CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Director

Mayor Timothy M. Keller

August 28, 2020

Ronald Bohannan, P.E.
Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, NM 87109

RE: Paradise North - Unser/McMahon
Grading and Drainage Plan & Master Drainage Plan
Engineer's Stamp Date: 08/04/20
Hydrology File: A11D017

Dear Mr. Bohannan:

Based upon the information provided in your submittal received 08/05/20, the Grading & Drainage Plan & Master Drainage Plan are approved for Grading Permit, Paving Permit, and for action by the DRB on Platting. Once the grading and paving of the project is complete, an engineering certification will be required.

As a reminder, if the project total area of disturbance (including the staging area and any work within the adjacent Right-of-Way) is 1 acre or more, then an Erosion and Sediment Control (ESC) Plan and Owner's certified Notice of Intent (NOI) is required to be submitted to the Stormwater Quality Engineer (Doug Hughes, PE, jhughes@cabq.gov, 924-3420) 14 days prior to any earth disturbance.

If you have any questions, please contact me at 924-3995 or rbrissette@cabq.gov.

Sincerely,

Renée C. Brissette

Renée C. Brissette, P.E. CFM
Senior Engineer, Hydrology
Planning Department

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 11/2018)

Project Title: _____ Building Permit #: _____ Hydrology File #: _____

DRB#: _____ EPC#: _____ Work Order#: _____

Legal Description: _____

City Address: _____

Applicant: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

Owner: _____ Contact: _____

Address: _____

Phone#: _____ Fax#: _____ E-mail: _____

TYPE OF SUBMITTAL: _____ PLAT (9 # OF LOTS) ____ RESIDENCE ____ DRB SITE ____ ADMIN SITE

IS THIS A RESUBMITTAL?: _____ Yes _____ No

DEPARTMENT: _____ TRAFFIC/ TRANSPORTATION _____ HYDROLOGY/ DRAINAGE

Check all that Apply:

TYPE OF SUBMITTAL:

____ ENGINEER/ARCHITECT CERTIFICATION
____ PAD CERTIFICATION
____ CONCEPTUAL G & D PLAN
____ GRADING PLAN
____ DRAINAGE MASTER PLAN
____ DRAINAGE REPORT
____ FLOODPLAIN DEVELOPMENT PERMIT APPLIC
____ ELEVATION CERTIFICATE
____ CLOMR/LOMR
____ TRAFFIC CIRCULATION LAYOUT (TCL)
____ TRAFFIC IMPACT STUDY (TIS)
____ OTHER (SPECIFY) _____
____ PRE-DESIGN MEETING?

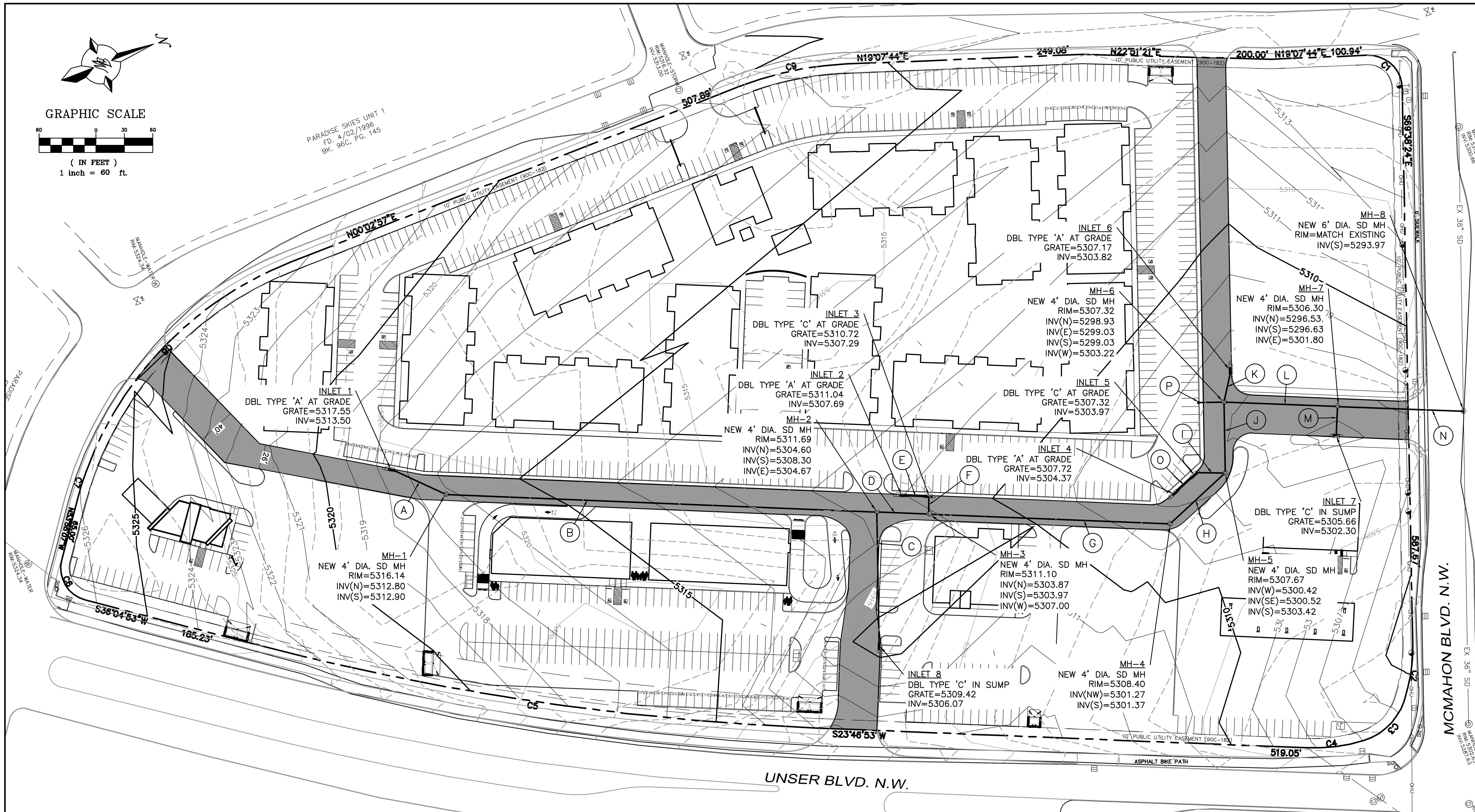
TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

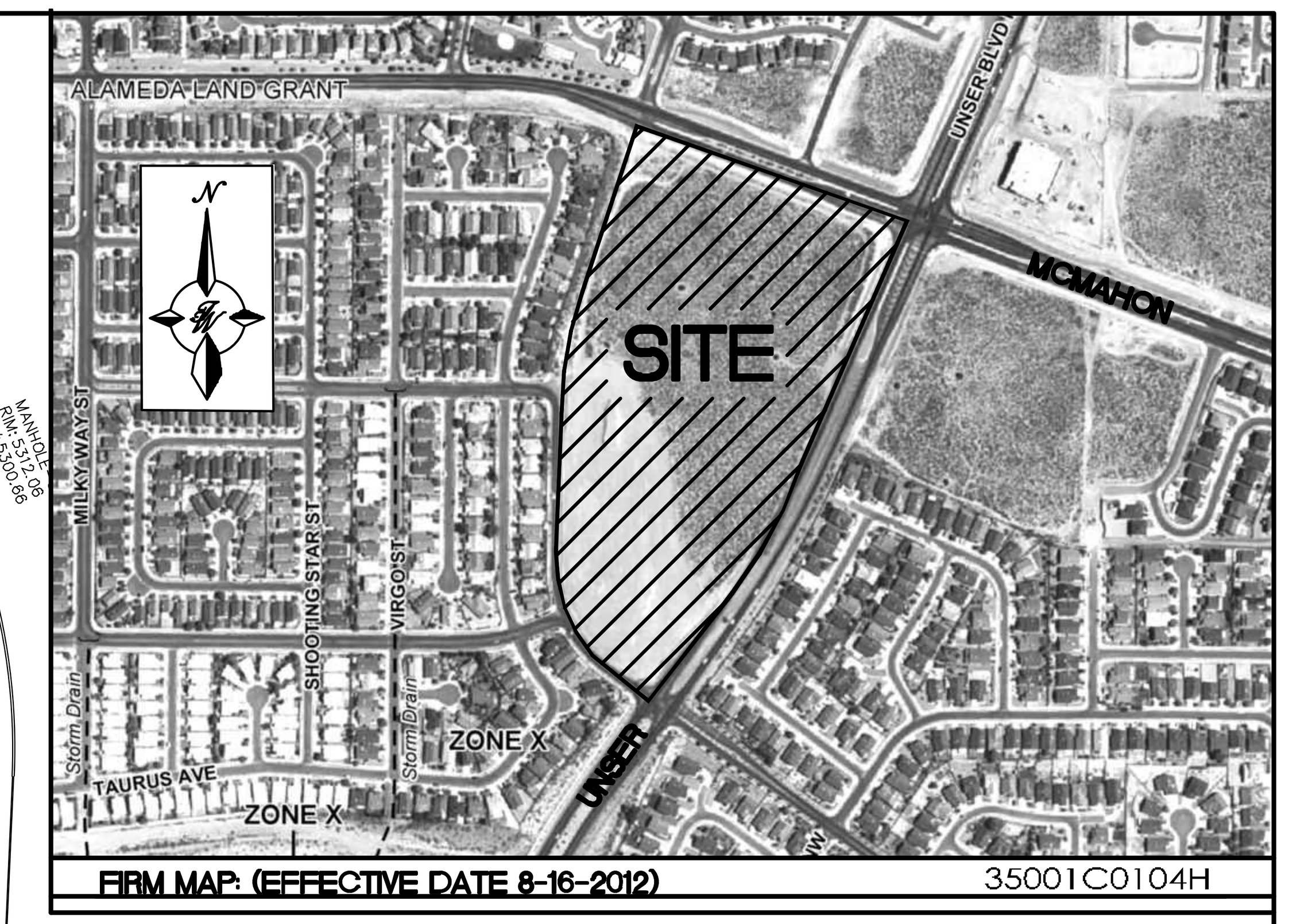
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY
____ PRELIMINARY PLAT APPROVAL
____ SITE PLAN FOR SUB'D APPROVAL
____ SITE PLAN FOR BLDG. PERMIT APPROVAL
____ FINAL PLAT APPROVAL
____ SIA/ RELEASE OF FINANCIAL GUARANTEE
____ FOUNDATION PERMIT APPROVAL
____ GRADING PERMIT APPROVAL
____ SO-19 APPROVAL
____ PAVING PERMIT APPROVAL
____ GRADING/ PAD CERTIFICATION
____ WORK ORDER APPROVAL
____ CLOMR/LOMR
____ FLOODPLAIN DEVELOPMENT PERMIT
____ OTHER (SPECIFY) _____

DATE SUBMITTED: _____ By: _____

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: _____

FEE PAID: _____



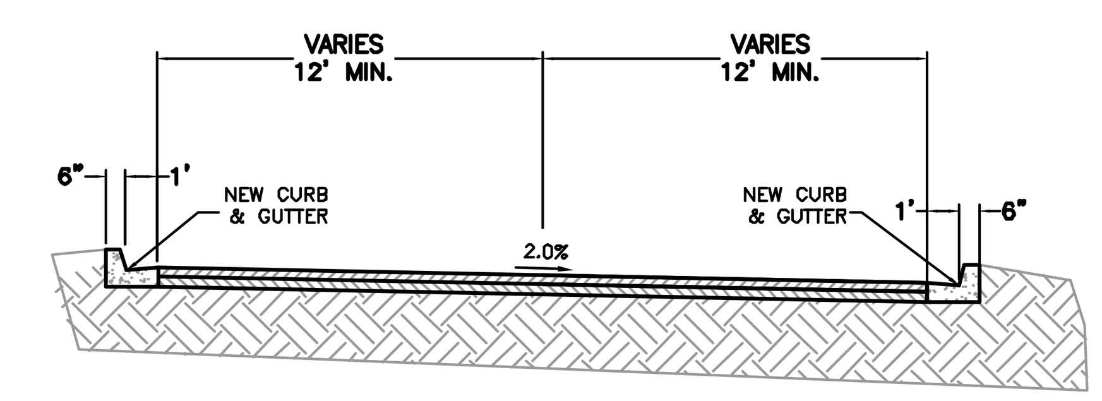


LEGEND

- CURB & GUTTER
- BOUNDARY LINE
- EASEMENT
- CENTERLINE
- RIGHT-OF-WAY
- BUILDING
- SIDEWALK
- ASPHALT PAVING
- 5010 CONTOUR MAJOR
- 5011 CONTOUR MINOR
- x 5048.25 SPOT ELEVATION (FLOWLINE)
- FLOW ARROW
- EXISTING CURB & GUTTER
- EXISTING BOUNDARY LINE
- 5010 EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- x 5048.25 EXISTING SPOT ELEVATION

