

DRAINAGE MASTER PLAN

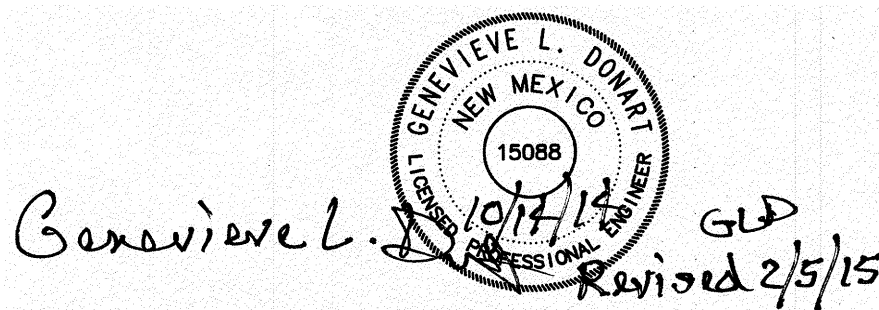
FOR

WINROCK TOWN CENTER

ALBUQUERQUE, NEW MEXICO

OCTOBER 14, 2014

REVISED FEBRUARY 5, 2015



Genevieve L. Donart, PE

Date

BY

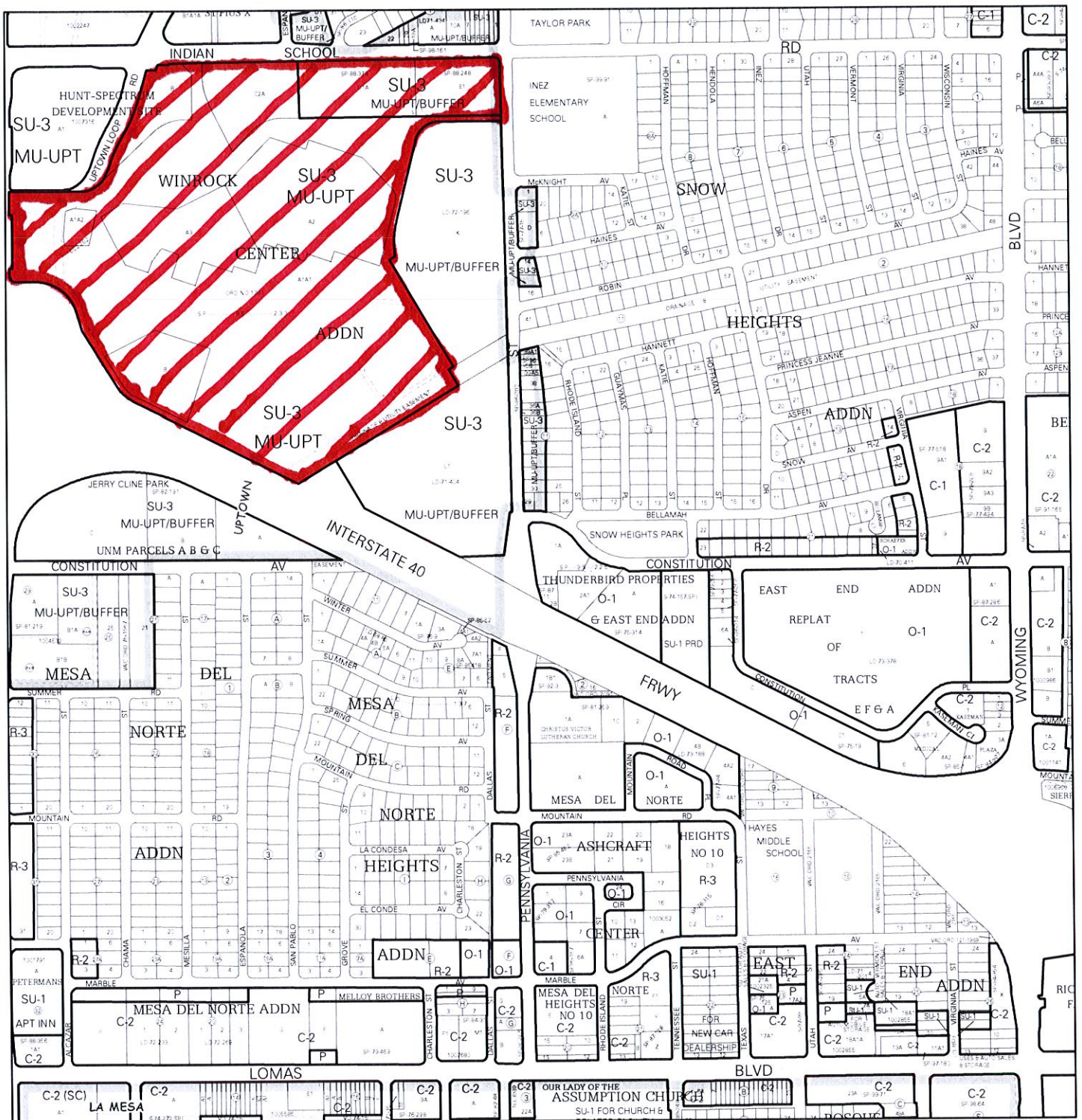


ISAACSON & ARFMAN, P.A.
Consulting Engineering Associates

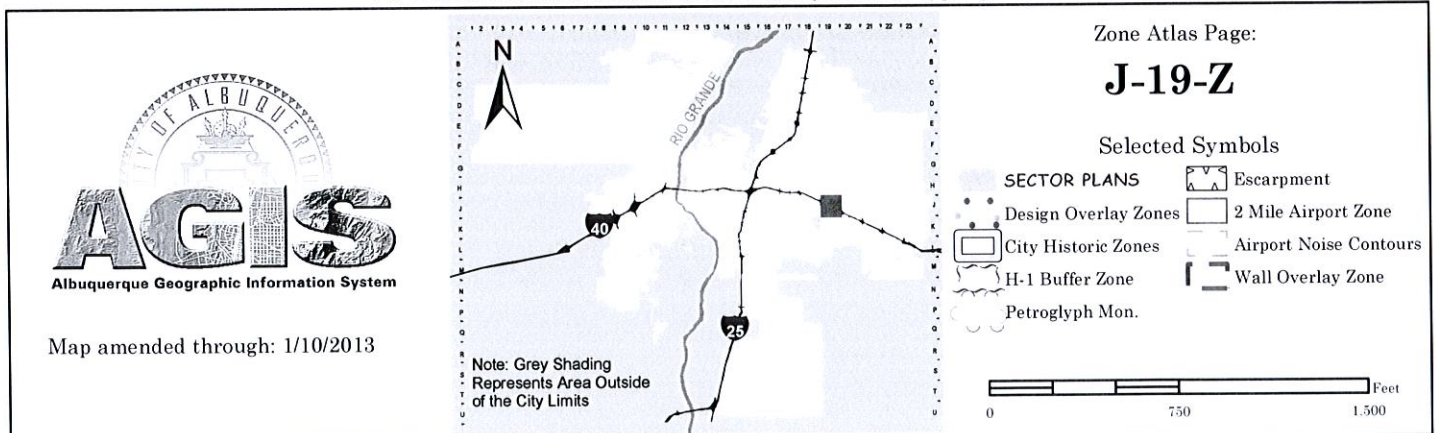
Thomas O. Isaacson, PE(RET.) & LS(RET.)
Fred C. Arfman, PE
Åsa Nilsson-Weber, PE

