

CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Interim Director



Mayor Timothy M. Keller

July 17, 2019

Yolanda Padilla Moyer, PE
Bohannon Huston, Inc.
7500 Jefferson St NE
Albuquerque, NM 87109

RE: **Catalonia Subdivision**
Tr 1 & 2, The Trails Unit 3A
Drainage Report Stamp Date: 7/11/19
Grading Plan Stamp Date: 7/11/19
Hydrology File: C09D013

Dear Ms. Padilla Moyer,

PO Box 1293

Based on the submittal received on 7/12/19 the above-referenced Drainage Report and Grading Plan cannot be approved until the following are corrected:

Albuquerque

Prior to Preliminary Plat and Grading Permit:

NM 87103

www.cabq.gov

1. Offsite Pond 1.
 - a. Per The Trails DMP (Thompson, 2015) this pond ultimately needs to be 2.44 Ac-Ft. The proposed size (1.54 Ac-Ft) and the ultimate size need to be called-out on the Drainage Report, Grading Plan, and Work Order Plans. In the drainage report, add explaining language that when the development to the north comes in, it'll need to divert its offsite flows south into Offsite Pond 1 and upsize it from 1.54 Ac-Ft (not 1.08 Ac-Ft) to 2.44 Ac-Ft.
 - b. Provide written and signed permission from the owner of *Portion of Tract 5 in the W/2 NE/4 NW/4 SEC 17 T11N R2E* for the grading and swale/pond construction on their property.
2. Pond Routing.
 - a. Pond B outlet needs to be revised in HMS to show an orifice plate that will restrict discharge to 3.36cfs max. The headwall into 6" culvert under Woodmont won't be acceptable; minimum pipe size is 24" as is correctly shown on the infrastructure list.
 - b. Show and label the 100-yr WSE and SWQV elevation of each pond on the grading plan.
3. Storm Water Quality (SWQ). Use of Retention Pond A5 and Pond A for retaining the SWQV acceptable provided that the SWQ volume and SWQ water surface elevations are called out on the plans and in the maintenance covenants. The SWQ retention within these ponds will be permanent.

CITY OF ALBUQUERQUE

Planning Department
Brennon Williams, Interim Director



Mayor Timothy M. Keller

4. Please look at the Cambrils Dr assembly/section in front of lots 1-5. The contours seem to show an inverted crown with an odd transition in front of lot 6.
5. The following drainage infrastructure needs to be amended on the infrastructure list provided with the submittal:
 - a. Pipe size for the RCP in Girona needs to be called out as 24"-48", not 18"-42".
 - b. Pipe size for the RCP in Woodmont (Tr 1 to Girona) needs to be called out as 24", not 18"-30".
 - c. Pipe size for the RCP in Tarragonia needs to be called out as 24", not 18"-30".
6. For Information. Reduced waterblock heights will be allowed at: Matero & Manresa (0.24' min) and Bellaterra & Cambrils (0.15' min).
7. 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 (Curtis Cherne, PE, ccherne@cabq.gov, 924-3420) 14 days prior to any earth disturbance.

PO Box 1293

Prior to Work Order (For Information):

Albuquerque

8. Provide dimensional data on plans (top width, bottom width, depth, etc.) for the spillways and swale.

NM 87103

9. Provide outlet structure detail for Offsite Pond 1 with 1' diameter orifice plate. Provide outlet structure detail for Pond B with orifice plate (diameter to be determined).

Prior to Release of Financial Guarantee (For Information):

www.cabq.gov

10. Engineer's Certification, per the DPM Chapter 22.7: *Engineer's Certification Checklist For Subdivision* is required.

If you have any questions, please contact me at 924-3695 or dpeterson@cabq.gov.

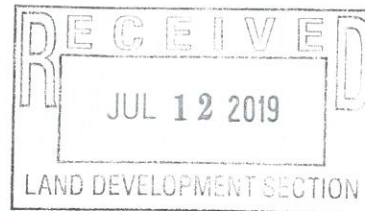
Sincerely,

Dana M. Peterson
Senior Engineer, Planning Dept.
Development Review Services

July 11, 2019

Mr. Dana Peterson, P.E.
Senior Engineer
City of Albuquerque
Planning Department
600 2nd Street NW
Albuquerque, NM 87103

RE: **Catalonia Subdivision**
Tr 1 & 2, The Trails Unit 3A
Drainage Report Stamp Date: 3/29/19
Grading Plan Stamp Date: 3/29/19
Hydrology File: C09D013



Dear Ms. Padilla Moyer,

1. Offsite Pond 1.
 - a. Per The Trails DMP (Thompson, 2015) this pond ultimately needs to be 2.44 Ac-Ft. The proposed size (0.99 Ac-Ft) and the ultimate size need to be called-out on the Drainage Report, Grading Plan, Infrastructure List, and Work Order Plans. In the drainage report, add explaining language that when the development to the north comes in, it'll need to divert its offsite flows south into Offsite Pond 1 and upsize it to 2.44 Ac-Ft. **This has been updated.**
 - b. Provide written and signed permission from the owner of Portion of Tract 5 in the W/2 NE/4 NW/4 SEC 17 T11N R2E for the grading and swale/pond construction on their property. Then, on the Infrastructure List, include a Drainage Covenant (no public easement) with Offsite Pond 1. **Client is currently working with owner to provide written permission, this will be provided once available.**
 - c. Call Temporary Pond 1 something else to avoid confusion with Offsite Pond 1. **Temporary Pond 1 will now be known as Pond A**
2. Provide written and signed permission from the owner(s) of Tract 4, Tract OS-1, and Tract OS-2, Bulk Land Plat of The Trails Unit 3A for the grading and pond construction on their property. Then, on the Infrastructure List, include a Public Drainage Easements and Agreements & Covenants for these ponds (Offsite Pond 1, Pond B, Pond A-5). **Will be provided as a supplemental submittal at a later date..**
3. Provide Hydraulic calculations for sizing the swale to Offsite Pond 1, the spillway for Offsite Pond 1, and the spillway for Pond B. **See Appendix F and G respectively.**
4. Inlet/Street Capacity Hydraulics. Appendix B.
 - a. Inlets in a sump need to demonstrate 2x capacity (IN1, IN2, IN3) below top of curb. **IN 2 and IN3 demonstrate 2x the capacity, while IN1 has an emergency spillway that goes to Pond B.**

Engineering 

Spatial Data 

Advanced Technologies 

- b. The combination equation you show as eqn 1, should work, but net open area needs to be shown, and h for the orifice equation needs to be defined as height of water above the center of the opening. **Note has been added.** Grate void space (or net open area) needs to be 3.72SF, for the bike-friendly Albuquerque grate, see new Dwg 2220 (attached). **This has been updated.**
 - c. IN1 is described as one double-A, but 2 separate inlets are shown on the grading plan. **Grading Plan has been updated to only show one inlet.**
5. Pond Routing. Appendix D.
- a. The basin areas and land treatments are slightly off from the Hydrology presented in Appendix A; please correct. **Land treatments and areas match.**
 - b. Provide the excel file, or the calculations/formulas used when resubmitting. **Design was redone in HEC-HMS, See appendix for HEC model information.**
 - c. Provide pond routing tables or curves for the ponds, including storage/inflow/discharge. **See Appendix H**
 - d. What control devices (orifice plates, ported risers?) will be used to maintain allowable discharge and where are their hydraulic calculations and design? **See Appendix H**
 - e. Temporary Pond 1 (rename) needs to be sized for the 10-day volume from basin A, plus the volume from Offsite Pond 1 (no dead storage in Offsite Pond 1, I assume), plus the surrounding area that will drain to it (to be delineated). **This has been updated.**
 - f. Woodmont Temp Pond should be sized for DMP Basin A1, plus Basin Offsite 2. **This has been updated.**
 - g. Will anything outfall into SDP 9, or will it be stubbed and capped? **There will be an outfall as the plans indicate see Exhibit E**
 - h. Interim Pond A-5 does need to be sized for the 10-day volume for the area draining to it: Basin B (minus any dead storage in Pond B), plus the surrounding area that will drain to it (to be delineated). **Pond A5 is sized per the Master DMP. Pond B is discharging less than the maximum allowable per the DMP.**
 - i. Show and label the 100-yr. WSE and SWQV elevation of each pond on the grading plan. **This has been added to the plans.**
6. Storm Water Quality. Appendix E.
- a. The storm water quality volume (SWQV) contained in Temporary Pond 1 and Woodmont Temp Pond is not acceptable, as these ponds are presented as temporary facilities that will go away once the downstream pipe is built. Provide a permanent SWQ facility to store the SWQV from Basin A and Offsite Basin 2. **Temporary naming has been removed. Ponds are considered to be permanent until future development begins. The Pond volume are greater than the required first flush volumes, therefore, first flush requirement is satisfied.**
 - b. Use of Retention Pond B and A5 for treating the SWQV from Basin B and Offsite Basin 3 is acceptable provided that the the SWQV and WSE is called out on the plans and in the maintenance covenants. **SWQV and WSE will be added to our plans along with maintenance.**

7. Storm Drain Profiles. Appendix C/F. the receiving pond as the beginning WSE for the HGL calculations, or the actual WSE, per the pond routing tables (to be prepared). **HGL calculations updated using the WSE of the ponds.**
 - d. Transition 1 and Transition 2 will not be allowed; provide manholes at these locations. **Storm cad inserted transitions at pipe to pipe connects. However, we are now using Civil 3D 2020 for the HGL analysis and this program doesn't insert transition at these locations. See Appendix C for updated HGL Calculations and profiles.**
 - e. Curvilinear pipe and bends are allowed in select cases; please see attached draft guidance for the new DPM. **Curvilinear pipes are allowed, and the pipe manufacture information is provided in the report. The draft DPM language you provided is not the approved language in the current draft.**
 - f. HGL profiles are missing for SDP9 and SDP2. **Profiles have been added, see Appendix C.**
8. The following drainage infrastructure needs to be added or amended on the infrastructure list (dated 3/29/19):
 - a. RCP w/ nec. MH's, Laterals, & Inlets, Woodmont, Pond B to Pond A5. **This has been updated.**
 - b. Offsite Pond 1 and Swale w/ Drainage Covenant (no public easement). Add volume. **This has been updated.**
 - c. Temporary Pond 1 (rename) w/ Public Drainage Easement and Agreement and Covenant. Add volume. **This has been updated.**
 - d. Pond B w/ Public Drainage Easement and Agreement and Covenant. Add volume. **This has been updated.**
 - e. Pond A5 w/ Public Drainage Easement and Agreement and Covenant. Add volume. **This has been updated.**
 - f. Engineer's Certification of Grading and Drainage needs to be its own item, complete with inspector sign-off, not a note. **This has been updated.**
9. You should request a Wavier to waterblock height when resubmitting at: Matero & Manresa, and Bellaterra & Cambrils. You'll need to quantify the flow and flow depth, to demonstrate that the waterblock height can be reduced at these spots. Otherwise, provide waterblocks 0.87' high. **See Appendix B for updated street calcs.**
10. Grading Plan Remarks.
 - a. Sheet labeling shown on Sheet 1 is incorrect. **This has been updated.**
 - b. Do not grade on Lot 9-16, Valle Prado Unit 5. **We do not know which project will be constructed first, therefore, a tie back to existing grade has been provided. Top of pond is such that it works with the walls for Valle Prado Unit 5 if it has been constructed.**
 - c. Add a line type to the legend for Retaining Wall, Constructed Prior to Grading/Pad Certification. These are for the side lot retaining walls to be built by the grading contractor. **This has been updated.**
 - d. Provide grate (or LP) elevation at IN2 and IN3. Ensure that there is an adequate sump between these inlets and the waterblock for Woodmont & Girona, so high flows don't simply spill over to Woodmont. This high point elevation also needs to be called out. **See updated grading plan**

- e. You're providing emergency spillways for Pond A5 and Temporary Pond 1, but these typically aren't required if retaining the 100-yr., 10-day volume. Emergency spillways will remain. **Emergency spillways will remain.**
- 11. This project requires an ESC Plan, submitted to the Stormwater Quality Engineer (Curtis Cherne PE, ccherne@cabq.gov or 924-3420). **This will be provided at a later date.**
- 12. On the Preliminary Plat, provide a Public drainage easement on Tract 1 for the short storm drain pipe between Tarragona and Pond B on OS-1. **A supplemental submittal to the review board will be provided to DRB prior to DRB**

Prior to Release of Financial Guarantee (For Information):

- 13. Engineer's Certification, per the DPM Chapter 22.7: *Engineer's Certification Checklist for Subdivision* is required.

Sincerely,



Yolanda Padilla Moyer, P.E.
Senior Project Manager
Community Development and Planning

YPM/cc
Enclosures

cc: Scott J. Steffen, PLDG

The Trails Community Association, Inc

3077 E. Warm Springs Road
Las Vegas, Nevada 89120

February 28, 2019

City of Albuquerque
Planning Department
P.O. Box 1293
Albuquerque, NM 87102

Re: Letter of Authorization for Construction within Tract OS-2, The Trails Unit 3A

To Whom It May Concern:

The Trails Community Association, Inc. ("The Trails"), owner of Tracts OS-1 and OS-2, The Trails Unit 3A, hereby grants permission to PV Trails Albuquerque, LLC ("PV Trails") to grade and install utilities and drainage infrastructure within Tracts OS-1 and OS-2 as necessary for the development of Tracts 1-6, The Trails Unit 3A. Grading may include, but not be limited to, tie slopes from Tracts 4-6 into Tract OS-2, tie slopes from Tract 2 into Tract OS-1, interim drainage ponds in both Tracts and permanent drainage ponds in both Tracts as shown in Plate 1 of the Drainage Master Plan for the Trails Units 1-3.

In addition, The Trails grants permission to PV Trails to install walls and/or fences along the common boundaries of Tracts OS-1 and OS-2 and Tracts 2 and 4-6, The Trails Unit 3A, such that wall footings and/or fence posts may encroach into Tracts OS-1 and OS-2.

Sincerely,



Kelly Calhoun
Manager

The Trails Community Association, Inc.

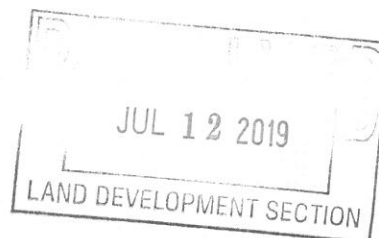


Figure 12

INFRASTRUCTURE LIST

EXHIBIT "A"
TO SUBDIVISION IMPROVEMENTS AGREEMENT
DEVELOPMENT REVIEW BOARD (D.R.B.) REQUIRED INFRASTRUCTURE LIST

CATALONIA AT THE TRAILS
REPLAT OF TRACT 1 AND TRACT 2 OF THE TRAILS UNIT 3A

Following is a summary of PUBLIC/PRIVATE Infrastructure required to be constructed or financially guaranteed for the above development. This listing is not necessarily a complete listing. During the SIA process and/or in the review of the construction drawings, if the DRC Chair determines that appurtenant items and/or unforeseen items have not been included in the infrastructure listing, the DRC Chair may include those items in the listing and related financial guarantee. Likewise, if the DRC Chair determines that appurtenant or non-essential items can be deleted from the listing, those items may be deleted as well as the related portions of the financial guarantees. All such revisions require approval by the DRC Chair, the User Department and agent/owner. If such approvals are obtained, these revisions to the listing will be incorporated administratively. In addition, any unforeseen items which arise during construction which which are necessary to complete the project and which normally are the Subdivider's responsibility will be required as a condition of project acceptance and close out by the City.

SIA Sequence #	COA DRC Project #	Size	Type of Improvement	Location	From	To	Private Inspector	City Inspector	City Cnst Engineer
		12" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	WOODMONT AVENUE	TRACT 1	STUB IN WOODMONT AVENUE, NORTH OF MANCOS STREET	/	/	/
		8" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	GIRONA AVENUE	TRACT 5	WOODMONT AVENUE	/	/	/
		6" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	CAMBRILS DRIVE	GIRONA AVENUE	TARRAGONA ROAD	/	/	/
		6" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	TARRAGONA ROAD	MANRESA DRIVE	CAMBRILS DRIVE	/	/	/
		6" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	MANRESA DRIVE	TARRAGONA ROAD	GIRONA AVENUE	/	/	/
		6" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	MATARO ROAD	MANRESA DRIVE	CAMBRILS DRIVE	/	/	/
		6" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	TORTOSA DRIVE	MATARO ROAD	GIRONA AVENUE	/	/	/
		8" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	BELLATERRA STREET	CAMBRILS DRIVE	WOODMONT AVENUE	/	/	/
		12" DIA (5W)	WATERLINE W/ NEC. VALVES FHS, MJS & RJS	WOODMONT AVENUE	TRACT 1	PASEO DEL NORTE	/	/	/

SIA Sequence #	COA DRC Project #	Size	Type of Improvement	Location	From	To	Private Inspector	City Inspector	City Cnst Engineer
		12" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	WOODMONT AVENUE	PASEO DEL NORTE	STUB IN WOODMONT AVENUE, NORTH OF MANCOS STREET	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	GIRONA AVENUE	TRACT 5	WOODMONT AVENUE	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	CAMBRILS DRIVE	LOT 78	GIRONA AVENUE	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	CAMBRILS DRIVE	LOT 1	SAS ESMT @ LOT 6	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	TARRAGONA ROAD	MANRESA DRIVE	SAS ESMT @ LOT 6	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	MANRESA DRIVE	LOT 32	TARRAGONA ROAD	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	MANRESA DRIVE	LOT 33	GIRONA AVENUE	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MHS & SERVICES	MATARO ROAD	LOT 30	CAMBRILS DRIVE	/	/	/

SIA Sequence #	COA/DRC Project #

[illegible]

SIA Sequence #	COA DRC Project #

SIA Sequence #	COA DRC Project #	Size	Type of Improvement	Location	From	To
		28' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4" WIDE SIDEWALK ON BOTH SIDES*	TORTOSA DRIVE	MATARO ROAD	GIRONA AVENUE
		50' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4" WIDE SIDEWALK* ON BOTH SIDES	BELLATERRA STREET	CAMBILLS DRIVE	WOODMONT AVENUE
		NOTE:	STREET LIGHTS AS REQUIRED PER THE COA DPM			
		*ALL SIDEWALKS TO BE DEFERRED ALONG FRONTAGE OF LOTS				
		*SIDEWALK TO BE WAIVED ON: 1) SOUTHSIDE OF TARRAGONA ROAD 2) NORTHSIDE OF GIRONA AVENUE				
		**PROVIDE / INSTALL THE NECESSARY ROADWAY SIGNAGE ASSOCIATED W/ THE DEVELOPMENT AS APPROVED BY THE CITY DRC				

YOLANDA PADILLA MOYER, P.E., PREPARED BY: PRINT NAME	DRB CHAIR	DATE	CODE ENFORCEMENT	DATE
BOHANNAN HUSTON INC.	TRANSPORTATION DEVELOPMENT	DATE	AMATCA	DATE
FIRM:	ABCWUA	DATE	CITY ENGINEER	DATE
SIGNATURE		DATE		DATE
MAXIMUM TIME ALLOW TO CONSTRUCT IMPROVEMENTS WITHOUT A DRB EXTENSION				

[illegible]

DRAINAGE REPORT FOR CATALONIA AT THE TRAILS SUBDIVISION

JULY 2019

Prepared for:

PV TRAILS ALBUQUERQUE LCC
4350 LA JOLLA VILLAGE DR. SUITE 110
SAN DIEGO CA, 92122

Prepared by:

Bohannon  **Huston**

Engineering

Spatial Data

Advanced Technologies



**DRAINAGE REPORT
FOR
CATALONIA AT THE TRAILS
ALBUQUERQUE, NM**

JULY 11, 2019

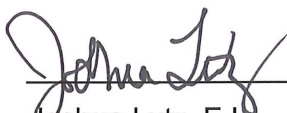
Prepared for:

**PV TRAILS ALBUQUERQUE LCC
4350 LA JOLLA VILLAGE DR. SUITE 110
SAN DIEGO, CA 92122**

Prepared by:

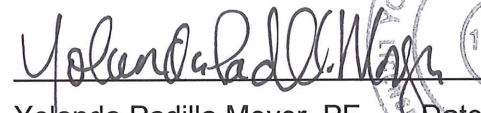
**BOHANNAN HUSTON, INC.
COURTYARD II
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109**

PREPARED BY:


Joshua Lutz, E.I.

7-11-19
Date

UNDER THE SUPERVISION OF:


Yolanda Padilla Moyer, PE Date

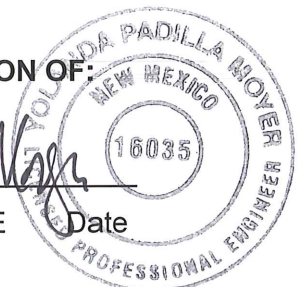


TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	PURPOSE OF REPORT	1
III.	METHODOLOGY AND REFERENCES.....	1
IV.	SITE LOCATION AND CHARACTERISTICS	2
V.	EXISTING CONDITIONS.....	2
VI.	DEVELOPED CONDITIONS.....	3
	A. INTERIM CONDITIONS	3
	B. ULTIMATE CONDITIONS	4
	C. FIRST FLUSH REQUIREMENTS.....	5
VII.	GRADING PLAN	5
VIII.	CALCULATIONS	5
IX.	CONCLUSION.....	6

APPENDICES

APPENDIX A: BASIN ANALYSIS AND SUMMARY OF LAND TREATMENTS
APPENDIX B: INLET/STREET HYDRAULICS
APPENDIX C: STORM DRAIN PIPE ANALYSIS
APPENDIX D: DETENTION POND ANALYSIS
APPENDIX E: FIRST FLUSH REQUIREMENTS
APPENDIX F: CHANNEL ANALYSIS
APPENDIX G: EMERGENCY SPILLWAY ANALYSIS
APPENDIX H: HEC-HMS ANALYSIS
APPENDIX I: MANUFACTURERS RECOMMENDATION

EXHIBITS

EXHIBIT A: PRELIMINARY PLAT
EXHIBIT B: ORIGINAL DEVELOPED CONDITIONS BASIN MAP FROM DMP
EXHIBIT C: EXISTING BASIN MAP
EXHIBIT D: PROPOSED BASIN MAP
EXHIBIT E: STORM DRAIN NETWORK
EXHIBIT F: GRADING PLAN

I. INTRODUCTION

This report establishes a drainage management plan for Catalonia at the Trails Unit 3A. The proposed development consists of 78 single family detached residential lots on approximately 20.29 acres. This project is located within the Volcano Trails Sector Plan area, in northwest Albuquerque, west of Rainbow Blvd and south of Woodmont Avenue. Catalonia is in the Trails Units 1-3 Drainage Master Plan (DMP) area and has discharge of developed flows to "Pond B" located to the Southeast of the site, and a temporary Pond located to the east of the site, both of which will be developed with this project. Future Pond A5 is located on the east side of Woodmont Avenue and east of the proposed Catalonia subdivision, both Pond B will be conveyed to this pond through storm drain networks. Future Pond A5 will be fully developed per the Master Drainage Plan with this project, however, the discharge for Future Pond A5 will not be developed. This report is submitted in support of grading approval and preliminary plat approval by the DRB.

II. PURPOSE OF REPORT

The purpose of this report is to provide site-specific drainage analysis for existing and ultimate conditions for the subdivision development referred to as Catalonia at the Trails. This plan is prepared and submitted to support design and grading of the subdivision and internal streets for preliminary and final plat approvals.

III. METHODOLOGY AND REFERENCES

All analysis was completed for the existing and fully developed conditions. The runoff volumes were computed for the 100 yr. – 6 hr. storm in accordance with the City of Albuquerque Development Manual (DPM), Volume II – Design Criteria, Section 22.2, Hydrology, The City of Albuquerque, January 2002. Since the site is less than 40 acres in size, the Rational Method is used in this report for the hydrology analysis. The storm drain network was analyzed assuming laminar flow and applying classical non-compressible fluid mechanics approach.

This report is consistent with previously approved drainage reports for this development. The following City of Albuquerque approved documents will be referenced throughout this report:

Amendment to Drainage Management Plan for the Trails Units 1, 2, and 3 Plate 2, prepared by Thompson Engineering Consultants, Inc., February 2015. This report establishes site specific drainage improvements guidelines for the subdivision Catalonia at the Trails and provides the allowable discharge from the ponds which will be developed with this project.

IV. SITE LOCATION AND CHARACTERISTICS

This project is located within the Volcano Trails Sector Plan area, in northwest Albuquerque, west of Rainbow Blvd and south of Woodmont Avenue. (see 'EXHIBIT E– Subdivision Location Map and Summary Plat').

The site consists primarily of native grasses and bushes, with few trees within the site. Slopes range from 1% to 25%, with the majority of the project sloping at 3% to 15%.

Considering that the site will not be phased, the flow paths for the interim and the ultimate conditions will not differ. Hence, the hydrology and hydraulics analysis will be performed for the existing and ultimate conditions.

V. EXISTING CONDITIONS

The existing basin and drainage patterns are shown graphically on the Existing Drainage Conditions Map in 'EXHIBIT C– Existing Conditions Basin Map'. The site currently has a berm running through the middle it from east to west starting at Woodmont Avenue and ending on the west side of the site. The berm will send the flows to the southeast or northeast depending on which side of the berm the flow is coming from. There are offsite flows draining to the site. For additional information please refer to Drainage Master Plan for the Trails Units 1, 2, and 3 and 'APPENDIX B– Original Developed Conditions Basin Map from DMP'.

The site runoff naturally flows southeast to Future Pond B, or northeast to the temporary pond that will be put in for this site. In addition, a small portion of the site drains

east to Woodmont Avenue which will be collected by existing storm drain inlets. For details refer to APPENDIX B.

The site has been divided into 5 basins: Ex Basin-1 ($A = 3.24$ acres, $Q_{100} = 4.1$ cfs), Ex Basin-2 ($A = 3.17$ acres, $Q_{100} = 12.2$ cfs), Ex Basin-3 ($A = 3.35$ acres, $Q_{100} = 10.9$ cfs), Ex Basin-4 ($A = 13.16$ acres, $Q_{100} = 42.8$ cfs), and Offsite Basin-1 ($A = 30.83$ acres, $Q_{100} = 39.1$ cfs).

VI. DEVELOPED CONDITIONS

A. INTERIM CONDITIONS

The development of Catalonia at the Trails Unit 3A must accommodate offsite historic flows. Ex Basin-1 ($A = 3.24$ acres, $Q_{100} = 4.1$ cfs), Ex Basin-2 ($A = 3.17$ acres, $Q_{100} = 12.2$ cfs), Ex Basin-3 ($A = 3.35$ acres, $Q_{100} = 10.9$ cfs), drains Northeast to the Northeastern boundary, Ex Basin-4 ($A = 4.20$ acres, $Q_{100} = 5.33$ cfs) drains Northwest to Southeast while Ex Basin-5 ($A = 13.16$ acres, $Q_{100} = 42.8$ cfs) drains to the Southeastern boundary. Per the drainage master plan, Offsite Basin-1 ($A = 30.83$ acres, $Q_{100} = 39.1$ cfs) is captured on the western boundary by a detention pond formally known as "Future Offsite Pond 1", from this point on "Future Offsite Pond 1" will be known as "Offsite Pond 1". Offsite Pond 1 discharges to a 24" storm drain pipe with an allowable discharge of $Q_{100} = 9.25$ cfs for the DMP from Thompson Engineering.

Ex Basin 1, Ex Basin 2, and a portion of Ex Basin 3 are combined to form Basin A ($A = 9.20$ acres, $Q_{100} = 29.7$ cfs). Within Basin A, $Q_{100} = 0.76$ cfs is conveyed by Mataro Road from lot 30 west to Manresa Drive, $Q_{100} = 14.0$ cfs is conveyed by Manresa Drive from the highpoint located near lot 33 north to the intersection of Manresa Drive and Girona Avenue, $Q_{100} = 7.0$ cfs is conveyed by Tortosa Drive from the highpoint located near lot 50 north to the intersection of Tortosa Drive and Girona Avenue, $Q_{100} = 8.2$ cfs is conveyed by Cambrils Drive from the highpoint located at the intersection of Cambrils Drive and Bellatara Street north to the intersection of Girona Avenue. East of the intersection of Cambrils Drive and Girona Avenue, the flow being conveyed by Girona Avenue is $Q_{100} = 29.7$ cfs, this results in the need for two (2) type A double wing wall inlets, one on each side of Girona Avenue, $Q_{100} = 32.41$ cfs per each inlet. The inlets tie into a 36" storm drain line which discharges to a retention pond, "Pond A" ($V = 4.37$ Ac-Ft, $Q_{100} = 37.89$ cfs).

A portion of Ex Basin 5 is to form Basin B ($A=11.10$ acres, $Q_{100} = 35.9$ cfs). Basin B is conveyed by Mataro Road from the highpoint located near lot 28 east to Cambrils Drive with a flowrate of $Q_{100} = 18.4$ cfs. From said intersection, drainage is conveyed by Cambrils Drive south to the low point in Tarragona Road, east of lot 7, at a flowrate of $Q_{100} = 24.8$ cfs. Additionally, $Q_{100} = 11.1$ cfs is conveyed by Tarragona Road from the highpoint located near lot 33 in Manresa Drive east to the low point previously mentioned. At the low point east of Lot 7 will a Type A double wing wall inlet, Inlet 1, to capture the $Q_{100} = 38.47$ cfs that is produced by Basin B. Inlet 1 will be located on the eastern side of the road which will be superelevated to convey the drainage to the inlet. A 12' wide concrete valley gutter will be placed across the road to help convey said drainage. Inlet 1 will discharge to a detention pond, Pond B ($V=2.13$ Ac-Ft, $Q_{100} = 33.73$ cfs). If the inlet were to clog, the drainage would overtop the curb and spill into Pond B. Pond B has an allowable discharge of $Q_{100} = 3.36$ cfs which will discharge to Pond A5 and is designed to have two feet of freeboard and an emergency spillway as shown on EXHIBIT F.

Basin Offsite 2 is Basin A3 from the master DMP for the Trails Unit 1, 2, and 3 ($A = 3.21$ acres, $Q_{100} = 11.41$ cfs). A portion of Offsite Basin 2 will be developed with this project as Woodmont Avenue. A pond will be placed just north of the developed Woodmont Avenue, called "Woodmont Pond" ($V=1.27$ Ac-Ft, $Q_{100} = 28$ cfs). Woodmont Temporary Pond will discharge through a 24" pipe which will ultimately be conveyed to Pond A by a 48" pipe. Woodmont Pond has an allowable discharge of $Q_{100} = 11.41$ cfs per the DMP from Thompson Engineering.

Offsite Basin 3 is a portion of Basin E4 from the master DMP ($A=1.43$ acres, $Q_{100} = 3.9$ cfs). Offsite Basin 3 will be conveyed down Woodmont Avenue where it will be collected by existing inlets. This basin does not exceed the master DMP flows.

Pond A5, formally known as "Future Pond A5", located east of Woodmont Avenue in Tract OS-2, $V=4.61$ acres per the master DMP, will be developed as a retention pond in the interim condition. The pond will store drainage from the area to the north of it as well as the discharge from Pond B.

B. ULTIMATE CONDITIONS

The ultimate conditions are the same as the interim conditions except for what is discussed from this point forward. Pond A will be removed and the 48" storm drain pipe that discharges to Pond A will be extended to the Southeast by a 54" storm drain to Pond A5.

