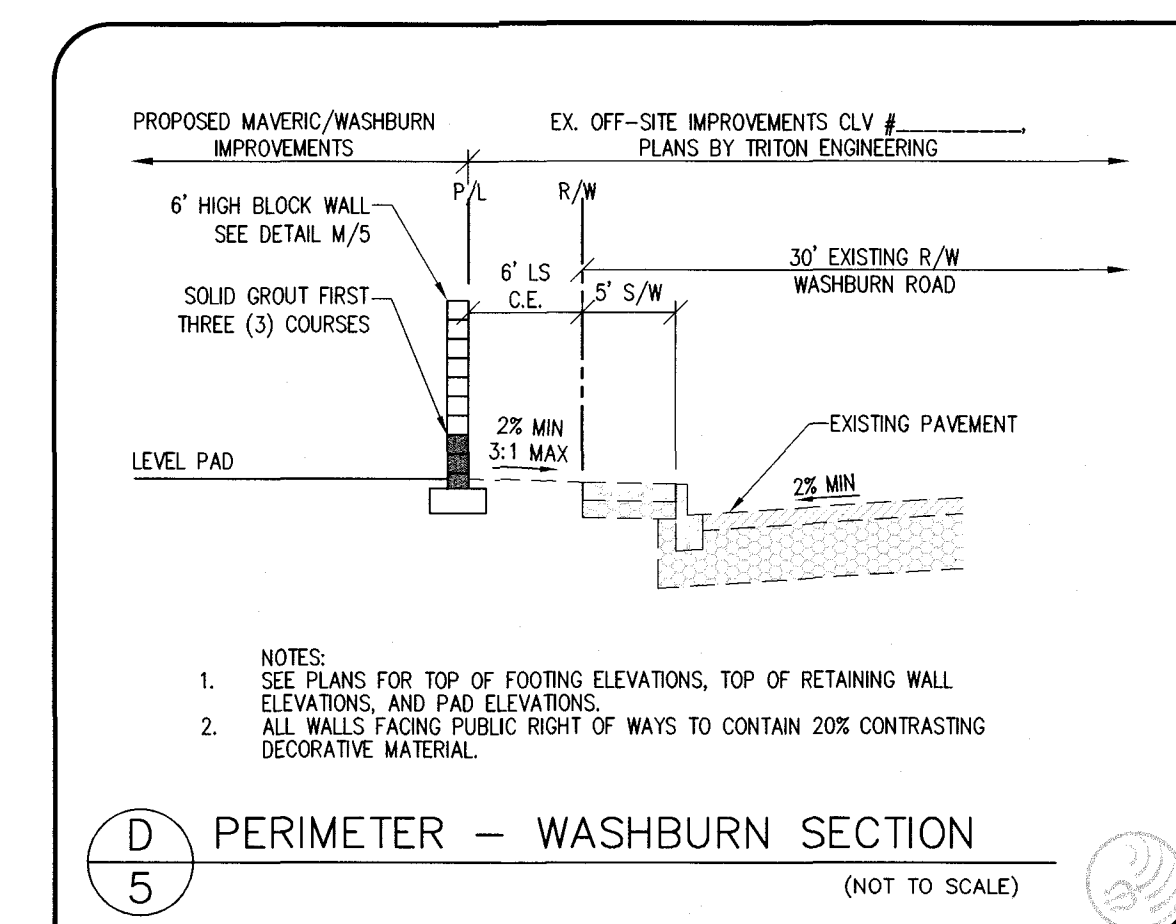
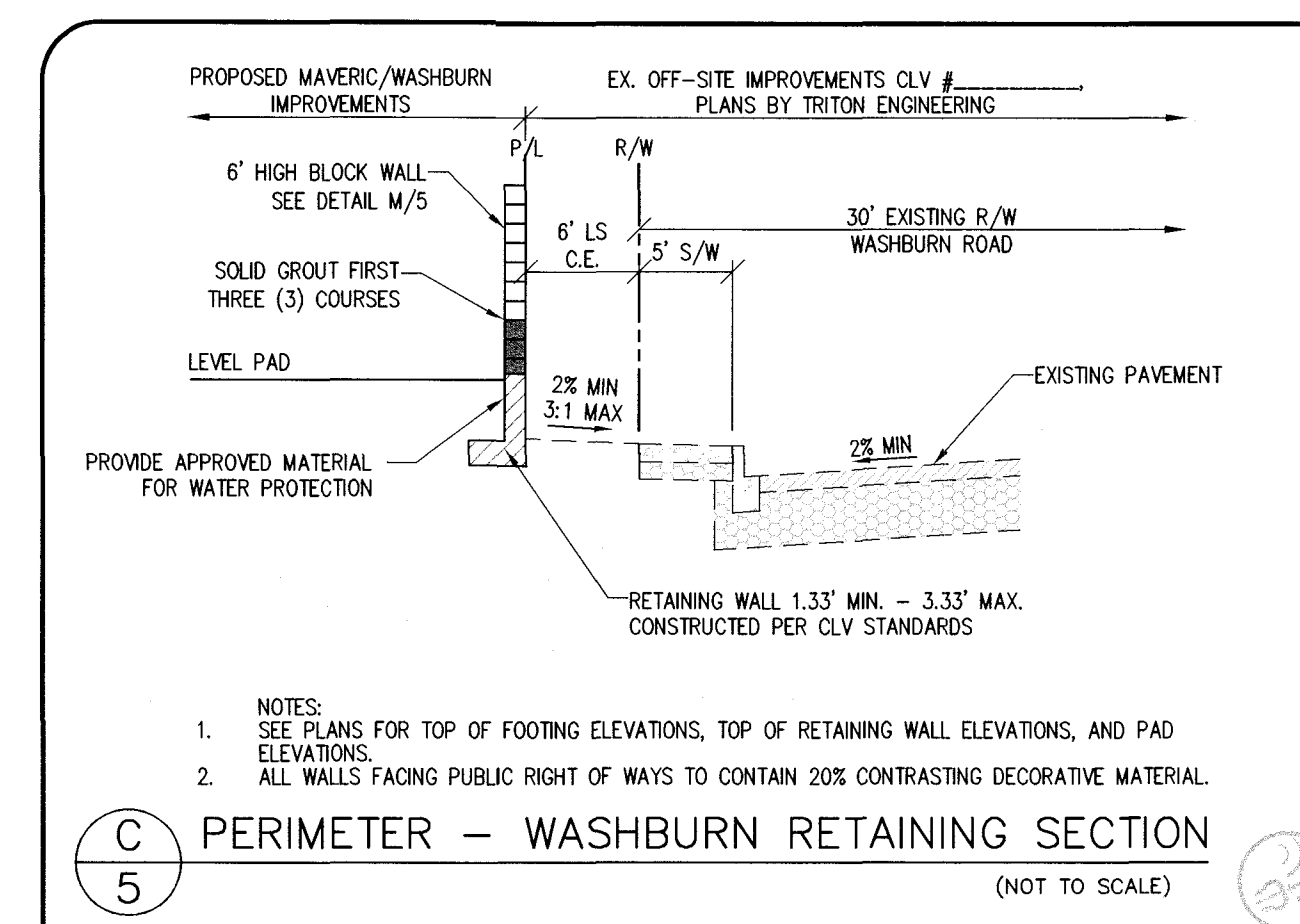