KEYED NOTES:

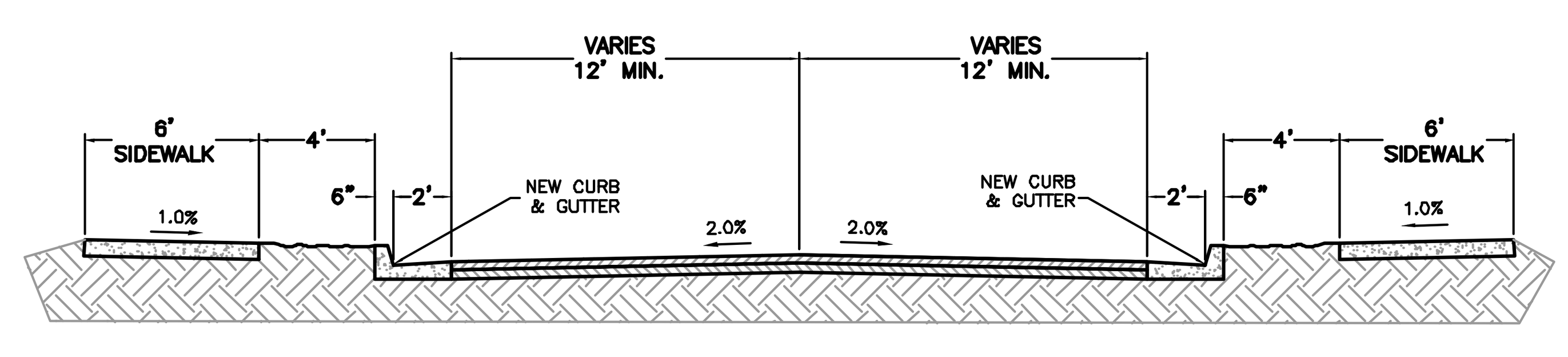
- (A) 18" RCP @ 2.0%
- (B) 18" RCP @ 1.0%
- (C) 18" RCP @ 1.0%
- (D) 18" RCP @ 2.0%
- (E) 18" RCP @ 2.0%
- (F) 18" RCP @ 2.0%
- (G) 24" RCP @ 1.0%
- (H) 24" RCP @ 1.0%
- (I) 18" RCP @ 2.0%
- (J) 24" RCP @ 2.0%
- (K) 18" RCP @ 2.0%
- (L) 36" RCP @ 2.0%
- (M) 18" RCP @ 2.0%
- (N) 36" RCP @ 2.0%
- (O) 18" RCP @ 2.0%
- (P) 30" RCP @ 2.0%, STUBBED 5' PAST EDGE OF PAVEMENT STUB INV=5299.53



CORRIDOR SECTION A-A
NTS

NOTICE TO CONTRACTORS

1. AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN CITY RIGHT-OF-WAY. AN APPROVED COPY OF THESE PLANS MUST BE SUBMITTED AT THE TIME OF APPLICATION FOR THIS PERMIT.
2. ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED, EXCEPT AS OTHERWISE STATED OR PROVIDED HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF ALBUQUERQUE INTERIM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1985.
3. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE, 260-1990 (OR DIAL 811 LOCALLY), FOR LOCATION OF EXISTING UTILITIES.
4. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL CONSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.
5. BACK FILL COMPACTION SHALL BE ACCORDING TO RESIDENTIAL STREET USE.
6. MAINTENANCE OF THESE FACILITIES SHALL BE THE RESPONSIBILITY OF THE OWNER OF THE PROPERTY SERVED.
7. WORK ON ARTERIAL STREETS SHALL BE PERFORMED ON A 24-HOUR BASIS.



BANDELIER CORRIDOR SECTION B-B
NTS

CAUTION:

ALL EXISTING UTILITIES SHOWN WERE OBTAINED FROM RESEARCH, AS-BUILTS, SURVEYS OR INFORMATION PROVIDED BY OTHERS. IT SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO CONDUCT ALL NECESSARY FIELD INVESTIGATIONS PRIOR TO AND INCLUDING ANY EXCAVATION, TO DETERMINE THE ACTUAL LOCATION OF UTILITIES AND OTHER IMPROVEMENTS, PRIOR TO STARTING THE WORK. ANY CHANGES FROM THIS PLAN SHALL BE COORDINATED WITH AND APPROVED BY THE ENGINEER.

ENGINEER'S SEAL	UNSER & MCMAHON	DRAWN BY RMG
RONALD R. BOHANNAN, NEW MEXICO, 7868, PROFESSIONAL ENGINEER, 08-04-20	GRADING AND DRAINAGE PLAN	DATE 08/03/2020
		2020015-GR
	TIERRA WEST, LLC 5571 MIDWAY PARK PLACE NE ALBUQUERQUE, NM 87109 (505) 858-3100 www.tierrawestllc.com	SHEET # C1
RONALD R. BOHANNAN P.E. #7868		JOB # 2020015

MASTER DRAINAGE PLAN

For

Paradise North
SW Corner of Unser/McMahon

Prepared by:

Tierra West, LLC
5571 Midway Park Place NE
Albuquerque, New Mexico 87109

August 3, 2020

I certify that this report was prepared under my supervision, and I am a registered professional engineer in the State of New Mexico in good standing.

08-04-20

Ronald R. Bohannan
PE # 7868

Job No. 2020015

TABLE OF CONTENTS

Purpose 3
Location 3
Exhibit A – Vicinity Map 4
Exhibit B – Site Aerial Image 5
Exhibit C – Existing Basin Map 6
Existing Conditions 6
Flood Plain 8
Exhibit D – FIRM Map 8
Exhibit E – Proposed Basin Map 9
Proposed Conditions 9
Stormwater Quality Management 13
Calculations 13
Summary 14

Appendices

Existing/Proposed Hydrology Table and Drainage Basin Maps ..... APPENDIX A

Storm Drain and Inlet Schematic Map ..... APPENDIX B

Gutter Depth Modeling Results ..... APPENDIX C

Drainage Inlet and Storm Drain Capacities ..... APPENDIX D

Drainage Inlet Bypass Calculations ..... APPENDIX E

Excerpts from *Master Drainage Study for the Unser/McMahon Area* ..... APPENDIX F

Drainage Criteria Map for Full Development ..... APPENDIX G

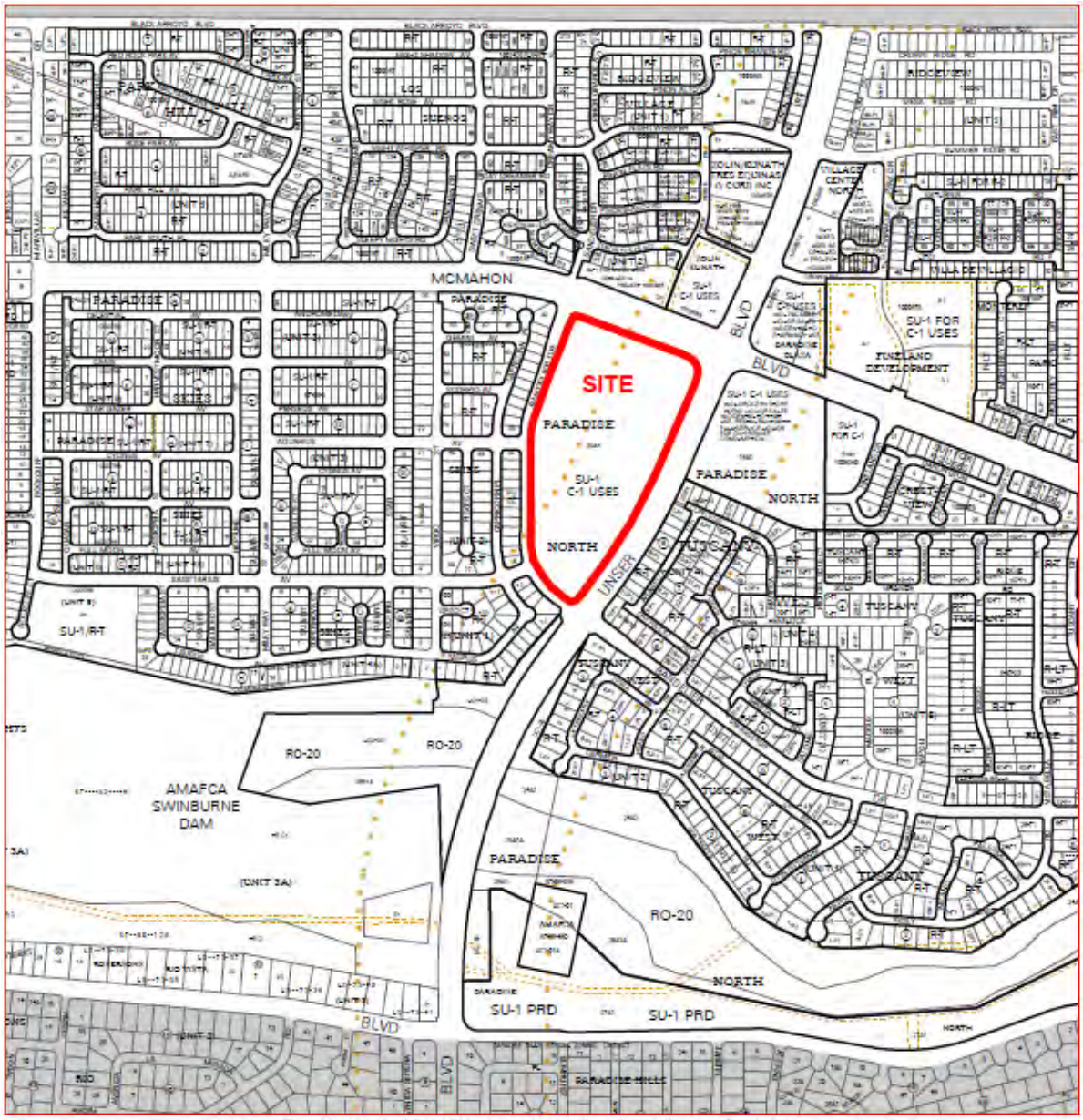
Purpose

The purpose of this report is to develop a Master Drainage Management Plan for a mixed-use development with commercial/retail and multi-family residential living uses on a 19-acre vacant tract of land. The land is currently going through a replatting process to subdivide the property from 1 lot into 9 lots, private main internal roads will provide access to each of the 9 proposed lots. The current legal description of the lot is “Tract 20A-1 Vacation Amended Plat & Replat of Paradise North”. The legal description for the site once the plat is finalized and recorded will be “Tracts 20A-1A thru 20A-1I Paradise North”. The project construction will be phased, with the initial work being to rough grade the site, pave the internal access roads, and install main utility service lines (storm drain, sanitary sewer, water, dry utility conduits); so this report is also to seek approval for rough grading the site, installing storm drain/manholes/inlets, and paving the internal main drive aisles to have the site “pad-ready” for the proposed 9 lots for potential users.