Pond A5 will no longer be a retention pond, instead it will be a detention pond as a 24" storm drain pipe will be installed to discharge an allowable flow of $Q_{100} = 15.56$ cfs to "Future Pond A6". As mentioned above, Pond A5 will collect discharge from a 54" from DMP Basin A3, Proposed Basin A and Offsite Pond 1. The Woodmont Pond will also be filled in to allow for Woodmont Avenue to be built. Woodmont Avenue will be designed so that there is a low point located in Basin A3 ($Q_{100} = 11.41$ cfs per the DMP) where inlets can be placed to collect and convey the drainage through the storm drain network which ultimately reaches Pond A5. Offsite Pond 1 will need to be upsized from 1.08 Ac-Ft to 2.44 Ac-Ft to meet the required volume from the master DMP once development to the North is added.

C. FIRST FLUSH REQUIREMENTS

This project is required to meet the first flush requirements of the new City Drainage Ordinance. The first flush requirement will be met via detention volume. Two retentions ponds will be constructed. Pond A ($V_s = 4.37$ Ac-Ft) will convey develop flows from Basin A, and Detention Pond B ($V_s = 2.13$ Ac-Ft) will convey develop flows from Basin B. The required storage is calculated as 0.42 in. times the subdivision acreage times the percent impervious area and is equal to 12628.7 cf (0.29 Ac-Ft). The provided detention volume is $V_{Provided} = 6.50$ Ac-Ft, hence the water quality requirements for this project is fulfilled.

See 'APPENDIX E– First Flush Requirements' for more information.

VII. GRADING PLAN

The grading plan for Catalonia is included in 'EXHIBIT F– Grading Plan' of this report.

VIII. CALCULATIONS

All the calculations to support the narrative are included in the appendices and were computed in accordance to the COA DPM, Chapter 22, Section 2. Microsoft Excel spreadsheets, manning equations and stream were used to analyze the site drainage, storm drain and roadway infrastructure. The design storm used in this analysis is the 100 year – 6hr storm event. The land treatment percentage D was computed using equation from COA DPM table A-5, Chapter 22, Section 2, as a function of the area and number of units. The remaining land treatment percentages was evenly divided between categories B and C. The

runoff coefficient, C, was obtain from COA DPM table A-11, chapter 22, section 2. The average rainfall intensity, i, was taken from COA DPM table A-10, chapter 22, section 2. Once these parameters were known the runoff flows for each sub-basin were computed, as shown in APPENDIX A. Manufactures curvilinear pipe recommendations can be found in APPENDIX I. For HGL analysis Autodesk Civil3D 2020 Analyze Gravity Networks was used which complies with the HEC-22 3rd edition energy grade line calculations. Output files can be found in APPENDIX C.

IX. CONCLUSION

This drainage report is in compliance with the previously approved drainage master plans and drainage reports, and no adverse effects are anticipated to the existing infrastructure. The proposed storm drain infrastructure and drainage management schemes allow for the safe management of storm runoff and preservation of the natural terrain in permanent conditions. The implementation of these concepts would result in the safe passage of the 100-year-6 hr. storm event. With the information presented in this report we are requesting this drainage report to be approved.

APPENDICES

**APPENDIX A: BASIN ANALYSIS AND SUMMARY
OF LAND TREATMENTS**

APPENDIX B: INLET/STREET HYDRAULICS

APPENDIX C: STORM DRAIN PIPE ANALYSIS

APPENDIX D: DETENTION POND ANALYSIS

APPENDIX E: FIRST FLUSH REQUIREMENTS

APPENDIX F: CHANNEL ANALYSIS

APPENDIX G: EMERGENCY SPILLWAY ANALYSIS

APPENDIX H: HEC-HMS ANALYSIS

**APPENDIX I: MANUFACTURERS
RECOMMENDATIONS**

APPENDIX A:
BASIN ANALYSIS AND SUMMARY OF LAND
TREATMENTS

EXISTING BASIN SUMMARY											
BASIN	AREA	AREA		% LAND TREATMENT				DISCHARGE (CFS)	DISCHARGE (CFS)	VOLUME (AC-FT)	VOLUME (AC-FT)
I.D.	(FT)	(AC)		A	B	C	D	10 yr	100YR	10 yr	100 yr
OFFSITE BASIN 1	1342745	30.83		100.00%	0.00%	0.00%	0.00%	7.7	39.1	0.21	1.13
Ex Basin 1	140918	3.24		100.00%	0.00%	0.00%	0.00%	0.8	4.1	0.02	0.12
Ex Basin 2	138230	3.17		0.00%	0.00%	34.00%	66.00%	7.6	12.2	0.26	0.43
Ex Basin 3	145822	3.35		0.00%	29.00%	29.00%	42.00%	6.2	10.9	0.20	0.37
Ex Basin 4	182996.9	4.20	0	100.00%	0.0%	0.0%	0.0%	1.1	5.33	0.03	0.15
Ex Basin 5	573090	13.16		0.00%	29.00%	29.00%	42.00%	24.5	42.8	0.78	1.43
TOTAL	2523801.9	57.9						47.9	114.5	1.5	3.6

DEVELOPED BASIN SUMMARY											
BASIN	AREA	AREA	Lots	% LAND TREATMENT				DISCHARGE (CFS)	DISCHARGE (CFS)	VOLUME (AC-FT)	VOLUME (AC-FT)
I.D.	(ft)	(AC)		A	B	C	D	10 yr	100YR	10 yr	
BASIN A	400914	9.20	39	0.00%	29.6%	29.6%	40.8%	16.9	29.7	0.54	0.99
BASIN B	483543	11.10	39	0.00%	29.6%	29.6%	40.8%	20.4	35.9	0.65	1.20
OFFSITE BASIN 1	1342745	30.83	0	100.00%	0.0%	0.0%	0.0%	7.7	39.1	0.21	1.13
OFFSITE BASIN 2	51247	1.18	0	0.00%	0.0%	10.0%	90.0%	3.2	5.0	0.11	0.18
OFFSITE BASIN 3	62458	1.43	0	0.00%	0.0%	10.0%	90.0%	3.9	6.05	0.14	0.22
OFFSITE BASIN 4	182996.9	4.20	0	100.00%	0.0%	0.0%	0.0%	1.1	5.33	0.03	0.15
TOTAL	2340907.00	53.7	78.00					52.2	115.7	1.6	3.7

APPENDIX B: INLET/STREET HYDRAULICS

Single Type "A" Sump- INLET A

ANALYSIS OF AN INLET IN A SUMP CONDITION - INLET 2 & 3 - Girona Avenue

INLET TYPE: Single Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: $Q=C*L*H^{1.5}$

ORIFICE: $Q=C*A*(2*G*H)^{0.5}$

Wing opening

Grate opening

Grate opening

Wing opening

C= 3.0

C=3.0

C=0.6

C=0.6

L= 4.0 ft

L(single grate)=[(2.67')+2(1.8')]=6.27' A(single grate)=3.72 sf A=2.0 sf

$Q=3.0(4.0')H^{1.5}=12.0H^{1.5}$ $Q=3.0(6.27)H^{1.5}=18.81H^{1.5}$ $Q=2.46*(64.4'H)^{0.5}$ $Q=1.2*(64.4'H)^{0.5}$

	WS	HEIGHT	Q (CFS) WEIR	Q (CFS) WEIR	Q (CFS) ORIFICE	TOTAL Q	COMMENTS:
	ELEVATION	ABOVE INLET	WING OPENING	SINGLE GRATE	SINGLE GRATE	(CFS)	
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at single "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.59	5.66	1.35	Weir controls on grate analysis
	0.20	0.20	1.07	1.68	8.01	3.83	
	0.30	0.30	1.97	3.09	9.81	7.03	
	0.40	0.40	3.04	4.76	11.33	10.83	
	0.50	0.50	4.24	6.65	12.67	15.14	Q required = 2x100yr = 59.4 Q provided = 64.82
	0.60	0.60	5.58	8.74	13.87	19.90	
TOP OF CURB	0.70	0.70	7.03	11.02	14.99	25.07	
	0.80	0.80	8.59	13.46	16.02	30.63	Q(100 yr) = 32.41 cfs is provided at this depth
ROW LIMIT	0.90	0.90	10.25	16.06	16.99	36.55	
	1.00	1.00	12.00	18.81	17.91	41.91	

NOTE:

The total runoff intercepted by the inlet at the low point in the road is:

$Q(100) = 2*[(\text{runoff of the wing opening}) + (\text{the lesser of the weir or orifice amount taken by the double grate})]$.

THE 100 YR STORM EVENT = 23.79 CFS at the sump condition

Height = Height of water above the center of the opening.

Double Type "A" Sump- Inlet A

ANALYSIS OF AN INLET IN A SUMP CONDITION - **INLET 1 - Catalonia**

INLET TYPE: Double Grate Type "A" with curb opening wings on both sides on inlet.

WEIR: $Q=C*L*H^{1.5}$

Wing opening

C= 3.0

L= 4.0 ft

$Q=3.0(4.0)H^{1.5}= 12.0H^{1.5}$

Grate opening

C=3.0

L(double grate)=[2(2.67')+2(1.8')]=8.94 ft

$Q=3.0(8.94)H^{1.5}=26.82*H^{1.5}$

ORIFICE: $Q=C*A*(2*G*H)^{0.5}$

Grate opening

C=0.6

A(double grate)=7.14 sf

$Q=4.194*(64.4*H)^{0.5}$

Wing opening

C=0.6

A=2.0 sf

$Q=1.2*(64.4*H)^{0.5}$

	WS ELEVATION	HEIGHT ABOVE INLET	Q (CFS) WEIR "A" OPENING	Q (CFS) WEIR DOUBLE GRATE	Q (CFS) ORIFICE DOUBLE GRATE	TOTAL Q (CFS)	COMMENTS:
~FL @ INLET	0.00	0.00	0.00	0.00	0.00	0.00	Flow at double "A" inlet w/ two wing openings
	0.10	0.10	0.38	0.85	10.87	1.61	Weir controls on grate analysis
	0.20	0.20	1.07	2.40	15.37	4.55	
	0.30	0.30	1.97	4.41	18.83	8.35	
	0.40	0.40	3.04	6.78	21.74	12.86	
	0.50	0.50	4.24	9.48	24.31	17.97	
	0.60	0.60	5.58	12.46	26.63	23.62	
TOP OF CURB	0.70	0.70	7.03	15.71	28.76	29.76	
	0.80	0.80	8.59	19.19	30.75	36.36	Q(100 yr) = 38.47 cfs is provided at this depth
	0.90	0.90	10.25	22.90	32.61	43.39	
ROW LIMIT	1.00	1.00	12.00	26.82	34.38	50.82	

Q required = 100yr = 35.9
Q provided = 38.47

NOTE:

The total runoff intercepted by the inlet at the low point in the road is:

$Q_r(100) = 2*[(\text{runoff of the wing opening}) + (\text{the lesser of the weir or orifice amount taken by the double grate})]$.

Height = Height of water above the center of the opening.

53' ROW - 32' F-F

MANNING'S N = 0.017 SLOPE = 0.020

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	12.6	0.1	7.0	42.4	0.0
2.0	10.5	0.7	5.0	26.5	0.3	8.0	42.5	0.7
3.0	10.6	0.0	6.0	40.4	0.1	9.0	53.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)

0.010	0.010	0.002	0.001	0.341	0.349	0.323	0.012
0.020	0.020	0.006	0.004	0.682	0.554	0.646	0.025
0.030	0.030	0.015	0.011	1.023	0.725	0.969	0.038
0.040	0.040	0.026	0.023	1.363	0.879	1.292	0.052
0.050	0.050	0.040	0.041	1.704	1.020	1.615	0.066
0.060	0.060	0.058	0.067	2.045	1.152	1.938	0.081
0.070	0.070	0.079	0.101	2.386	1.276	2.261	0.095
0.080	0.080	0.103	0.144	2.727	1.395	2.584	0.110
0.090	0.090	0.131	0.197	3.068	1.509	2.907	0.125
0.100	0.100	0.162	0.261	3.409	1.619	3.230	0.141
0.110	0.110	0.195	0.337	3.749	1.725	3.553	0.156
0.120	0.120	0.233	0.425	4.090	1.828	3.876	0.172
0.130	0.130	0.274	0.491	4.984	1.789	4.752	0.180
0.140	0.140	0.329	0.561	6.430	1.704	6.181	0.185
0.150	0.150	0.398	0.672	7.876	1.690	7.610	0.194
0.160	0.160	0.481	0.825	9.322	1.714	9.038	0.206
0.170	0.170	0.579	1.019	10.768	1.761	10.467	0.218
0.180	0.180	0.691	1.257	12.214	1.821	11.896	0.232
0.190	0.190	0.817	1.543	13.660	1.890	13.324	0.246
0.200	0.200	0.957	1.880	15.106	1.965	14.753	0.260
0.210	0.210	1.112	2.271	16.552	2.043	16.182	0.275
0.220	0.220	1.281	2.718	17.998	2.123	17.610	0.290
0.230	0.230	1.464	3.227	19.444	2.204	19.039	0.306
0.240	0.240	1.661	3.798	20.890	2.286	20.468	0.321
0.250	0.250	1.873	4.437	22.336	2.369	21.896	0.337
0.260	0.260	2.099	5.145	23.782	2.451	23.325	0.353
0.270	0.270	2.340	5.926	25.228	2.533	24.754	0.370
0.280	0.280	2.594	6.783	26.674	2.615	26.182	0.386
0.290	0.290	2.863	7.719	28.120	2.696	27.611	0.403
0.300	0.300	3.147	8.736	29.566	2.776	29.040	0.420
0.310	0.310	3.444	9.837	31.012	2.856	30.468	0.437
0.320	0.320	3.756	11.026	32.458	2.936	31.897	0.454
0.330	0.330	4.075	12.625	32.478	3.098	31.900	0.479
0.340	0.340	4.394	14.309	32.498	3.257	31.903	0.505
0.350	0.350	4.713	16.076	32.519	3.411	31.906	0.531
0.360	0.360	5.032	17.923	32.539	3.562	31.909	0.557
0.370	0.370	5.351	19.849	32.559	3.709	31.912	0.584
0.380	0.380	5.670	21.851	32.579	3.854	31.915	0.611
0.390	0.390	5.990	23.930	32.599	3.995	31.918	0.638
0.400	0.400	6.309	26.082	32.620	4.134	31.921	0.666

Intersection Girona Ave
Manresa Drive (West) -
Q=14.0 cfs
E=0.50'<0.87'
D=0.34'

0.410	0.410	6.628	28.307	32.640	4.271	31.924	0.694
0.420	0.420	6.947	30.603	32.660	4.405	31.927	0.722
0.430	0.430	7.267	32.969	32.680	4.537	31.930	0.750
0.440	0.440	7.586	35.404	32.701	4.667	31.933	0.779
0.450	0.450	7.905	37.907	32.721	4.795	31.936	0.808
0.460	0.460	8.225	40.477	32.741	4.922	31.939	0.837
0.470	0.470	8.544	43.113	32.761	5.046	31.942	0.866
0.480	0.480	8.863	45.814	32.781	5.169	31.945	0.896
0.490	0.490	9.183	48.579	32.802	5.290	31.948	0.925
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
INC	AREA	RATE	PER	VEL	PLUS	ENERGY	
FT.	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)	
0.500	0.500	9.502	51.408	32.822	5.410	31.952	0.955
0.510	0.510	9.822	54.299	32.842	5.528	31.955	0.985
0.520	0.520	10.141	57.251	32.862	5.645	31.958	1.016
0.530	0.530	10.461	60.265	32.883	5.761	31.961	1.046
0.540	0.540	10.781	63.339	32.903	5.875	31.964	1.077
0.550	0.550	11.100	66.473	32.923	5.988	31.967	1.108
0.560	0.560	11.420	69.665	32.943	6.100	31.970	1.139
0.570	0.570	11.740	72.916	32.964	6.211	31.973	1.170
0.580	0.580	12.059	76.225	32.984	6.321	31.976	1.201
0.590	0.590	12.379	79.591	33.004	6.429	31.979	1.233
0.600	0.600	12.699	83.013	33.024	6.537	31.982	1.265
0.610	0.610	13.019	86.492	33.044	6.644	31.985	1.297
0.620	0.620	13.339	90.026	33.065	6.749	31.988	1.329
0.630	0.630	13.659	93.615	33.085	6.854	31.991	1.361
0.640	0.640	13.979	97.258	33.105	6.958	31.994	1.393
0.650	0.650	14.299	100.955	33.125	7.061	31.997	1.425
0.660	0.660	14.619	104.706	33.146	7.163	32.000	1.458
0.670	0.670	14.944	106.483	34.146	7.126	33.000	1.460
0.680	0.680	15.279	108.385	35.146	7.094	34.000	1.463
0.690	0.690	15.624	110.410	36.146	7.067	35.000	1.467
0.700	0.700	15.979	112.556	37.146	7.044	36.000	1.472
0.710	0.710	16.344	114.821	38.147	7.026	37.000	1.478
0.720	0.720	16.719	117.206	39.147	7.011	38.000	1.484
0.730	0.730	17.104	119.708	40.147	6.999	39.000	1.492
0.740	0.740	17.499	122.328	41.147	6.991	40.000	1.500
0.750	0.750	17.904	125.065	42.147	6.985	41.000	1.509
0.760	0.760	18.319	127.918	43.148	6.983	42.000	1.518
0.770	0.770	18.744	130.887	44.148	6.983	43.000	1.528
0.780	0.780	19.179	133.973	45.148	6.986	44.000	1.539
0.790	0.790	19.624	137.175	46.148	6.990	45.000	1.550
0.800	0.800	20.079	140.494	47.148	6.997	46.000	1.562
0.810	0.810	20.544	143.931	48.149	7.006	47.000	1.573
0.820	0.820	21.019	147.484	49.149	7.017	48.000	1.586
0.830	0.830	21.504	151.156	50.149	7.029	49.000	1.599
0.840	0.840	21.999	154.946	51.149	7.043	50.000	1.612
0.850	0.850	22.504	158.855	52.149	7.059	51.000	1.625
0.860	0.860	23.019	162.885	53.150	7.076	52.000	1.639

53' ROW 32' F-F

MANNING'S N = 0.017 SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	12.6	0.1	7.0	42.4	0.0
2.0	10.5	0.7	5.0	26.5	0.3	8.0	42.5	0.7
3.0	10.6	0.0	6.0	40.4	0.1	9.0	53.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOPWID	TOTAL	FROUDE
FT.	INC	AREA	RATE	PER	VEL	PLUS	WATER	ENERGY	NO.
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS		(FT)	

0.010	0.010	0.002	0.001	0.329	0.427	0.311	0.311	0.013	1.063
0.020	0.020	0.006	0.004	0.657	0.677	0.621	0.621	0.027	1.194
0.030	0.030	0.014	0.012	0.986	0.887	0.932	0.932	0.042	1.277
0.040	0.040	0.025	0.027	1.314	1.075	1.243	1.243	0.058	1.340
0.050	0.050	0.039	0.048	1.643	1.247	1.554	1.554	0.074	1.391
0.060	0.060	0.056	0.079	1.971	1.408	1.864	1.864	0.091	1.433
0.070	0.070	0.076	0.119	2.300	1.561	2.175	2.175	0.108	1.471
0.080	0.080	0.099	0.170	2.629	1.706	2.486	2.486	0.125	1.504
0.090	0.090	0.126	0.232	2.957	1.845	2.797	2.797	0.143	1.534
0.100	0.100	0.155	0.308	3.286	1.980	3.107	3.107	0.161	1.561
0.110	0.110	0.188	0.397	3.614	2.110	3.418	3.418	0.179	1.586
0.120	0.120	0.224	0.500	3.943	2.236	3.729	3.729	0.198	1.609
0.130	0.130	0.263	0.619	4.271	2.358	4.039	4.039	0.216	1.631
0.140	0.140	0.310	0.670	5.755	2.161	5.506	5.506	0.213	1.605
0.150	0.150	0.373	0.781	7.238	2.095	6.972	6.972	0.218	1.598
0.160	0.160	0.450	0.943	8.722	2.097	8.438	8.438	0.228	1.602
0.170	0.170	0.541	1.157	10.205	2.138	9.904	9.904	0.241	1.612
0.180	0.180	0.648	1.426	11.689	2.201	11.370	11.370	0.255	1.625
0.190	0.190	0.769	1.751	13.173	2.278	12.837	12.837	0.271	1.641
0.200	0.200	0.905	2.139	14.656	2.364	14.303	14.303	0.287	1.658
0.210	0.210	1.055	2.591	16.140	2.457	15.769	15.769	0.304	1.674
0.220	0.220	1.220	3.114	17.623	2.552	17.235	17.235	0.321	1.691
0.230	0.230	1.400	3.710	19.107	2.651	18.701	18.701	0.339	1.708
0.240	0.240	1.594	4.383	20.590	2.750	20.167	20.167	0.358	1.725
0.250	0.250	1.803	5.139	22.074	2.850	21.634	21.634	0.376	1.741
0.260	0.260	2.027	5.980	23.557	2.950	23.100	23.100	0.395	1.756
0.270	0.270	2.265	6.910	25.041	3.051	24.566	24.566	0.415	1.771
0.280	0.280	2.518	7.933	26.524	3.151	26.032	26.032	0.434	1.786
0.290	0.290	2.786	9.053	28.008	3.250	27.498	27.498	0.454	1.800
0.300	0.300	3.068	10.274	29.491	3.349	28.965	28.965	0.474	1.814
0.310	0.310	3.365	11.599	30.975	3.447	30.431	30.431	0.495	1.827
0.320	0.320	3.677	13.031	32.458	3.544	31.897	31.897	0.515	1.841
0.330	0.330	3.996	14.963	32.479	3.745	31.900	31.900	0.548	1.866
0.340	0.340	4.315	17.000	32.499	3.940	31.903	31.903	0.581	1.889
0.350	0.350	4.634	19.138	32.519	4.130	31.906	31.906	0.615	1.911
0.360	0.360	4.953	21.376	32.539	4.316	31.909	31.909	0.650	1.931
0.370	0.370	5.272	23.710	32.559	4.498	31.912	31.912	0.685	1.951
0.380	0.380	5.591	26.140	32.580	4.675	31.915	31.915	0.720	1.969
0.390	0.390	5.910	28.662	32.600	4.850	31.918	31.918	0.756	1.987

Intersection Girona Ave
Tortosa St - Q=21.6 cfs
E=0.37'<0.87'
D=0.25'

0.400	0.400	6.229	31.275	32.620	5.021	31.921	31.921	0.792	2.004		
0.410	0.410	6.548	33.978	32.640	5.189	31.924	31.924	0.829	2.020		
0.420	0.420	6.868	36.768	32.661	5.354	31.927	31.927	0.866	2.035		
0.430	0.430	7.187	39.644	32.681	5.516	31.930	31.930	0.903	2.050		
0.440	0.440	7.506	42.606	32.701	5.676	31.933	31.933	0.941	2.064		
0.450	0.450	7.826	45.651	32.721	5.833	31.936	31.936	0.979	2.078		
0.460	0.460	8.145	48.778	32.742	5.989	31.939	31.939	1.018	2.091		
0.470	0.470	8.464	51.986	32.762	6.142	31.942	31.942	1.057	2.103		
0.480	0.480	8.784	55.274	32.782	6.293	31.945	31.945	1.096	2.116		
0.490	0.490	9.103	58.641	32.802	6.442	31.948	31.948	1.135	2.127		
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOPWID	TOTAL	FROUDE		
INC	AREA	RATE	PER	VEL	PLUS	WATER	ENERGY	NO.			
FT.	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS		(FT)				
0.500	0.500	9.423	62.085	32.822	6.589	31.952	31.952	1.175	2.139		
0.510	0.510	9.742	65.607	32.843	6.734	31.955	31.955	1.215	2.150		
0.520	0.520	10.062	69.204	32.863	6.878	31.958	31.958	1.256	2.161		
0.530	0.530	10.382	72.876	32.883	7.020	31.961	31.961	1.296	2.171		
0.540	0.540	10.701	76.623	32.903	7.160	31.964	31.964	1.337	2.182		
0.550	0.550	11.021	80.442	32.924	7.299	31.967	31.967	1.379	2.192		
0.560	0.560	11.341	84.334	32.944	7.437	31.970	31.970	1.420	2.201		
0.570	0.570	11.660	88.298	32.964	7.573	31.973	31.973	1.462	2.211		
0.580	0.580	11.980	92.332	32.984	7.707	31.976	31.976	1.504	2.220		
0.590	0.590	12.300	96.437	33.005	7.841	31.979	31.979	1.546	2.229		
0.600	0.600	12.620	100.611	33.025	7.973	31.982	31.982	1.589	2.238		
0.610	0.610	12.939	104.853	33.045	8.103	31.985	31.985	1.631	2.246		
0.620	0.620	13.259	109.164	33.065	8.233	31.988	31.988	1.674	2.254		
0.630	0.630	13.579	113.543	33.085	8.362	31.991	31.991	1.717	2.263		
0.640	0.640	13.899	117.988	33.106	8.489	31.994	31.994	1.761	2.271		
0.650	0.650	14.219	122.500	33.126	8.615	31.997	31.997	1.804	2.278		
0.660	0.660	14.539	127.077	33.146	8.740	32.000	32.000	1.848	2.286		
0.670	0.670	14.864	129.259	34.146	8.696	33.000	33.000	1.846	2.284		
0.680	0.680	15.199	131.593	35.147	8.658	34.000	34.000	1.846	2.283		
0.690	0.690	15.544	134.078	36.147	8.626	35.000	35.000	1.847	2.282		
0.700	0.700	15.899	136.709	37.147	8.599	36.000	36.000	1.850	2.281		
0.710	0.710	16.264	139.487	38.147	8.576	37.000	37.000	1.854	2.281		
0.720	0.720	16.639	142.410	39.147	8.559	38.000	38.000	1.859	2.280		
0.730	0.730	17.024	145.477	40.148	8.545	39.000	39.000	1.866	2.280		
0.740	0.740	17.419	148.687	41.148	8.536	40.000	40.000	1.873	2.280		
0.750	0.750	17.824	152.039	42.148	8.530	41.000	41.000	1.882	2.281		
0.760	0.760	18.239	155.534	43.148	8.528	42.000	42.000	1.891	2.281		
0.770	0.770	18.664	159.170	44.148	8.528	43.000	43.000	1.901	2.282		
0.780	0.780	19.099	162.949	45.149	8.532	44.000	44.000	1.912	2.283		
0.790	0.790	19.544	166.871	46.149	8.538	45.000	45.000	1.924	2.284		
0.800	0.800	19.999	170.935	47.149	8.547	46.000	46.000	1.936	2.285		
0.810	0.810	20.464	175.142	48.149	8.559	47.000	47.000	1.949	2.287		
0.820	0.820	20.939	179.492	49.149	8.572	48.000	48.000	1.963	2.288		
0.830	0.830	21.424	183.987	50.150	8.588	49.000	49.000	1.977	2.290		
0.840	0.840	21.919	188.627	51.150	8.606	50.000	50.000	1.992	2.291		
0.850	0.850	22.424	193.412	52.150	8.625	51.000	51.000	2.007	2.293		
0.860	0.860	22.939	198.344	53.150	8.647	52.000	52.000	2.023	2.295		

53' ROW 32' F-F

MANNING'S N = 0.017 SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	12.6	0.1	7.0	42.4	0.0
2.0	10.5	0.7	5.0	26.5	0.3	8.0	42.5	0.7
3.0	10.6	0.0	6.0	40.4	0.1	9.0	53.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOPWID	TOTAL	FROUDE
FT.	INC	AREA	RATE	PER	VEL	PLUS	WATER	ENERGY	NO.
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS		(FT)	

0.010	0.010	0.002	0.001	0.329	0.427	0.311	0.311	0.013	1.063
0.020	0.020	0.006	0.004	0.657	0.677	0.621	0.621	0.027	1.194
0.030	0.030	0.014	0.012	0.986	0.887	0.932	0.932	0.042	1.277
0.040	0.040	0.025	0.027	1.314	1.075	1.243	1.243	0.058	1.340
0.050	0.050	0.039	0.048	1.643	1.247	1.554	1.554	0.074	1.391
0.060	0.060	0.056	0.079	1.971	1.408	1.864	1.864	0.091	1.433
0.070	0.070	0.076	0.119	2.300	1.561	2.175	2.175	0.108	1.471
0.080	0.080	0.099	0.170	2.629	1.706	2.486	2.486	0.125	1.504
0.090	0.090	0.126	0.232	2.957	1.845	2.797	2.797	0.143	1.534
0.100	0.100	0.155	0.308	3.286	1.980	3.107	3.107	0.161	1.561
0.110	0.110	0.188	0.397	3.614	2.110	3.418	3.418	0.179	1.586
0.120	0.120	0.224	0.500	3.943	2.236	3.729	3.729	0.198	1.609
0.130	0.130	0.263	0.619	4.271	2.358	4.039	4.039	0.216	1.631
0.140	0.140	0.310	0.670	5.755	2.161	5.506	5.506	0.213	1.605
0.150	0.150	0.373	0.781	7.238	2.095	6.972	6.972	0.218	1.598
0.160	0.160	0.450	0.943	8.722	2.097	8.438	8.438	0.228	1.602
0.170	0.170	0.541	1.157	10.205	2.138	9.904	9.904	0.241	1.612
0.180	0.180	0.648	1.426	11.689	2.201	11.370	11.370	0.255	1.625
0.190	0.190	0.769	1.751	13.173	2.278	12.837	12.837	0.271	1.641
0.200	0.200	0.905	2.139	14.656	2.364	14.303	14.303	0.287	1.658
0.210	0.210	1.055	2.591	16.140	2.457	15.769	15.769	0.304	1.674
0.220	0.220	1.220	3.114	17.623	2.552	17.235	17.235	0.321	1.691
0.230	0.230	1.400	3.710	19.107	2.651	18.701	18.701	0.339	1.708
0.240	0.240	1.594	4.383	20.590	2.750	20.167	20.167	0.358	1.725
0.250	0.250	1.803	5.139	22.074	2.850	21.634	21.634	0.376	1.741
0.260	0.260	2.027	5.980	23.557	2.950	23.100	23.100	0.395	1.756
0.270	0.270	2.265	6.910	25.041	3.051	24.566	24.566	0.415	1.771
0.280	0.280	2.518	7.933	26.524	3.151	26.032	26.032	0.434	1.786
0.290	0.290	2.786	9.053	28.008	3.250	27.498	27.498	0.454	1.800
0.300	0.300	3.068	10.274	29.491	3.349	28.965	28.965	0.474	1.814
0.310	0.310	3.365	11.599	30.975	3.447	30.431	30.431	0.495	1.827
0.320	0.320	3.677	13.031	32.458	3.544	31.897	31.897	0.515	1.841
0.330	0.330	3.996	14.963	32.479	3.745	31.900	31.900	0.548	1.866
0.340	0.340	4.315	17.000	32.499	3.940	31.903	31.903	0.581	1.889
0.350	0.350	4.634	19.138	32.519	4.130	31.906	31.906	0.615	1.911
0.360	0.360	4.953	21.376	32.539	4.316	31.909	31.909	0.650	1.931
0.370	0.370	5.272	23.710	32.559	4.498	31.912	31.912	0.685	1.951
0.380	0.380	5.591	26.140	32.580	4.675	31.915	31.915	0.720	1.969
0.390	0.390	5.910	28.662	32.600	4.850	31.918	31.918	0.756	1.987