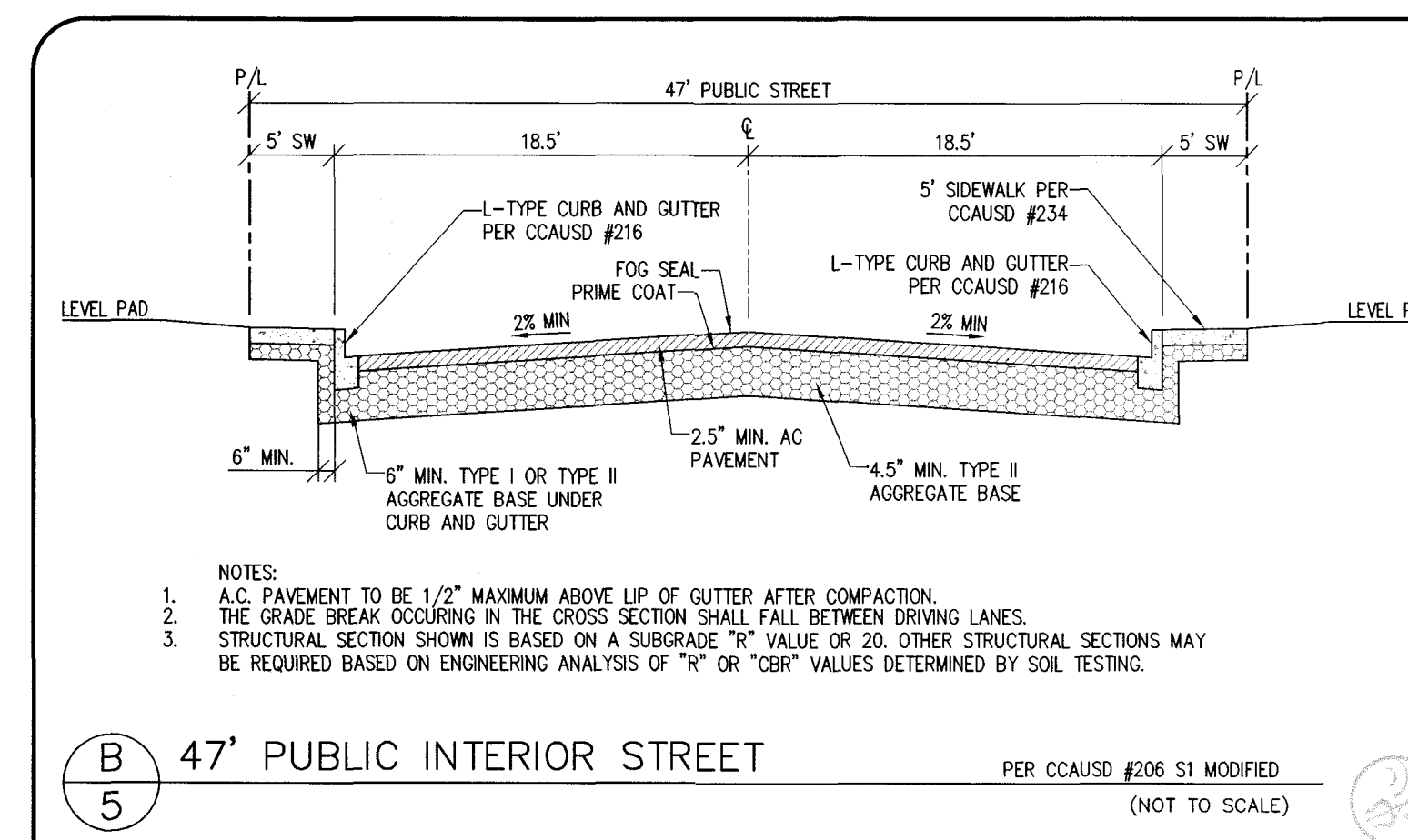
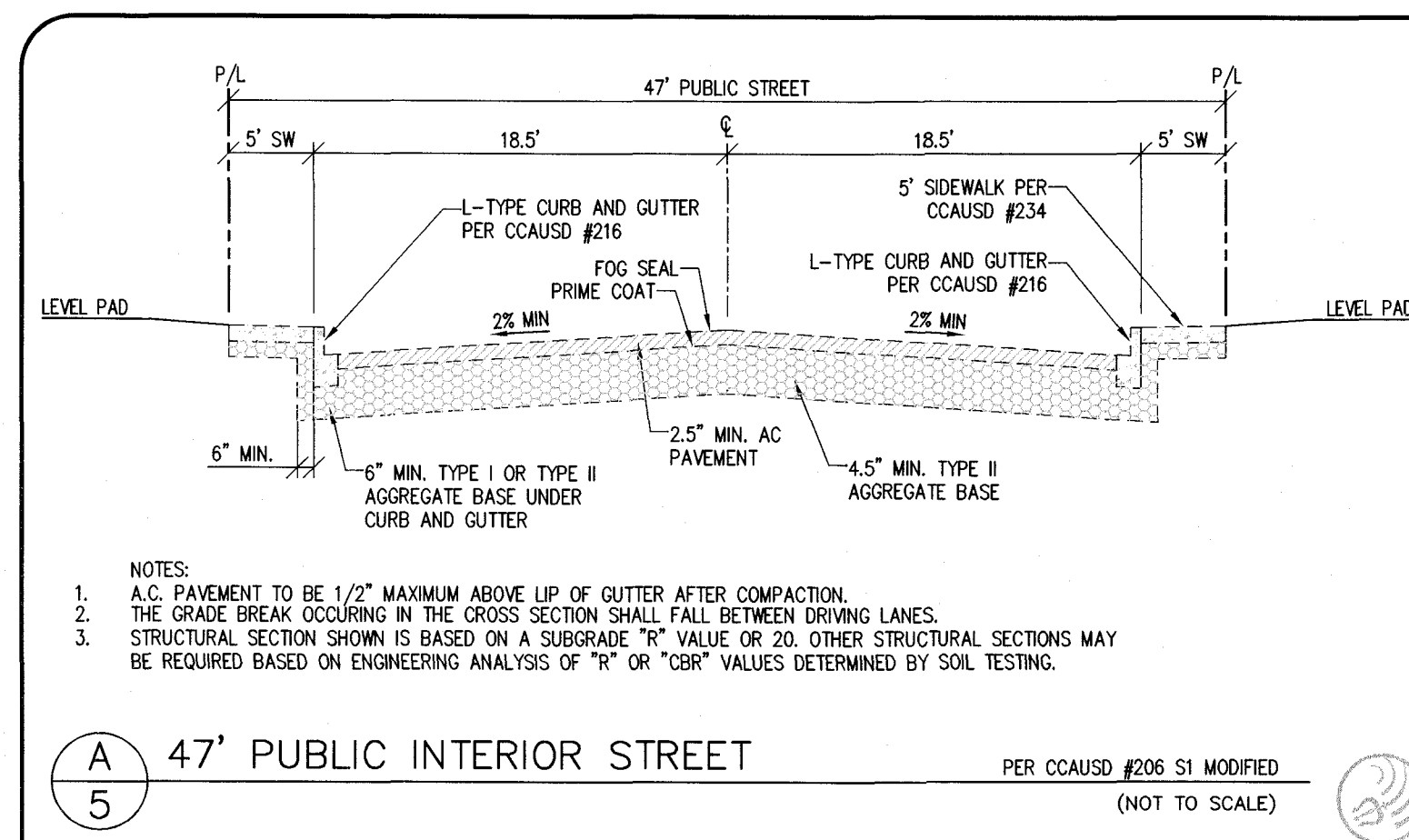
Triton Engineering
Office: (702) 254-1480
Fax: (702) 254-3002
www.tritoneng.com
6357 W. Charleston Blvd.,
Suite B
Las Vegas, Nevada 89146