Location

The site is located at the southwest corner of the Unser Blvd/McMahon Blvd intersection. The property is currently vacant with no development in place. The site is bounded by McMahon Blvd to the north, Unser Blvd to the east, and Bandelier Drive to the west. A portion of Bandelier Drive at the northwest corner of the property has not yet been constructed; this road will be extended to McMahon Blvd along with the construction of this development, however is not taken into consideration for this drainage master plan as it is assumed that the drainage for that roadway extension will be handled within the public Right-of-Way. A vicinity map and aerial image of the site can be seen in Exhibits A and B, respectively.

Exhibit A – Vicinity Map



For more current information and more details visit: http://www.cabq.gov/gis

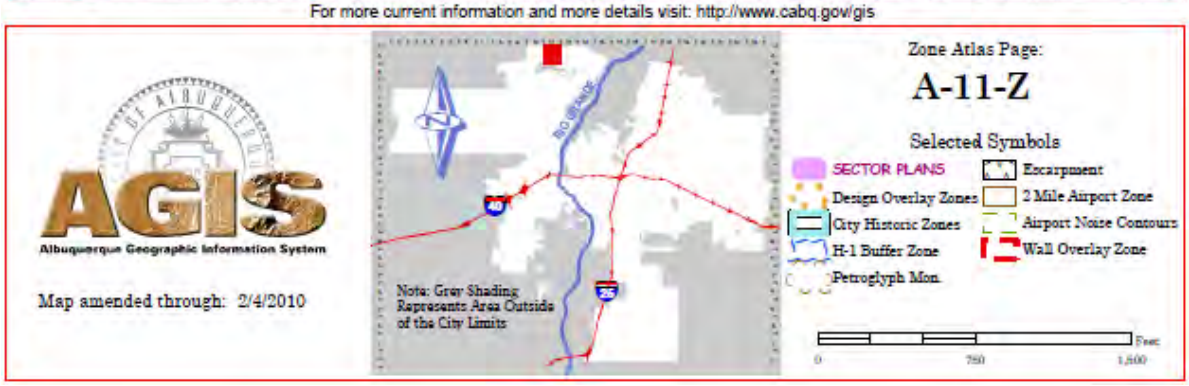
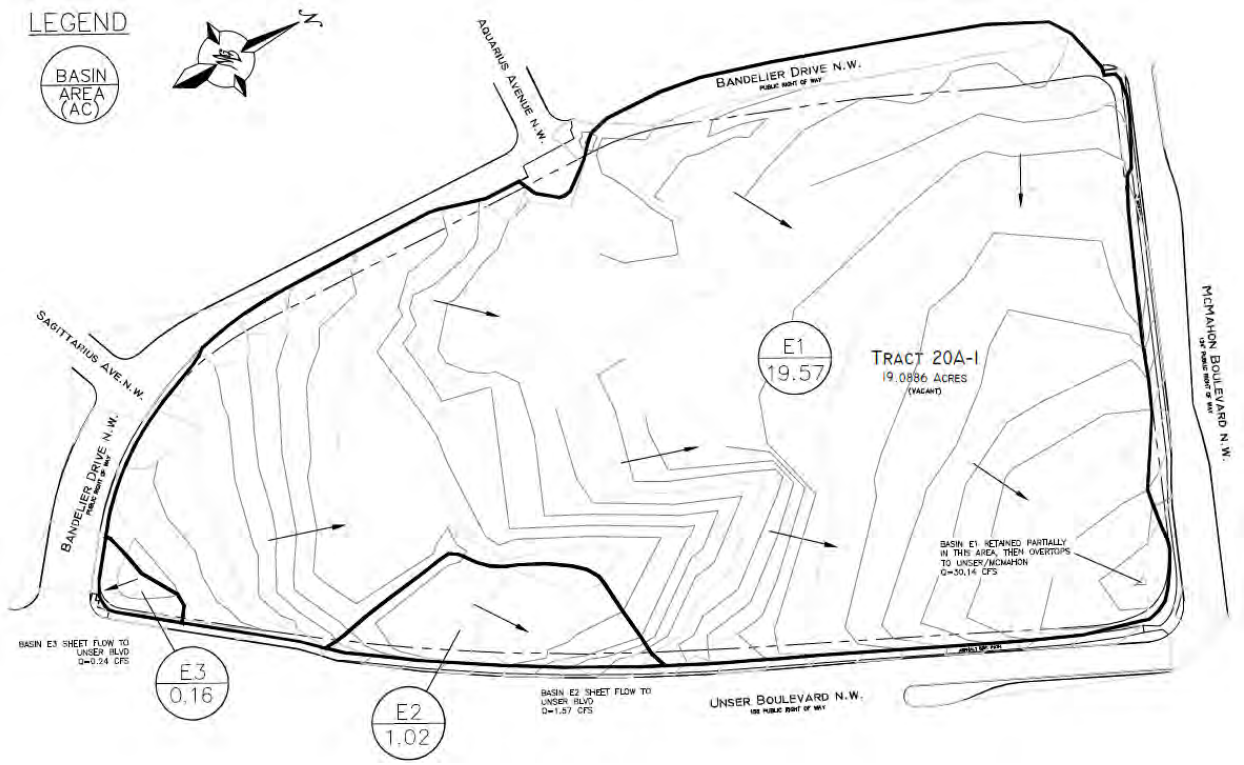


Exhibit B – Site Aerial Image

Exhibit C – Existing Basin Map



Existing Conditions

The site is currently vacant and undeveloped. Drainage of the site predominantly flows from southwest to northeast with three primary basins, E1, E2, and E3. The two smaller drainage basins, E2 and E3, sheet flow runoff to the Unser Blvd right-of-way, basin E1 directs runoff towards the Unser/McMahon intersection.

Basin E1 consists of the majority of the site, plus the unbuilt portion of Bandelier Drive near the northwest corner of the site. Runoff from this basin flows from southwest to northeast and is directed towards a small low point onsite near the Unser/McMahon intersection. The runoff from this basin retains a small volume in this low point area and then overtops to the McMahon and Unser right-of-way.

Basin E2 consists of just over one acre of land adjacent to Unser Blvd. Runoff from this basin flows from west to east and sheet flows into the Unser right-of-way.

Basin E3 consists of a small portion of the site located at the northwest corner of the Bandelier Dr/Unser Blvd intersection. This is the highpoint of the site where drainage sheet flows from northwest to southwest and into the Bandelier/Unser intersection.

The total 100-year peak flow of these existing basins is 31.95 cfs, hydrology tables and an enlarged existing drainage basin map can be found in Appendix A. This site lies within the *Master Drainage Study for the Unser/McMahon Area* by Bohannan-Huston, Inc. with an amended date of 11/13/2001 (COA Drainage File #A11/D5A). Per this study, the site lies within Basin DB6 and is allowed a maximum developed flow rate discharge of 78.2 cfs into the existing storm drain in McMahon. Excerpts from this report and developed drainage basin map can be found in Appendix F.

Flood Plain

The site is located on FIRM Map 35001C0104H. The map indicates that the site does not lie within any flood hazard areas.

Exhibit D – FIRM Map

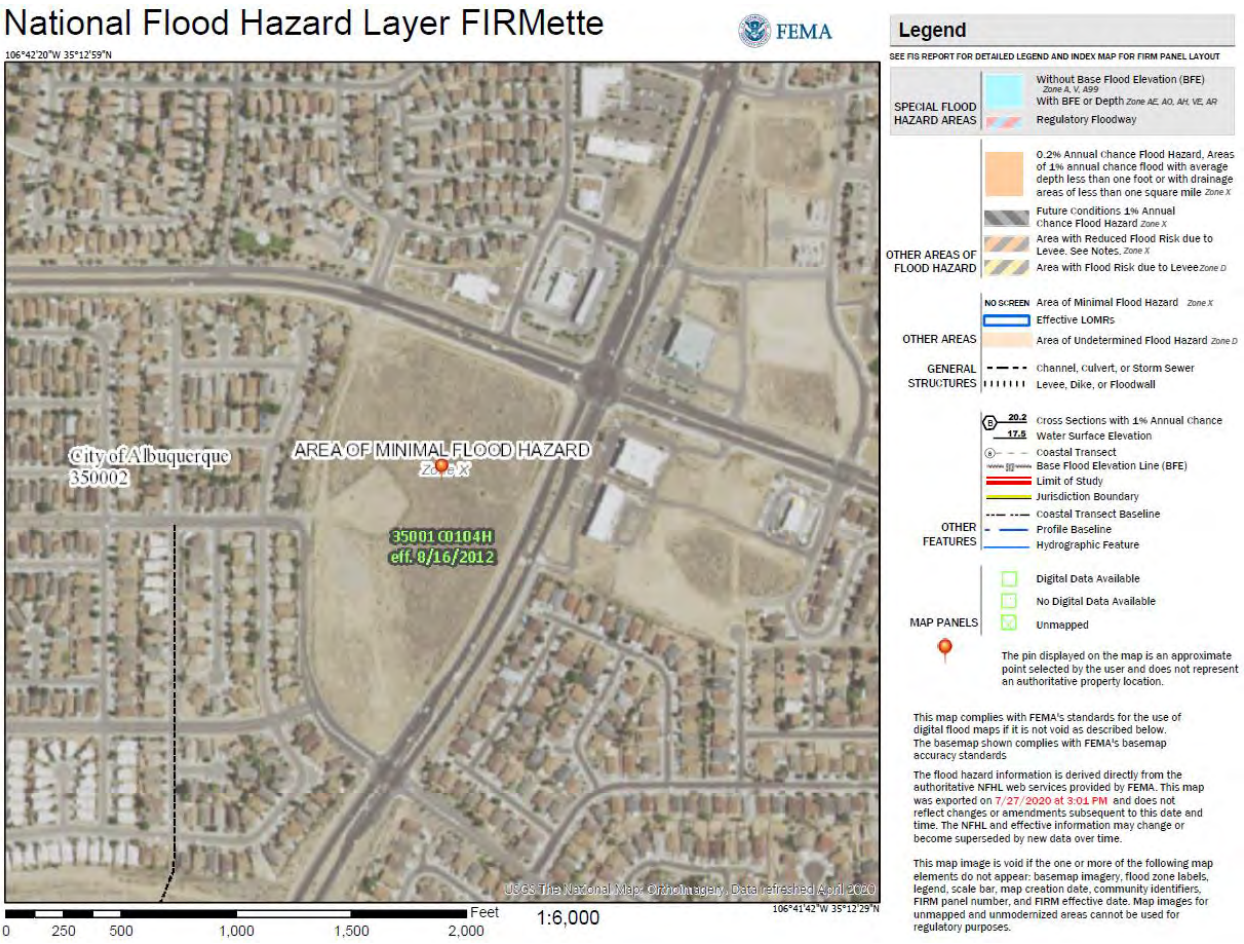
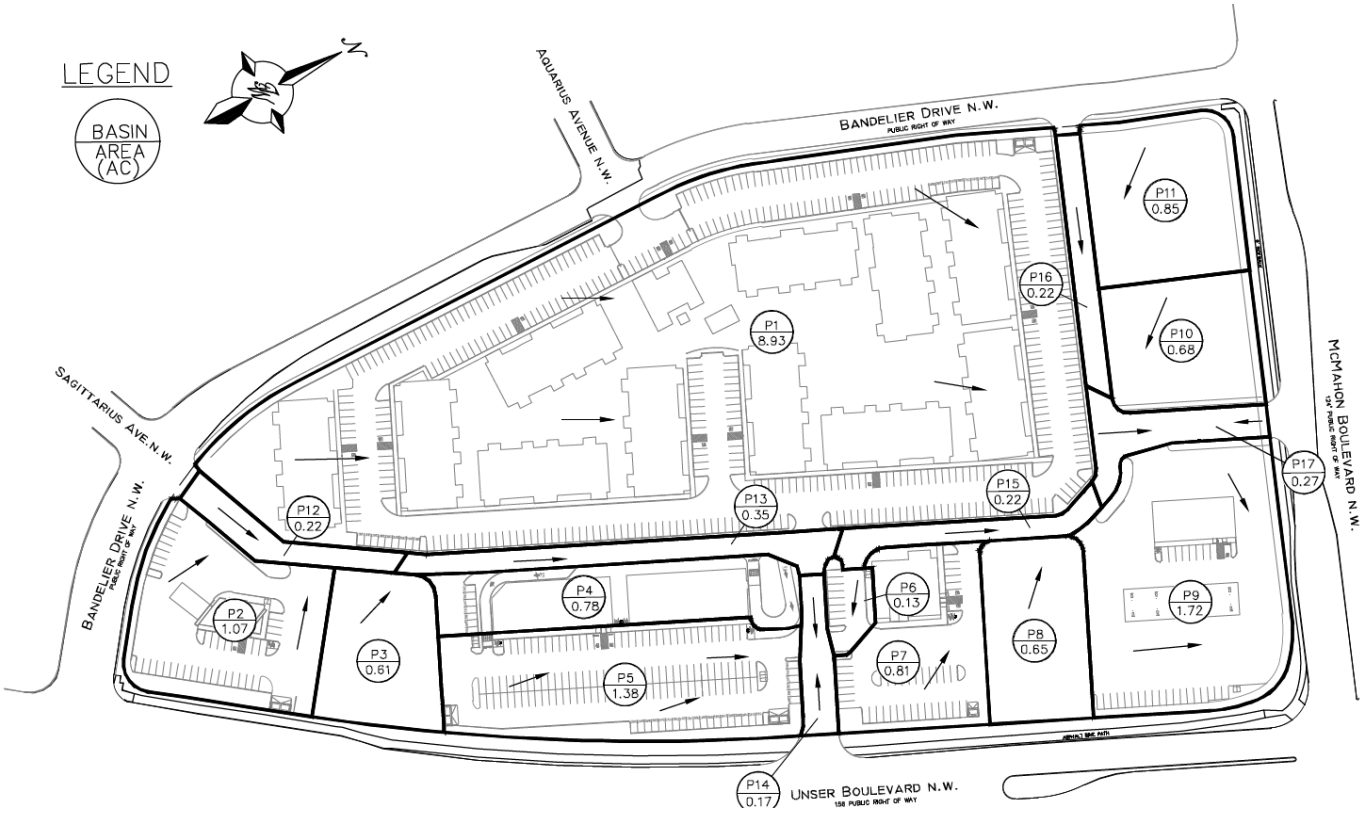