Intersection Girona Ave
Cambrils Drive - Q=29.7
cfs
E=0.48'<0.87'
D=0.31'

0.400	0.400	6.229	31.275	32.620	5.021	31.921	31.921	0.792	2.004		
0.410	0.410	6.548	33.978	32.640	5.189	31.924	31.924	0.829	2.020		
0.420	0.420	6.868	36.768	32.661	5.354	31.927	31.927	0.866	2.035		
0.430	0.430	7.187	39.644	32.681	5.516	31.930	31.930	0.903	2.050		
0.440	0.440	7.506	42.606	32.701	5.676	31.933	31.933	0.941	2.064		
0.450	0.450	7.826	45.651	32.721	5.833	31.936	31.936	0.979	2.078		
0.460	0.460	8.145	48.778	32.742	5.989	31.939	31.939	1.018	2.091		
0.470	0.470	8.464	51.986	32.762	6.142	31.942	31.942	1.057	2.103		
0.480	0.480	8.784	55.274	32.782	6.293	31.945	31.945	1.096	2.116		
0.490	0.490	9.103	58.641	32.802	6.442	31.948	31.948	1.135	2.127		
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOPWID	TOTAL	FROUDE		
INC	AREA	RATE	PER	VEL	PLUS	WATER	ENERGY	NO.			
FT.	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS		(FT)				
0.500	0.500	9.423	62.085	32.822	6.589	31.952	31.952	1.175	2.139		
0.510	0.510	9.742	65.607	32.843	6.734	31.955	31.955	1.215	2.150		
0.520	0.520	10.062	69.204	32.863	6.878	31.958	31.958	1.256	2.161		
0.530	0.530	10.382	72.876	32.883	7.020	31.961	31.961	1.296	2.171		
0.540	0.540	10.701	76.623	32.903	7.160	31.964	31.964	1.337	2.182		
0.550	0.550	11.021	80.442	32.924	7.299	31.967	31.967	1.379	2.192		
0.560	0.560	11.341	84.334	32.944	7.437	31.970	31.970	1.420	2.201		
0.570	0.570	11.660	88.298	32.964	7.573	31.973	31.973	1.462	2.211		
0.580	0.580	11.980	92.332	32.984	7.707	31.976	31.976	1.504	2.220		
0.590	0.590	12.300	96.437	33.005	7.841	31.979	31.979	1.546	2.229		
0.600	0.600	12.620	100.611	33.025	7.973	31.982	31.982	1.589	2.238		
0.610	0.610	12.939	104.853	33.045	8.103	31.985	31.985	1.631	2.246		
0.620	0.620	13.259	109.164	33.065	8.233	31.988	31.988	1.674	2.254		
0.630	0.630	13.579	113.543	33.085	8.362	31.991	31.991	1.717	2.263		
0.640	0.640	13.899	117.988	33.106	8.489	31.994	31.994	1.761	2.271		
0.650	0.650	14.219	122.500	33.126	8.615	31.997	31.997	1.804	2.278		
0.660	0.660	14.539	127.077	33.146	8.740	32.000	32.000	1.848	2.286		
0.670	0.670	14.864	129.259	34.146	8.696	33.000	33.000	1.846	2.284		
0.680	0.680	15.199	131.593	35.147	8.658	34.000	34.000	1.846	2.283		
0.690	0.690	15.544	134.078	36.147	8.626	35.000	35.000	1.847	2.282		
0.700	0.700	15.899	136.709	37.147	8.599	36.000	36.000	1.850	2.281		
0.710	0.710	16.264	139.487	38.147	8.576	37.000	37.000	1.854	2.281		
0.720	0.720	16.639	142.410	39.147	8.559	38.000	38.000	1.859	2.280		
0.730	0.730	17.024	145.477	40.148	8.545	39.000	39.000	1.866	2.280		
0.740	0.740	17.419	148.687	41.148	8.536	40.000	40.000	1.873	2.280		
0.750	0.750	17.824	152.039	42.148	8.530	41.000	41.000	1.882	2.281		
0.760	0.760	18.239	155.534	43.148	8.528	42.000	42.000	1.891	2.281		
0.770	0.770	18.664	159.170	44.148	8.528	43.000	43.000	1.901	2.282		
0.780	0.780	19.099	162.949	45.149	8.532	44.000	44.000	1.912	2.283		
0.790	0.790	19.544	166.871	46.149	8.538	45.000	45.000	1.924	2.284		
0.800	0.800	19.999	170.935	47.149	8.547	46.000	46.000	1.936	2.285		
0.810	0.810	20.464	175.142	48.149	8.559	47.000	47.000	1.949	2.287		
0.820	0.820	20.939	179.492	49.149	8.572	48.000	48.000	1.963	2.288		
0.830	0.830	21.424	183.987	50.150	8.588	49.000	49.000	1.977	2.290		
0.840	0.840	21.919	188.627	51.150	8.606	50.000	50.000	1.992	2.291		
0.850	0.850	22.424	193.412	52.150	8.625	51.000	51.000	2.007	2.293		
0.860	0.860	22.939	198.344	53.150	8.647	52.000	52.000	2.023	2.295		

47' ROW - 28' F-F

MANNING'S N = 0.017 SLOPE = 0.045

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	11.6	0.1	7.0	37.5	0.0
2.0	9.5	0.7	5.0	23.5	0.3	8.0	37.6	0.7
3.0	9.6	0.0	6.0	35.5	0.1	9.0	47.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)

0.010	0.010	0.002	0.001	0.341	0.523	0.323	0.014
0.020	0.020	0.006	0.005	0.682	0.830	0.646	0.031
0.030	0.030	0.015	0.016	1.023	1.088	0.969	0.048
0.040	0.040	0.026	0.034	1.363	1.318	1.292	0.067
0.050	0.050	0.040	0.062	1.704	1.530	1.615	0.086
0.060	0.060	0.058	0.100	2.045	1.727	1.938	0.106
0.070	0.070	0.079	0.152	2.386	1.914	2.261	0.127
0.080	0.080	0.103	0.216	2.727	2.093	2.584	0.148
0.090	0.090	0.131	0.296	3.068	2.263	2.907	0.170
0.100	0.100	0.162	0.392	3.409	2.428	3.230	0.192
0.110	0.110	0.195	0.506	3.749	2.587	3.553	0.214
0.120	0.120	0.233	0.638	4.090	2.742	3.876	0.237
0.130	0.130	0.274	0.731	5.042	2.664	4.810	0.240
0.140	0.140	0.330	0.831	6.604	2.517	6.355	0.239
0.150	0.150	0.402	1.000	8.166	2.489	7.900	0.246
0.160	0.160	0.488	1.232	9.729	2.523	9.445	0.259
0.170	0.170	0.590	1.531	11.291	2.593	10.990	0.275
0.180	0.180	0.708	1.901	12.853	2.685	12.535	0.292
0.190	0.190	0.841	2.347	14.416	2.790	14.080	0.311
0.200	0.200	0.990	2.873	15.978	2.903	15.625	0.331
0.210	0.210	1.154	3.486	17.540	3.021	17.170	0.352
0.220	0.220	1.333	4.190	19.102	3.143	18.715	0.374
0.230	0.230	1.528	4.992	20.665	3.267	20.260	0.396
0.240	0.240	1.738	5.895	22.227	3.391	21.805	0.419
0.250	0.250	1.964	6.906	23.789	3.516	23.350	0.442
0.260	0.260	2.205	8.028	25.352	3.640	24.895	0.466
0.270	0.270	2.462	9.268	26.914	3.765	26.440	0.490
0.280	0.280	2.734	10.630	28.476	3.888	27.985	0.515
0.290	0.290	3.014	12.499	28.496	4.147	27.988	0.558
0.300	0.300	3.294	14.486	28.517	4.398	27.991	0.601
0.310	0.310	3.574	16.588	28.537	4.642	27.994	0.645
0.320	0.320	3.854	18.801	28.557	4.879	27.997	0.690
0.330	0.330	4.134	21.122	28.577	5.110	28.000	0.736
0.340	0.340	4.414	23.549	28.598	5.335	28.003	0.783
0.350	0.350	4.694	26.079	28.618	5.556	28.006	0.830
0.360	0.360	4.974	28.710	28.638	5.772	28.009	0.878
0.370	0.370	5.254	31.441	28.658	5.984	28.012	0.927
0.380	0.380	5.534	34.268	28.678	6.192	28.015	0.976
0.390	0.390	5.814	37.190	28.699	6.396	28.018	1.026
0.400	0.400	6.094	40.206	28.719	6.597	28.021	1.077

IN 1 Upstream (South)
on Tarragona St
Q=11.04 cfs
E=0.26'<0.87'
D=0.16'

Intersection Mataro Rd
Cambrils Drive -
Q=22.08 cfs
E=0.40'<0.87'
D=0.23'

IN 1 Upstream (North)
on Tarragona St
Q=24.86 cfs
E=0.45'<0.87'
D=0.26'

0.410	0.410	6.375	43.314	28.739	6.795	28.024	1.128	
0.420	0.420	6.655	46.512	28.759	6.989	28.027	1.180	
0.430	0.430	6.935	49.799	28.780	7.181	28.030	1.232	
0.440	0.440	7.216	53.174	28.800	7.369	28.033	1.285	
0.450	0.450	7.496	56.635	28.820	7.555	28.036	1.338	
0.460	0.460	7.776	60.182	28.840	7.739	28.039	1.392	
0.470	0.470	8.057	63.812	28.861	7.920	28.042	1.446	
0.480	0.480	8.337	67.525	28.881	8.099	28.045	1.500	
0.490	0.490	8.618	71.320	28.901	8.276	28.048	1.555	
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL	
INC	AREA	RATE	PER	VEL	PLUS	ENERGY		
FT.	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)		
0.500	0.500	8.898	75.196	28.921	8.451	28.052	1.611	
0.510	0.510	9.179	79.152	28.941	8.623	28.055	1.667	
0.520	0.520	9.459	83.186	28.962	8.794	28.058	1.723	
0.530	0.530	9.740	87.299	28.982	8.963	28.061	1.780	
0.540	0.540	10.020	91.489	29.002	9.130	28.064	1.837	
0.550	0.550	10.301	95.754	29.022	9.296	28.067	1.894	
0.560	0.560	10.582	100.096	29.043	9.459	28.070	1.952	
0.570	0.570	10.862	104.512	29.063	9.621	28.073	2.010	
0.580	0.580	11.143	109.002	29.083	9.782	28.076	2.068	
0.590	0.590	11.424	113.565	29.103	9.941	28.079	2.127	
0.600	0.600	11.705	118.201	29.124	10.098	28.082	2.186	
0.610	0.610	11.986	122.908	29.144	10.255	28.085	2.246	
0.620	0.620	12.266	127.687	29.164	10.409	28.088	2.305	
0.630	0.630	12.547	132.536	29.184	10.563	28.091	2.365	
0.640	0.640	12.828	137.455	29.204	10.715	28.094	2.426	
0.650	0.650	13.109	142.443	29.225	10.866	28.097	2.486	
0.660	0.660	13.390	147.500	29.245	11.015	28.100	2.547	
0.670	0.670	13.676	149.417	30.240	10.925	29.095	2.527	
0.680	0.680	13.972	151.538	31.235	10.846	30.089	2.510	
0.690	0.690	14.278	153.857	32.230	10.776	31.084	2.496	
0.700	0.700	14.594	156.369	33.225	10.715	32.079	2.486	
0.710	0.710	14.920	159.070	34.220	10.662	33.074	2.478	
0.720	0.720	15.255	161.956	35.215	10.616	34.068	2.473	
0.730	0.730	15.601	165.024	36.209	10.578	35.063	2.470	
0.740	0.740	15.957	168.272	37.204	10.546	36.058	2.470	
0.750	0.750	16.322	171.699	38.199	10.519	37.053	2.471	
0.760	0.760	16.698	175.301	39.194	10.499	38.047	2.474	
0.770	0.770	17.083	179.080	40.189	10.483	39.042	2.479	
0.780	0.780	17.478	183.032	41.184	10.472	40.037	2.486	
0.790	0.790	17.884	187.159	42.179	10.465	41.032	2.494	
0.800	0.800	18.299	191.460	43.174	10.463	42.026	2.503	
0.810	0.810	18.724	195.933	44.169	10.464	43.021	2.513	
0.820	0.820	19.160	200.581	45.164	10.469	44.016	2.525	
0.830	0.830	19.605	205.402	46.159	10.477	45.011	2.537	
0.840	0.840	20.060	210.397	47.154	10.489	46.005	2.551	

MANNING'S N = 0.017 SLOPE = 0.015

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	11.6	0.1	7.0	37.5	0.0
2.0	9.5	0.7	5.0	23.5	0.3	8.0	37.6	0.7
3.0	9.6	0.0	6.0	35.5	0.1	9.0	47.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)

0.010	0.010	0.002	0.000	0.341	0.302	0.323	0.011
0.020	0.020	0.006	0.003	0.682	0.479	0.646	0.024
0.030	0.030	0.015	0.009	1.023	0.628	0.969	0.036
0.040	0.040	0.026	0.020	1.363	0.761	1.292	0.049
0.050	0.050	0.040	0.036	1.704	0.883	1.615	0.062
0.060	0.060	0.058	0.058	2.045	0.997	1.938	0.075
0.070	0.070	0.079	0.087	2.386	1.105	2.261	0.089
0.080	0.080	0.103	0.125	2.727	1.208	2.584	0.103
0.090	0.090	0.131	0.171	3.068	1.307	2.907	0.117
0.100	0.100	0.162	0.226	3.409	1.402	3.230	0.131
0.110	0.110	0.195	0.292	3.749	1.494	3.553	0.145
0.120	0.120	0.233	0.368	4.090	1.583	3.876	0.159
0.130	0.130	0.274	0.422	5.042	1.538	4.810	0.167
0.140	0.140	0.330	0.480	6.604	1.453	6.355	0.173
0.150	0.150	0.402	0.577	8.166	1.437	7.900	0.182
0.160	0.160	0.488	0.711	9.729	1.457	9.445	0.193
0.170	0.170	0.590	0.884	11.291	1.497	10.990	0.205
0.180	0.180	0.708	1.098	12.853	1.550	12.535	0.217
0.190	0.190	0.841	1.355	14.416	1.611	14.080	0.230
0.200	0.200	0.990	1.659	15.978	1.676	15.625	0.244
0.210	0.210	1.154	2.013	17.540	1.744	17.170	0.257
0.220	0.220	1.333	2.419	19.102	1.815	18.715	0.271
0.230	0.230	1.528	2.882	20.665	1.886	20.260	0.285
0.240	0.240	1.738	3.403	22.227	1.958	21.805	0.300
0.250	0.250	1.964	3.987	23.789	2.030	23.350	0.314
0.260	0.260	2.205	4.635	25.352	2.102	24.895	0.329
0.270	0.270	2.462	5.351	26.914	2.173	26.440	0.343
0.280	0.280	2.734	6.138	28.476	2.245	27.985	0.358
0.290	0.290	3.014	7.216	28.496	2.394	27.988	0.379
0.300	0.300	3.294	8.364	28.517	2.539	27.991	0.400
0.310	0.310	3.574	9.577	28.537	2.680	27.994	0.422
0.320	0.320	3.854	10.855	28.557	2.817	27.997	0.443
0.330	0.330	4.134	12.195	28.577	2.950	28.000	0.465
0.340	0.340	4.414	13.596	28.598	3.080	28.003	0.488
0.350	0.350	4.694	15.057	28.618	3.208	28.006	0.510
0.360	0.360	4.974	16.576	28.638	3.333	28.009	0.533
0.370	0.370	5.254	18.152	28.658	3.455	28.012	0.556
0.380	0.380	5.534	19.785	28.678	3.575	28.015	0.579
0.390	0.390	5.814	21.472	28.699	3.693	28.018	0.602
0.400	0.400	6.094	23.213	28.719	3.809	28.021	0.626

Intersection of
Manresa Dr. and
Mataro Rd
Q=0.3.1 CFS
D=0.234' which is
less than the delta
from the HP in Mataro
to the flowline in
Manresa (0.85')

0.410	0.410	6.375	25.007	28.739	3.923	28.024	0.649
0.420	0.420	6.655	26.854	28.759	4.035	28.027	0.673
0.430	0.430	6.935	28.752	28.780	4.146	28.030	0.697
0.440	0.440	7.216	30.700	28.800	4.255	28.033	0.722
0.450	0.450	7.496	32.699	28.820	4.362	28.036	0.746
0.460	0.460	7.776	34.746	28.840	4.468	28.039	0.771
0.470	0.470	8.057	36.842	28.861	4.573	28.042	0.795
0.480	0.480	8.337	38.986	28.881	4.676	28.045	0.820
0.490	0.490	8.618	41.177	28.901	4.778	28.048	0.845
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)	
0.500	0.500	8.898	43.415	28.921	4.879	28.052	0.870
0.510	0.510	9.179	45.698	28.941	4.979	28.055	0.896
0.520	0.520	9.459	48.028	28.962	5.077	28.058	0.921
0.530	0.530	9.740	50.402	28.982	5.175	28.061	0.947
0.540	0.540	10.020	52.821	29.002	5.271	28.064	0.972
0.550	0.550	10.301	55.284	29.022	5.367	28.067	0.998
0.560	0.560	10.582	57.790	29.043	5.461	28.070	1.024
0.570	0.570	10.862	60.340	29.063	5.555	28.073	1.050
0.580	0.580	11.143	62.932	29.083	5.648	28.076	1.076
0.590	0.590	11.424	65.567	29.103	5.739	28.079	1.102
0.600	0.600	11.705	68.243	29.124	5.830	28.082	1.129
0.610	0.610	11.986	70.961	29.144	5.921	28.085	1.155
0.620	0.620	12.266	73.720	29.164	6.010	28.088	1.182
0.630	0.630	12.547	76.520	29.184	6.098	28.091	1.208
0.640	0.640	12.828	79.359	29.204	6.186	28.094	1.235
0.650	0.650	13.109	82.239	29.225	6.273	28.097	1.262
0.660	0.660	13.390	85.159	29.245	6.360	28.100	1.289
0.670	0.670	13.676	86.266	30.240	6.308	29.095	1.289
0.680	0.680	13.972	87.491	31.235	6.262	30.089	1.290
0.690	0.690	14.278	88.830	32.230	6.221	31.084	1.292
0.700	0.700	14.594	90.280	33.225	6.186	32.079	1.295
0.710	0.710	14.920	91.839	34.220	6.156	33.074	1.299
0.720	0.720	15.255	93.505	35.215	6.129	34.068	1.304
0.730	0.730	15.601	95.277	36.209	6.107	35.063	1.310
0.740	0.740	15.957	97.152	37.204	6.089	36.058	1.317
0.750	0.750	16.322	99.130	38.199	6.073	37.053	1.324
0.760	0.760	16.698	101.210	39.194	6.061	38.047	1.331
0.770	0.770	17.083	103.392	40.189	6.052	39.042	1.340
0.780	0.780	17.478	105.674	41.184	6.046	40.037	1.349
0.790	0.790	17.884	108.056	42.179	6.042	41.032	1.358
0.800	0.800	18.299	110.539	43.174	6.041	42.026	1.368
0.810	0.810	18.724	113.122	44.169	6.041	43.021	1.378
0.820	0.820	19.160	115.805	45.164	6.044	44.016	1.388
0.830	0.830	19.605	118.589	46.159	6.049	45.011	1.399
0.840	0.840	20.060	121.473	47.154	6.056	46.005	1.410

MANNING'S N = 0.017 SLOPE = 0.030

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1.0	0.0	0.9	4.0	11.6	0.1	7.0	37.5	0.0
2.0	9.5	0.7	5.0	23.5	0.3	8.0	37.6	0.7
3.0	9.6	0.0	6.0	35.5	0.1	9.0	47.0	0.9

WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
		SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)

0.010	0.010	0.002	0.001	0.341	0.427	0.323	0.013
0.020	0.020	0.006	0.004	0.682	0.678	0.646	0.027
0.030	0.030	0.015	0.013	1.023	0.888	0.969	0.042
0.040	0.040	0.026	0.028	1.363	1.076	1.292	0.058
0.050	0.050	0.040	0.050	1.704	1.249	1.615	0.074
0.060	0.060	0.058	0.082	2.045	1.410	1.938	0.091
0.070	0.070	0.079	0.124	2.386	1.563	2.261	0.108
0.080	0.080	0.103	0.177	2.727	1.709	2.584	0.125
0.090	0.090	0.131	0.242	3.068	1.848	2.907	0.143
0.100	0.100	0.162	0.320	3.409	1.983	3.230	0.161
0.110	0.110	0.195	0.413	3.749	2.113	3.553	0.179
0.120	0.120	0.233	0.521	4.090	2.239	3.876	0.198
0.130	0.130	0.274	0.597	5.042	2.175	4.810	0.204
0.140	0.140	0.330	0.679	6.604	2.055	6.355	0.206
0.150	0.150	0.402	0.816	8.166	2.032	7.900	0.214
0.160	0.160	0.488	1.006	9.729	2.060	9.445	0.226
0.170	0.170	0.590	1.250	11.291	2.117	10.990	0.240
0.180	0.180	0.708	1.552	12.853	2.192	12.535	0.255
0.190	0.190	0.841	1.916	14.416	2.278	14.080	0.271
0.200	0.200	0.990	2.346	15.978	2.370	15.625	0.287
0.210	0.210	1.154	2.846	17.540	2.467	17.170	0.305
0.220	0.220	1.333	3.421	19.102	2.566	18.715	0.322
0.230	0.230	1.528	4.076	20.665	2.667	20.260	0.341
0.240	0.240	1.738	4.813	22.227	2.769	21.805	0.359
0.250	0.250	1.964	5.638	23.789	2.871	23.350	0.378
0.260	0.260	2.205	6.555	25.352	2.972	24.895	0.397
0.270	0.270	2.462	7.568	26.914	3.074	26.440	0.417
0.280	0.280	2.734	8.680	28.476	3.175	27.985	0.437
0.290	0.290	3.014	10.206	28.496	3.386	27.988	0.468
0.300	0.300	3.294	11.828	28.517	3.591	27.991	0.501
0.310	0.310	3.574	13.544	28.537	3.790	27.994	0.533
0.320	0.320	3.854	15.351	28.557	3.983	27.997	0.567
0.330	0.330	4.134	17.246	28.577	4.172	28.000	0.601
0.340	0.340	4.414	19.228	28.598	4.356	28.003	0.635
0.350	0.350	4.694	21.294	28.618	4.537	28.006	0.670
0.360	0.360	4.974	23.442	28.638	4.713	28.009	0.705
0.370	0.370	5.254	25.671	28.658	4.886	28.012	0.741
0.380	0.380	5.534	27.980	28.678	5.056	28.015	0.778
0.390	0.390	5.814	30.366	28.699	5.223	28.018	0.814
0.400	0.400	6.094	32.828	28.719	5.387	28.021	0.851

Intersection of
Bellaterra St. and
Cambrils Drive
Q=0.78 CFS
D=0.147' which is
less than the delta
from the HP in
Bellaterra to the
flowline in Cambrils
(0.19')

0.410	0.410	6.375	35.366	28.739	5.548	28.024	0.889
0.420	0.420	6.655	37.977	28.759	5.707	28.027	0.927
0.430	0.430	6.935	40.661	28.780	5.863	28.030	0.965
0.440	0.440	7.216	43.417	28.800	6.017	28.033	1.003
0.450	0.450	7.496	46.243	28.820	6.169	28.036	1.042
0.460	0.460	7.776	49.138	28.840	6.319	28.039	1.081
0.470	0.470	8.057	52.102	28.861	6.467	28.042	1.120
0.480	0.480	8.337	55.134	28.881	6.613	28.045	1.160
0.490	0.490	8.618	58.233	28.901	6.757	28.048	1.200
WSEL	DEPTH	FLOW	FLOW	WETTED	FLOW	TOPWID	TOTAL
FT.	INC	AREA	RATE	PER	VEL	PLUS	ENERGY
	SQ.FT.	(CFS)	(FT)	(FPS)	OBSTRUCTIONS	(FT)	
0.500	0.500	8.898	61.397	28.921	6.900	28.052	1.241
0.510	0.510	9.179	64.627	28.941	7.041	28.055	1.281
0.520	0.520	9.459	67.921	28.962	7.180	28.058	1.322
0.530	0.530	9.740	71.279	28.982	7.318	28.061	1.363
0.540	0.540	10.020	74.700	29.002	7.455	28.064	1.404
0.550	0.550	10.301	78.183	29.022	7.590	28.067	1.446
0.560	0.560	10.582	81.728	29.043	7.723	28.070	1.488
0.570	0.570	10.862	85.334	29.063	7.856	28.073	1.530
0.580	0.580	11.143	89.000	29.083	7.987	28.076	1.572
0.590	0.590	11.424	92.725	29.103	8.117	28.079	1.615
0.600	0.600	11.705	96.510	29.124	8.245	28.082	1.657
0.610	0.610	11.986	100.354	29.144	8.373	28.085	1.700
0.620	0.620	12.266	104.256	29.164	8.499	28.088	1.744
0.630	0.630	12.547	108.215	29.184	8.625	28.091	1.787
0.640	0.640	12.828	112.231	29.204	8.749	28.094	1.831
0.650	0.650	13.109	116.304	29.225	8.872	28.097	1.874
0.660	0.660	13.390	120.433	29.245	8.994	28.100	1.918
0.670	0.670	13.676	121.999	30.240	8.920	29.095	1.908
0.680	0.680	13.972	123.731	31.235	8.856	30.089	1.900
0.690	0.690	14.278	125.624	32.230	8.798	31.084	1.894
0.700	0.700	14.594	127.675	33.225	8.749	32.079	1.890
0.710	0.710	14.920	129.880	34.220	8.705	33.074	1.889
0.720	0.720	15.255	132.236	35.215	8.668	34.068	1.889
0.730	0.730	15.601	134.742	36.209	8.637	35.063	1.890
0.740	0.740	15.957	137.394	37.204	8.610	36.058	1.893
0.750	0.750	16.322	140.191	38.199	8.589	37.053	1.897
0.760	0.760	16.698	143.133	39.194	8.572	38.047	1.903
0.770	0.770	17.083	146.218	40.189	8.559	39.042	1.909
0.780	0.780	17.478	149.445	41.184	8.550	40.037	1.917
0.790	0.790	17.884	152.815	42.179	8.545	41.032	1.926
0.800	0.800	18.299	156.326	43.174	8.543	42.026	1.935
0.810	0.810	18.724	159.979	44.169	8.544	43.021	1.945
0.820	0.820	19.160	163.774	45.164	8.548	44.016	1.956
0.830	0.830	19.605	167.710	46.159	8.555	45.011	1.968
0.840	0.840	20.060	171.789	47.154	8.564	46.005	1.981

APPENDIX C: STORM DRAIN PIPE ANALYSIS

GIRONA SD

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface El
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	SDFE12	4	50.35	187.027	13.351	1.361	2.13	2.771	5528.65	5528.4	0.001	0	5530.832	5528.061	4.132	5530.832	5529.8	5534.114
2	SDFE9	3	38.95	131.275	5.51	3	0	0.472	5531.021	5530.549	0.003	0.448	5531.469	5530.997	4.249	5531.705	5529.456	5532.315
3	SDFE8	2	9.25	117.376	2.944	2	0	0.135	5531.759	5531.624	0.002	0.196	5531.956	5531.821	2.779	5531.999	5531.22	5531.401
4	SDFE16	2	9.25	210.682	7.98	0.793	1.087	0.99	5532.053	5531.918	0.002	0	5534.183	5533.193	1.783	5534.183	5534.5	5537.778
5	SDFE17	2	9.25	353.78	8.997	0.725	1.087	1.258	5534.25	5534.082	0	0	5541.984	5540.725	1.984	5541.984	---	5542.375
6	SDFE10	1.5	14.85	23.885	8.403	1.5	0	1.098	5532.145	5531.047	0.02	0.477	5532.622	5531.524	4.841	5532.841	---	5532.045
7	SDFE11	1.5	14.85	8.618	8.403	1.5	0	1.098	5532.145	5531.047	0.02	0.172	5532.317	5531.219	4.476	5532.536	---	5532.059
8	SDFE19	2	11.4	131.583	3.629	2	0	0.205	5530.914	5530.709	0.003	0.334	5531.248	5531.044	3.335	5531.289	---	5530.329

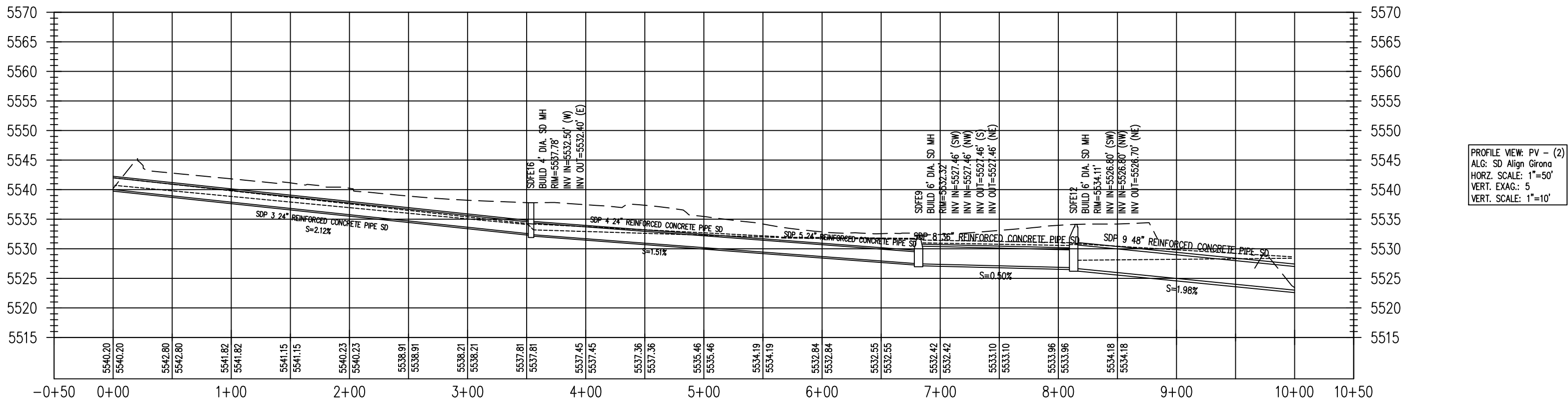
LOWPOINT IN TARRAGONA TO POND B

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface El
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	SDFE2	2	35.9	64.309	11.427	2	0	2.03	5521.492	5519.462	0.02	1.308	5522.8	5520.77	4.437	5523.207	---	5523.267