DR. HORTON
MAVERICK & WASHBURN

GRADING PLAN II



[illegible]

DATE :	09/09/2016
PM :	J. PEARCE
DRAWN BY :	D.I.
DESIGNED BY :	D.I.
CHECKED BY :	
ADA CHECKED :	
JOB NO. :	007.098
SCALE :	NONE



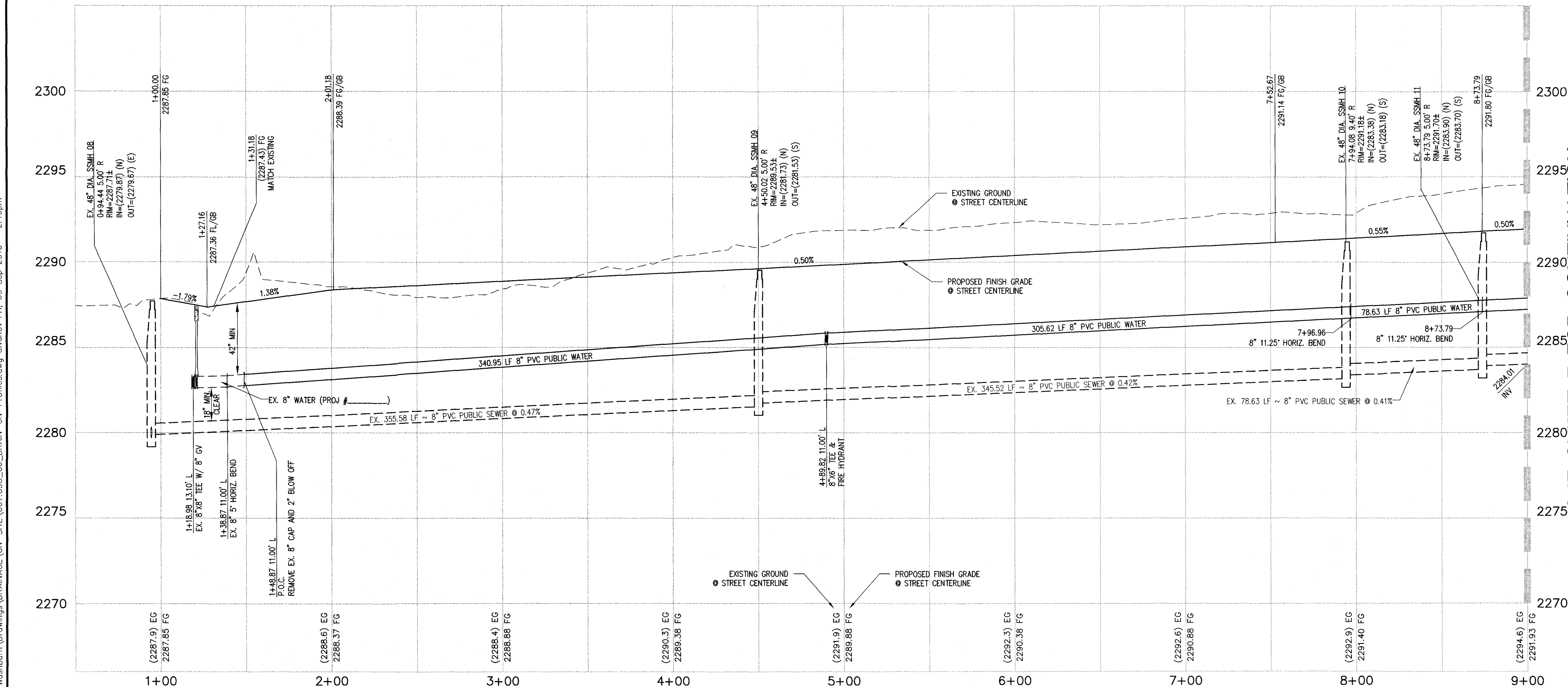
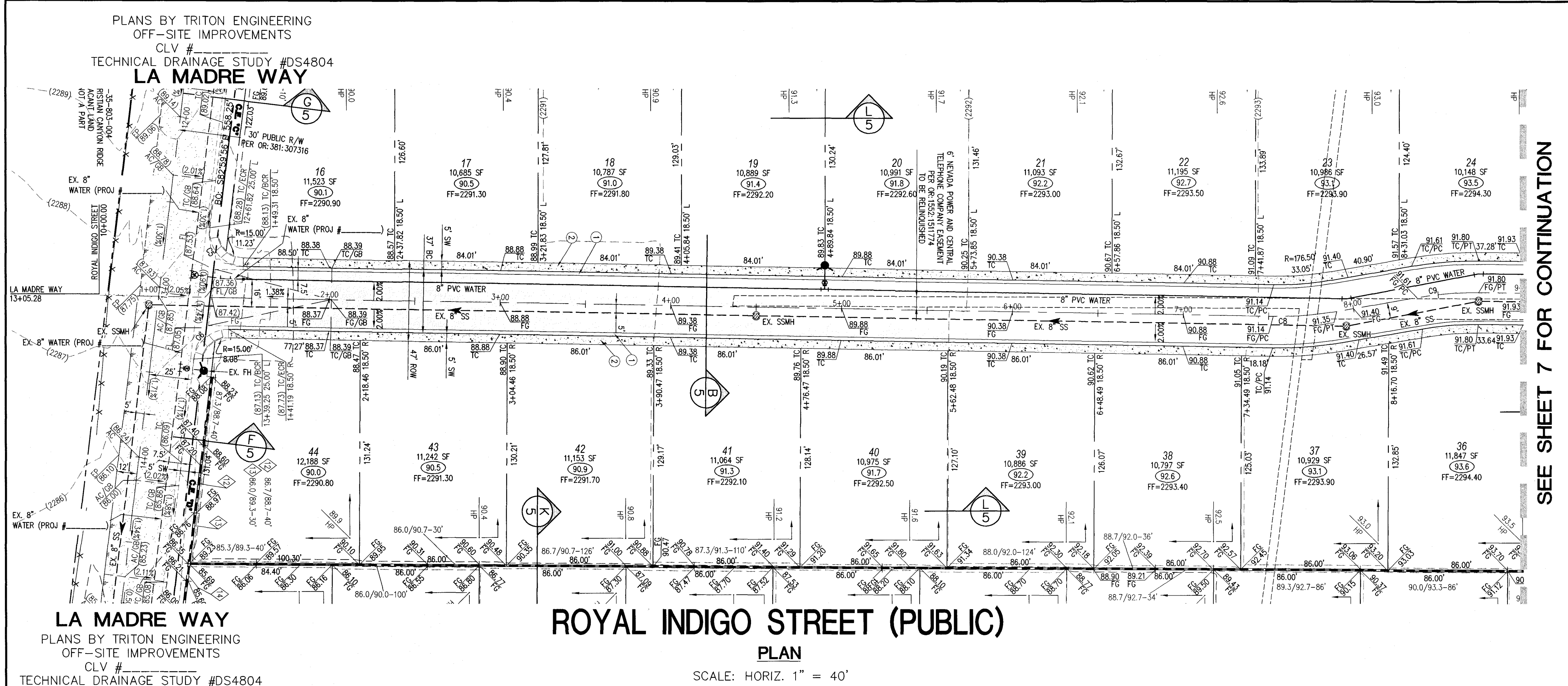
Triton
Engineering