Exhibit E – Proposed Basin Map



Proposed Conditions

All improvements of the site will be built in phases, depending on when each of the 9 proposed lots gain a user for development. The first phase of construction will be to rough grade the entire site, install the main utilities internal to the site (main storm drain/manholes/inlets, sanitary sewer, water, and dry utility conduits). The intent is to have the entire site "pad-ready" for full development. Subsequent phases will then consist of site development plans of each lot as users come in for development. This overall drainage plan assumes full development, with each lot (Basins P1 thru P11) having 10% Type 'C' and 90% Type 'D' Land Treatment. The internal roads (Basins P12 thru P17) are assumed as 100% Type 'D' Land Treatment. As previously stated in the "Purpose" section of this report, our intent is to first rough grade the site, pave the main

internal roads (Basins P12 thru P17) and install the main storm drain line and associated manholes and curb inlets within these internal roads.

The overall drainage concept will be to discharge the site from south to north via storm drain connection to the public storm drain in McMahon Blvd. The site will be limited to a maximum discharge of 78.2 cfs to the McMahon storm drain per the BHI 2001 *Master Drainage Study for the Unser/McMahon Area*. As each lot goes through the development and entitlement process, they will each have to have their own grading and drainage plan that conforms to the discharge and water quality criteria identified in this drainage study.

Basin P1 consists of the largest proposed lot onsite, predominantly fronted along Bandelier Drive. The lot is intended to be a multi-family residential apartment complex and is zoned as such. This basin will be required to drain from Southeast to northwest towards Basin P17 via storm drain connection. A 30" storm drain will be stubbed from the main storm drain line near the northwest corner of the basin. The peak discharge from this basin will be limited to 35.69 cfs.

Basin P2 consists of the commercial lot at the southeast corner of the site. This lot will drain via surface flow from southeast to northwest into the internal road, Basin P12. Discharge from this site will be limited to 4.28 cfs. Basin P12 will drain from south to north into an at-grade Double Type 'A' Inlet at a rate of 5.08 cfs and with a bypass of 2.8 cfs to Basin P13.

Basin P3 consists of the next northern commercial lot that fronts Unser Blvd, drainage will surface flow from southeast to northwest into the internal road, Basin P13. This lot/basin will be limited to a discharge rate of 2.44 cfs into Basin P13. Basin P4 consists of the western half of the next northern lot that fronts Unser Blvd. Like P3, Basin P4 will drain from southeast to northwest into P13 at a maximum discharge rate of 3.13 cfs. The internal road Basin P13 outfall will consist of a Double Type 'A' Inlet and a Double Type 'C' Inlet that will pick up 7.8 cfs of the basins and have 1.3 cfs bypass to Basin P15.

Basins P5 and P6 will surface flow towards Basin P14, which is the internal road connection to Unser Blvd. Basin P14 will have a Double Type 'C' Inlet in a sump that will connect via storm drain to the inlets of the internal road storm drain in P12, P13 and P15. The sump inlet has taken into account a 50% clogging factor and doesn't consider the throat of the inlet as part of the capacity, but should the inlet fully clog, then drainage flows can overtop into the Unser Blvd right-of-way. The sump inlet will pick up 6.73 cfs of drainage from these basins with no bypass flows.

Basin P7 and P8 will convey drainage via surface flow from southeast to northwest towards the internal road, Basin P15. Basin P7 will be limited to a discharge to this road of 3.25 cfs and Basin P8 will be limited to a discharge rate of 2.59 cfs. The internal road Basin P15 outfall will consist of a Double Type 'A' inlet and a Double Type 'C' inlet at-grade that will pick up 7.0 cfs from the upland basins and will have 1.05 cfs bypass to Basin P17.

Basins P10 and P11 will surface flow from northwest to southeast towards the internal road Basin P16. Basin P16 will have a Double Type 'A' Inlet at-grade near the easternmost side of the basin. The inlet will pick up 3.0 cfs from the upland basins and will have 4.0 cfs bypass to Basin P17. Basin P10 will be limited to a discharge rate of 2.72 cfs and Basin P11 will be limited to 3.38 cfs.

Basin P17 is the furthest downstream basin within this development. This basin will pick up the bypass flows from P15 and P16 and discharge into a Double Type 'C' inlet in sump condition. Similar to P14, the inlet in Basin P17 capacity has taken into account a 50% clogging factor and excludes the capacity of the inlet throat, but should the inlet clog then drainage flows will overtop towards the McMahon Blvd right-of-way. The inlet in this basin will connect to the existing storm drain in McMahon Blvd.

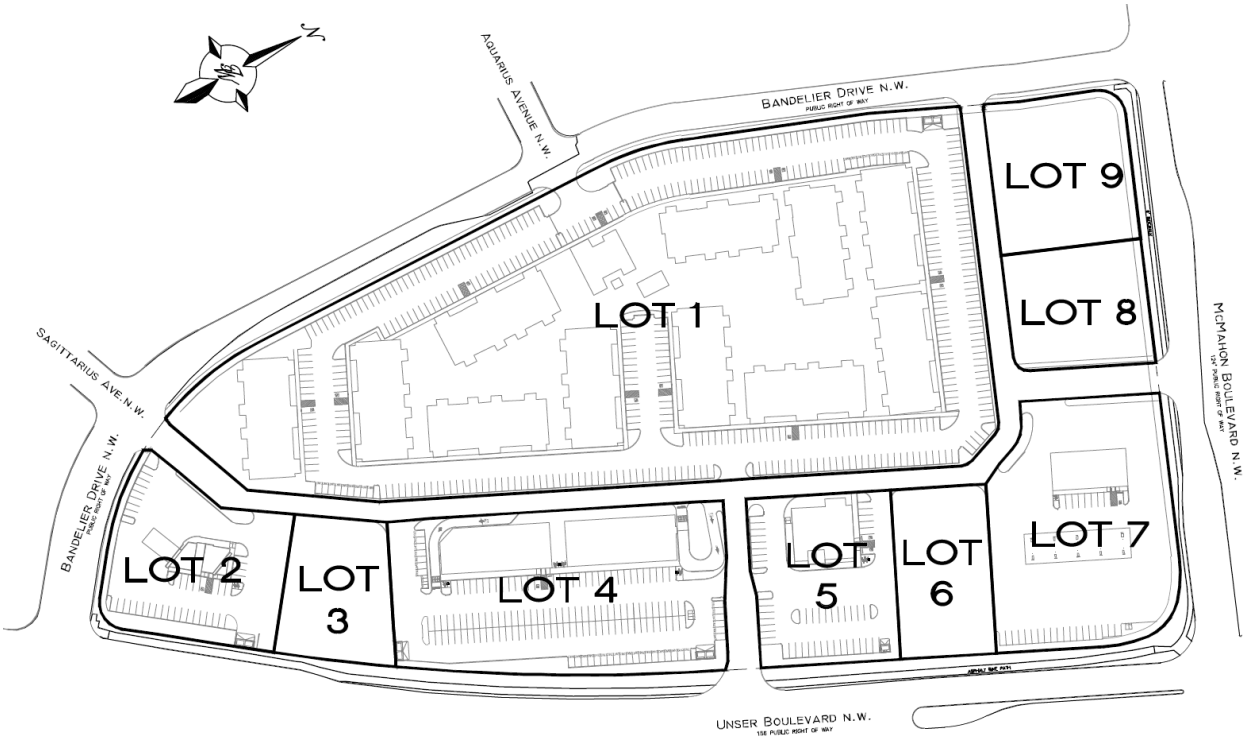
Basin P9 is the only lot that will not surface flow towards the internal road due to the grades of the development. Instead, this basin will flow from southwest to northeast and will be required to discharge via storm drain connection to the back of the existing storm drain inlet in McMahon Blvd, near the McMahon/Unser intersection. This ultimately

leads P9 developed drainage into the same McMahon storm drain that captures all of the developed onsite drainage.

The total 100-year 6-hour peak discharge of the entire site at the assumed land treatments and full development is 76.37 cfs. The maximum discharge rate allowed from this site from the 2001 BHI *Master Drainage Study for the Unser/McMahon Area* is 78.2 cfs, so the fully developed conditions will be allowable for this site. The developed conditions hydrology table and enlarged proposed basin map can be found in Appendix A. *Table 1* below also gives the drainage criteria needed to be followed for each proposed lot as they become ready for specific site development. A more detailed Drainage Criteria Map, providing this table plus the lots and storm drain layout, can be found in Appendix G.

Table 1 - Paradise North Developed Drainage Criteria

Lot No.	Designated Basin(s)	Drains to Basin…	Discharge Conveyance Method	Max Allowable Discharge Rate (cfs)
1	P1	P17	Storm Drain Connection Only	35.69
2	P2	P12	Surface Flow	4.28
3	P3	P13	Surface Flow	2.44
4	P4	P13	Surface Flow	3.13
	P5	P14	Surface Flow	5.52
5	P6	P14	Surface Flow	0.52
	P7	P15	Surface Flow	3.25
6	P8	P15	Surface Flow	2.59
7	P9	McMahon Curb Inlet	Storm Drain Connection Only	6.88
8	P10	P16	Surface Flow	2.72
9	P11	P16	Surface Flow	3.38



Stormwater Quality Management

As each lot becomes ready to be developed, each lot will need to capture their own onsite water quality volume prior to discharging any runoff to the main internal roads and to any public right-of-way. The onsite stormwater quality volume required to be captured shall follow Article 6-12 of the COA Development Process Manual dated June 15, 2020 for new development, which can be calculated as 0.42 inches multiplied by the impervious area of each developed lot.