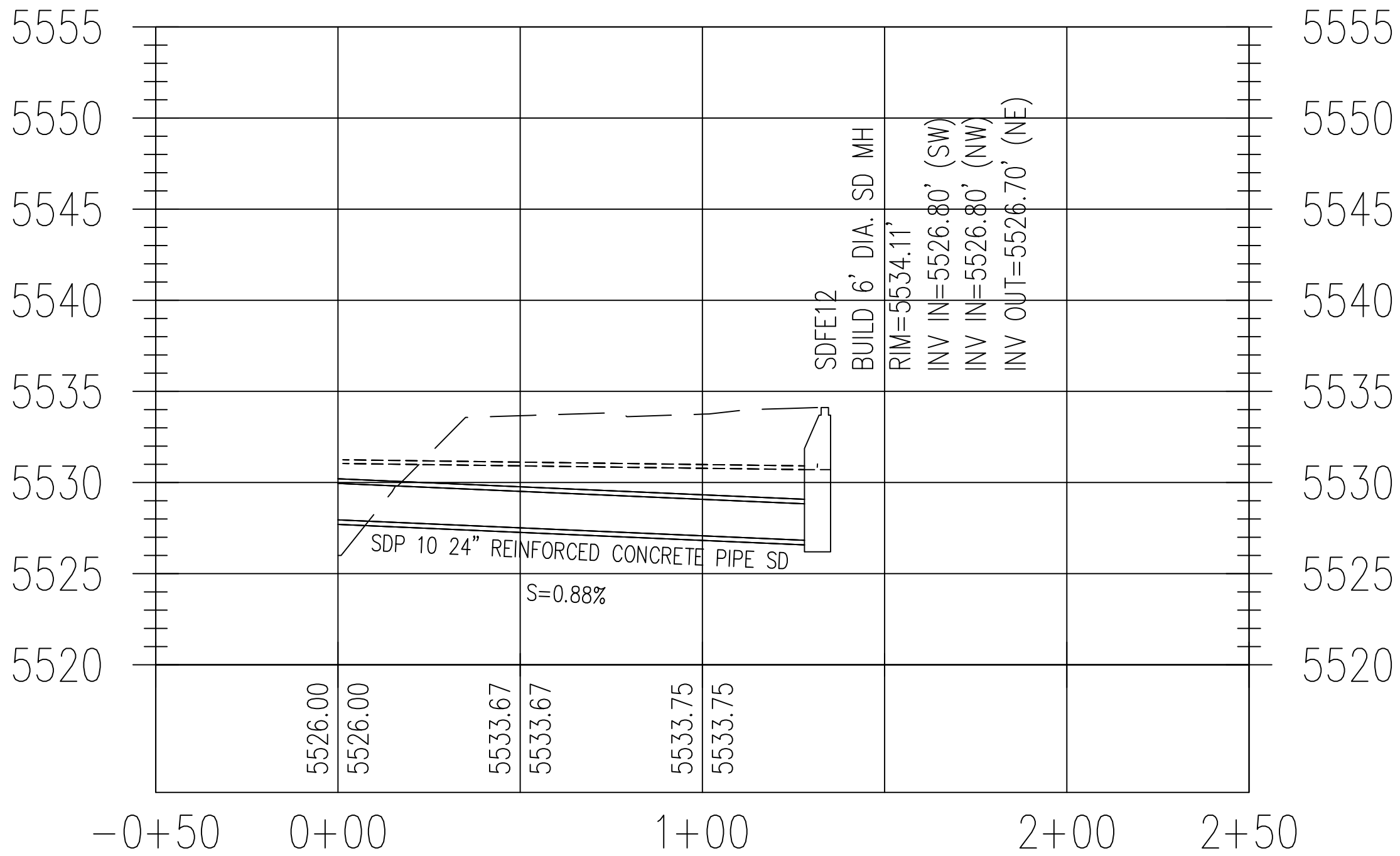
POND B TO POND A5

#Line	Struct. ID	D	Q	L	V	d	dc	v^2/2g	EGLo	HGLo	Sf	Total Pipe	EGLi	HGLi	Ea	EGLa	U/S TOC	Surface El
		(ft)	(cu. ft/sec)	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	SDFE18	2	3.36	216.583	7.821	0.389	0.641	0.951	5511.771	5511.751	0	0	5517.34	5516.389	1.34	5517.34	---	5518.375

GIRONA
FROM OFFSITE POND 1 TO POND A

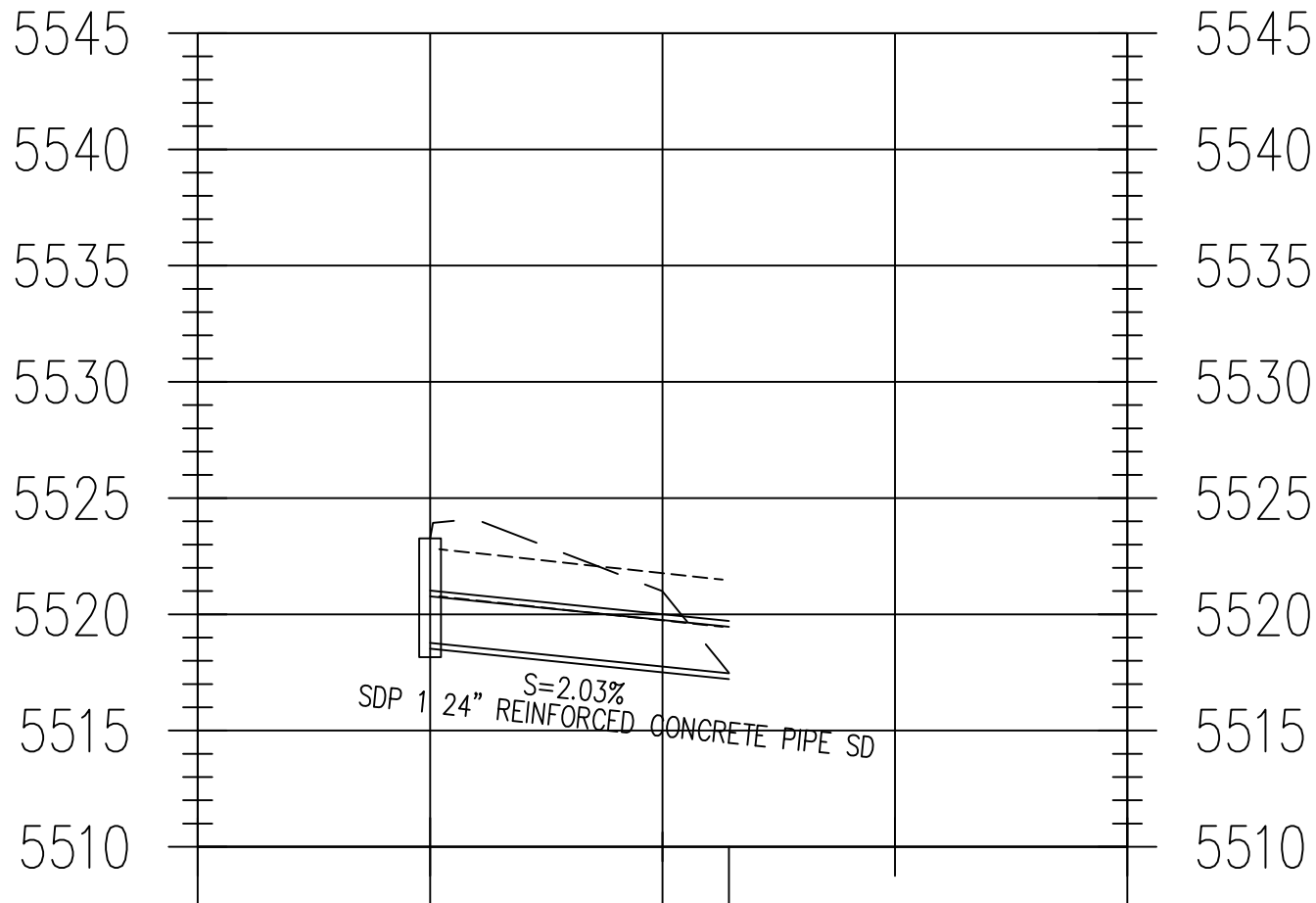


FROM WOODMONT POND
TO GIRONA STORM DRAIN



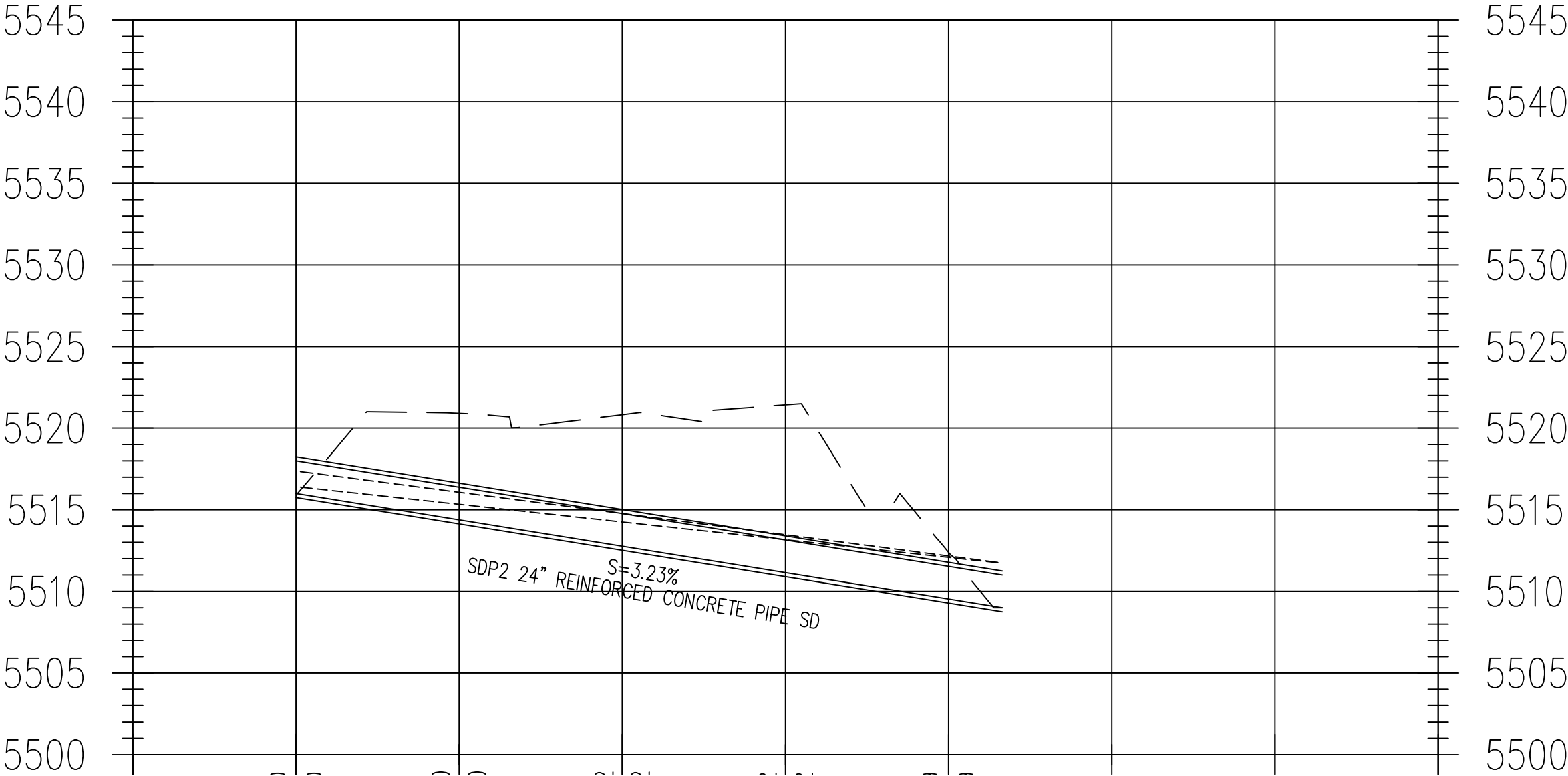
PROFILE VIEW: PV - (9)
ALG: SD Align Woodmont
HORZ. SCALE: 1"=50'
VERT. EXAG.: 5
VERT. SCALE: 1"=10'

LOWPOINT IN TARRAGONA
TO POND B



PROFILE VIEW: PV - (8)
ALG: SD Align Tarragona
HORZ. SCALE: 1"=50'
VERT. EXAG.: 5
VERT. SCALE: 1"=10'

POND B TO POND A5



PROFILE VIEW: PV - (6)
ALG: SD Align Pond B to A5
HORZ. SCALE: 1"=50'
VERT. EXAG.: 5
VERT. SCALE: 1"=10'

APPENDIX D:
DETENTION POND ANALYSIS

Detention Pond Volume Calculations

NOTE: Blue shaded cells require user input, all other cells should not be edited.

ASSUMPTIONS:

1. Area less than 40 acres (simplified hydrograph method).
2. 100-year, 6-hour storm event

Catalonia at the Trails

Offsite Pond 1

Peak Flow per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.7
3	1.87	2.6	3.45	5.02
4	2.2	2.92	3.73	5.25

Basin Name = Offsite Basin 1

Choose Zone (1 - 4) 1

Basin Area = (acres) 30.83

Exist Conditions				Proposed Conditions			
Treatment	Percentage	Area	Q (cfs)	Treatment	Percentage	Area	Q (cfs)
A	100.0%	30.83	39.77	A	100.0%	30.83	39.77
B	0.0%	0.00	0.00	B	0.0%	0.00	0.00
C	0.0%	0.00	0.00	C	0.0%	0.00	0.00
D	0.0%	0.00	0.00	D	0.0%	0.00	0.00
Q Peak - exist =			39.77	Peak Q Developed =			39.8

Use my calculated exist cond. flow as the peak controlled discharge (1 = yes, or N) 1
If No, what is the maximum allowable discharge 2 9.25

Excess Precipitation - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.8	1.08	1.46	2.64

Determine Developed E (avg excess precipitation for the developed basin)

%A x E = 0.44
%B x E = 0.00
%C x E = 0.00
%D x E = 0.00
Avg E(in) = 0.44

Determine Tb (hours)

Tb = 0.719

Determine Tc (Note: Tc is assumed to be 0.2 hours, this should be checked using DPM 22.2.B.2)

Tc = 0.2

Determine Tp and Duration of Peak (hours)

Tp = 0.273333
Peak Duration = 0

Compute the required retention volume using the simple hydrograph, Figure A-3 in DPM Section 22.2

Time to Control Q (hrs) = 0.064
Time to end of Control Q (hrs) = 0.61509
Duration of Control Q (hrs) = 0.552

Required Detention Volume (CF) = 30298.82258 0.6955653 AC-ft

Required Volume (10-day) = 30298.82258 0.6955653

Pond A

Peak Flow per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.7
3	1.87	2.6	3.45	5.02
4	2.2	2.92	3.73	5.25

Basin Name = Pond A

Choose Zone (1 - 4) 1

Basin Area = (acres) 9.2

Exist Conditions				Proposed Conditions Basin A			
Treatment	Percentage	Area	Q (cfs)	Treatment	Percentage	Area	Q (cfs)
A	100.0%	9.20	11.87	A	0.0%	0.00	0.00
B	0.0%	0.00	0.00	B	29.6%	2.72	5.53
C	0.0%	0.00	0.00	C	29.6%	2.72	7.82
D	0.0%	0.00	0.00	D	40.8%	3.75	16.40
Q Peak - exist =			11.87	Peak Q Developed =			33.1

Proposed Conditions Offsite 4			
Treatment	Percentage	Area	Q (cfs)
A	0.0%	0.00	0.00
B	0.0%	0.00	0.00
C	100.0%	1.18	3.39
D	0.0%	0.00	0.00

Use my calculated exist cond. flow as the peak controlled discharge (1 = yes, or N) 1
If No, what is the maximum allowable discharge 2 0

Excess Precipitation - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.8	1.08	1.46	2.64

Determine Developed E (avg excess precipitation for the developed basin)

%A x E = 0.00
%B x E = 0.20
%C x E = 0.29
%D x E = 0.80
Avg E(in) = 1.30

Determine Tb (hours)

Tb = 0.656

Determine Tc (Note: Tc is assumed to be 0.2 hours, this should be checked using DPM 22.2.B.2)

Tc = 0.2

Determine Tp and Duration of Peak (hours)

Tp = 0.239333
Peak Duration = 0.102

Compute the required retention volume using the simple hydrograph, Figure A-3 in DPM Section 22.2

Time to Control Q (hrs) = 0.000
Time to end of Control Q (hrs) = 0.65696
Duration of Control Q (hrs) = 0.656

Required Detention Volume (CF) = 45189.22343 1.0374018 AC-ft

Required Volume (10-day) = 65218.80839 1.4972178

Pond B

Peak Flow per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.7
3	1.87	2.6	3.45	5.02
4	2.2	2.92	3.73	5.25

Basin Name : Pond B

Choose Zone (1 - 4) 1

Basin Area = (acres) 11.1

Exist Conditions				Proposed Conditions			
Treatment	Percentage	Area	Q (cfs)	Treatment	Percentage	Area	Q (cfs)
A	100.0%	11.10	14.32	A	0.0%	0.00	0.00
B	0.0%	0.00	0.00	B	29.6%	3.29	6.67
C	0.0%	0.00	0.00	C	29.6%	3.29	9.43
D	0.0%	0.00	0.00	D	40.8%	4.53	19.79
Q Peak - exist =			14.32	Peak Q Developed =			35.9

Use my calculated exist cond. flow as the peak controlled discharge (1 = yes, or N) 2 N
If No, what is the maximum allowable discharge 2 3.36

Excess Precipitation - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.8	1.08	1.46	2.64

Determine Developed E (avg excess precipitation for the developed basin)

%A x E = 0.00
%B x E = 0.20
%C x E = 0.29
%D x E = 0.80
Avg E(in) = 1.30

Determine Tb (hours)

Tb = 0.742

Determine Tc (Note: Tc is assumed to be 0.2 hours, this should be checked using DPM 22.2.B.2)

Tc = 0.2

Determine Tp and Duration of Peak (hours)

Tp = 0.239333
Peak Duration = 0.102

Compute the required retention volume using the simple hydrograph, Figure A-3 in DPM Section 22.2

Time to Control Q (hrs) = 0.022
Time to end of Control Q (hrs)=0.704451
Duration of Control Q (hrs)=0.682

Required Detention Volume (CF) = 45909.412

1.0539351 AC-ft

Required Volume (10-day)= 70075.54168

1.6087131

Woodmont Pond

Peak Flow per Acre - DPM Section 22.2 Table A-9

Zone	A	B	C	D
1	1.29	2.03	2.87	4.37
2	1.56	2.28	3.14	4.7
3	1.87	2.6	3.45	5.02
4	2.2	2.92	3.73	5.25

Basin Name : Basin A1 from DMP

Choose Zone (1 - 4) 1

Basin Area = (acres) 15.5

Exist Conditions				Proposed Conditions Basin A1			
Treatment	Percentage	Area	Q (cfs)	Treatment	Percentage	Area	Q (cfs)
A	100.0%	15.50	20.00	A	100.0%	15.50	20.00
B	0.0%	0.00	0.00	B	0.0%	0.00	0.00
C	0.0%	0.00	0.00	C	0.0%	0.00	0.00
D	0.0%	0.00	0.00	D	0.0%	0.00	0.00
Q Peak - exist =			20.00	Peak Q Developed (A1+Offsite 2)=			25.0

Proposed Conditions Offsite 2			
Treatment	Percentage	Area	Q (cfs)
A	0.0%	0.00	0.00
B	0.0%	0.00	0.00
C	10.0%	0.12	0.34
D	90.0%	1.07	4.66

Use my calculated exist cond. flow as the peak controlled discharge (1 = yes, or N) 2 N
If No, what is the maximum allowable discharge 2 11.41

Excess Precipitation - DPM Section 22.2 Table A-8

Zone	A	B	C	D
1	0.44	0.67	0.99	1.97
2	0.53	0.78	1.13	2.12
3	0.66	0.92	1.29	2.36
4	0.8	1.08	1.46	2.64

Determine Developed E (avg excess precipitation for the developed basin)

%A x E = 0.44
%B x E = 0.00
%C x E = 0.00
%D x E = 0.00
Avg E(in) = 0.44

Determine Tb (hours)

Tb = 0.575

Determine Tc (Note: Tc is assumed to be 0.2 hours, this should be checked using DPM 22.2.B.2)

Tc = 0.2

Determine Tp and Duration of Peak (hours)

Tp = 0.273333
Peak Duration = 0

Compute the required retention volume using the simple hydrograph, Figure A-3 in DPM Section 22.2

Time to Control Q (hrs) = 0.125
Time to end of Control Q (hrs)=0.437273
Duration of Control Q (hrs)=0.312

Required Detention Volume (CF) = 7638.325093

0.1753518 AC-ft

Required Volume (10-day)= 13324.47325

0.3058878

103155

2.368113

APPENDIX E:
FIRST FLUSH REQUIREMENTS

First Flush Calculations

	Area (Sq Ft)	%D	Required Volume	
Basin A	400914	40.8%	5724.456 CF	0.131 Ac-Ft
Basin B	483543	40.8%	6904.275 CF	0.159 Ac-Ft
		Total	12628.7	0.290 Ac-Ft

APPENDIX F: CHANNEL ANALYSIS

Channel Report

<Name>

Triangular

Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 1.50

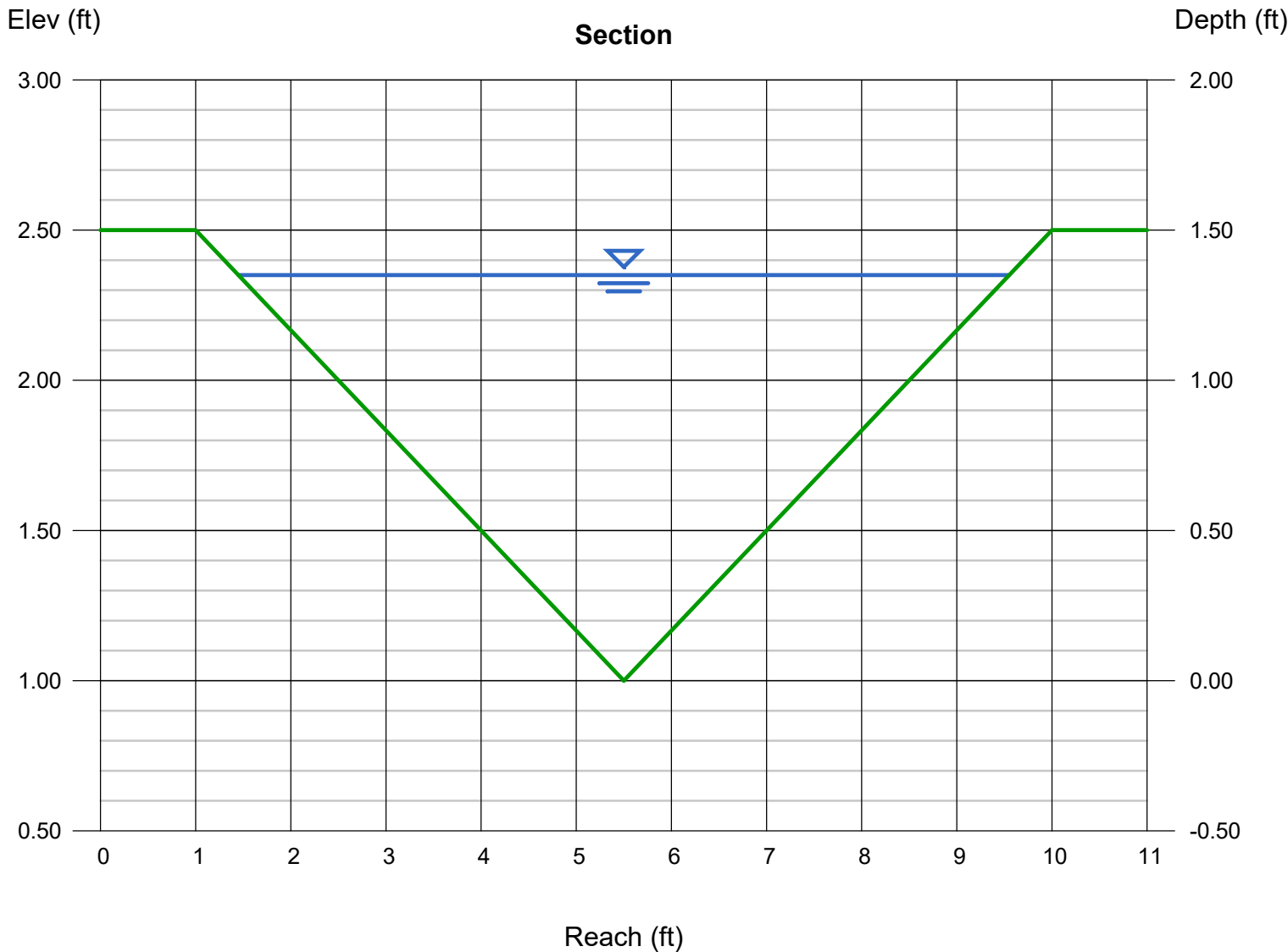
Invert Elev (ft) = 1.00
Slope (%) = 1.96
N-Value = 0.022

Calculations

Compute by: Q vs Depth
No. Increments = 10

Highlighted

Depth (ft) = 1.35
Q (cfs) = 38.41
Area (sqft) = 5.47
Velocity (ft/s) = 7.02
Wetted Perim (ft) = 8.54
Crit Depth, Yc (ft) = 1.50
Top Width (ft) = 8.10
EGL (ft) = 2.12



APPENDIX G:
EMERGENCY SPILLWAY ANALYSIS

Weir Report

POND A5 EMERGENCY
SPILLWAY

Trapezoidal Weir

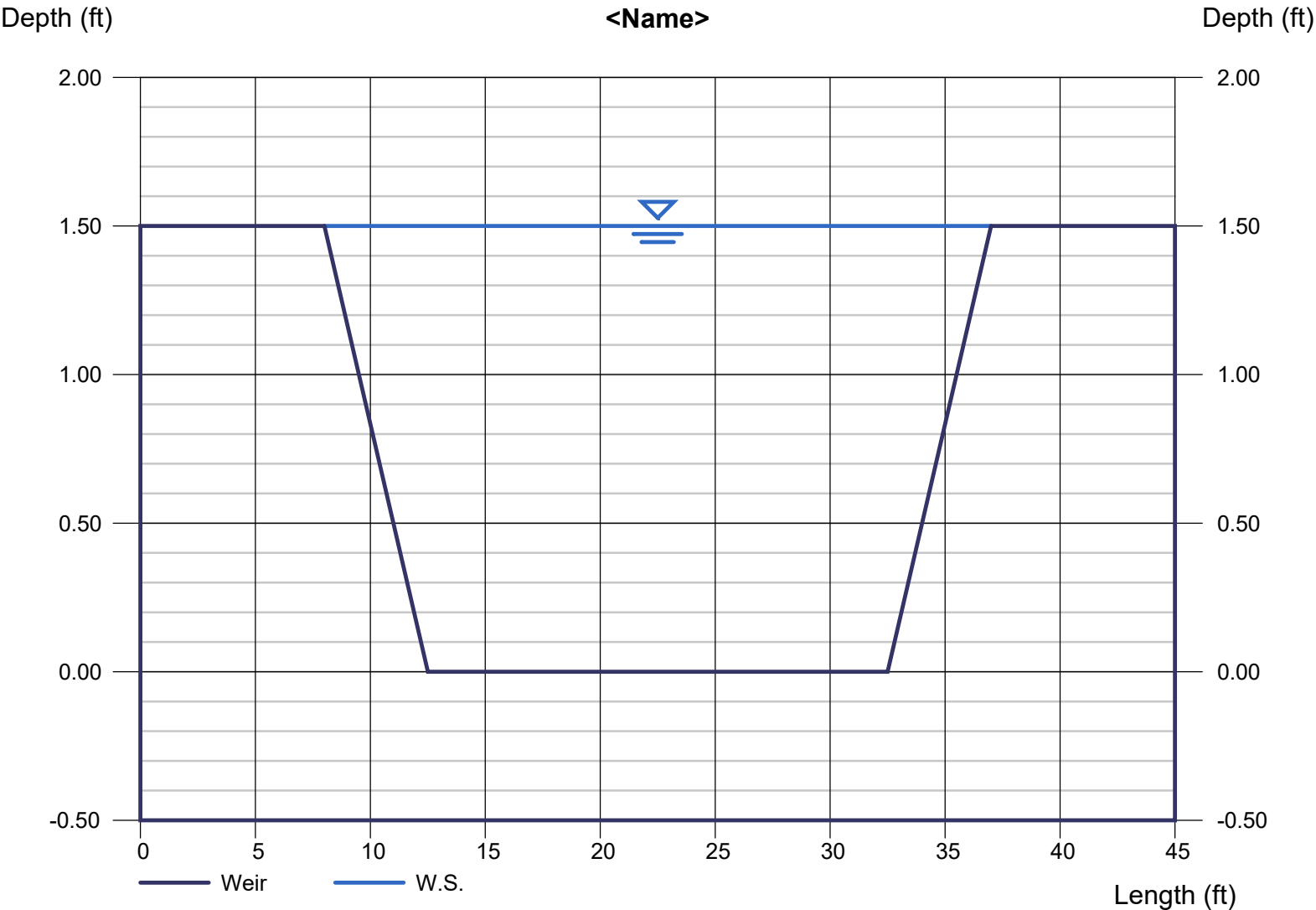
Crest = Sharp
Bottom Length (ft) = 20.00
Total Depth (ft) = 1.50
Side Slope (z:1) = 3.00

Highlighted

Depth (ft) = 1.50
Q (cfs) = 115.33
Area (sqft) = 36.75
Velocity (ft/s) = 3.14
Top Width (ft) = 29.00