Office: (702) 254-1480
Fax: (702) 254-3062
www.tritonenig.com

6757 W. Charleston Blvd.
Suite B
Las Vegas, Nevada 89146

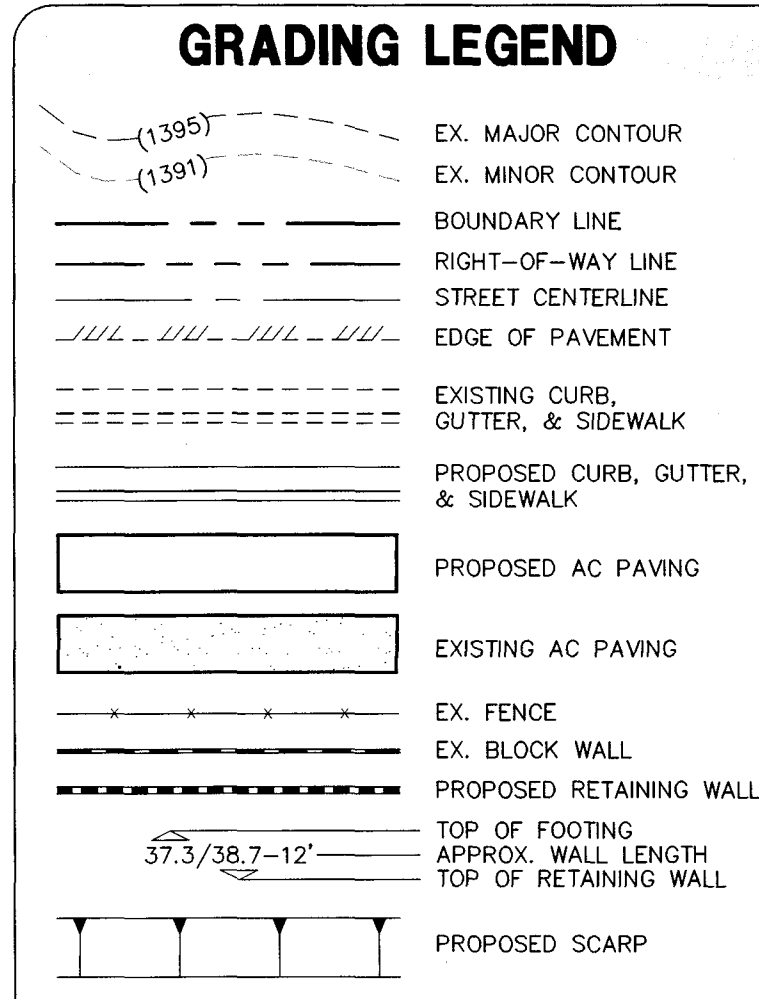
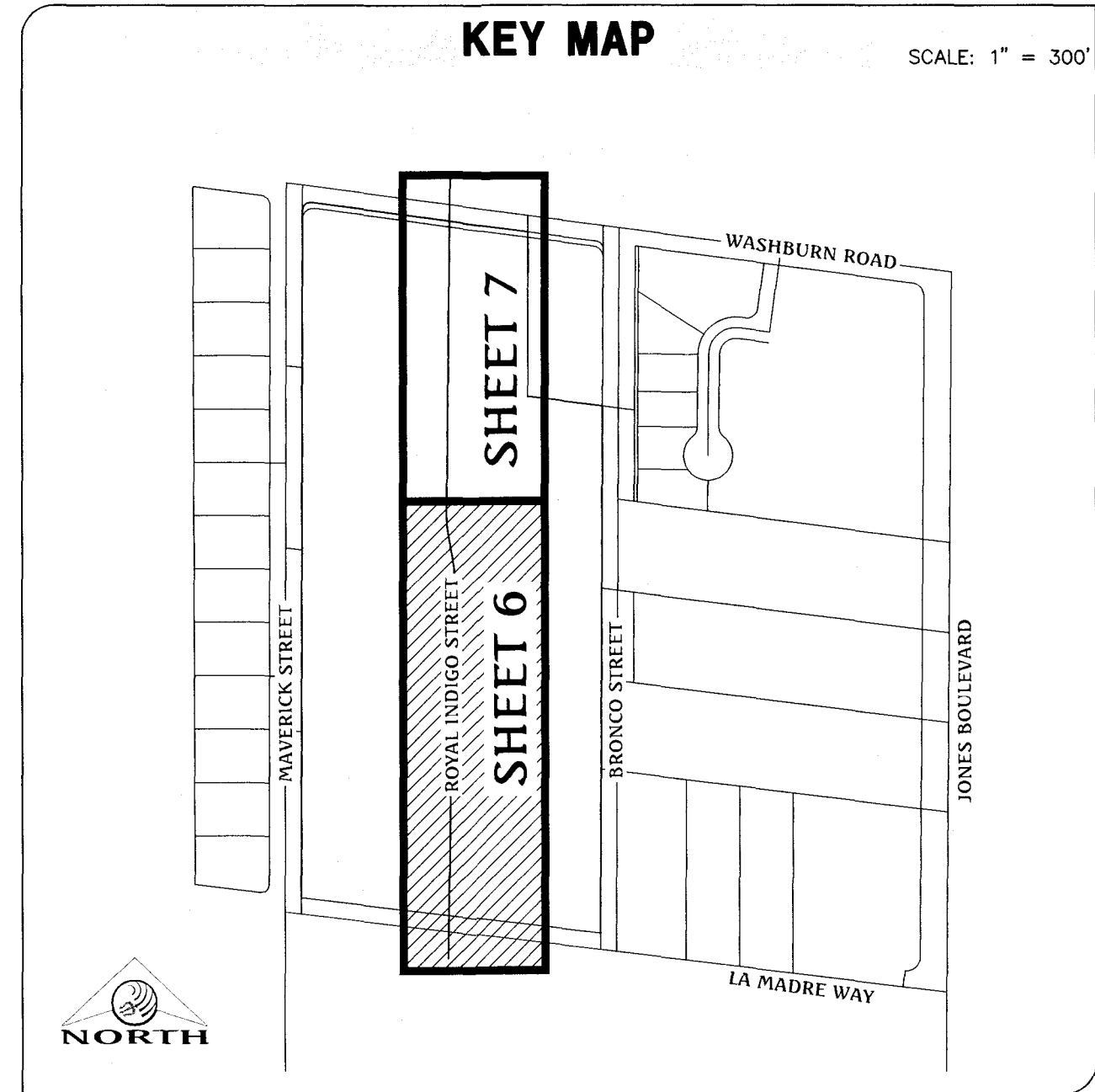
DR HORTON
MAVERICK & WASHBURN
GRADING DETAILS