Calculations

The *Weighted E Method* and *Peak Discharge Rate for Small Watersheds* Under Article 6-2 of the COA Development Process Manual dated June 15, 2020 was used to calculate the runoff and volume for the site, the hydrology tables can be found in Appendix A. Drainage capacities for the gutter depths and storm drains were

determined through Bentley FlowMaster and results can be found in Appendix C and D, respectively. Drop inlet capacity calculations can be found in Appendix D as well, which follow Figure 6.9.10 of the COA DPM. Lastly, Appendix E gives calculations for runoff bypass flow for internal roads curb inlets.

Summary

The entire site will consist of 9 lots and internal roads for access to each lot. The entire site will be phased for development, with the first phase being rough grading the entire site, installing the main storm drain line/inlets, and paving the internal roads to be “pad-ready” for development of each lot. The enclosed grading plan shows the proposed rough grades for each lot, the finished grades of the internal roads, and the grate and invert elevations of the drainage inlets and storm drain.

The proposed full development will consist of 1 residential multi-family lot while the remaining 8 will be for commercial/retail uses. As each lot goes through the site development plan process for building permit approval, the developer will need to follow the drainage criteria set for in this master drainage plan. The intent of this master plan is also for approval of rough grading, storm drain installation, paving internal roads, and plat approval.

APPENDIX A

EXISTING/PROPOSED HYDROLOGY TABLE

AND DRAINAGE BASIN MAPS

DPM Weighted E Method

Precipitation Zone 1
SW Corner Unser Blvd/McMahon Blvd
Tracts 20A-1A thru 20A-1I Paradise North (Formerly Tract 20A-1 Paradise North)
TWLLC **VP** **Date** 7/22/2020

Existing Conditions

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr		
Basin ID	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs
E1	852,497.83	19.571	0.03058	100%	19.571	0%	0.000	0%	0.000	0%	0.000	0.550	0.897	30.14	0.110	0.179	5.87
E2	44,474.92	1.021	0.00160	100%	1.021	0%	0.000	0%	0.000	0%	0.000	0.550	0.047	1.57	0.110	0.009	0.31
E3	6,826.56	0.157	0.00024	100%	0.157	0%	0.000	0%	0.000	0%	0.000	0.550	0.007	0.24	0.110	0.001	0.05
Total	**903,799.31**	**20.748**	**0.03242**		**0.000**		**0.000**		**0.000**		**0.000**		**0.951**	**31.95**		**0.190**	**6.22**

Proposed Conditions

Basin Descriptions												100-Year, 6-Hr			10-Year, 6-Hr		
Basin ID	Area (sf)	Area (acres)	Area (sq miles)	Treatment A %	Treatment A (acres)	Treatment B %	Treatment B (acres)	Treatment C %	Treatment C (acres)	Treatment D %	Treatment D (acres)	Weighted E (in)	Volume (ac-ft)	Flow cfs	Weighted E (in)	Volume (ac-ft)	Flow cfs
P1	389,121.54	8.933	0.01396	0%	0.000	0%	0.000	10%	0.893	90%	8.040	2.111	1.571	35.69	1.330	0.990	21.97
P2	46,633.06	1.071	0.00167	0%	0.000	0%	0.000	10%	0.107	90%	0.963	2.111	0.188	4.28	1.330	0.119	2.63
P3	26,588.77	0.610	0.00095	0%	0.000	0%	0.000	10%	0.061	90%	0.549	2.111	0.107	2.44	1.330	0.068	1.50
P4	34,092.59	0.783	0.00122	0%	0.000	0%	0.000	10%	0.078	90%	0.704	2.111	0.138	3.13	1.330	0.087	1.92
P5	60,232.39	1.383	0.00216	0%	0.000	0%	0.000	10%	0.138	90%	1.244	2.111	0.243	5.52	1.330	0.153	3.40
P6	5,706.02	0.131	0.00020	0%	0.000	0%	0.000	10%	0.013	90%	0.118	2.111	0.023	0.52	1.330	0.015	0.32
P7	35,443.02	0.814	0.00127	0%	0.000	0%	0.000	10%	0.081	90%	0.732	2.111	0.143	3.25	1.330	0.090	2.00
P8	28,224.99	0.648	0.00101	0%	0.000	0%	0.000	10%	0.065	90%	0.583	2.111	0.114	2.59	1.330	0.072	1.59
P9	75,044.37	1.723	0.00269	0%	0.000	0%	0.000	10%	0.172	90%	1.551	2.111	0.303	6.88	1.330	0.191	4.24
P10	29,615.39	0.680	0.00106	0%	0.000	0%	0.000	10%	0.068	90%	0.612	2.111	0.120	2.72	1.330	0.075	1.67
P11	36,890.30	0.847	0.00132	0%	0.000	0%	0.000	10%	0.085	90%	0.762	2.111	0.149	3.38	1.330	0.094	2.08
P12	9,404.71	0.216	0.00034	0%	0.000	0%	0.000	0%	0.000	100%	0.216	2.240	0.040	0.89	1.430	0.026	0.55
P13	15,328.54	0.352	0.00055	0%	0.000	0%	0.000	0%	0.000	100%	0.352	2.240	0.066	1.45	1.430	0.042	0.90
P14	7,315.89	0.168	0.00026	0%	0.000	0%	0.000	0%	0.000	100%	0.168	2.240	0.031	0.69	1.430	0.020	0.43
P15	9,646.85	0.221	0.00035	0%	0.000	0%	0.000	0%	0.000	100%	0.221	2.240	0.041	0.91	1.430	0.026	0.57
P16	9,520.30	0.219	0.00034	0%	0.000	0%	0.000	0%	0.000	100%	0.219	2.240	0.041	0.90	1.430	0.026	0.56
P17	11,897.56	0.273	0.00043	0%	0.000	0%	0.000	0%	0.000	100%	0.273	2.240	0.051	1.13	1.430	0.033	0.70
Total	**830,706.29**	**19.070**	**0.02980**		**0.000**		**0.000**		**1.762**		**17.308**		**3.370**	**76.37**		**2.126**	**47.05**

Equations:

Weighted E = Ea*Aa + Eb*Ab + Ec*Ac + Ed*Ad / (Total Area)

Volume = Weighted E * Total Area

Flow = Qa*Aa + Qb*Ab + Qc*Ac + Qd*Ad

Excess Precipitation, E (in.)		
Zone 1	100-Year	10-Year
Ea	0.55	0.11
Eb	0.73	0.26
Ec	0.95	0.43
Ed	2.24	1.43

Peak Discharge (cfs/acre)		
Zone 1	100-Year	10-Year
Qa	1.54	0.3
Qb	2.16	0.81
Qc	2.87	1.46
Qd	4.12	2.57

Water Quality Volume (Onsite)

Total Impervious Area = 17.307 Acres = 753,892.92 SF

Retainage depth = 0.42" = 0.035' (COA DPM Article 6-12)

Retention Volume = 0.035*753,892.92 = 26,386.25 **CF = 0.606 Ac-Ft**

LEGEND

BASIN AREA (AC)

N

AQUARIUS AVENUE N.W.

BANDELIER DRIVE N.W.
PUBLIC RIGHT OF WAY

SAGITTARIUS AVE. N.W.

BANDELIER DRIVE N.W.
PUBLIC RIGHT OF WAY

E1
19.57

TRACT 20A-1
19.0886 ACRES
(VACANT)

MCMAHON BOULEVARD N.W.
124' PUBLIC RIGHT OF WAY

BASIN E1 RETAINED PARTIALLY IN THIS AREA, THEN OVERTOPS TO UNSER/MCMAHON
Q=30.14 CFS

BASIN E3 SHEET FLOW TO UNSER BLVD
Q=0.24 CFS

E3
0.16

E2
1.02

BASIN E2 SHEET FLOW TO UNSER BLVD
Q=1.57 CFS

UNSER BOULEVARD N.W.
156 PUBLIC RIGHT OF WAY

ASPHALT BIKE PATH

EXISTING BASIN MAP

LEGEND

BASIN
AREA
(AC)

N

AQUARIUS AVENUE N.W.

BANDELIER DRIVE N.W.
PUBLIC RIGHT OF WAY

SAGITTARIUS AVE. N.W.

BANDELIER DRIVE N.W.
PUBLIC RIGHT OF WAY

McMAHON BOULEVARD N.W.
124' PUBLIC RIGHT OF WAY

UNSER BOULEVARD N.W.
156 PUBLIC RIGHT OF WAY

P1 8.93

P2 1.07

P3 0.61

P4 0.78

P5 1.38

P6 0.13

P7 0.81

P8 0.65

P9 1.72

P10 0.68

P11 0.85

P12 0.22

P13 0.35

P14 0.17

P15 0.22

P16 0.22

P17 0.27

P1 DISCHARGE VIA 30" STORM DRAIN Q=35.69 CFS

DBL A INLET Q=3.0 CFS (4.0 CFS BYPASS TO P17)

DBL A INLET & DBL C INLET Q=7.0 CFS (1.06 CFS BYPASS TO P17)

DBL C INLET IN SUMP Q=9.73 CFS TO MAIN IN McMAHON BLVD

DBL A INLET Q=6.06 CFS (2.8 CFS BYPASS TO P13)

DBL A INLET & DBL C INLET Q=7.8 CFS (1.3 CFS BYPASS TO P15)

DBL C INLET IN SUMP Q=8.73 CFS

ASPHALT BIKE PATH

PROPOSED BASIN MAP

APPENDIX B

STORM DRAIN AND INLET SCHEMATIC MAP

APPENDIX C

GUTTER DEPTH MODELING RESULTS

Worksheet for Gutter Depth - Inlet Area 1

Project Description

Solve For	Spread

Input Data

Channel Slope	0.03000	ft/ft
Discharge	5.08	ft³/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	9.25	ft
Flow Area	0.94	ft²
Depth	0.27	ft
Gutter Depression	0.09	ft
Velocity	5.40	ft/s

Used for Inlet Grate Capacity Determination

Worksheet for Gutter Depth - Inlet Area 2

Project Description

Solve For	Spread

Input Data

Channel Slope	0.01000	ft/ft
Discharge	9.10	ft³/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	14.83	ft
Flow Area	2.28	ft²
Depth	0.38	ft
Gutter Depression	0.08	ft
Velocity	3.99	ft/s

Used for Inlet Grate Capacity Determination

Worksheet for Gutter Depth - Inlet Area 4

Project Description

Solve For	Spread

Input Data

Channel Slope	0.01100	ft/ft
Discharge	8.05	ft³/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	13.86	ft
Flow Area	2.00	ft²
Depth	0.36	ft
Gutter Depression	0.08	ft
Velocity	4.02	ft/s

Used for Inlet Grate Capacity Determination

Worksheet for Gutter Depth - Inlet Area 5

Project Description

Solve For	Spread

Input Data

Channel Slope	0.01700	ft/ft
Discharge	7.00	ft³/s
Gutter Width	2.00	ft
Gutter Cross Slope	0.06	ft/ft
Road Cross Slope	0.02	ft/ft
Roughness Coefficient	0.013	

Results

Spread	11.99	ft
Flow Area	1.52	ft²
Depth	0.32	ft
Gutter Depression	0.08	ft
Velocity	4.61	ft/s

Used for Inlet Grate Capacity Determination

APPENDIX D

DRAINAGE INLET AND STORM DRAIN CAPACITIES

FIGURE 6.9.10 **Grate Capacities for Types "Double A," "Double C," and "Double D"**