Calculations

Weir Coeff. Cw = 2.66
Compute by: Q vs Depth
No. Increments = 10



Weir Report

OFFSITE POND 1 AND POND B
EMERGENCY SPILLWAY

Trapezoidal Weir

Crest = Sharp

Bottom Length (ft) = 10.00

Total Depth (ft) = 1.50

Side Slope (z:1) = 3.00

Highlighted

Depth (ft) = 1.35

Q (cfs) = 55.24

Area (sqft) = 18.97

Velocity (ft/s) = 2.91

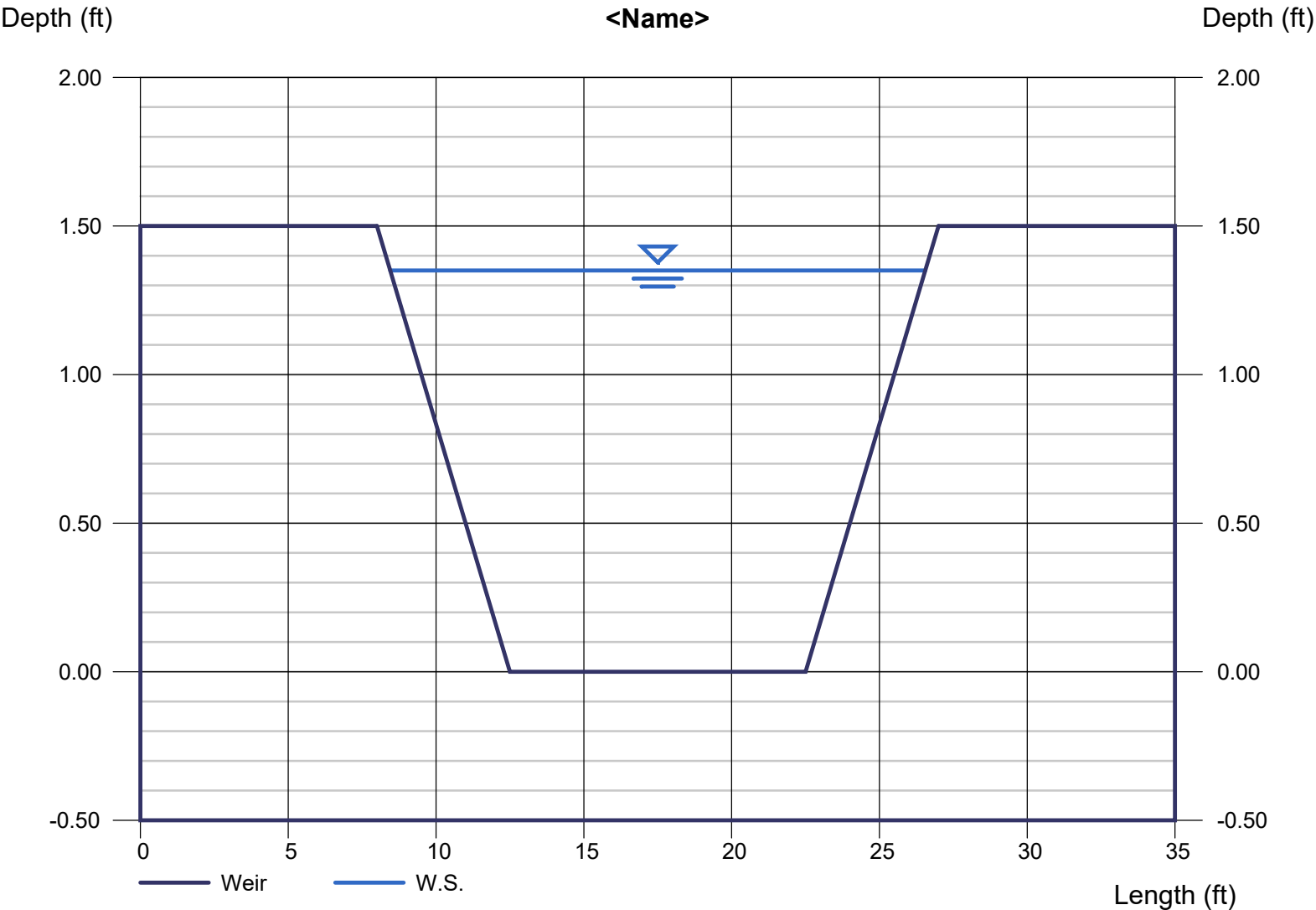
Top Width (ft) = 18.10

Calculations

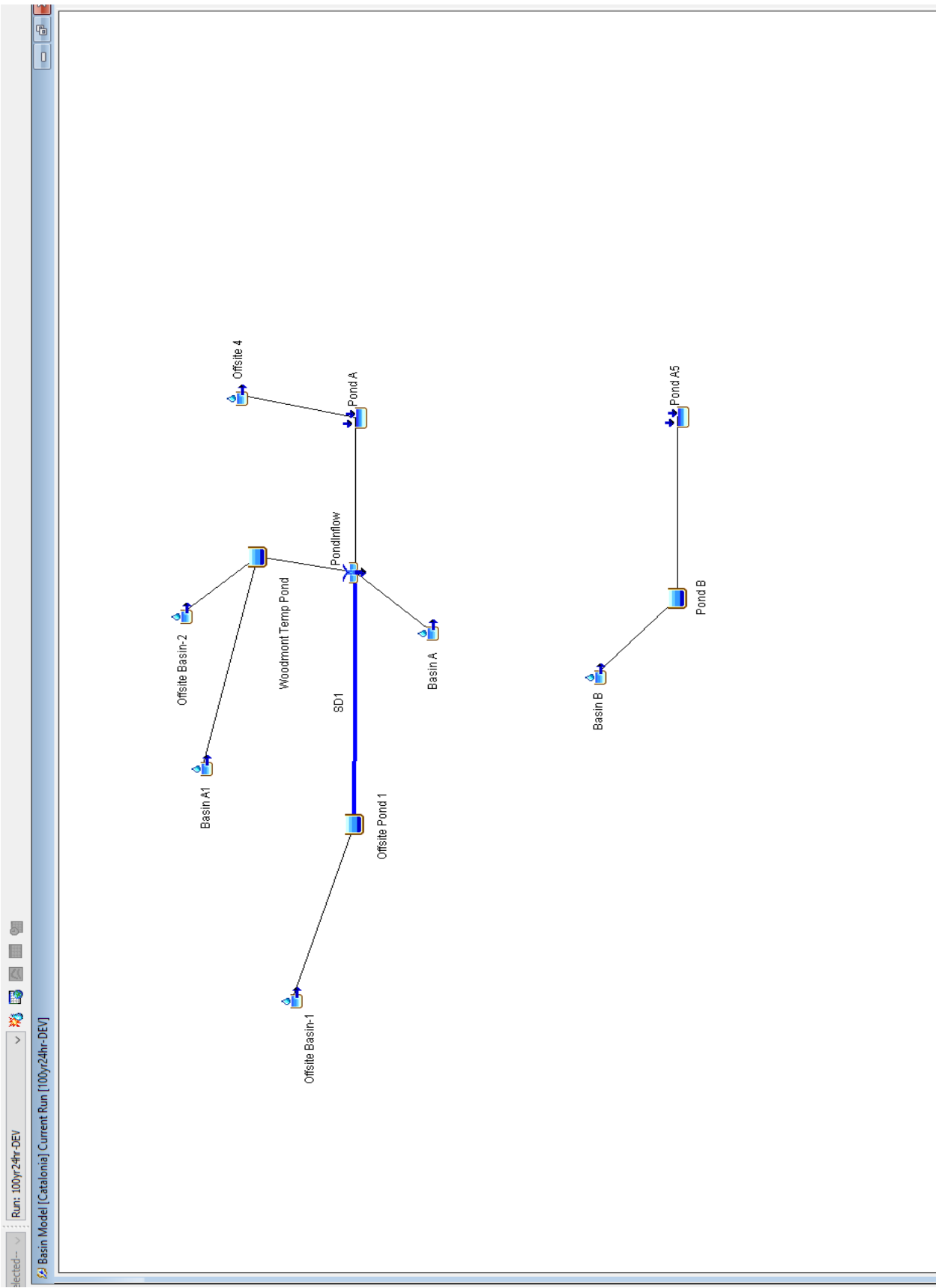
Weir Coeff. Cw = 2.66

Compute by: Q vs Depth

No. Increments = 10



APPENDIX H: HEC-HMS ANALYSIS



Frequency Storm

Met Name: 100yr24hr-DPM

Probability: Other

Input Type: Partial Duration

Output Type: Partial Duration

Intensity Duration: 5 Minutes

Storm Duration: 1 Day

Intensity Position: 50 Percent

Storm Area (MI2) 0

Curve: Uniform For All Subbasins

Duration	Partial-Duration Depth (IN)
5 Minutes	0.55100
15 Minutes	1.0400
1 Hour	1.7300
2 Hours	1.9800
3 Hours	2.0700
6 Hours	2.2300
12 Hours	2.3600
1 Day	2.5900
2 Days	

OFFSITE POND 1

Select a Paired Data

Select Table Graph

Elevation (FT)	Storage (AC-FT)
5540.0	0.000000
5541.0	0.200000
5542.0	0.450000
5543.0	0.760000
5544.0	1.120000
5545.0	1.540000

Select Apply Cancel

Reservoir Outlet 1 Options

Basin Name: Catalonia

Element Name: Offsite Pond 1

Method: Orifice Outlet

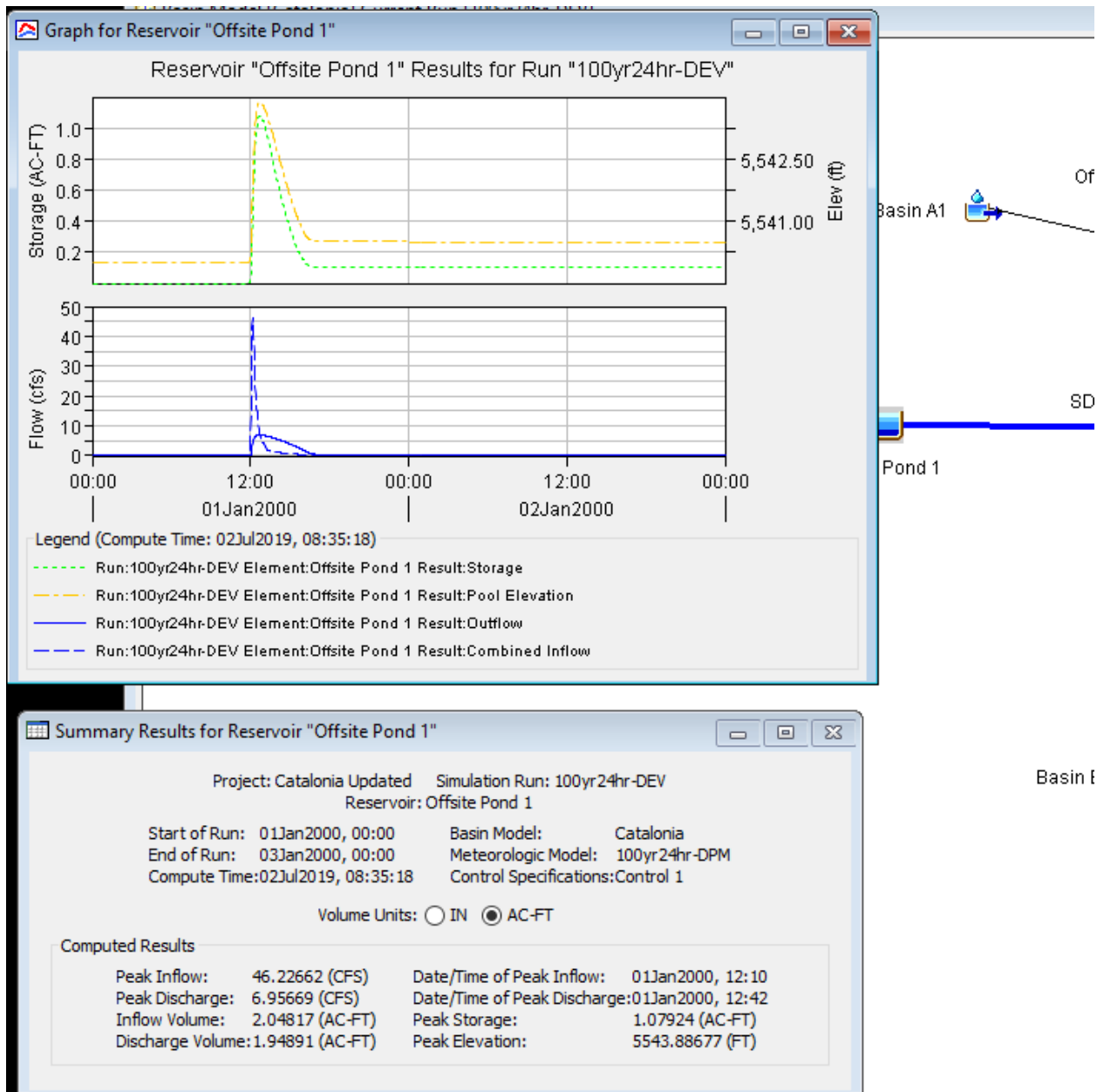
Direction: Main

Number Barrels: 1

*Center Elevation (FT) 5540.5

*Area (FT2) 0.7854

*Coefficient: 0.6



WOODMONT TEMPORARY POND

Select a Paired Data

Select Table Graph

Elevation (FT)	Storage (AC-FT)
5526.5	0.0000
5527.0	0.1550
5528.0	0.3400
5529.0	0.5570
5529.5	0.6800

Select Apply Cancel

Basin Name: Catalonia

Element Name: Woodmont Temp Pond

Method: Culvert Outlet

Direction: Main

Number Barrels: 1

Solution Method: Automatic

Shape: Circular

Chart: 1: Concrete Pipe Culvert

Scale: 1: Square edge entrance with headwall

*Length (FT) 131.58

*Diameter (FT) 2.0

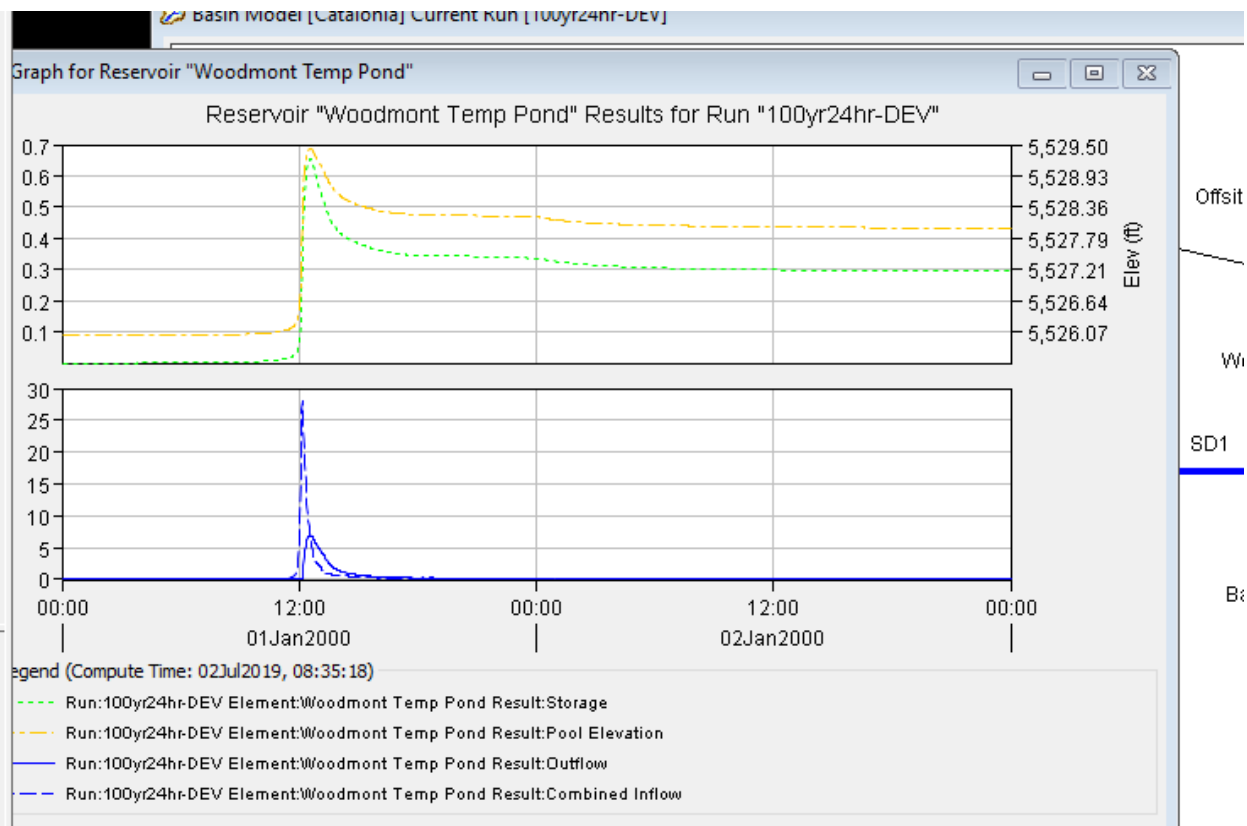
*Inlet Elevation (FT) 5527.95

Entrance Coefficient: 0.5

*Outlet Elevation (FT) 5527.29

*Exit Coefficient: 0.5

*Mannings n: 0.013



Summary Results for Subbasin "Basin B"

Project: Catalonia Updated Simulation Run: 100yr24hr-DEV
Subbasin: Basin B

Start of Run: 01Jan2000, 00:00 Basin Model: Catalonia
End of Run: 03Jan2000, 00:00 Meteorologic Model: 100yr24hr-DPM
Compute Time:02Jul2019, 08:35:18 Control Specifications:Control 1

Volume Units: ☐ IN ☒ AC-FT

Computed Results

Peak Discharge:	33.73186 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 12:10
Precipitation Volume:	2.39592 (AC-FT)	Direct Runoff Volume:	1.41878 (AC-FT)
Loss Volume:	0.97715 (AC-FT)	Baseflow Volume:	0.00000 (AC-FT)
Excess Volume:	1.41878 (AC-FT)	Discharge Volume:	1.41878 (AC-FT)

POND B

Select a Paired Data

Select Table Graph

Elevation (FT)	Storage (AC-FT)
5516.0	0.00000
5517.0	0.30100
5518.0	0.66100
5519.0	1.08400
5520.0	1.57300
5521.0	2.13000

Select Apply Cancel

Reservoir Outlet 1 Options

Basin Name: Catalonia

Element Name: Pond B

Method: Culvert Outlet

Direction: Main

Number Barrels: 1

Solution Method: Automatic

Shape: Circular

Chart: 1: Concrete Pipe Culvert

Scale: 1: Square edge entrance with headwall

*Length (FT) 217

*Diameter (FT) 0.5

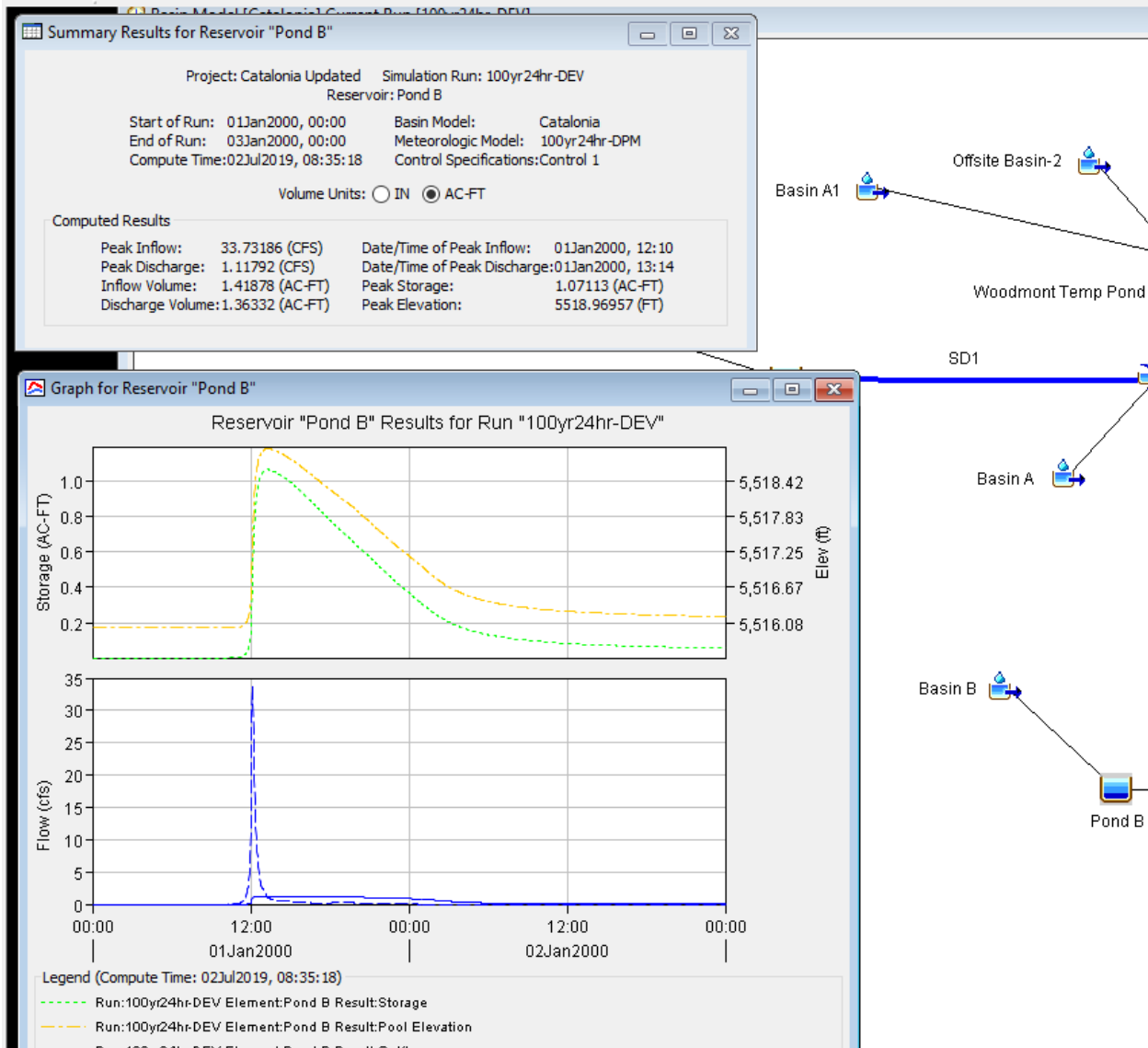
*Inlet Elevation (FT) 5516.1

Entrance Coefficient: 0.5

*Outlet Elevation (FT) 5509.1

*Exit Coefficient: 0.5

*Mannings n: 0.013



POND A5

Select a Paired Data

Select Table Graph

Elevation (FT)	Storage (AC-FT)
5509.0	0.000000
5510.0	0.718000
5511.0	1.534000
5512.0	2.450000
5513.0	3.476000
5514.0	4.610000
5515.0	5.847000
5516.0	7.200000

Select Apply Cancel

Summary Results for Sink "Pond A5"

Project: Catalonia Updated Simulation Run: 100yr24hr-DEV
Sink: Pond A5

Start of Run: 01Jan2000, 00:00 Basin Model: Catalonia
End of Run: 03Jan2000, 00:00 Meteorologic Model: 100yr24hr-DPM
Compute Time: DATA CHANGED, RECOMPUTE Control Specifications: Control 1

Volume Units: ☐ IN ☒ AC-FT

Computed Results

Peak Discharge: 1.11792 (CFS)	Date/Time of Peak Discharge: 01Jan2000, 13:14
Volume: 1.36332 (AC-FT)	

Basin A1

Pond 1

1.0

APPENDIX I:
MANUFACTURERS RECOMMENDATION



6560 Langfield Rd. Bldg. 3
Houston, Texas 77092
832-590-5300
832-590-5399 (fax)

September 13, 2018

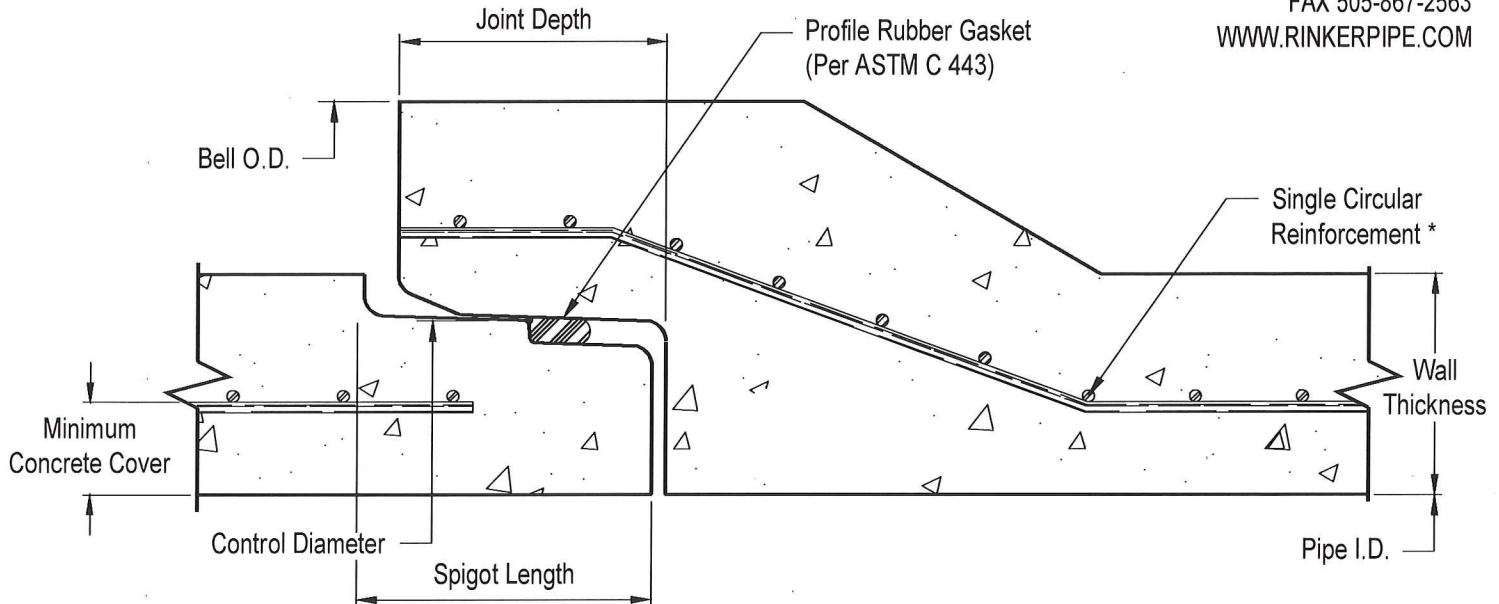
12" – 108" Gasketed Joint Concrete Pipe (RCP)
Bernalillo Facility
Albuquerque, New Mexico

The 12" – 108" RCP rubber gasket pipe joint that is currently produced at our Bernalillo facility is designed to provide an adequate seal when the joint is not fully 'homed'. The allowable joint gaps that will still maintain an adequate seal for these sizes are listed below.

Pipe Diameter	Allowable Joint Gap
12"	0.75"
15"	0.75"
18"	0.75"
24"	0.75"
30"	1.00"
36"	1.00"
48"	1.00"
54"	1.00"
60"	1.00"
66"	1.00"
72"	1.00"
78"	1.00"
84"	1.00"
90"	1.00"
96"	1.00"
102"	1.00"
108"	1.00"

Steve Hiner, P.E.
Director – Product Development/Corporate Engineer
Rinker Materials
6560 Langfield Road
Houston, TX 77092
832-590-5351 (work)
281-435-8237 (cell)
www.lovicks.hiner@rinkerpipe.com

**Reinforced Concrete Pipe (RCP)
Single Offset Joint 12"Ø - 36"Ø Diameter**



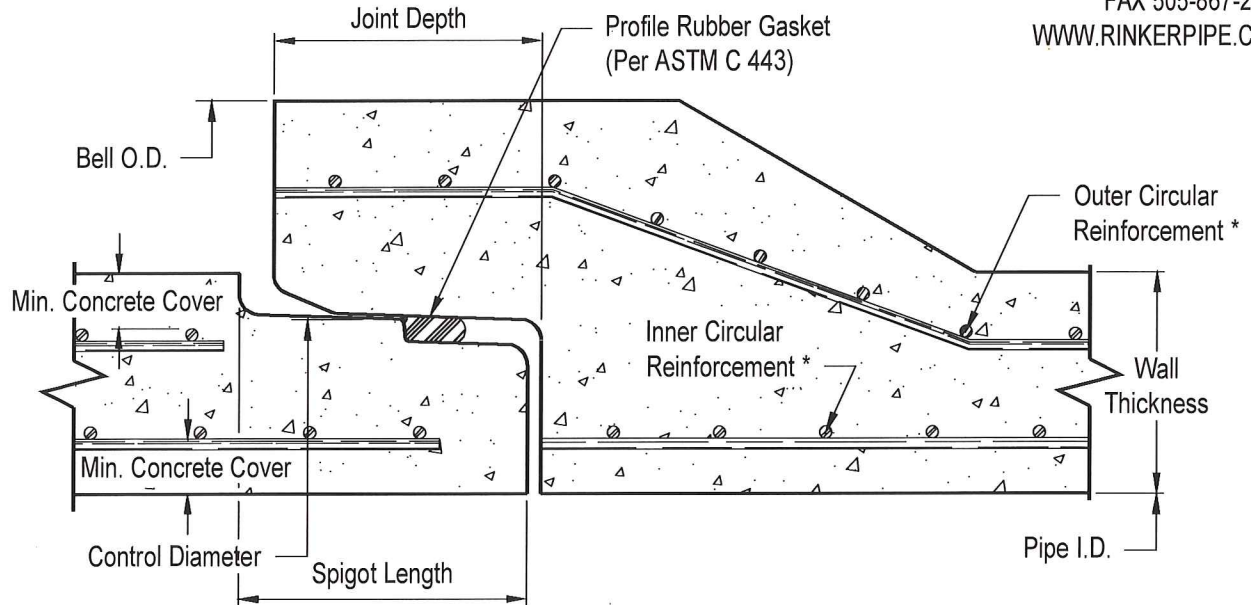
Section Thru Joint

12"Ø to 36"Ø RCP (Big Bell Single Offset Joint) w/ Single Cage Reinforcement								
Pipe I.D. (Nom.)	Wall Thickness	Joint Depth	Spigot Length	Control Diameter	Gasket Height	Bell O.D.	RCP Length	Weight (Lbs./Foot)
12"Ø	2" (B)	3 5/8"	3 3/4"	15 1/4"Ø	3/4"	20"Ø	8'	95
15"Ø	2 1/4" (B)	3 5/8"	3 3/4"	18 3/4"Ø	3/4"	23 7/8"Ø	8'	130
18"Ø	2 1/2" (B)	3 5/8"	3 3/4"	22 1/8"Ø	3/4"	27 3/4"Ø	8'	175
24"Ø	3" (B)	3 7/8"	4"	29"Ø	3/4"	35 1/2"Ø	8'	275
30"Ø	3 1/2" (B)	4 5/8"	4 3/4"	35 5/8"Ø	13/16"	42 1/4"Ø	8'	395
36"Ø	4" (B)	4 7/8"	5"	42 5/16"Ø	13/16"	50 1/4"Ø	8'	540
"X" RCP (size & class) are included as part of the submittal for the project identified on the cover letter herein.								

NOTES:

1. Reinforced Concrete Pipe (RCP) manufactured to meet ASTM C76 & AASHTO M170 specifications (latest edition). RCP strength classification requirements as per project requirements and or determined by a qualified engineer.
- * 2. Product Data subject to change without notice, reinforcement shown may vary.
3. Profile rubber gaskets are furnished with the pipe and will meet the performance requirements of ASTM C443.
4. Consult a Rinker Materials representative for further details and information not shown.