A circular professional engineer seal for the State of Nevada. The outer ring contains the text "PROFESSIONAL ENGINEER-STATE OF NEVADA" and "No. 9552". The inner circle contains the name "JAMES M. PEARCE", the expiration date "Exp. 12-31-17", and the discipline "CIVIL". There is a handwritten signature across the seal.



SEE SHEET 7 FOR CONTINUATION

SEE SHEET 7 FOR CONTINUATION



CURVE TABLE			
CURVE	DELTA	RADIUS	LENGTH
C1	097°00'52"	20.00'	33.86'
C2	082°59'08"	20.00'	28.97'
C3	097°28'44"	20.00'	34.03'
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C8	010°43'47"	200.00'	37.45'
C9	010°21'56"	200.00'	36.18'

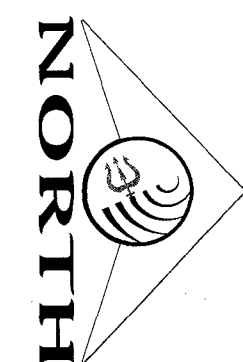
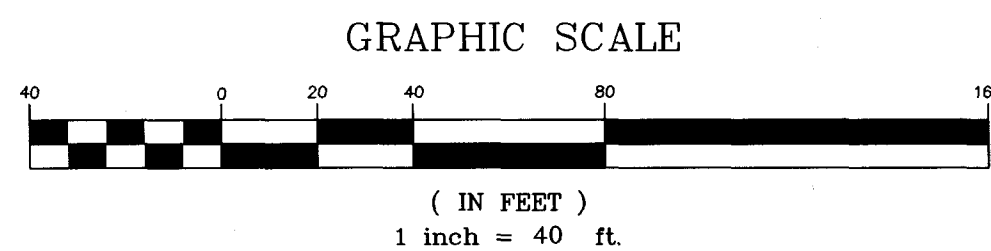
FAST
Call before you
Underground
1-702-432-5300

Avoid overhead power
line contact. It's costly.
**Call before you
Overhead**
1-702-227-2929

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

ROYAL INDIGO STREET (PUBLIC)

PROFILE
SCALE: HORIZ. 1" = 40'
VERT. 1" = 4'



DATE : 09/09/2016
PW : J. PEARCE
DRAWN BY : D.L.
DESIGNED BY : D.L.
CHECKED BY :
ADA CHECKED :
JOB NO. : 007098
SCALE : 1" = 40'

Triton Engineering
Office: (702) 254-1480
6757 W. Charleston Blvd.
Las Vegas, Nevada 89146
Fax: (702) 254-3062
www.tritoneng.com