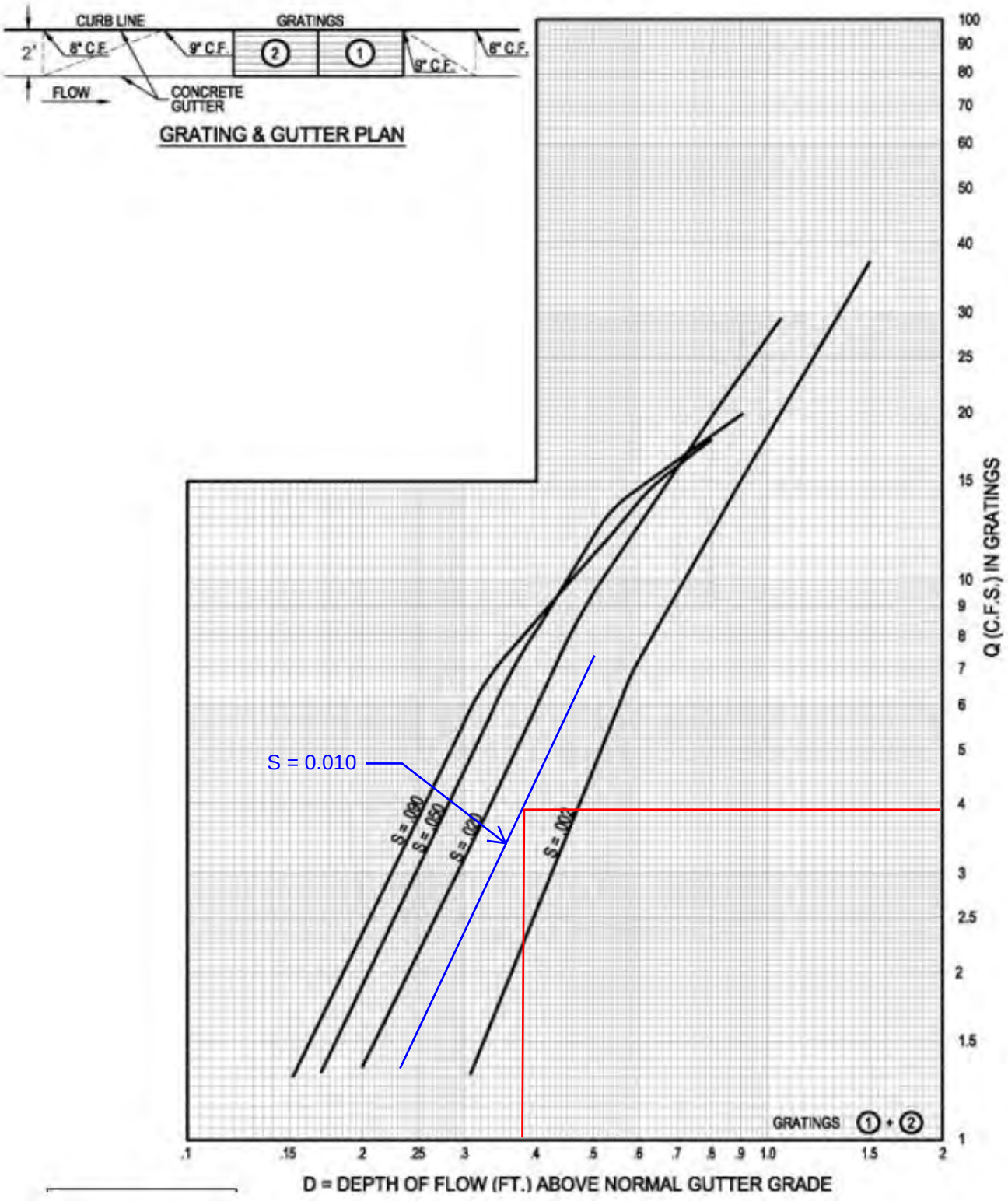


FIGURE 6.9.10 **Grate Capacities for Types "Double A," "Double C," and "Double D"**

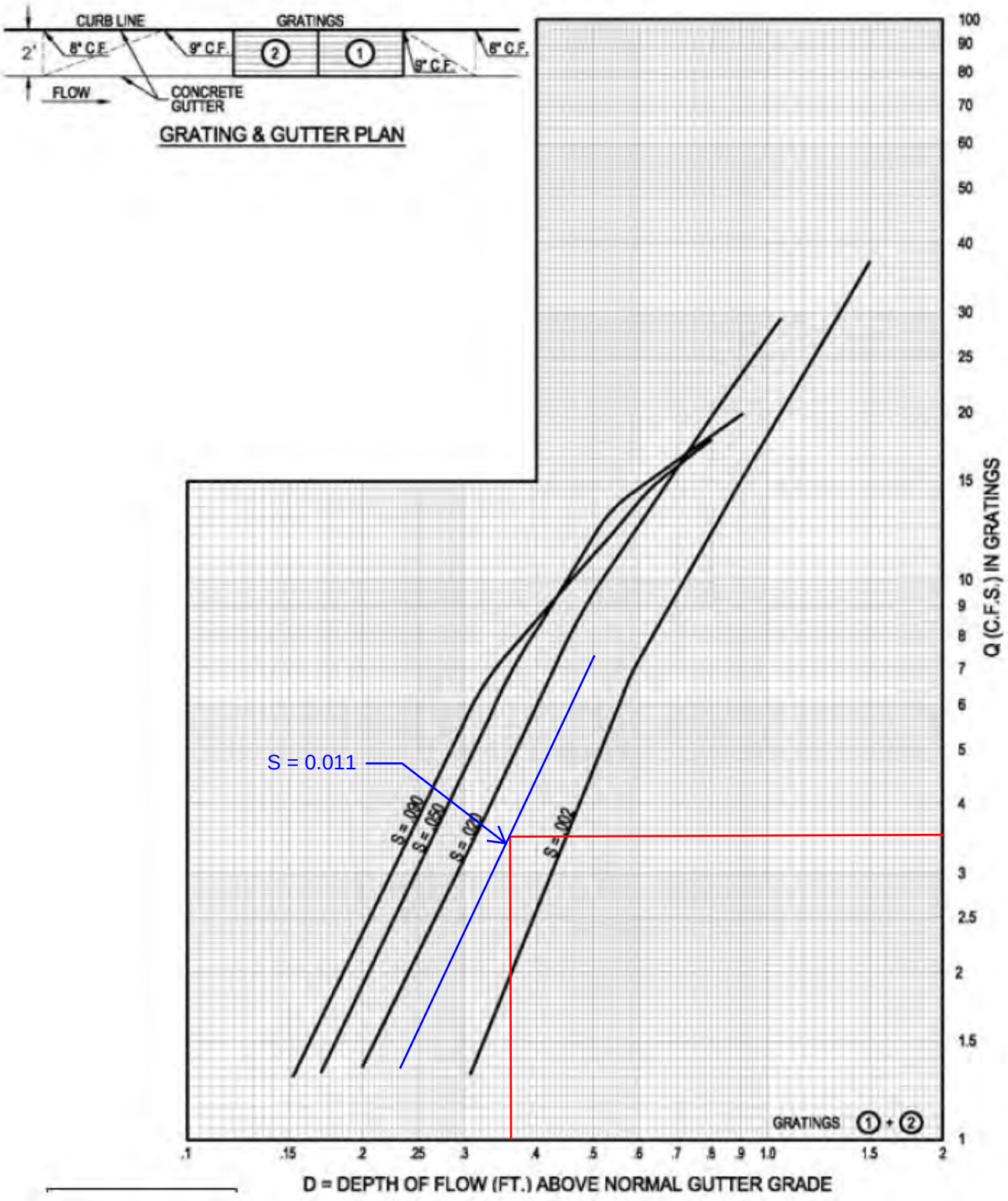


FIGURE 6.9.10 **Grate Capacities for Types "Double A," "Double C," and "Double D"**

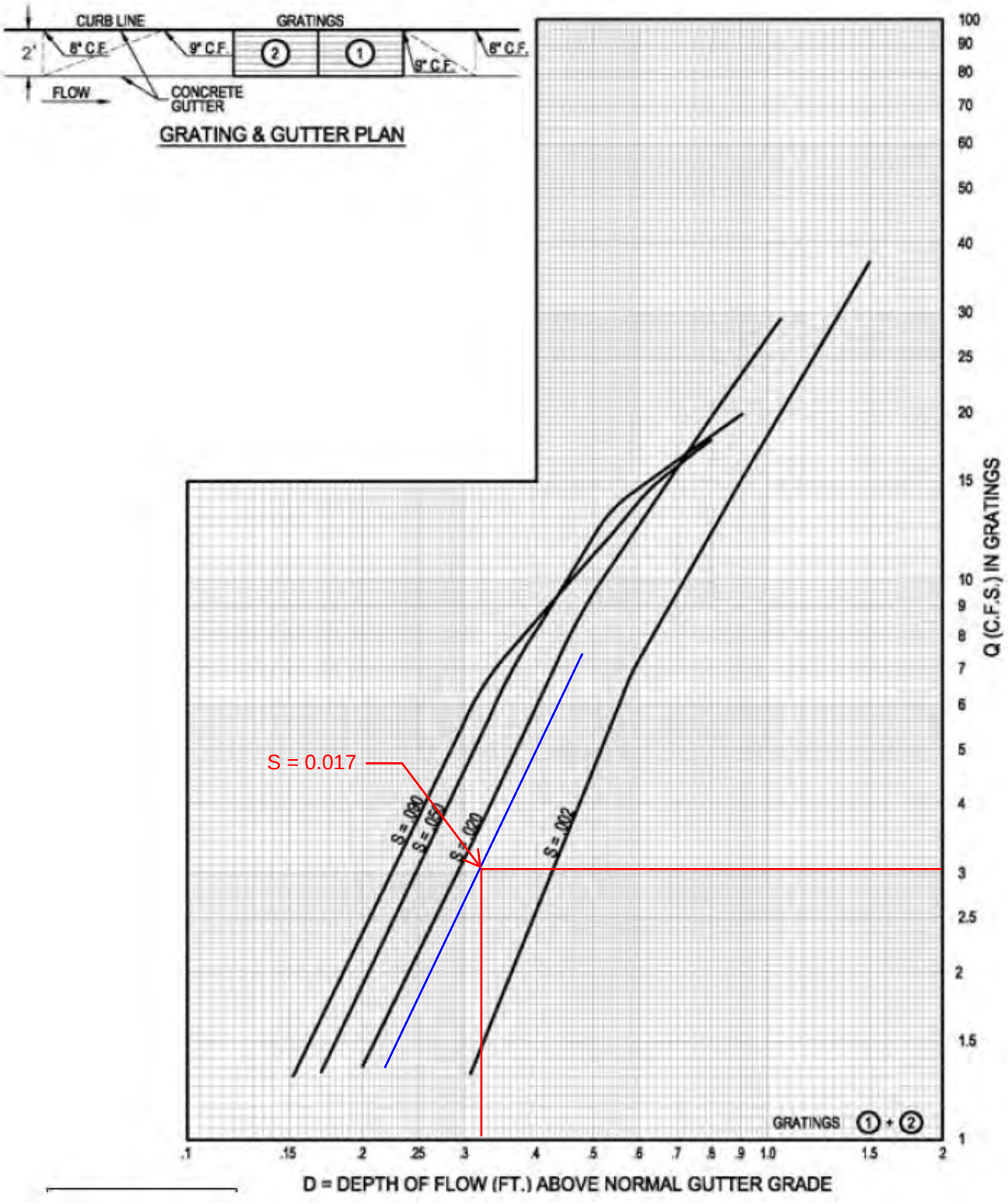
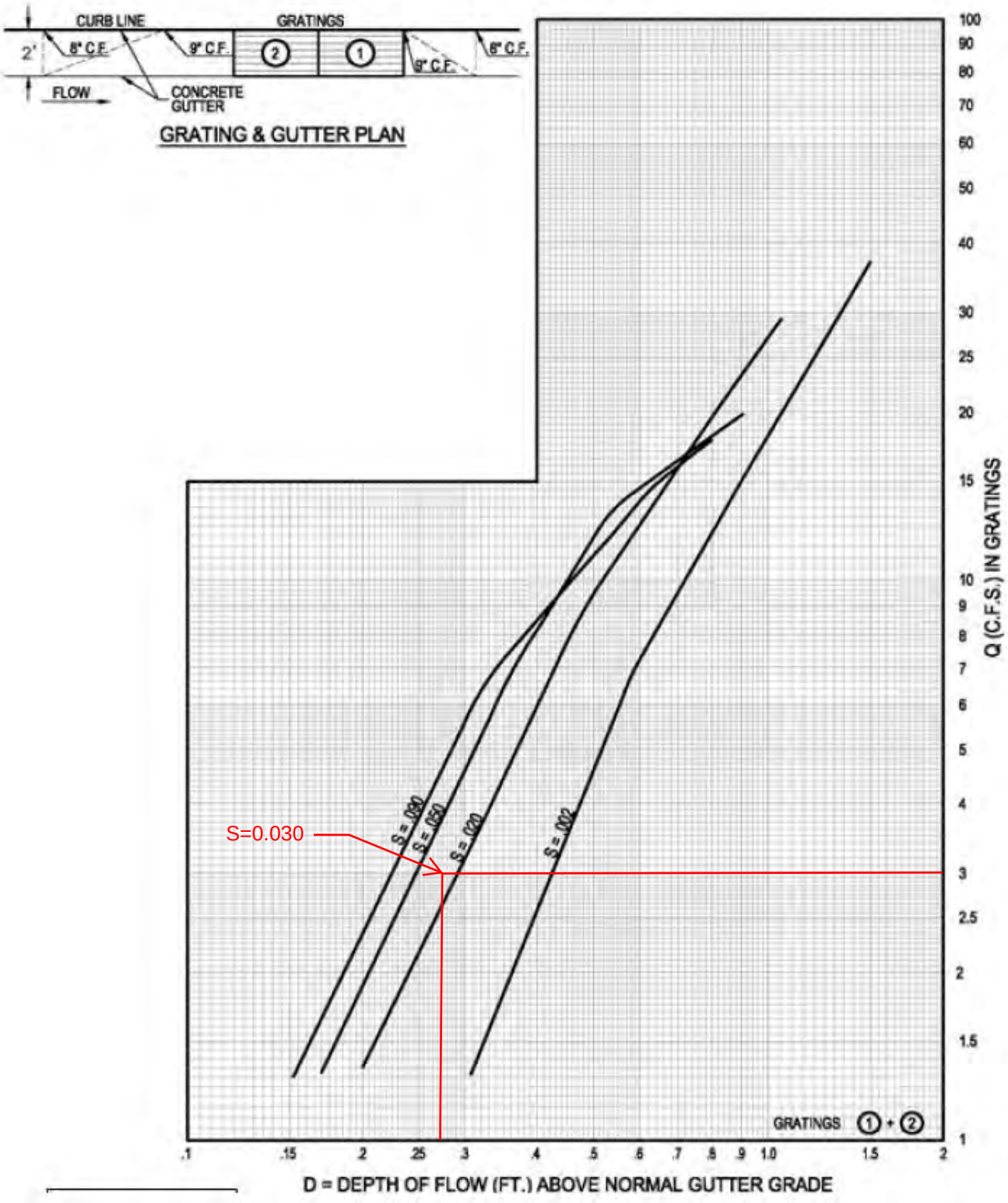