**Reinforced Concrete Pipe (RCP)
Single Offset Joint 30"Ø - 72"Ø Diameter**



Section Thru Joint

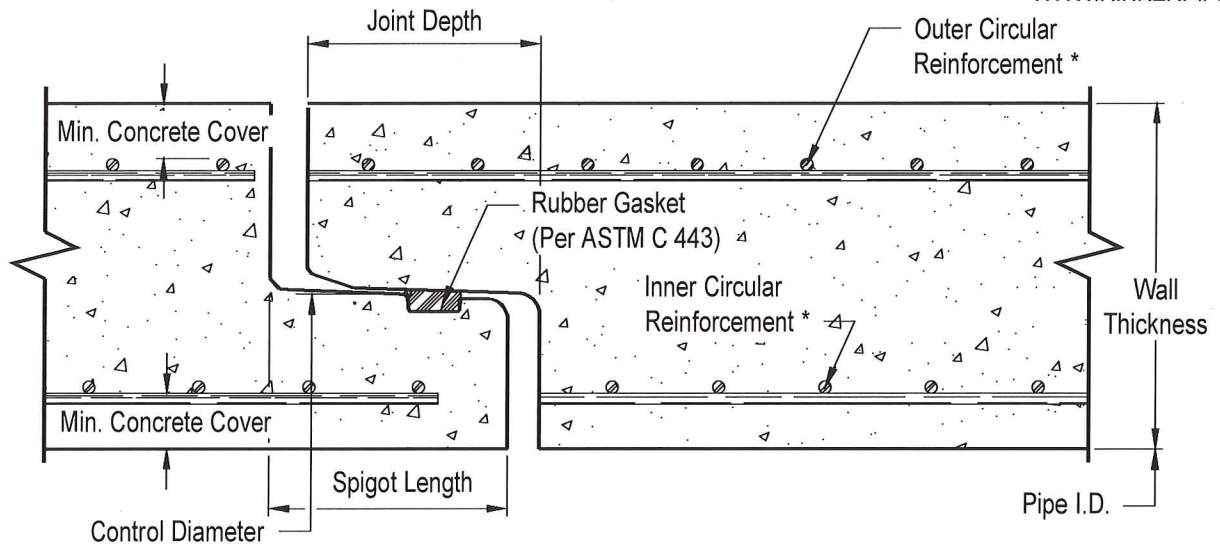
30"Ø to 72"Ø RCP (Big Bell Single Offset Joint) w/ Double Cage Reinforcement								
Pipe I.D. (Nom.)	Wall Thickness	Joint Depth	Spigot Length	Control Diameter	Gasket Height	Bell O.D.	RCP Length	Weight (Lbs./Foot)
30"Ø	3 1/2" (B)	4 5/8"	4 3/4"	35 5/8"Ø	13/16"	42 1/4"Ø	8'	395
36"Ø	4" (B)	4 7/8"	5"	42 5/16"Ø	13/16"	50 1/4"Ø	8'	540
42"Ø	4 1/2" (B)	5 1/4"	5 3/8"	49 5/16"Ø	13/16"	58"Ø	8'	705
48"Ø	5" (B)	5 1/2"	5 5/8"	55 5/16"Ø	13/16"	64"Ø	8'	895
54"Ø	6 1/4" (C)	5 1/2"	5 5/8"	61 1/4"Ø	13/16"	70"Ø	8'	1270
60"Ø	6 3/4" (C)	5 1/2"	5 5/8"	67 1/4"Ø	13/16"	76"Ø	8'	1525
66"Ø	7 1/4" (C)	5 1/2"	5 5/8"	73 1/4"Ø	13/16"	82"Ø	8'	1800
72"Ø	7 3/4" (C)	5 1/2"	5 5/8"	79 1/4"Ø	13/16"	88"Ø	8'	2090

"X" RCP (size & class) are included as part of the submittal for the project identified on the cover letter herein.

NOTES:

1. Reinforced Concrete Pipe (RCP) manufactured to meet ASTM C76 & AASHTO M170 specifications (latest edition). RCP strength classification requirements as per project requirements and or determined by a qualified engineer.
- * 2. Product Data subject to change without notice, reinforcement shown may vary.
3. Profile rubber gaskets are furnished with the pipe and will meet the performance requirements of ASTM C443.
4. Consult a Rinker Materials representative for further details and information not shown.

**Reinforced Concrete Pipe (RCP)
Rubber Gasket Joint 78"Ø - 96"Ø Diameter**

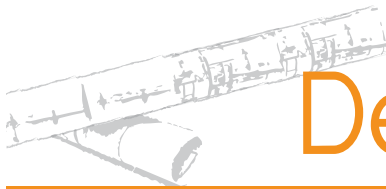


Section Thru Joint

78"Ø to 96"Ø RCP (Flush Bell Rubber Gasket Joint) w/ Double Cage Reinforcement								
Pipe I.D. (Nom.)	Wall Thickness	Joint Depth	Spigot Length	Control Diameter	Gasket Height	Pipe O.D.	RCP Length	Weight (Lbs./Foot)
78"Ø	8 1/4" (C)	5 1/2"	5 5/8"	85 1/4"Ø	13/16"	94 1/2"Ø	8'	2410
84"Ø	8" (B)	5 3/4"	5 7/8"	91"Ø	13/16"	100"Ø	8'	2490
90"Ø	8 1/2" (B)	6 1/8"	6 1/4"	97 1/2"Ø	13/16"	107"Ø	8'	2830
96"Ø	9" (B)	6 5/8"	6 3/4"	104"Ø	13/16"	114"Ø	8'	3195
"X" RCP (size & class) are included as part of the submittal for the project identified on the cover letter herein.								

NOTES:

1. Reinforced Concrete Pipe (RCP) manufactured to meet ASTM C76 & AASHTO M170 specifications (latest edition). RCP strength classification requirements as per project requirements and or determined by a qualified engineer.
- * 2. Product Data subject to change without notice, reinforcement shown may vary.
3. Rubber gaskets are furnished with the pipe and will meet the performance requirements of ASTM C443.
4. Consult a Rinker Materials representative for further details and information not shown.



Curved Alignment

Changes in direction of sewer lines are usually accomplished at manhole structures. Grade and alignment changes in concrete pipe sewers, however, can be incorporated into the line through the use of deflected straight pipe, radius pipe or specials.

DEFLECTED STRAIGHT PIPE

With concrete pipe installed in straight alignment and the joints in a home (or normal) position, the joint space, or distance between the ends of adjacent pipe sections, is essentially uniform around the periphery of the pipe. Starting from this home position any joint may be opened up to the maximum permissible on one side while the other side remains in the home position. The difference between the home and opened joint space is generally designated as the pull. The maximum permissible pull must be limited to that opening which will provide satisfactory joint performance. This varies for different joint configurations and is best obtained from the pipe manufacturer.

The radius of curvature which may be obtained by this method is a function of the deflection angle per joint (joint opening), diameter of the pipe and the length of the pipe sections.

The radius of curvature is computed by the equation:

$$R = \frac{L}{2 \left(\tan \frac{1}{2} \frac{\Delta}{N} \right)} \quad (1)$$

where:

R = radius of curvature, feet

L = length of pipe sections measured along the centerline, feet

Δ = total deflection angle of curve, degrees

N = number of pipe with pulled joints

$\frac{\Delta}{N}$ = total deflection of each pipe, degrees

From Figure 1, the deflection angle $\frac{1}{2} \frac{\Delta}{N}$ is further defined as:

$$\frac{1}{2} \frac{\Delta}{N} = \sin^{-1} \frac{\text{PULL}}{2(D + 2t)} \text{ or } \sin^{-1} \frac{\text{PULL}}{2B_c} \quad (2)$$

where:

PULL = joint opening, inches

D = inside pipe diameter, inches

t = wall thickness, inches

Figure 1 Deflected Straight Pipe

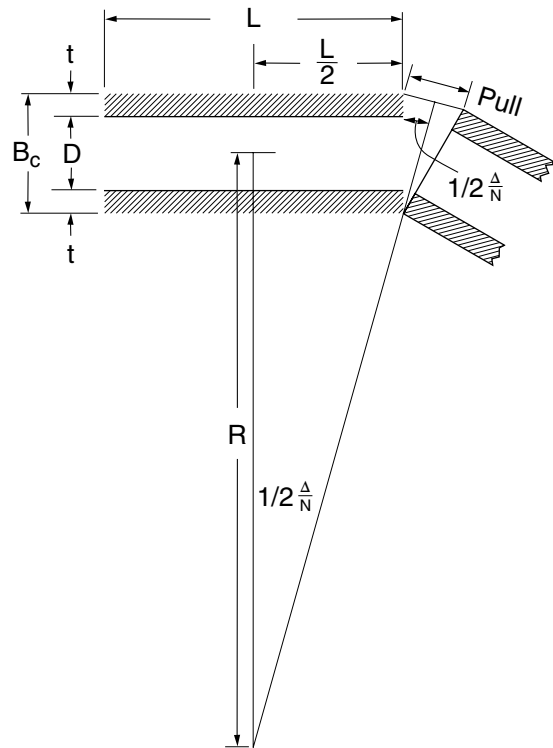
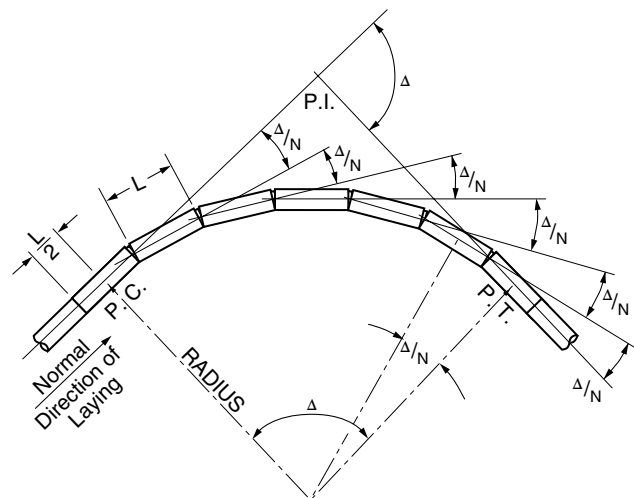


Figure 2 Curved Alignment Using Deflected Straight Pipe



B_c = outside pipe diameter, inches

The joint opening and pipe length required to provide a curved pipeline alignment may be calculated using the unit values found in Table 1 on page 3. The table tabulates the radius of a pipeline constructed of standard eight-foot laying length pipe with a 1-inch joint opening (PULL). Other pipeline radii may be calculated by changing, first, the joint opening, and if necessary, the pipe laying length. An eight-foot laying length is standard for most concrete pipe manufacturers. Other lengths may require special manufacturing procedures. Changes in the design radius are directly proportional to the pipe laying length and inversely proportional to the joint opening. The specific pull per pipe joint is found by the equation:

$$PULL_x = \left(\frac{L_x}{L_8} \right) \left(\frac{R_u}{R_x} \right) (PULL_8) \quad (3)$$

$$R_x = (L_x/L_8)(PULL_8/PULL_x) R_u \quad (4)$$

where:

PULL = the joint opening

R_u = the Unit Radius (Taken from Table 1)

L_x = Length of deflected pipe

Specific radii may be calculated by the following procedure:

- Select the unit radius of curvature for the specified diameter pipe from the chart.
- Increase or decrease the joint opening (PULL) in Equation 1 to obtain the design radius. If the required joint opening exceeds the pipe manufacturers recommendations, select a pipe with a shorter laying length. Four and six foot are common non-standard pipe lengths. Check with the pipe manufacturer for availability of non-standard lengths.
- Recalculate the pull for the shorter pipe.

As illustrated in Figure 2, when concrete pipe is installed on curved alignment using deflected straight pipe, the point of curve (P.C.) is at the midpoint of the last undeflected pipe section and the point of tangent (P.T.) is at the midpoint of the last pulled pipe.

RADIUS PIPE

Radius pipe, also referred to as bevelled or mitered pipe, incorporates the deflection angle into the pipe joint. The pipe is manufactured by shortening one side of the pipe. The amount of shortening or drop for any given pipe is dependent on manufacturing feasibility. Because of the possibility of greater deflection angles per joint, sharper curvature with correspondingly shorter radii can be obtained with radius pipe than with deflected straight pipe. As in the case of deflected straight pipe, the radius of curvature which may be obtained by radius pipe is a function of the deflection angle per joint, diameter of the pipe, length of pipe sections and wall thickness.

The radius of curvature is computed by the equation:

$$R = \frac{L}{\tan \frac{\Delta}{N}} - \left(\frac{D}{2} + t \right) \quad (5)$$

where:

Δ = total deflection angle of curve, degrees

N = number of radius pipe

L = standard pipe length being used, feet

$\frac{\Delta}{N}$ = total deflection angle of each pipe

From Figure 3, the radius of curvature can be expressed in terms of the drop and is given by the equation:

$$R = \frac{L(D + 2t)}{DROP} - \left(\frac{D}{2} + t \right) \quad (6)$$

$$R = B_c \left(\frac{L}{DROP} - \frac{1}{2} \right) \quad (7)$$

$$DROP = \frac{LB_c}{R + B_c/2} \quad (8)$$

where:

B_c = outside diameter of the pipe, feet

Figure 5 presents R/B_c ratios for drops from one inch through 15 inches and commonly manufactured pipe lengths. **Since the maximum permissible drop for any given pipe is dependent on manufacturing feasibility, it is essential to coordinate the design of radius pipe with the pipe manufacturer. Many manufacturers have standardized joint configurations and deflections for specific radii and economics may be realized by utilizing standard radius pipe.**

As illustrated in Figure 4, when concrete pipe is installed on curved alignment using radius pipe, the pipe sections are oriented such that the plane of the dropped joint is tangent to the theoretical circular curve. Projection of the joints do not converge at a common point, but are tangents to a common circle of diameter equal to the length of pipe sections. The point of curve (P.C.) is at the midpoint of the last straight pipe and the point of tangent (P.T.) is one half of the standard pipe length back from the straight end of the last radius pipe. The required number of pieces of radius pipe is equal to the length of the circular curve in feet divided by the centerline length of the radius pipe ($L - 1/2 DROP$). Where possible, minor modifications in the radius are normally made so this quotient will be a whole number.

Minimum radius of curvature obtained from equations (1) and (5) are approximate, but are within a range of accuracy that will enable the pipe to be readily installed to fit the required alignment. A reasonable amount of field adjustment is possible for radius pipe by pulling the joints in the same manner as with deflected straight pipe.

BENDS AND SPECIAL SECTIONS

Special precast sections can be used for extremely

short radius curves which cannot be negotiated with either deflected straight pipe or with conventional radius pipe. Sharper curves can be handled by using special short lengths of radius pipe rather than standard lengths. These may be computed in accordance with the methods discussed for radius pipe. Certain types of manufacturing processes permit the use of a dropped joint on both ends of the pipe, which effectively doubles the deflection. Special bends, or elbows can be manufactured to meet any required deflection angle and some manufacturers produce standard bends which provide given angular deflection per section.

One or more of these methods may be employed to meet the most severe alignment requirements. **Since manufacturing processes and local standards vary, local concrete pipe manufacturers should be consulted to determine the availability and geometric configuration of special sections.**

The following example illustrates proper use of the Tables and Figures.

Given: A 42-inch diameter concrete pipe storm sewer is to be installed on curved alignment corresponding to the roadway curvature. The pipe will be manufactured in 7-1/2 foot lengths with a 4-1/2-inch wall thickness. The curve data for the roadway curb is:

point of intersection station	P.I. = 50+00
point of curve station	P.C. = 49+29.6
point of tangent station	P.T. = 50+63.1
total deflection angle	$\Delta = 45^\circ$
radius of curvature	R = 170 feet

Find: The required pull per joint for deflected straight pipe or the required drop for radius pipe.

Solution: From Table 1, for a 42-inch diameter pipe, the radius of curvature for a 1-inch pull is 408 feet. The required pull for 170 feet is:

$$PULL_x = \left(\frac{7.5}{8} \right) \left(\frac{408}{170} \right) (1) = 1.125"$$

To evaluate the required drop for radius pipe to negotiate the roadway curvature, it is first necessary to calculate the R/Bc ratio:

$$\frac{R}{B_c} = \frac{170}{4.25} = 40$$

Enter Figure 5 on the vertical scale at R/Bc 40. Proceed horizontally until the line representing L = 7.5 feet is intersected. At this point the horizontal scale shows the required drop to be 2.2 inches. Or

$$Drop = \frac{(7.5)(4.25)}{170 + 4.25/2} = 0.185 \text{ ft.} = 2.2 \text{ in.}$$

Answer: Radius pipe with a 2-1/4-inch drop would be required. **It is important to consult local concrete pipe manufacturers to determine the feasibility of manufacturing a 42-inch diameter pipe with the required drop.**

Figure 3 Radius Pipe

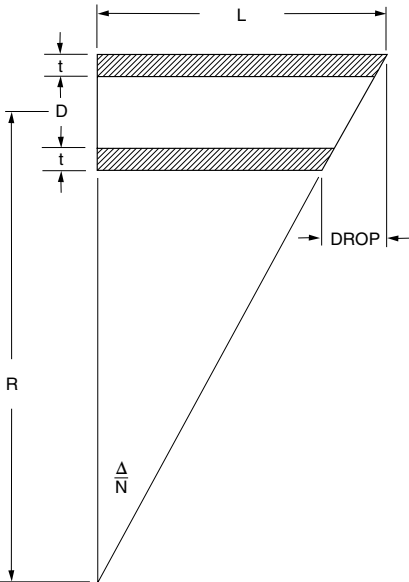


Figure 4 Curved Alignment Using Radius Pipe

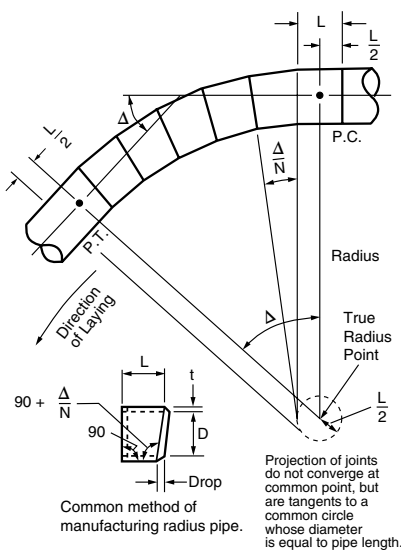
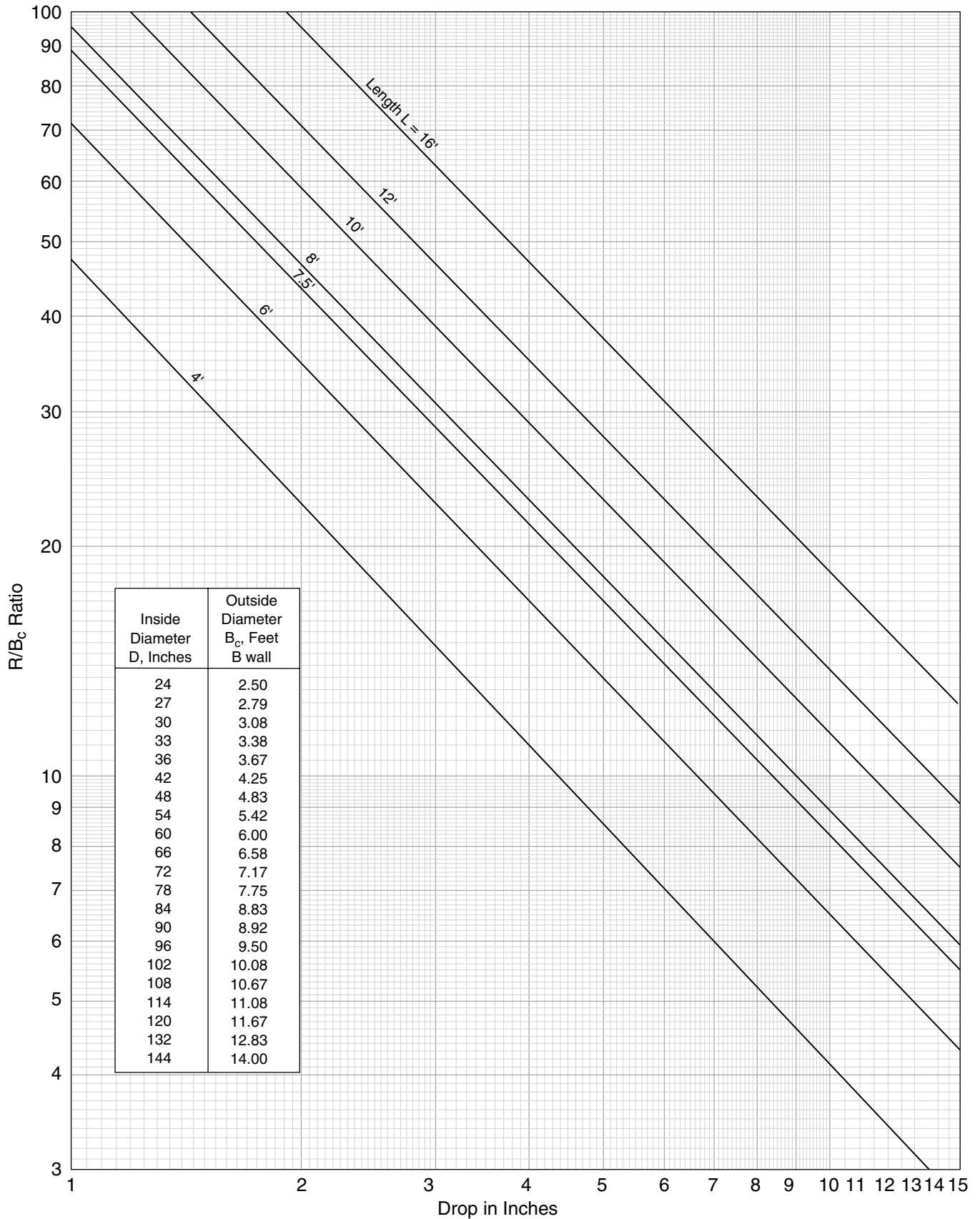


Table 1 Unit Radius of Curvature For 8-Foot Straight Deflected Pipe With 1" Pull

Size	12	15	18	20	24	27	30	33	36	42	48	54	60	66	72	78	84	90	96
Radius	128	156	184	212	240	268	286	364	352	408	464	520	576	632	688	744	780	856	912

Figure 5 Radius of Curvature For Radius Pipe



SD SIZE	PULL* (in)	D (inside dia)	t (wall thickness)	Bc	1/2 *theta/N	R (ft)
	(max joint gap) ¹	(in)	(in)	Outer dia (in)		
18"	0.7500	18	2 1/2	23	0.9342	245
24"	0.7500	24	3	30	0.7162	320
30"	1.0000	30	3 1/2	37	0.7743	296
36"	1.0000	36	4	44	0.6511	352
42"	1.0000	42	4 1/2	51	0.5617	408

¹ Allowable joint gap provided by Rinker 09-13-18

* max joint gap suggested by manufacturer
is 1/2 Dimension "A" + 3/8"

$$\text{min Radius}^{**} = \frac{L}{2(\tan 1/2 * \theta / N)}$$

** see formula on enclosed data sheet for american concrete pipe association

$$1/2 * \theta / N = \sin^{-1} * \sin^{-1} * \frac{(PULL)}{2Bc}$$

D= inside pipe diameter
t=wall thickness

EXHIBITS

EXHIBIT A: PRELIMINARY PLAT

**EXHIBIT B: ORIGINAL DEVELOPED
CONDITIONS BASIN MAP FROM
DMP**

EXHIBIT C: EXISTING BASIN MAP

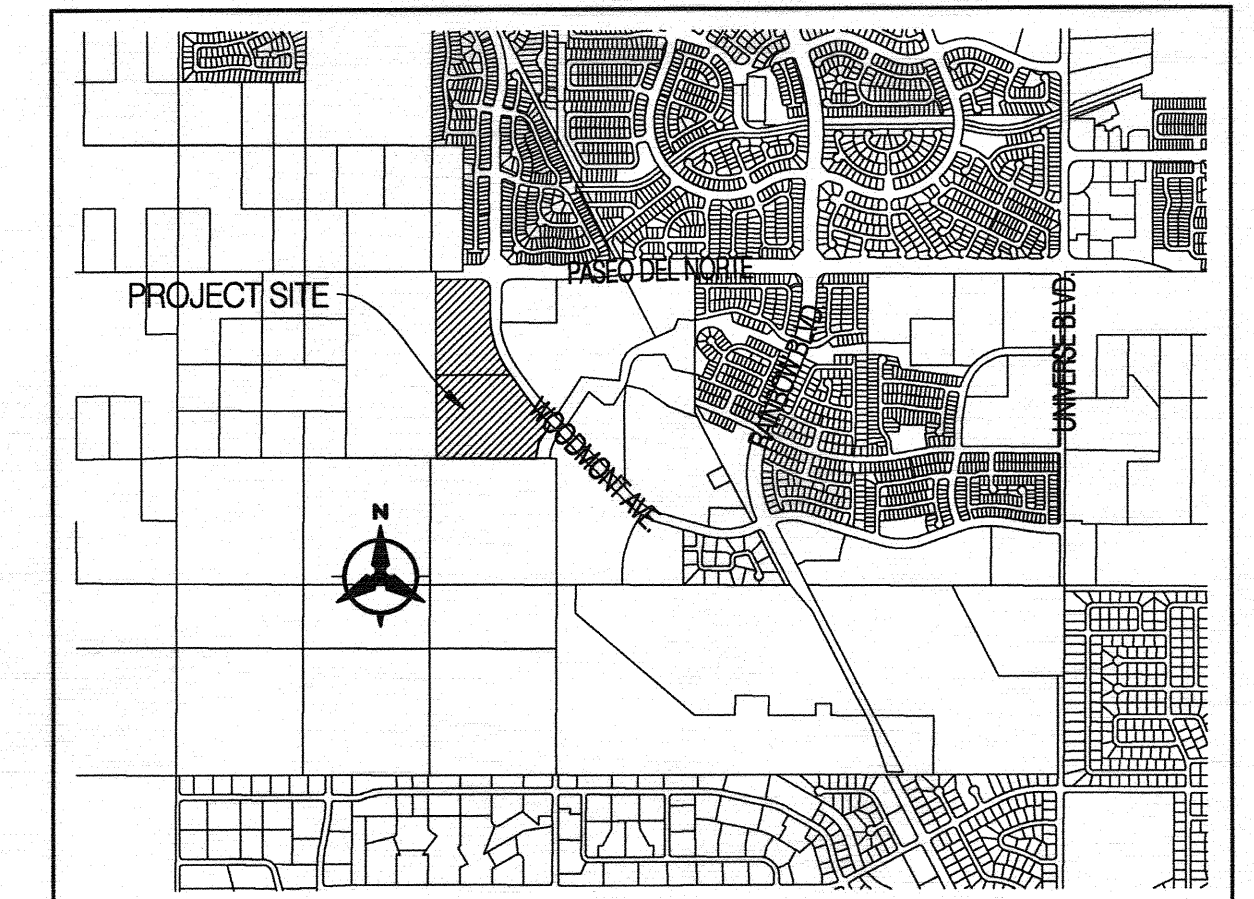
EXHIBIT D: PROPOSED BASIN MAP

EXHIBIT E: STORM DRAIN NETWORK

EXHIBIT F: GRADING PLAN

EXHIBIT A:
PRELIMINARY PLAT

PRELIMINARY PLAT
CATALONIA
REPLAT OF TRACT 1 AND TRACT 2
THE TRAILS UNIT 3A
ALBUQUERQUE, NEW MEXICO
MARCH, 2019



LOCATION MAP
SCALE: 1"=2000'
Zone Atlas Index Number: C-08

PLAT IS LOCATED WITHIN TOWN OF ALAMEDA GRANT, PROJECTED SECTIONS 16 & 17, TOWNSHIP 11 NORTH, RANGE 2 EAST, NEW MEXICO PRINCIPAL MERIDIAN, CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO.

SURVEY NOTES:

1. UNLESS OTHERWISE NOTED, ALL BOUNDARY CORNERS SHOWN THUS (●) SHALL BE MARKED BY A #5 REBAR STAMPED "HUGG, PS 9750".
2. ALL STREET CENTERLINE MONUMENTATION SHALL BE INSTALLED AT ALL CENTERLINE PC'S, PT'S, ANGLE POINTS AND STREET INTERSECTIONS AND SHOWN THUS (▲) WILL BE MARKED BY A FOUR (4") ALUMINUM CAP STAMPED "CITY OF ALBUQUERQUE CENTERLINE MONUMENTATION MARKED. DO NOT DISTURB, P.L.S. 9750".
3. THE SUBDIVISION BOUNDARY WILL BE TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM AS SHOWN.
4. BASIS OF BEARINGS WILL BE NEW MEXICO STATE PLANE GRID BEARINGS.
5. DISTANCES SHALL BE GROUND DISTANCES.
6. MANHOLES WILL BE OFFSET AT ALL POINTS OF CURVATURE POINTS OF TANGENCY, STREET INTERSECTIONS AND ALL OTHER ANGLE POINTS TO ALLOW THE USE OF CENTERLINE MONUMENTATION.