DR. HORTON
MAVERICK & WASHBURN
ROYAL INDIGO STREET
PLAN AND PROFILE
STA 1+00 TO STA 9+00

PROFESSIONAL ENGINEER
JAMES M. PEARCE
Exp. 12-31-
CIVIL
No. 9552

SHEET **6** OF 7
C.L.V. DWG.#



WASHBURN ROAD

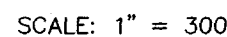
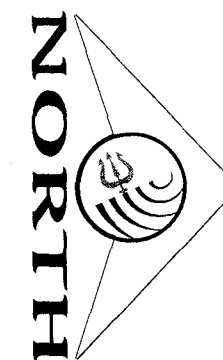
PLANS BY TRITON ENGINEERING

TECHNICAL DRAINAGE STUDY #DS4804



PROFILE

GRAPHIC SCALE



	EX. MAJOR CONTOUR
	EX. MINOR CONTOUR
	BOUNDARY LINE
	RIGHT-OF-WAY LINE
	STREET CENTERLINE
	EDGE OF PAVEMENT
	EXISTING CURB, GUTTER, & SIDEWALK
	PROPOSED CURB, GUTTER, & SIDEWALK
	PROPOSED AC PAVING
	EXISTING AC PAVING
	EX. FENCE
	EX. BLOCK WALL
	PROPOSED RETAINING WALL
	TOP OF FOOTING
	APPROX. TOP OF LENGTH WALL
	APPROX. TOP OF RETAINING WALL
	PROPOSED SCARP

NORTH 82°59'56" WEST, BEING THE BEARING OF THE SOUTH LINE OF THE NORTH HALF (N 1/2) OF THE SOUTHEAST QUARTER (SE 1/4) OF SECTION 35, TOWNSHIP 19 SOUTH, RANGE 60 EAST, M.D.M., CITY OF LAS VEGAS, CLARK COUNTY, NEVADA AS SHOWN ON THAT CERTAIN MAP ON FILE IN THE CLARK COUNTY RECORDER'S OFFICE IN BOOK 117, PAGE 9 OF PLATS.

RIVET & PLATE IN TOP OF CURB AT THE SOUTHWEST CORNER OF
WASHBURN ROAD & MAVERICK STREET.

THE PROJECT SITE IS LOCATED ON FEMA FLOOD INSURANCE RATE MAP #32003C1765F. THE SITE IS LOCATED WITHIN DESIGNATED FLOOD HAZARD ZONE X BEING AN AREA DETERMINED TO BE OUTSIDE THE 100 YEAR FLOOD PLAIN.

1. ALL PROPOSED PAD ELEVATIONS AND SWALE ELEVATIONS ARE ROUGH GRADES. ALL OTHER PROPOSED ELEVATIONS ARE FINISHED GRADES.
2. THE GRADING PLANS SHALL BE AT THE PROJECT SITE THROUGHOUT THE CONSTRUCTION.
3. ALL GRADING SHALL BE PERFORMED IN CONFORMANCE WITH THE LINES, GRADES AND DETAILS AS SHOWN ON THESE PLANS. ANY DEVIATION FROM THESE PLANS WILL NOT BE PERMITTED UNLESS WRITTEN APPROVAL FROM THE ENGINEER.
4. ALL PADS ARE TO BE GRADED WITHIN $\pm 0.3'$ OF THE ELEVATIONS AS SHOWN ON THE PLANS. GRADING IS NOT COMPLETED UNTIL THE ENGINEER HAS CERTIFIED THAT THE PADS HAVE BEEN GRADED IN SUBSTANTIAL CONFORMANCE TO THE PLANS.
5. ALL PLACEMENT OF OVERSIZED MATERIALS AND/OR FILL MATERIALS SHALL BE IN ACCORDANCE WITH THE SOILS REPORT REFERENCED ON THIS PLAN.
6. ADD 2200 TO ALL SPOT GRADES AND TOP OF CURB, FLOW LINE AND FINISH GRADE ELEVATIONS.
7. ANY CURVED CURB LESS THAN 12' MUST BE WATER TESTED BY CONTRACTOR AS REQUIRED BY CITY INSPECTOR.

CONSTRUCTION NOTES

- ① CONSTRUCT "L" TYPE CURB & GUTTER PER CCAUSD #216.
- ② CONSTRUCT 5' WIDE SIDEWALK PER CCAUSD #234.
- ③ SAWCUT AND MATCH EXISTING ASPHALT.
- ④ EXISTING "L" CURB, GUTTER AND SIDEWALK TO BE REMOVED & REPLACED PER CCAUSD #216 AND #234.
- ⑤ PROTECT IN PLACE EXISTING MANHOLE.
- ⑥ PROTECT IN PLACE EX. GATE VALVE.

DR HORTON
MAVERICK & WASHBURN
ROYAL INDIGO STREET
PLAN AND PROFILE
STA 9+00 TO STA 15+00