FIGURE 6.9.10 **Grate Capacities for Types "Double A," "Double C," and "Double D"**



Worksheet for Storm Drain A/B Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.00	ft³/s

Results

Normal Depth	0.55	ft
Flow Area	0.59	ft²
Wetted Perimeter	1.95	ft
Hydraulic Radius	0.30	ft
Top Width	1.44	ft
Critical Depth	0.66	ft
Percent Full	36.6	%
Critical Slope	0.00513	ft/ft
Velocity	5.13	ft/s
Velocity Head	0.41	ft
Specific Energy	0.96	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00082	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	36.58	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain C Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.73	ft³/s

Results

Normal Depth	0.87	ft
Flow Area	1.07	ft²
Wetted Perimeter	2.60	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	1.00	ft
Percent Full	58.2	%
Critical Slope	0.00661	ft/ft
Velocity	6.31	ft/s
Velocity Head	0.62	ft
Specific Energy	1.49	ft
Froude Number	1.31	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00411	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.20	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain D Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	1.50	ft
Discharge	9.73	ft^3/s

Results

Normal Depth	0.89	ft
Flow Area	1.09	ft^2
Wetted Perimeter	2.63	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	1.20	ft
Percent Full	59.0	%
Critical Slope	0.00892	ft/ft
Velocity	8.96	ft/s
Velocity Head	1.25	ft
Specific Energy	2.13	ft
Froude Number	1.84	
Maximum Discharge	15.98	ft^3/s
Discharge Full	14.85	ft^3/s
Slope Full	0.00858	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.03	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain E/F Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	1.50	ft
Discharge	7.80	ft³/s

Results

Normal Depth	0.77	ft
Flow Area	0.92	ft²
Wetted Perimeter	2.40	ft
Hydraulic Radius	0.38	ft
Top Width	1.50	ft
Critical Depth	1.08	ft
Percent Full	51.5	%
Critical Slope	0.00728	ft/ft
Velocity	8.51	ft/s
Velocity Head	1.13	ft
Specific Energy	1.90	ft
Froude Number	1.92	
Maximum Discharge	15.98	ft³/s
Discharge Full	14.85	ft³/s
Slope Full	0.00551	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.47	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain G/H Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	17.53	ft³/s

Results

Normal Depth	1.32	ft
Flow Area	2.20	ft²
Wetted Perimeter	3.80	ft
Hydraulic Radius	0.58	ft
Top Width	1.89	ft
Critical Depth	1.51	ft
Percent Full	66.1	%
Critical Slope	0.00712	ft/ft
Velocity	7.95	ft/s
Velocity Head	0.98	ft
Specific Energy	2.31	ft
Froude Number	1.30	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00601	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.13	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain I/O Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	1.50	ft
Discharge	7.00	ft³/s

Results

Normal Depth	0.72	ft
Flow Area	0.84	ft²
Wetted Perimeter	2.30	ft
Hydraulic Radius	0.37	ft
Top Width	1.50	ft
Critical Depth	1.02	ft
Percent Full	48.3	%
Critical Slope	0.00676	ft/ft
Velocity	8.28	ft/s
Velocity Head	1.07	ft
Specific Energy	1.79	ft
Froude Number	1.95	
Maximum Discharge	15.98	ft³/s
Discharge Full	14.85	ft³/s
Slope Full	0.00444	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.28	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain J Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	2.00	ft
Discharge	24.53	ft³/s

Results

Normal Depth	1.31	ft
Flow Area	2.19	ft²
Wetted Perimeter	3.78	ft
Hydraulic Radius	0.58	ft
Top Width	1.90	ft
Critical Depth	1.75	ft
Percent Full	65.6	%
Critical Slope	0.01065	ft/ft
Velocity	11.22	ft/s
Velocity Head	1.96	ft
Specific Energy	3.27	ft
Froude Number	1.84	
Maximum Discharge	34.41	ft³/s
Discharge Full	31.99	ft³/s
Slope Full	0.01176	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	65.63	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain K Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	1.50	ft
Discharge	3.00	ft³/s

Results

Normal Depth	0.46	ft
Flow Area	0.46	ft²
Wetted Perimeter	1.75	ft
Hydraulic Radius	0.26	ft
Top Width	1.38	ft
Critical Depth	0.66	ft
Percent Full	30.5	%
Critical Slope	0.00513	ft/ft
Velocity	6.58	ft/s
Velocity Head	0.67	ft
Specific Energy	1.13	ft
Froude Number	2.02	
Maximum Discharge	15.98	ft³/s
Discharge Full	14.85	ft³/s
Slope Full	0.00082	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	30.48	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain L Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	3.00	ft
Discharge	63.22	ft³/s

Results

Normal Depth	1.80	ft
Flow Area	4.42	ft²
Wetted Perimeter	5.31	ft
Hydraulic Radius	0.83	ft
Top Width	2.94	ft
Critical Depth	2.56	ft
Percent Full	59.9	%
Critical Slope	0.00843	ft/ft
Velocity	14.30	ft/s
Velocity Head	3.18	ft
Specific Energy	4.98	ft
Froude Number	2.06	
Maximum Discharge	101.46	ft³/s
Discharge Full	94.32	ft³/s
Slope Full	0.00899	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.91	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain M Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	1.50	ft
Discharge	6.18	ft³/s

Results

Normal Depth	0.67	ft
Flow Area	0.77	ft²
Wetted Perimeter	2.21	ft
Hydraulic Radius	0.35	ft
Top Width	1.49	ft
Critical Depth	0.96	ft
Percent Full	45.0	%
Critical Slope	0.00631	ft/ft
Velocity	8.02	ft/s
Velocity Head	1.00	ft
Specific Energy	1.67	ft
Froude Number	1.97	
Maximum Discharge	15.98	ft³/s
Discharge Full	14.85	ft³/s
Slope Full	0.00346	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.98	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain N Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	3.00	ft
Discharge	69.48	ft^3/s

Results

Normal Depth	1.91	ft
Flow Area	4.76	ft^2
Wetted Perimeter	5.55	ft
Hydraulic Radius	0.86	ft
Top Width	2.88	ft
Critical Depth	2.65	ft
Percent Full	63.8	%
Critical Slope	0.00972	ft/ft
Velocity	14.59	ft/s
Velocity Head	3.31	ft
Specific Energy	5.22	ft
Froude Number	2.00	
Maximum Discharge	101.46	ft^3/s
Discharge Full	94.32	ft^3/s
Slope Full	0.01085	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.82	%
Downstream Velocity	Infinity	ft/s

Worksheet for Storm Drain P Capacity

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Diameter	2.50	ft
Discharge	35.69	ft³/s

Results

Normal Depth	1.42	ft
Flow Area	2.87	ft²
Wetted Perimeter	4.26	ft
Hydraulic Radius	0.67	ft
Top Width	2.48	ft
Critical Depth	2.03	ft
Percent Full	56.7	%
Critical Slope	0.00772	ft/ft
Velocity	12.42	ft/s
Velocity Head	2.40	ft
Specific Energy	3.82	ft
Froude Number	2.03	
Maximum Discharge	62.40	ft³/s
Discharge Full	58.00	ft³/s
Slope Full	0.00757	ft/ft
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
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.72	%
Downstream Velocity	Infinity	ft/s

APPENDIX E

DRAINAGE INLET BYPASS CALCULATIONS

TIERRA WEST, LLC

Project _____ Date _____

Project No. _____

Meeting Purpose _____ Sheet No. ___ of ___

Attendees _____

Inlet Area 1:

Basins : P2 + P12 = 4.28 + 0.8 = 5.08 cfs , Depth = 0.27 ft (Flowmaster)

Grate Capacity = 3 cfs (Double A, COA DPM Figure 6.9.10 for S= 3%)

* Use Double A Inlet ⇒ 2.08 cfs bypass

Inlet Area 2:

Basins : P12 (bypass) + P3 + P4 + P13 = 2.08 + 2.44 + 3.13 + 1.45 = 9.1 cfs

Depth = 0.38 ft (Flowmaster)

Grate Capacity = 3.9 cfs (Double A/C, COA DPM Figure 6.9.10 for S= 1%)

* Use Double A and Double C Inlet = 7.8 cfs capacity ⇒ 1.3 cfs bypass

Inlet Spacing = 20.5 ft (COA DPM Figure 6.9.12 w/ Fr=1.14)

Inlet Area 3:

Basins : P5 + P6 + P14 = 5.52 + 0.52 + 0.69 = 6.73 cfs , Depth = 0.25 ft

Grate Capacity = 9.73 cfs (See Double C Sump Orifice Eqn. Calcs this appendix)

* Use Double C in sump ⇒ No bypass

Inlet Area 4:

Basins : P13 (bypass) + P7 + P8 + P15 = 1.3 + 3.25 + 2.59 + 0.91 = 8.05 cfs

Depth = 0.36 ft (Flowmaster)

Grate Capacity = 3.5 cfs (Double A/C, COA DPM Figure 6.9.10 for S= 1.1%)

* Use Double A and Double C Inlet = 7.0 cfs capacity ⇒ 1.05 cfs bypass

Inlet Spacing = 20.9 ft (COA DPM Figure 6.9.12 w/ Fr=1.18)