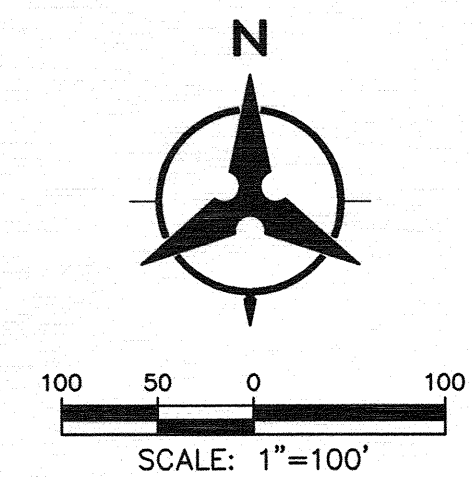
APPROVED FOR MONUMENTATION AND STREET NAMES

Scott N. Rimbauer P.S. 3/2/19
CITY SURVEYOR DATE

Andrew M. Kaplan 3/28/19
DATE

PV TRAILS ALBUQUERQUE, LLC
ITS MANAGER
PV GENERAL PARTNER, LLC
ANDREW M. KAPLAN, MANAGER

LEGEND	
---	BOUNDARY LINE
---	TRACT LINE
---	ADJOINING PROPERTY LINE
---	EXISTING EASEMENT
---	PROJECT SITE



SHEET 1 of 3

Bohannon & Huston
www.bhinc.com 800.877.5332

PRELIMINARY PLAT CATALONIA

REPLAT OF TRACT 1 AND TRACT 2 THE TRAILS UNIT 3A

ALBUQUERQUE, NEW MEXICO

MARCH, 2019

BOUNDARY CURVE TABLE						
ID	ARC	RADIUS	DELTA	TANGENT	CHORD LENGTH	CHORD DIRECTION
C1	157.10'	100.00'	90°00'43.31"	100.02'	141.436	S44° 48' 26.34"E
C2	649.92'	1049.00'	35°29'52.79"	335.77'	639.570	S17° 33' 01.08"E
C3	317.65'	2049.00'	8°52'57.01"	159.15'	317.336	S39° 44' 25.98"E

LEGAL DESCRIPTION:
A REPLAT OF :
TRACT '1' AND TRACT '2'
THE TRAILS UNIT 3A
FILED: DEC 21, 2007 (2007C-0352)

- EXISTING ZONING: R-1B AND R-1D (LOT 7-16, 31 & 32)
PROPOSED ZONING: NO CHANGE
PROPOSED RESIDENTIAL DEVELOPMENT:
SINGLE FAMILY DETACHED RESIDENTIAL
- TOTAL ACREAGE:
EXISTING TRACT '1' = 13.9033 ACRES
EXISTING TRACT '2' = 20.2878 ACRES

ACREAGE:
TRACT '1' = 0.7055 Acres
TRACT '2' = 0.0997 Acres
TRACT '3' = 0.0500 Acres
TRACT '4' = 0.2307 Acres
TRACT '5' = 0.0220 Acres
TRACT '6' = 0.0196 Acres
TRACT '7' = 0.0740 Acres
TRACT '8' = 0.1456 Acres
TRACT '9' = 0.0130 Acres
TRACT '10' = 13.7197 Acres

NUMBER OF LOTS: CATALONIA = 78
SUBDIVISION ACREAGE: CATALONIA = 20.4376
PROPOSED DENSITY: 3.82 D.U./ACRE

3. MINIMUM LOT DIMENSIONS R-1A R-1D
55' x 120' 75' x 133.333'
MINIMUM LOT AREA 6600 S.F. 10,000 S.F.

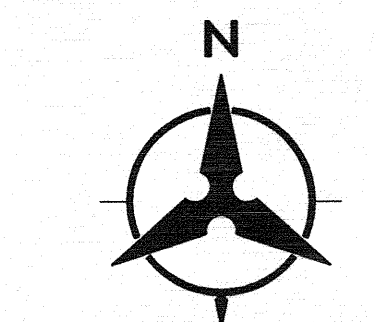
4. SEWER AND WATER ARE PUBLIC TO BE OWNED AND MAINTAINED BY
THE ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY.
STREET AND STORM DRAIN IMPROVEMENTS ARE PUBLIC TO BE OWNED
AND MAINTAINED BY THE CITY OF ALBUQUERQUE

5. LOT SETBACKS SHALL CONFORM TO R-1B AND
R-1D (LOT 7-16, 31 & 32) ZONE REGULATIONS.

6. TRACTS 1-9 WILL BE OWNED AND MAINTAINED BY
TRAILS COMMUNITY ASSOCIATION INC.

7. NO LOTS ARE ALLOWED DIRECT ACCESS TO WOODMONT AVE.

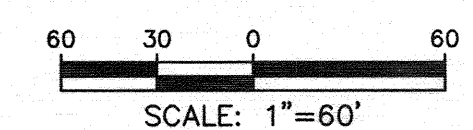
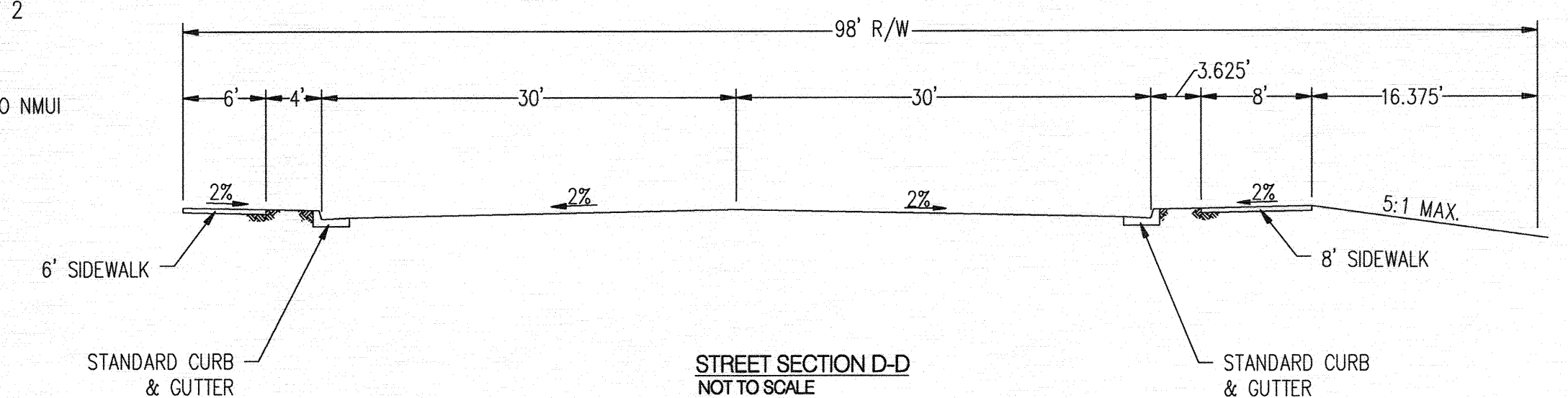
LEGEND	
---	BOUNDARY LINE
---	TRACT LINE
---	ADJOINING PROPERTY LINE
---	EXISTING EASEMENT
---	PROPOSED EASEMENT



SCALE: 1"=60'

SHEET 2 of 3

MARCH, 2019



LEGEND

	BOUNDARY LINE
	TRACT LINE
	ADJOINING PROPERTY LINE
	EXISTING EASEMENT
	PROPOSED EASEMENT

Bohannon  Huston
www.bhinc.com 800.877.5332

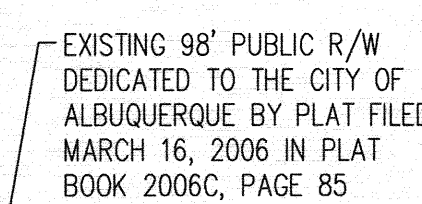
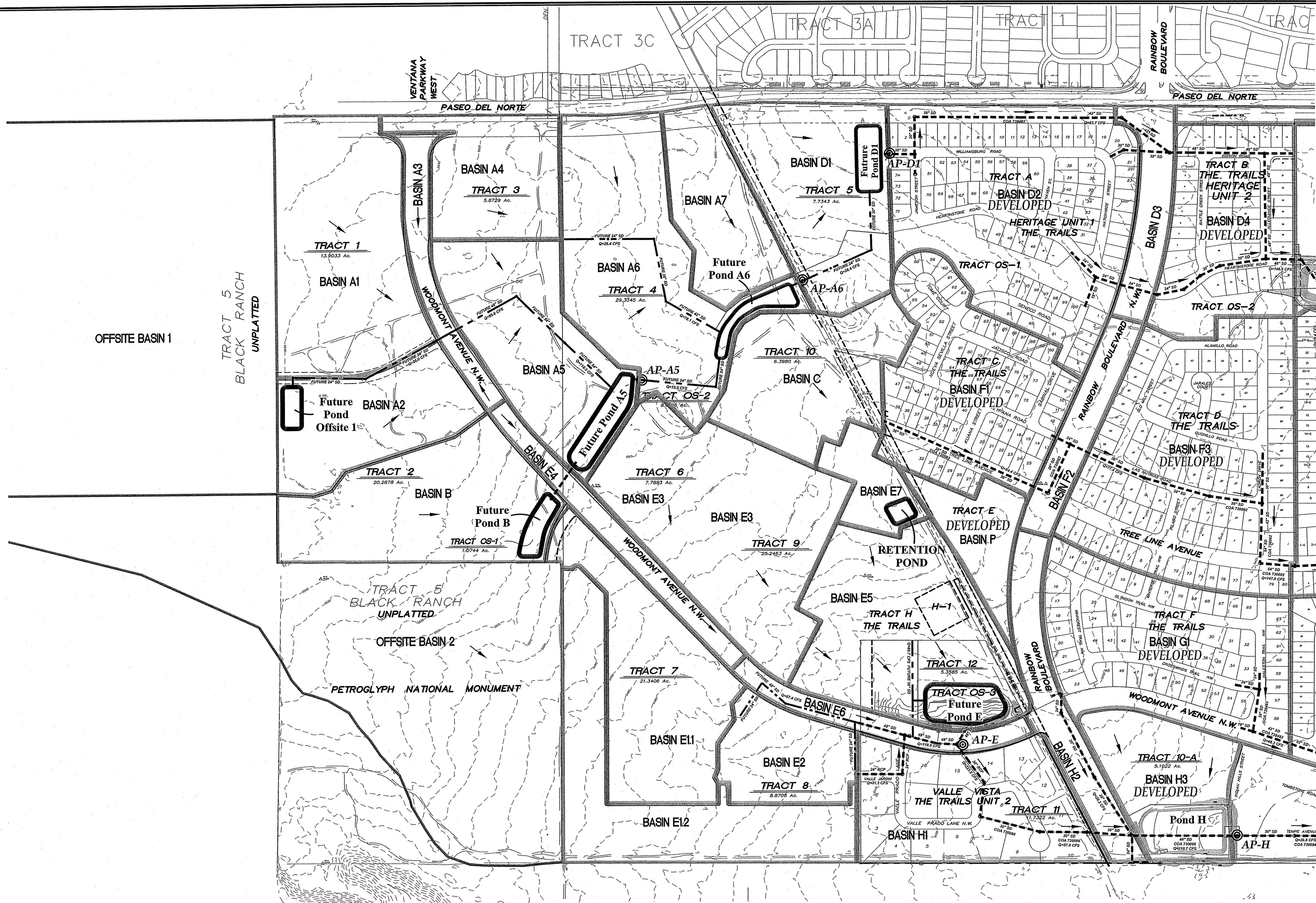


EXHIBIT B:
ORIGINAL DEVELOPED CONDITIONS BASIN MAP
FROM DMP



OFFSITE BASIN 1

TRACT 5
BLACK RANCH
UNPLATTED

Future
Pond
Offsite 1

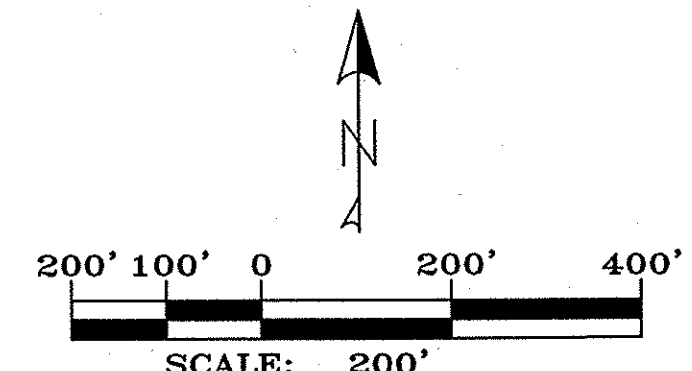
TRACT 5
BLACK RANCH
UNPLATTED

OFFSITE BASIN 2

PETROGLYPH NATIONAL MONUMENT

LEGEND

- ANALYSIS POINT
- EXISTING STORM DRAIN
- FLOW DIRECTION
- FUTURE DEVELOPED STORM DRAIN



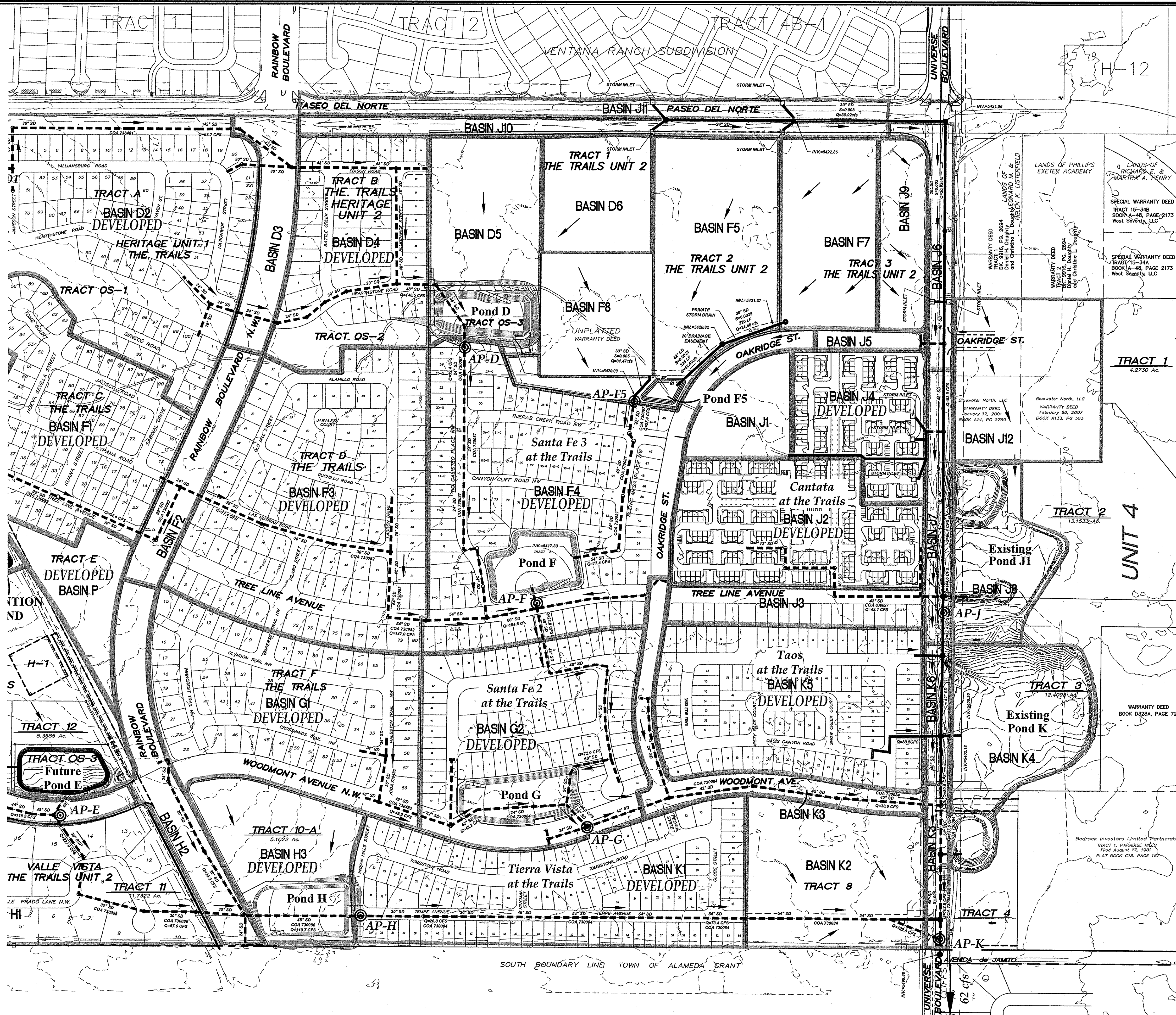
DATUM NAVD 1929

Thompson
Engineering
Consultants, Inc.
tecmm@yahoo.com
P.O. BOX 65760
ALBUQUERQUE, NM 87193
PHONE: (505) 271-2199
FAX: (505) 630-9246

UPDATE TO THE
AMENDMENT TO DMP FOR
THE TRAILS UNITS, 1, 2 AND 3
PLATE 1

9677
PROFESSIONAL
ENGINEER

- NOTES:
1. STORM DRAIN SIZES BASED ON 100-YR, 24-HR STORM FLOWS.
FUTURE PROJECTS MAY BE REQUIRED TO INCREASE STORM DRAIN
SIZE BASED ON 100-YR, 6-HR STORM FLOWS.
 2. THE INTENDED FUTURE CONTRIBUTION FROM THE TRAILS UNIT 4 IS 20 CFS
TO THE MAXIMUM DOWNSTREAM DISCHARGE OF 62 CFS IN UNIVERSE BLVD.



DETENTION POND CHARACTERISTICS

POND	DRAIN AREA (AC)	Q100 IN (CFS)	Q100 OUT (CFS)	BYPASS Q (CFS)	MAX VOL (ac-ft)	V100 (ac-ft)	TOP ELEV	BOTTOM ELEV	WSL
OFF 1	127.9	37.00	9.25		2.44	2.302	6	0	5.80
A5	179.6	121.19	16.29		4.61	4.256	5516	5511	5515.76
A6	204.2	84.21	16.19		4.72	3.241	5506	5500	5504.73
B	12.8	34.80	3.36		0.99	0.930	5519	5515	5518.86
D1	222.5	65.02	14.46		6.06	5.360	5475	5471	5474.48
D	274.7	146.48	5.93	13.77	6.24	4.035	5436.9	5429.5	5435.03
E	118.2	194.46	20.22		7.17	6.412	5452	5440	5451.44
F	18.9	62.89	19.84		1.40	1.386	5426	5421	5425.97
F	373.1	259.49	17.58	6.20	11.76	10.293	5424.3	5415.08	5423.31
G	403.5	111.28	7.00	17.61	7.21	2.948	5422.5	5415.67	5419.83
H	149.8	97.80	4.30	21.60	3.02	2.205	5422	5418.65	5421.42
J	57.9	141.18	6.05	26.34	7.94	3.771	5417	5414	5415.66
K	670.8	239.15	15.75	44.91	14.84	8.346	5409	5404.85	5407.77

ANALYSIS POINT PEAK FLOWS

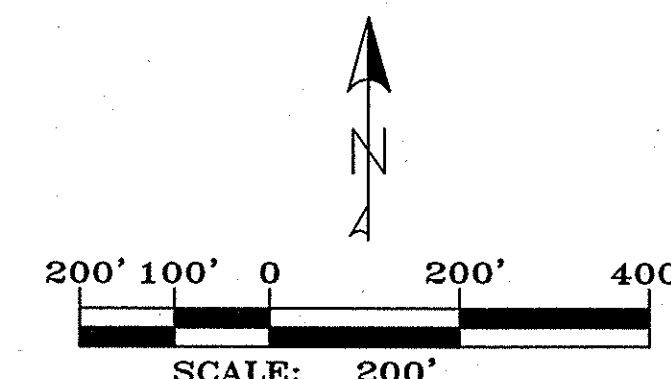
ANALYSIS POINT	PEAK FLOW
AP-A5	16.29 CFS
AP-A6	16.19 CFS
AP-D1	14.46 CFS
AP-D	19.42 CFS
AP-E	20.22 CFS
AP-F5	27.40 CFS
AP-F	23.78 CFS
AP-G	24.61 CFS
AP-H	26.10 CFS
AP-J	32.39 CFS
AP-K	60.66 CFS

DEVELOPED DRAINAGE BASIN CHARACTERISTICS

BASIN	AREA ACRES	A	B	C	D	Q CFS	VOL AC-FT
OFFSITE 1	127.87	100	0	0	0	37.00	4.426
A1	15.30	0	12.5	12.5	75	51.68	2.610
A2	8.52	0	33	33	34	23.43	0.960
A3	3.21	0	5	5	90	11.41	0.606
A4	7.59	0	7.5	7.5	85	26.39	1.381
A5	11.71	0	17	17	66	37.55	1.829
A6	16.97	0	19	19	62	53.44	2.558
A7	6.75	0	12.5	12.5	75	22.52	1.137
C	9.08	12.8	28.4	28.4	30.4	23.20	0.935
D1	11.62	0	19	19	62	36.60	1.752
D2	22.12	0	28.5	28.5	43	63.65	2.763
D3	3.71	0	5	5	90	13.18	0.701
D4	12.55	0	28.5	28.5	43	36.12	1.568
D5	8.75	0	23	23	54	26.55	1.224
D6	5.00	0	18	18	64	15.89	0.764
F1	14.13	0	21.7	21.8	56.5	43.39	2.023
F2	3.67	0	5	5	90	13.02	0.692
F3	22.80	0	21.7	21.8	56.5	70.02	3.267
F4	24.91	0	25	25	50	74.16	3.349
F5	11.85	0	12.5	12.5	75	39.52	1.996
F7	7.02	0	7.5	7.5	85	24.42	1.278
F8	5.00	0	18	18	64	15.89	0.764
G1	16.20	0	25	25	50	48.23	2.178
G2	16.19	0	25	25	50	48.22	2.177
OFFSITE 2	51.52	100	0	0	0	13.87	1.783
B	12.79	0	34	34	32	34.80	1.407
E1.1	11.91	0	28.1	28.1	43.8	34.41	1.501
E1.2	12.76	0	28.1	28.1	43.8	36.78	1.608
E2	5.55	0	30.7	30.7	38.6	15.63	0.660
E3	15.50	0	22	22	56	47.48	2.210
E4	3.69	0	5	5	90	13.11	0.697
E5	17.28	18.8	23.8	26.4	31	43.19	1.762
E6	3.12	0	5	5	90	11.09	0.590
E7	2.90	16.5	24.8	20.6	38.1	7.55	0.324
P	4.51	43	25	25	7	8.41	0.273
H1	11.00	0	26.6	26.6	46.8	32.26	1.431
H2	5.35	0	5	5	90	19.16	1.018
H3	7.62	0	20	20	60	23.39	1.128
J1	3.31	0	12.5	12.5	75	11.04	0.557
J2	10.92	0	12.5	12.5	75	36.40	1.839
J3	3.71	0	19	19	62	11.70	0.560
J4	6.44	0	12.5	12.5	75	21.47	1.084
J5	0.86	0	5	5	90	3.05	0.162
J6	2.70	0	5	5	90	9.59	0.510
J7	2.84	0	5	5	90	10.09	0.536
J8	5.78	0	70	30	0	12.31	0.355
J9	3.51	0	7.5	7.5	85	12.20	0.638
J10	4.02	0	5	5	90	14.27	0.759
J11	4.79	0	5	5	90	16.65	0.886
J12	9.08	100	0	0	0	10.65	0.314
K1	17.11	0	19	19	62	59.54	2.579
K2	9.51	0	15	15	70	29.39	1.357
K3	5.85	0	5	5	90	20.76	1.104
K4	8.58	0	70	30	0	18.28	0.527
K5	15.13	0	19	19	62	47.63	2.281
K6	1.41	0	5	5	90	5.01	0.266

LEGEND

- ⊙ ANALYSIS POINT
- EXISTING STORM DRAIN
- FLOW DIRECTION
- - - FUTURE DEVELOPED STORM DRAIN



NOTES:

- STORM DRAIN SIZES BASED ON 100-YR, 24-HR STORM FLOWS. FUTURE PROJECTS MAY BE REQUIRED TO INCREASE STORM DRAIN SIZE BASED ON 100-YR, 6-HR STORM FLOWS.
- THE INTENDED FUTURE CONTRIBUTION FROM THE TRAILS UNIT 4 IS 20 CFS TO THE MAXIMUM DOWNSTREAM DISCHARGE OF 61 CFS IN UNIVERSE BLVD.

DATUM NAVD 1929

Tompson Engineering Consultants, Inc.
 tecm@yaahoo.com
 P.O. BOX 65760 ALBUQUERQUE, NM 87193
 PHONE: (505) 271-2199 FAX: (505) 830-9246

UPDATE TO THE AMENDMENT TO DMP FOR THE TRAILS UNITS, 1, 2 AND 3 PLATE 2

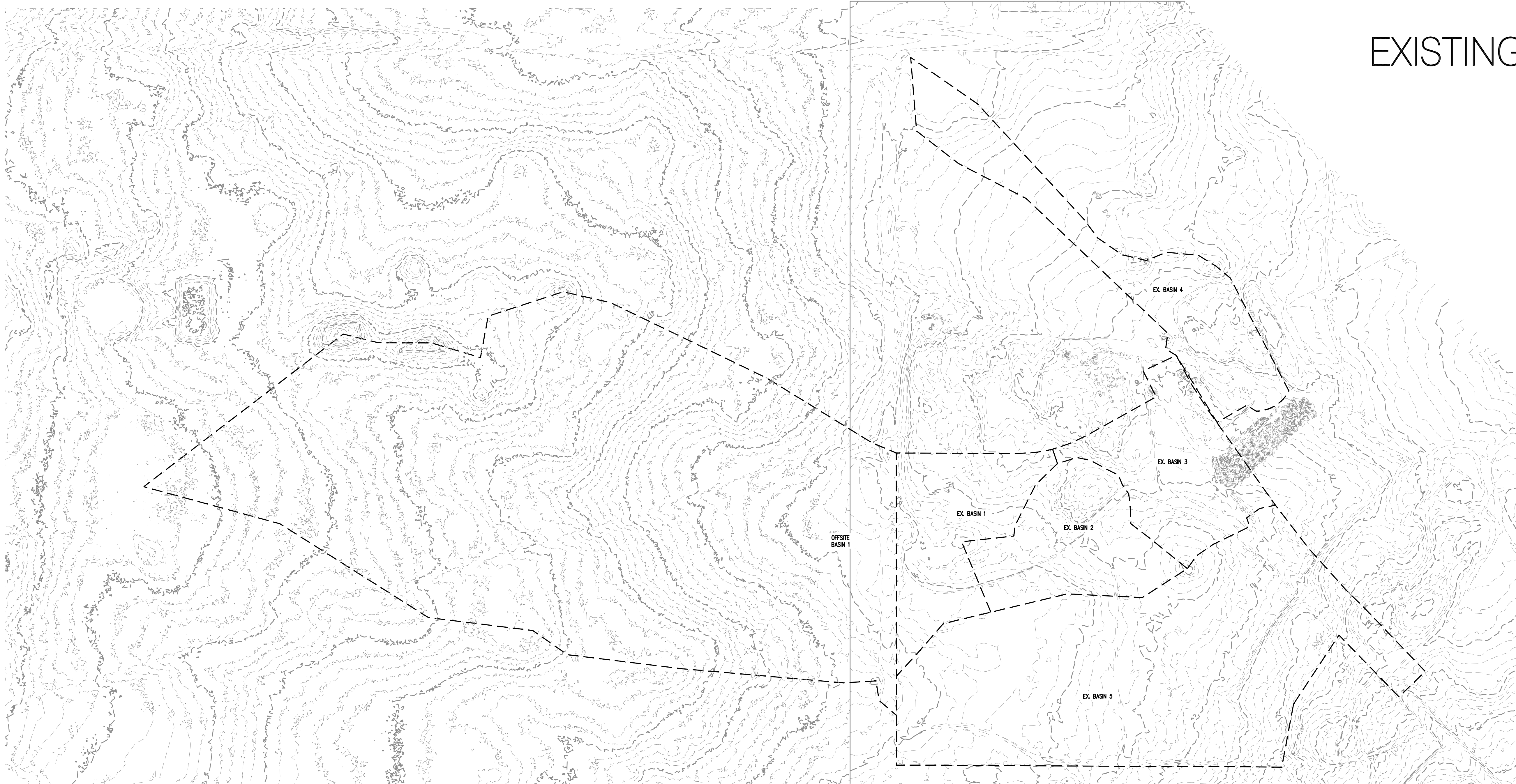
Signature
 9677
 2-26-15
 LICENSED PROFESSIONAL ENGINEER

EXHIBIT C:
EXISTING BASIN MAP

CATALONIA SUBDIVISION

EXISTING BASINS MAP

MARCH 2019



EXISTING BASIN SUMMARY											
BASIN I.D.	AREA (FT)	AREA (AC)	% LAND TREATMENT				DISCHARGE (CFS)		VOLUME (AC-FT)		
			A	B	C	D	10 yr	100YR	10 yr	100 yr	
OFFSITE BASIN 1	1342745	30.83	100.00%	0.00%	0.00%	0.00%	7.7	39.1	0.21	1.13	
Ex Basin 1	140918	3.24	100.00%	0.00%	0.00%	0.00%	0.8	4.1	0.02	0.12	
Ex Basin 2	138230	3.17	0.00%	0.00%	34.00%	66.00%	7.6	12.2	0.26	0.43	
Ex Basin 3	145822	3.35	0.00%	29.00%	29.00%	42.00%	6.2	10.9	0.20	0.37	
Ex Basin 4	182966.9	4.20	0	100.00%	0.0%	0.0%	1.1	5.33	0.03	0.15	
Ex Basin 5	573090	13.16		0.00%	29.00%	29.00%	24.5	42.8	0.78	1.43	
TOTAL	2523801.9	57.9					47.9	114.5	1.5	3.6	

LEGEND

BASIN BOUNDARY

FLOW ARROW

PROPOSED STORM DRAIN

EXISTING STORM DRAIN

PROPOSED STREET SLOPE OR FLOW PATH

PROPOSED STORM DRAIN MANHOLE

PROPOSED STORM DRAIN INLET

2.19%

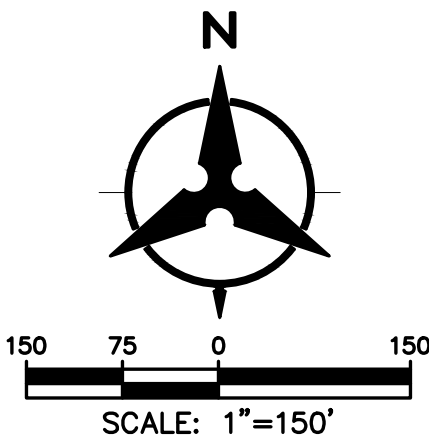
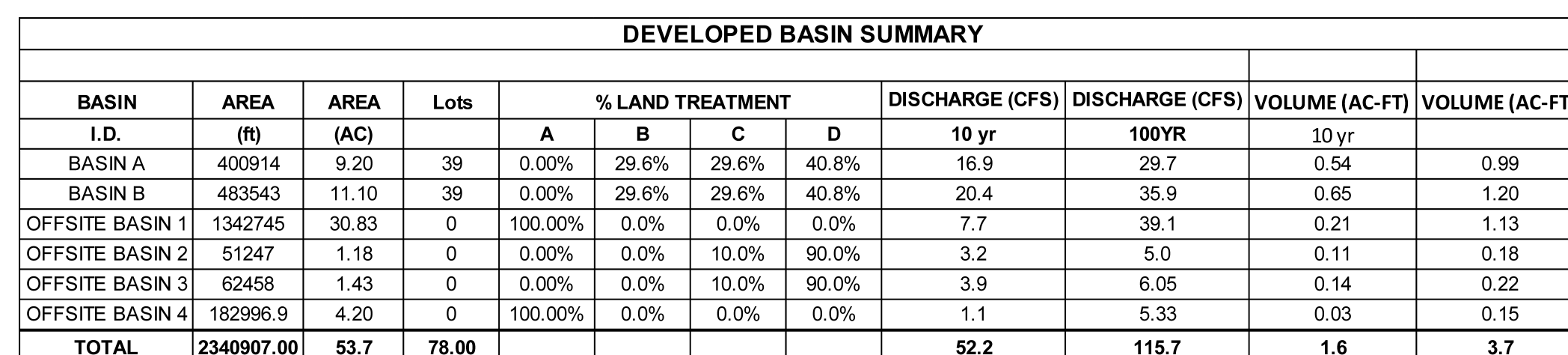


EXHIBIT D:
PROPOSED BASIN MAP

JULY 2019



LEGEND

- BASIN BOUNDARY
- FLOW ARROW
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- PROPOSED STREET SLOPE OR FLOW PATH
- PROPOSED STORM DRAIN MANHOLE
- PROPOSED STORM DRAIN INLET

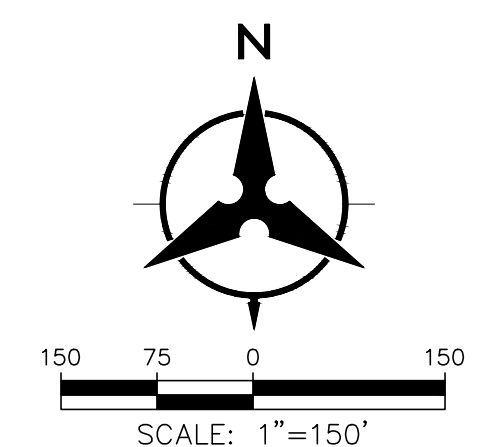


EXHIBIT E:
STORM DRAIN NETWORK

CATALONIA SUBDIVISION

STORM DRAIN EXHIBIT

MARCH 2019

OFFSITE POND 1
Q_IN = 46.2 CFS
Q_OUT = 6.9 CFS
V = 1.54 AC-FT

WOODMONT POND
Q_IN = 28.1 CFS
Q_OUT = 7.1 CFS
V = 0.66 AC-FT

RETENTION POND A
Q_IN = 37.89 CFS
V = 4.37 AC-FT

RETENTION POND A5
V = 4.61 AC-FT

DETENTION POND B
Q_IN = 33.7 CFS
Q_OUT = 1.1 CFS
V = 2.13 AC-FT

STORM DRAIN PIPE TABLE					
PIPE #	Size in.	Slope	Capacity ¹ cfs	ACTUAL FLOW cfs	PIPE LENGTH ft
ONSITE					
SDP1	24	3.00%	39.18	35.90	
SDP2	24	1.00%	22.62	3.36	
SDP3	24	0.70%	18.93	9.25	
SDP4	24	3.00%	39.18	9.25	
SDP6	18	2.00%	14.86	14.85	
SDP7	18	2.00%	14.86	14.85	
SDP8	36	2.00%	94.33	34.68	
SDP9	24	1.00%	22.62	11.40	
SDP10	48	1.00%	143.64	46.09	