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TIERRA WEST, LLC

Project _____ Date _____

Project No. _____

Meeting Purpose _____ Sheet No. ___ of ___

Attendees _____ _____

_____ _____

_____ _____

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_____ _____

Inlet Area 5:

Basins : P10 + P11 + P16 = 2.72 + 3.38 + 0.90 = 7.0 cfs

Depth = 0.32 ft (Flowmaster)

Grate Capacity = 3 cfs (Double A/C, COA DPM Figure 6.9.10 for S = 1.7%)

* Use Double A = 3 cfs ⇒ 4 cfs bypass

Inlet Area 6:

Basins : P15(bypass) + P16(bypass) + P17 = 1.05 + 4.0 + 1.13 = 6.18 cfs , Depth = 0.25 ft

Grate Capacity = 9.73 cfs (see Double C Sump Orifice Eqn. calcs this appendix)

* Use Double C ⇒ No bypass

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APPENDIX F

EXCERPTS FROM *MASTER DRAINAGE STUDY FOR THE UNSER/MCMAHON AREA*

using 25% type 'B', 25% type 'C', and 50% type 'D'. The commercial tracts were restricted to historic discharge of 95% type 'A' and 5% type 'B'. The only commercial tracts allowed developed discharge in the Ridgeview report were the Village Center North Tracts because Mr. Smith paid to upsize the Ridgeview storm drain. One amendment was made to the drainage plan proposed by the Ridgeview Subdivision. The runoff from the Fein Residential property that was originally conveyed through the Ridgeview Subdivision and discharged into Black Arroyo Boulevard is now directed through the Stonebridge Subdivision. This change was made due to a subsequent analysis of the Fein property performed by Community Sciences. This analysis determined that there is sufficient capacity in the Stonebridge storm drain to accommodate the 36.3 cfs from the Fein Residential property. Therefore, the contribution from this basin was removed from the Ridgeview storm drain.

The tracts of land west of Unser or south of McMahon do not drain through the Ridgeview Subdivision. The commercial tracts in this area are permitted developed discharge and were analyzed using 90% type 'D' and 10% type 'B'. The residential tracts were analyzed using 20% type 'B', 20% type 'C', and 60% type 'D'. See **Figure 3**, the Developed Conditions Land Treatment Exhibit for an illustration of land treatment values.

V. PROPOSED DEVELOPED CONDITIONS

There are four major storm drain reaches included in this analysis. First, the southern reach of the analysis consists of basins that contribute flow to McMahon Boulevard and Unser Boulevard south of Black Arroyo Boulevard. Secondly, the West section of the analysis consists of the basins that contribute flow to Black Arroyo Boulevard west of Unser. Thirdly, the east portion of the analysis consists of basins that contribute flow to Black Arroyo Boulevard adjacent to the Ridgeview Subdivision. Finally, the Lower Reach of the analysis includes the section of storm drain that conveys the flow from the other reaches east to the Lands of A.M.A.F.C.A. At the top of the southern reach, the runoff from basins DB6 and DC2 south of McMahon combine with the street flow from McMahon Boulevard and the commercial tract DB4-C and is conveyed to the intersection of McMahon and Unser Boulevards. The flow then combines with the Unser street flow and 180 cfs is diverted north in Unser Boulevard. Basin DB5A discharges into the Unser storm drain and is conveyed to the south boundary of the Ridgeview Subdivision. At this point, basin DB5B

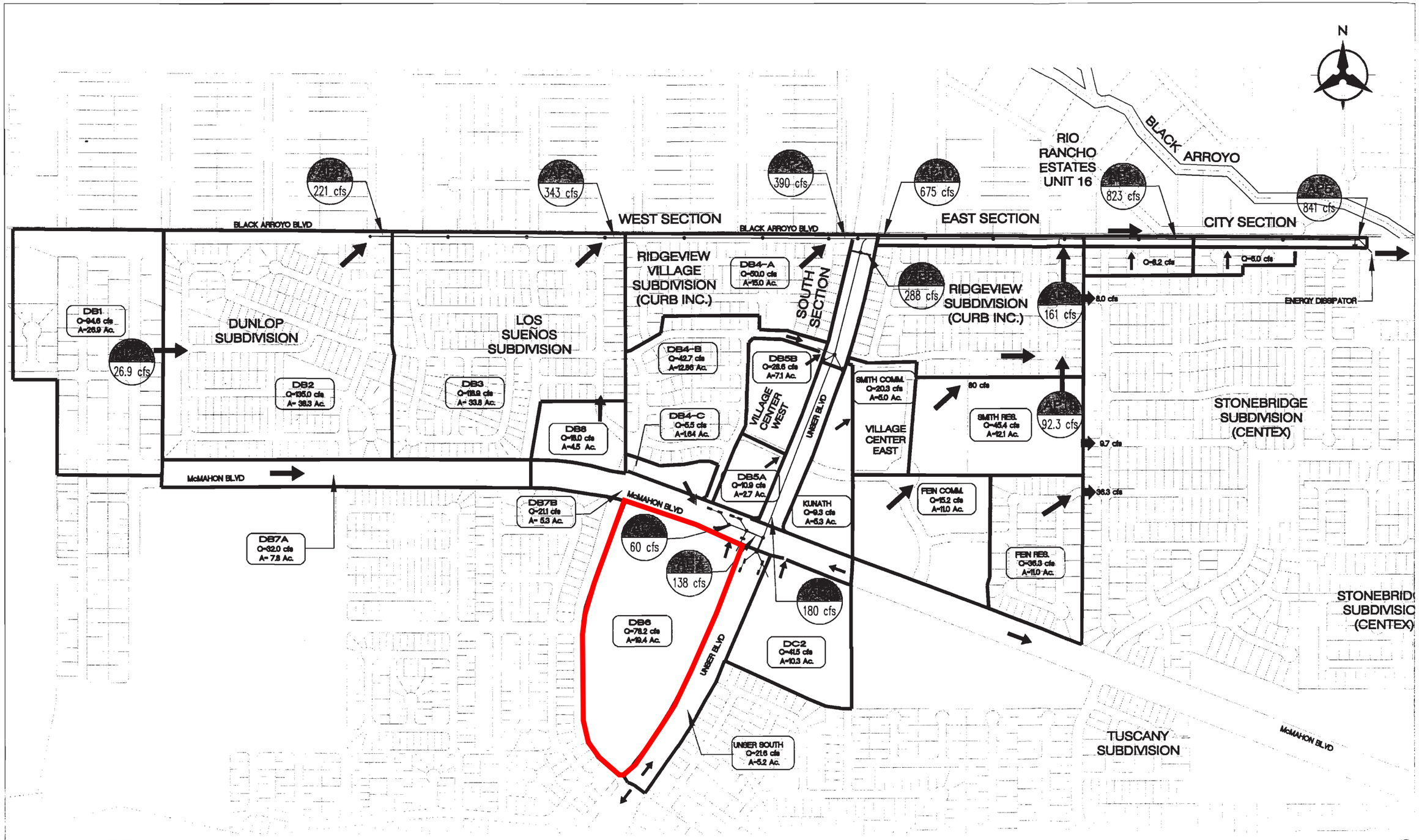

FIGURE 2
DEVELOPED CONDITIONS
BASIN MAP

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APPENDIX G

DRAINAGE CRITERIA MAP FOR FULL DEVELOPMENT

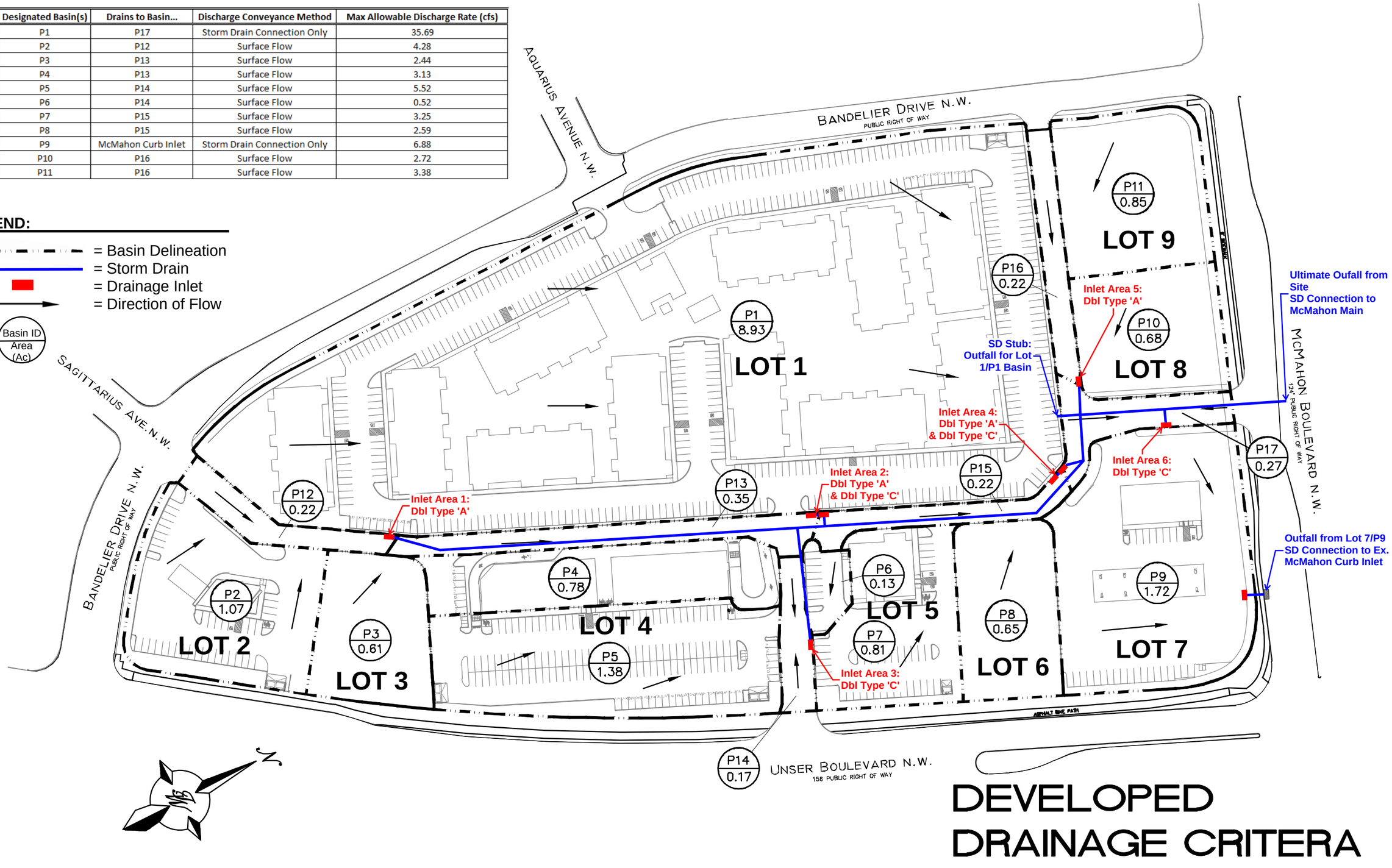
Table 1 - Paradise North Developed Drainage Criteria

Lot No.	Designated Basin(s)	Drains to Basin...	Discharge Conveyance Method	Max Allowable Discharge Rate (cfs)
1	P1	P17	Storm Drain Connection Only	35.69
2	P2	P12	Surface Flow	4.28
3	P3	P13	Surface Flow	2.44
4	P4	P13	Surface Flow	3.13
	P5	P14	Surface Flow	5.52
5	P6	P14	Surface Flow	0.52
	P7	P15	Surface Flow	3.25
6	P8	P15	Surface Flow	2.59
7	P9	McMahon Curb Inlet	Storm Drain Connection Only	6.88
8	P10	P16	Surface Flow	2.72
9	P11	P16	Surface Flow	3.38

LEGEND:

= Basin Delineation
= Storm Drain
= Drainage Inlet
= Direction of Flow

Basin ID / Area (Ac)



DEVELOPED DRAINAGE CRITERA