1- Capacity Based on Manning's Eq w/ N= 0.013

INLET TABLE			
Inlet #	Inlet Type	Actual Flow	Avail Head ft
IN1	1-DBL COA TYPE A	35.90	0.83
IN2	1-SGL COA TYPE C	14.85	0.83
IN3	1-SGL COA TYPE C	14.85	0.83

LEGEND

BASIN BOUNDARY	
FLOW ARROW	
PROPOSED STORM DRAIN	
EXISTING STORM DRAIN	
PROPOSED STREET SLOPE OR FLOW PATH	
PROPOSED STORM DRAIN MANHOLE	
PROPOSED STORM DRAIN INLET	

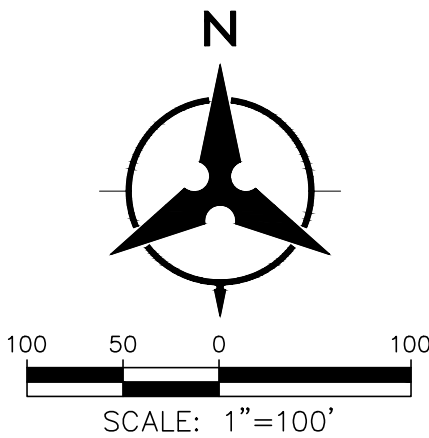
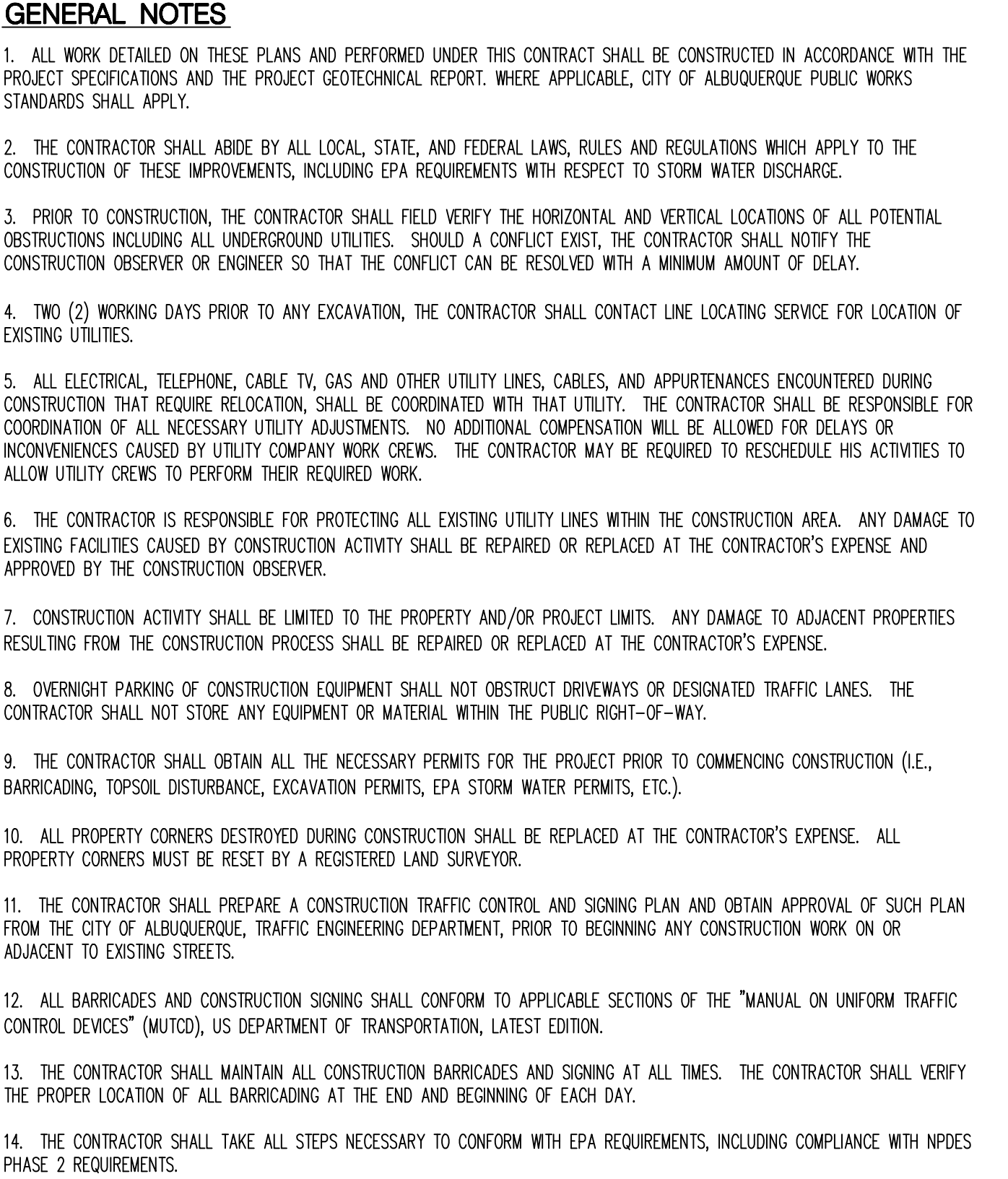


EXHIBIT F:
GRADING PLAN

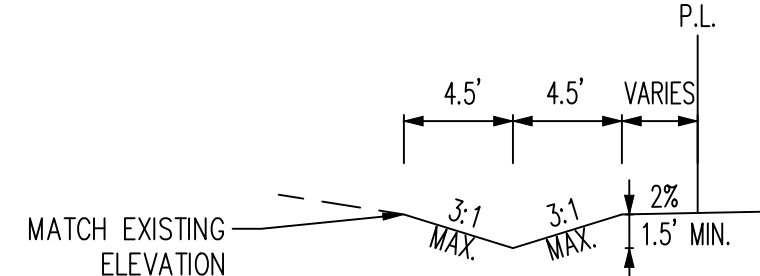
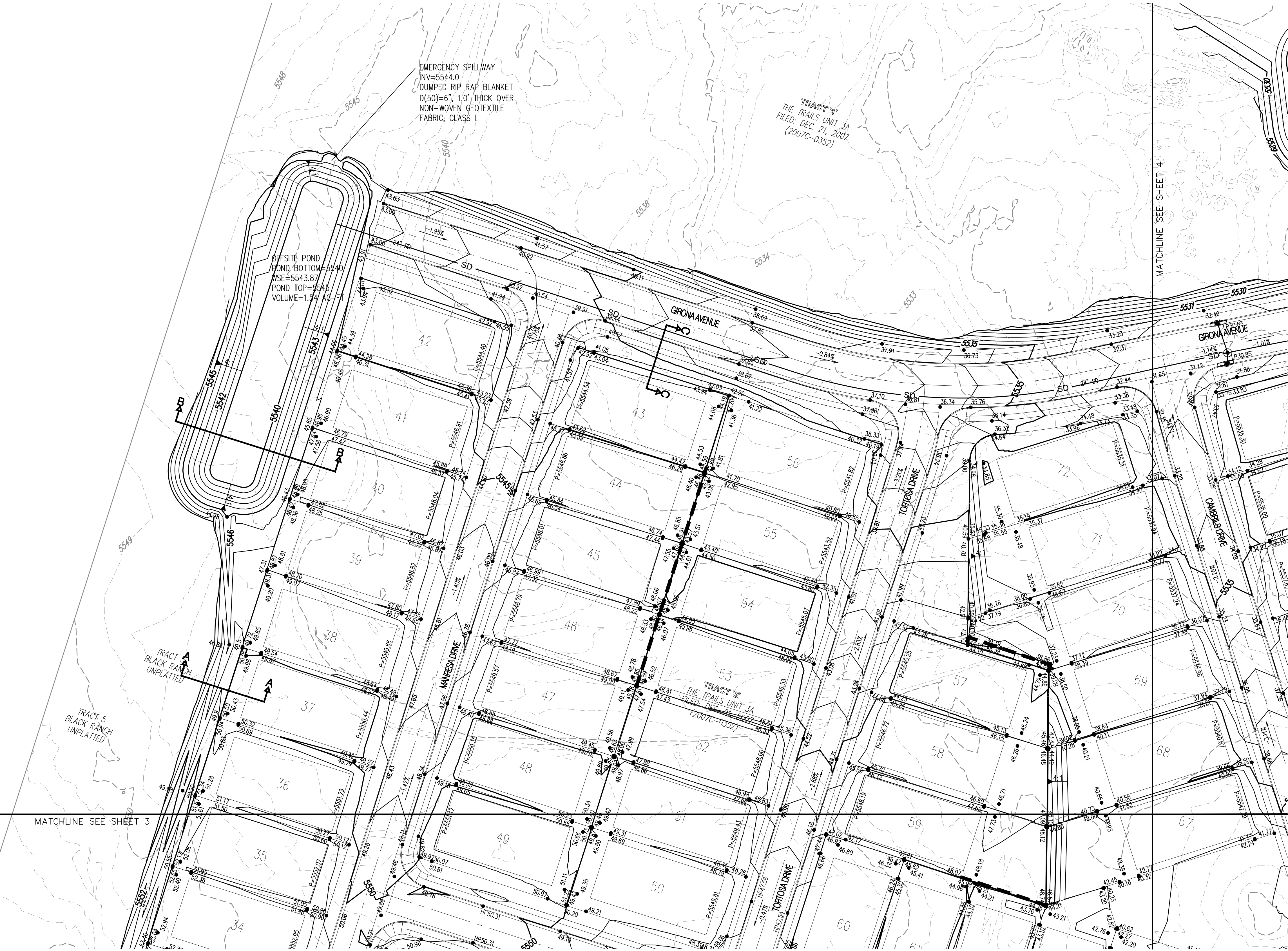


1. EXCEPT AS PROVIDED HEREIN, GRADING SHALL BE PERFORMED AT THE ELEVATIONS AND IN ACCORDANCE WITH THE DETAILS SHOWN ON THIS PLAN.
2. CONTRACTOR SHALL OBTAIN AND ABIDE BY A TOPSOIL DISTURBANCE PERMIT FROM THE CITY OF ALBUQUERQUE ENVIRONMENTAL HEALTH DIVISION, PRIOR TO CONSTRUCTION. THE COST FOR REQUIRED CONSTRUCTION DUST AND EROSION CONTROL MEASURES SHALL BE IN ADDITION TO THE PROJECT COST. THE CONTRACTOR SHALL CONFORM TO ALL CITY, COUNTY, STATE, AND FEDERAL DUST CONTROL MEASURES AND REQUIREMENTS AND WILL BE RESPONSIBLE FOR PREPARING AND OBTAINING ALL NECESSARY APPLICATIONS AND APPROVALS.
3. ALL WORK RELATED TO FOUNDATION CONSTRUCTION, SITE PREPARATION, AND PAVEMENT INSTALLATION, AS SHOWN ON THIS PLAN, SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SOILS REPORT PREPARED BY BREXENDAW DATED JULY 22, 2013. ALL OTHER WORK, UNLESS OTHERWISE STATED OR PROVIDED FOR HEREON, SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS (FIRST PRIORITY), AND/OR THE CITY OF ALBUQUERQUE (COA) STANDARD SPECIFICATIONS FOR PUBLIC WORKS (SECOND PRIORITY).
4. TWO WORKING DAYS PRIOR TO EXCAVATION, CONTRACTOR MUST CONTACT LINE LOCATING SERVICE (765-1264) FOR LOCATION OF EXISTING UTILITIES.
5. PRIOR TO GRADING, ALL VEGETATION DEBRIS, AND NEAR SURFACE ORGANICALLY CONTAMINATED SOIL SHALL BE STRIPPED FROM ALL AREAS TO BE GRADED. VEGETATION AND DEBRIS SHALL BE DISPOSED OF OFF-SITE OR STOCK-PILED FOR USE IN PLANTERS AND NON-STRUCTURAL FILLS.
6. EARTH SLOPES SHALL NOT EXCEED 4 HORIZONTAL TO 1 VERTICAL UNLESS SHOWN OTHERWISE.
7. IT IS THE INTENT OF THESE PLANS THAT THIS CONTRACTOR SHALL NOT PERFORM ANY WORK OUTSIDE OF THE PROPERTY BOUNDARIES EXCEPT AS REQUIRED BY THIS PLAN.
8. THE CONTRACTOR IS TO ENSURE THAT NO SOIL ERODES FROM THE SITE ONTO ADJACENT PROPERTY OR PUBLIC RIGHT-OF-WAY. THIS SHOULD BE ACHIEVED BY CONSTRUCTING TEMPORARY BERMS AT THE PROPERTY LINES MEETING THE SOIL TO PROTECT IT FROM WIND EROSION.
9. A DISPOSAL SITE FOR ALL EXCESS EXCAVATION AND UNSUITABLE MATERIAL SHALL BE OBTAINED BY THE CONTRACTOR IN COMPLIANCE WITH APPLICABLE ENVIRONMENTAL REGULATIONS AND APPROVED BY THE OBSERVER. ALL COSTS INCURRED IN OBTAINING A DISPOSAL SITE AND HAUL THERE TO BE CONSIDERED INCIDENTAL TO THE PROJECT, AND NO SEPARATE MEASUREMENT OR PAYMENT SHALL BE MADE.
10. PAYING AND ROADWAY GRADES SHALL BE +/- 0.1" FROM PLAN ELEVATIONS. PAD ELEVATION SHALL BE +/- 0.05" FROM BUILDING PLAN ELEVATIONS.
11. ALL SPOT ELEVATIONS ARE TO FOLLOWLINE UNLESS OTHERWISE NOTED. VALLEY GUTTER ELEVATIONS ARE SHOWN AT FOLLOWLINE ELEVATION.

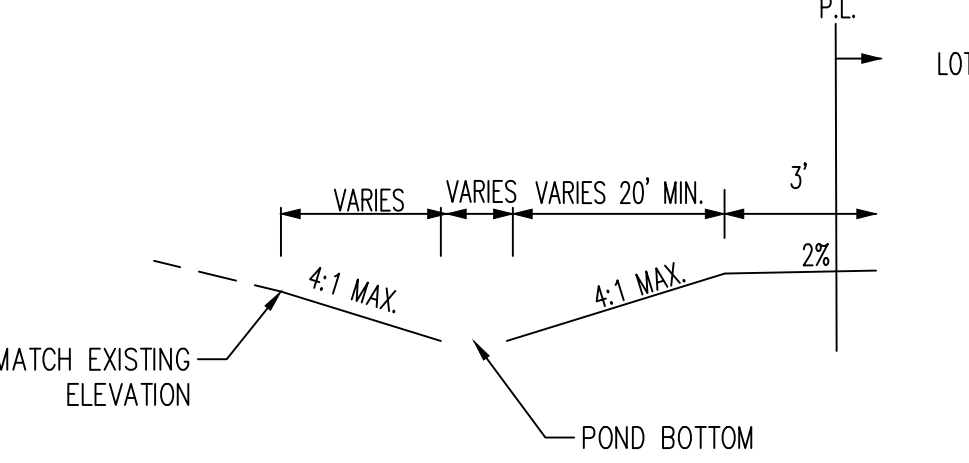
PROPOSED SPOT ELEVATION ● 5235.25
EXISTING SPOT ELEVATION ● EX 5235.25
PROPOSED CONTOUR -5025-
EXISTING STORM DRAIN LINE == == == == ==
PROPOSED STORM DRAIN INLET []
PROPOSED STORM DRAIN LINE == == == == ==
PROPOSED STORM DRAIN MANHOLE ()
PROPOSED WATER BLOCK ~~~~~
RETAINING WALL, CONSTRUCTED
PRI TO GRADING/PAD
CERTIFICATION []
PAD 1.0
P=5300.00
TURNED BLOCK TB
STREET SLOPE XX



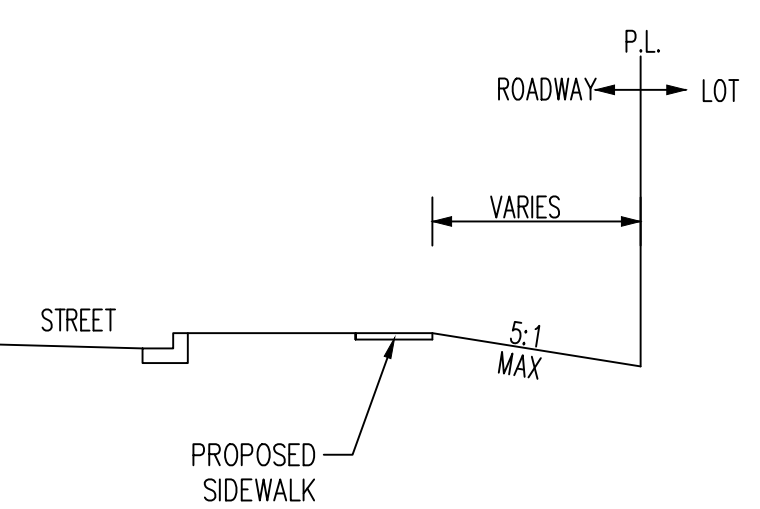
P:\20190248\CDP\Plans\General\20190248_GradingPlan01.dwg
 Thu, 11-Jul-2019 - 3:42:pm, Plotted by: JLUTZ
 PRIOR TO GRADING CERTIFICATION.
 ALL DESIGN REGULATIONS FOR WALLS, FENCES, AND
 RETAINING WALLS.
 BHI JOB NO. 20190248



TYPICAL CROSS SECTION A-A
NOT TO SCALE



TYPICAL CROSS SECTION B-B
NOT TO SCALE



TYPICAL CROSS SECTION C-C
NOT TO SCALE

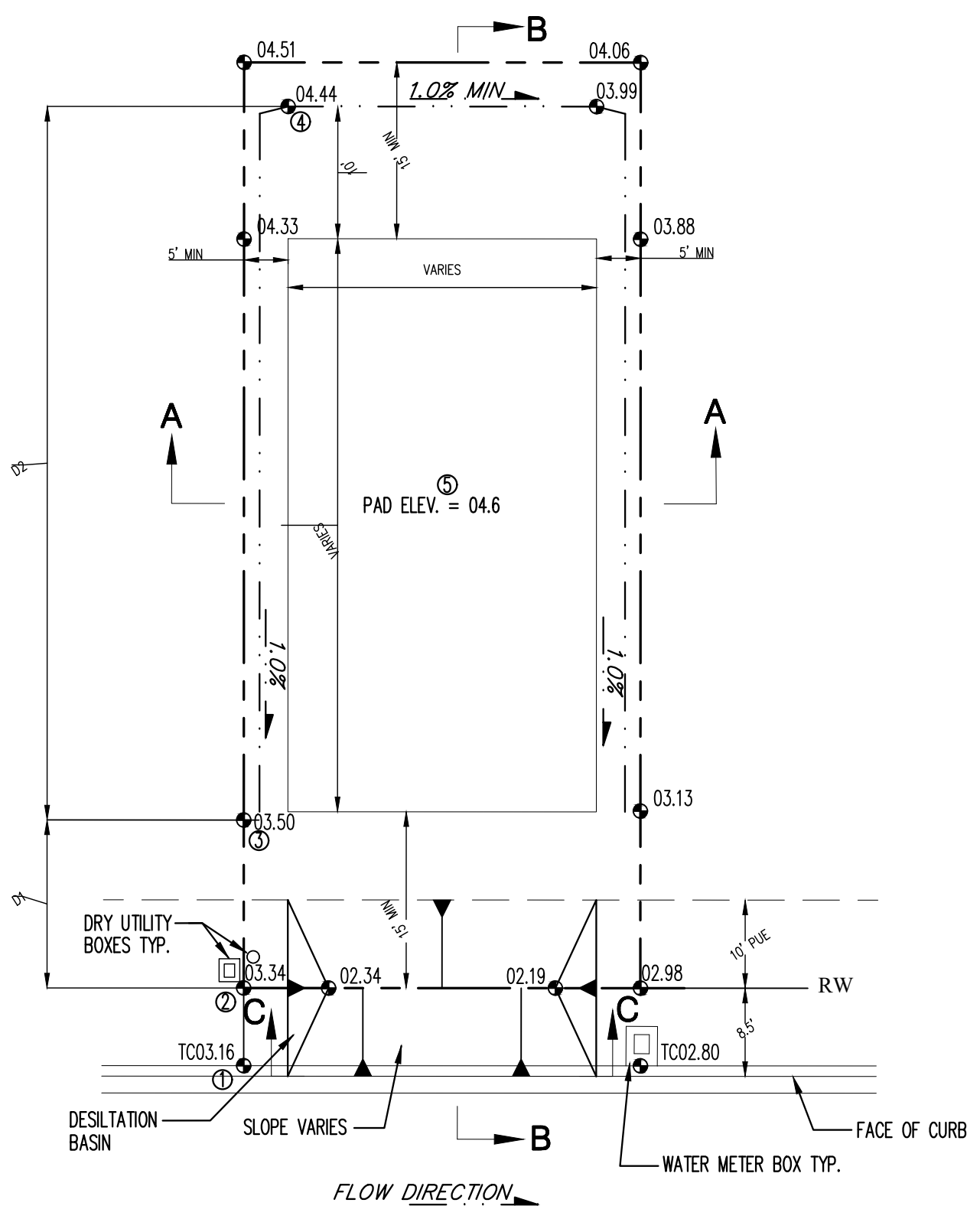
LEGEND

- PROPOSED SPOT ELEVATION: 5235.25
- EXISTING SPOT ELEVATION: EX 5235.25
- PROPOSED CONTOUR: 5025
- EXISTING STORM DRAIN LINE: - - - - -
- PROPOSED STORM DRAIN INLET: [Symbol]
- PROPOSED STORM DRAIN LINE: [Symbol]
- PROPOSED STORM DRAIN MANHOLE: [Symbol]
- PROPOSED WATER BLOCK: [Symbol]
- RETAINING WALL, CONSTRUCTED PRIOR TO GRADING/PAD CERTIFICATION: [Symbol]
- PAD: 10 P=5300.00
- TURNED BLOCK: TB
- STREET SLOPE: XY

Bohannon & Huston
www.bhinc.com 800.877.5332

		CITY OF ALBUQUERQUE DEPARTMENT OF MUNICIPAL DEVELOPMENT	
CATALONIA GRADING PLAN			
DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	MO./DAY/YR.	MO./DAY/YR.
LAST DESIGN UPDATE			
CITY PROJECT NO.	ZONE MAP NO. C-08	SHEET 2	OF

AS-BUILT INFORMATION		BENCH MARKS		SURVEY INFORMATION		ENGINEER'S SEAL	
CONTRACTOR	DATE	ACS MONUMENT STAMPED "UNION"	DATE	FIELD NOTES	BY		REMARKS
WORKED BY	DATE	GEOGRAPHIC POSITION (NAD 83)	DATE				
INSPECTOR'S	DATE	N.M. STATE PLANE COORDINATES (CENTRAL ZONE)	DATE	NO.	BY	DESIGN	REVISIONS
ACCEPTANCE BY	DATE	N = 1,923,503.475 E = 1,493,655.030	DATE				
VERIFICATION BY	DATE	GROUND-TO-GRID FACTOR = 0.999664360	DATE				
DRAWINGS	DATE	24x = -0016'58.96"	DATE				
DESIGNED BY	DATE	NAVD 1988 ELEVATION = 5524.950	DATE				
CHECKED BY	DATE		DATE				
NO.	DATE		DATE				



TYPICAL LOT GRADE DETAIL
WITH DESILTATION BASIN FOR SEDIMENTATION CONTROL
NOT TO SCALE

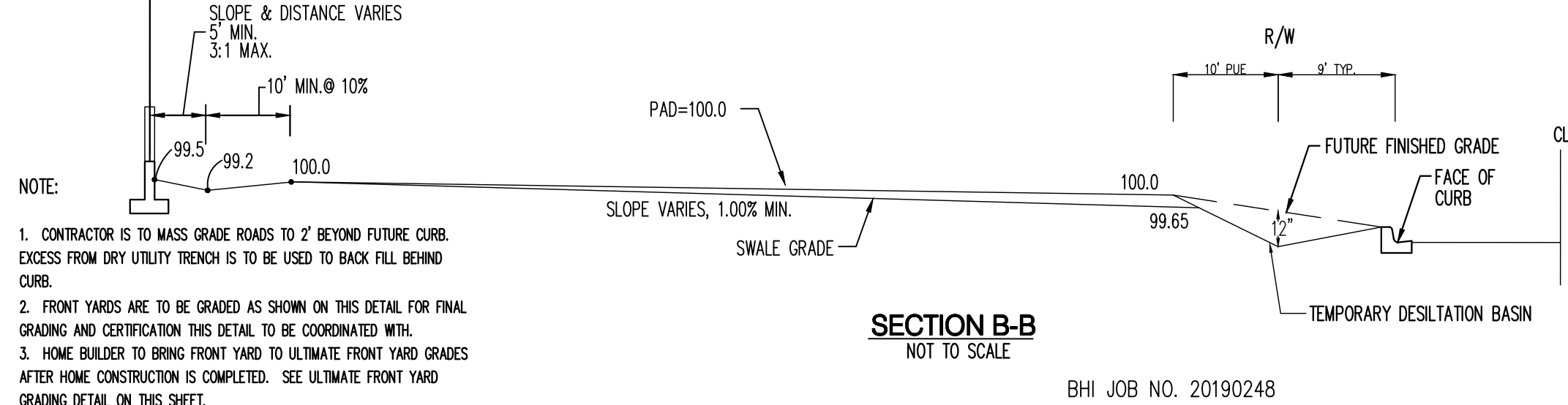
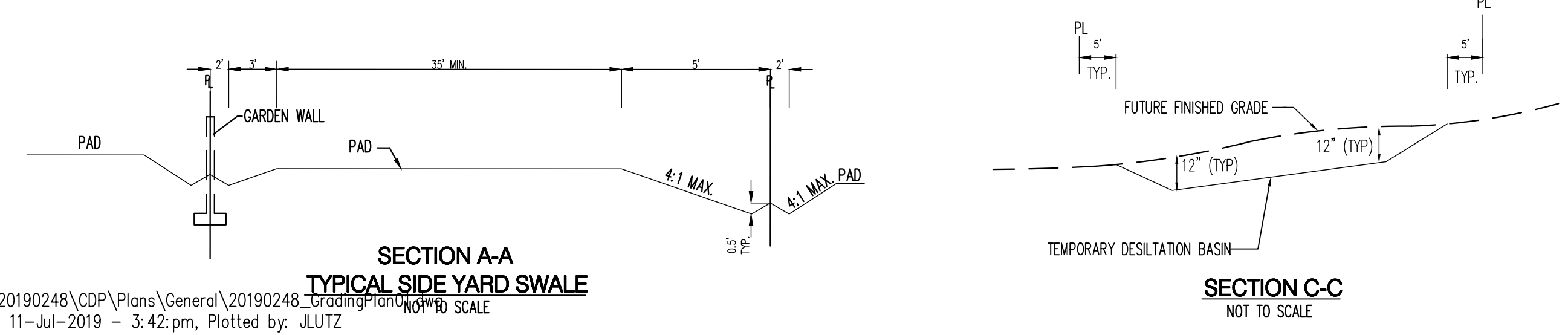
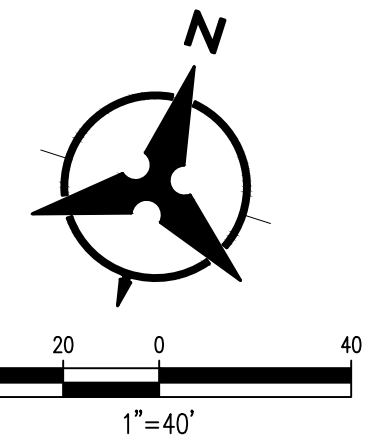
TO SET SPOT ② - ADD 0.17' TO SPOT ①
TO SET SPOT ③ - MULTIPLY D1 BY 1.0% AND ADD TO SPOT ②
TO SET SPOT ④ - MULTIPLY D2 BY 1.0% AND ADD TO SPOT ③
TO SET SPOT ⑤ - ADD 0.2' TO SPOT ④

BOTTOM OF BASIN IS 1' BELOW PROPERTY LINE ELEVATION.
SEE GRADING PLANS FOR EXACT ELEVATIONS.
CONTRACTOR SHALL CONSTRUCT TEMPORARY DESILTATION BASIN AT EACH LOT.

LEGEND

- PROPOSED SPOT ELEVATION: 5235.25
- EXISTING SPOT ELEVATION: EX 5235.25
- PROPOSED CONTOUR: 5025
- EXISTING STORM DRAIN LINE: ---
- PROPOSED STORM DRAIN INLET: [Symbol]
- PROPOSED STORM DRAIN LINE: [Symbol]
- PROPOSED STORM DRAIN MANHOLE: [Symbol]
- PROPOSED WATER BLOCK: [Symbol]
- RETAINING WALL, CONSTRUCTED PRIOR TO GRADING/PAD CERTIFICATION: [Symbol]
- PAD: 10' P=5300.00
- TURNED BLOCK: TB
- STREET SLOPE: XX

1"=40'



NOTE:

- CONTRACTOR IS TO MASS GRADE ROADS TO 2' BEYOND FUTURE CURB. EXCESS FROM DRY UTILITY TRENCH IS TO BE USED TO BACK FILL BEHIND CURB.
- FRONT YARDS ARE TO BE GRADED AS SHOWN ON THIS DETAIL FOR FINAL GRADING AND CERTIFICATION THIS DETAIL TO BE COORDINATED WITH.
- HOME BUILDER TO BRING FRONT YARD TO ULTIMATE FRONT YARD GRADES AFTER HOME CONSTRUCTION IS COMPLETED. SEE ULTIMATE FRONT YARD GRADING DETAIL ON THIS SHEET.

AS-BUILT INFORMATION									
CONTRACTOR		DATE		WORKED BY		DATE		INSPECTOR'S	
ACCEPTANCE BY		DATE		VERIFICATION BY		DATE		DRAWINGS	
REVISIONS		DATE		REVISIONS		DATE		DESIGN	
DESIGNED BY		YPM		DATE		04/19		DRAWN BY	
CHECKED BY		YPM		DATE		04/19		DATE	
DATE		04/19		DATE		04/19		DATE	

ENGINEER'S SEAL		SURVEY INFORMATION		BENCH MARKS		AS-BUILT INFORMATION	
NO.		FIELD NOTES		ACS MONUMENT STAMPED "UNION"		CONTRACTOR	
BY		DATE		GEOGRAPHIC POSITION (NAD 83)		WORKED BY	
NO.		DATE		N.M. STATE PLANE COORDINATES (CENTRAL ZONE)		INSPECTOR'S	
REMARKS		BY		N = 1,923,503.475 E = 1,493,655.030		ACCEPTANCE BY	
REVISIONS		DATE		GROUND-TO-GRID FACTOR = 0.9999664360		VERIFICATION BY	
DESIGN		DATE		Δm = -0.0165896"		DRAWINGS	
DESIGNED BY		YPM		NAVD 1988 ELEVATION = 5524.950		REVISIONS	
DRAWN BY		AR				DATE	
CHECKED BY		YPM				MICRO-FILM INFORMATION	
DATE		04/19				RECORDED BY	
DATE		04/19				NO.	
DATE		04/19				DATE	

SHEET		OF	
4			

Bohannon & Huston
www.bhinc.com 800.877.5332

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT

CATALONIA
GRADING PLAN

DESIGN REVIEW COMMITTEE	CITY ENGINEER APPROVAL	MO./DAY/YR.	MO./DAY/YR.

CITY PROJECT NO. ZONE MAP NO. C-08 SHEET 4 OF