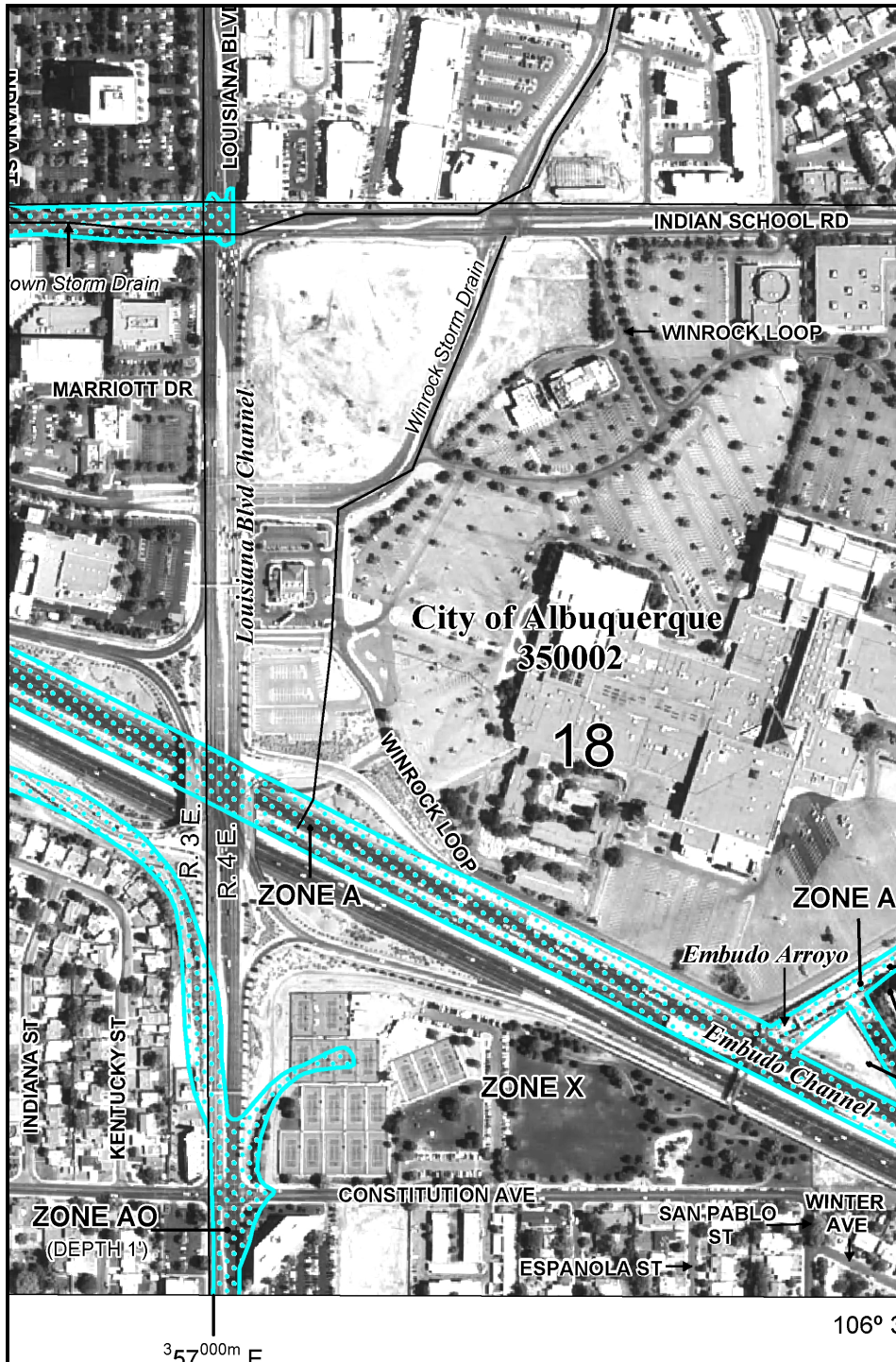
I&A Project No. 1823

M:\PROJECT DOCUMENTS\1800-1899\1883\REPORTS & EXHIBITS



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





38° 05' 00" N

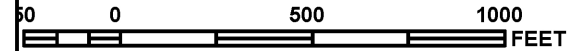
1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN CHANNEL

ZONE X

35° 05' 37.5"
106° 33' 45"

357° 00' 00" E

MAP SCALE 1" = 500'



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0352H

FIRM

FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS

PANEL 352 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0352	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
35001C0352H

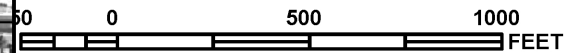
MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356H

FIRM

FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY,
NEW MEXICO
AND INCORPORATED AREAS

PANEL 356 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0356	H

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER
35001C0356H

MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

TABLE OF CONTENTS

VICINITY MAP

FEMA FIRMETTES

I.	PROJECT INFORMATION	Page 1
II.	INTRODUCTION	Page 2
III.	EXISTING CONDITIONS.....	Page 2
IV.	PROPOSED CONDITIONS	Page 4

APPENDICES

APPENDIX A: Basin Map

APPENDIX B: Hydrology Calculations

APPENDIX C: Storm Drain Calculations



I. PROJECT INFORMATION

PROPOSED LEGAL DESCRIPTION:

Tracts A through P, Winrock Town Center

EXISTING LEGAL DESCRIPTION:

Parcels A-1-A-1, A-1-A-2, A-2, A-3, B, C-2A, D-1-A, and E-1, Winrock Center Addition, and Tract B, Hunt-Spectrum Development Site

ENGINEER: Isaacson & Arfman, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828
Attn: Genevieve Donart

SURVEYOR: Surv-Tek, Inc.
(505) 897-3366
Attn: Russ Hugg, NMPLS No. 9750

DEVELOPER: Winrock Partners, LLC. c/o Goodman Realty Group
100 Sun Ave NE Suite 100,
Albuquerque NM 87109 4659
(505) 881-0100

TOTAL AREA: 80.1 Acres

FLOODPLAIN: This site lies outside flood hazard areas as shown on National Flood Insurance Program Flood Insurance Rate Maps 35001C0352H and 35001C0356H, revised August 16, 2012.



II. INTRODUCTION

The purpose of this Drainage Master Plan (DMP) is to provide an overall understanding of the drainage patterns in the proposed Winrock Town Center project, and to provide a drainage framework for upcoming development within the project.

The Winrock Town Center is a proposed “open-air” mall at the site of the Winrock Mall. Existing and proposed buildings will be mixed with pedestrian-friendly roads and parking areas. The rights-of-way between buildings will have utility corridors, including storm drains as needed.

The quantity of storm water generated by the site is not affected by the proposed changes, since the site is already fully developed at a high percentage of impervious area.

Every new project within the site will be required to submit a Grading & Drainage Plan to the City of Albuquerque Hydrology Department that complies with this Drainage Master Plan.

III. EXISTING CONDITIONS

The Winrock site is a complex of buildings that includes the main mall, a number of outlying restaurants, the Toys ‘R’ Us, and a recently completed movie theater. The existing mall building is composed of a number of individual buildings that were enclosed by an overall structure.

The site is bounded by Indian School Road to the north, America’s Parkway (aka Uptown Loop) to the northwest, Louisiana Blvd to the west, I-40 and the Embudo Arroyo to the south, the Winrock Villas Condo complex to the east, and Pennsylvania Ave to the northeast.

The site generally slopes from the east towards the southwest corner. Existing drainage patterns direct storm water towards one of the existing storm drains, or to the surrounding roads. The site is completely developed with about 88% impervious area.

There are a number of previous reports that relate to this site. The most recent are:

- “Final Drainage Study for Winrock Redevelopment Winrock Market Center” by Huitt-Zollars, Inc. dated 03/13/2006 (H-Z Drainage Study)
- “Phase 1 Amendment to the Final Drainage Study for Winrock Redevelopment” by Huitt-Zollars, Inc. dated 09/07/2011 (H-Z Amendment)

These reports address the existing basins, and provide for new storm drains based on the proposed layout at that time.

WINROCK TOWN CENTER



In the existing condition the site is fully developed and doesn't provide any onsite detention, resulting in a historic free-discharge from the overall Winrock site. Downstream drainage infrastructure is sized to accept the existing flows from each existing discharge point.



IV. PROPOSED CONDITIONS

The Winrock Town Center is a proposed “open-air” mall at the site of the Winrock Mall.

There are existing buildings on the site that are to remain, including restaurants on the perimeter of the site, Toys ‘R’ Us, the new theater, and some of the buildings that were part of the main mall building. The paving directly adjacent to these improvements is likely to remain.

There are rights-of-way in a grid-like pattern that run between existing and proposed buildings. A plaza/park central to the project has a water feature that will collect roof flows from adjoining buildings. An overflow for this water feature must be sized to allow free discharge of the incoming 100-year flow.

The site is allowed free-discharge overall, but each basin has been sized to maintain 100-year flows at existing discharge points that are at or below the existing quantities (per the H-Z Drainage Study as revised in the H-Z Amendment). Proposed Basin boundaries in this DMP are modified from the previous studies. The new basins must be honored to maintain the historic discharge rates. (See Appendix A for a Basin Map and Appendix B for the Hydrology Calculations.)

Free discharge is based on the land treatments for each basin in the Hydrology Calculations.

The proposed basins are as follows:

BASIN 100

Basin 100 consists of the Regal Theater and areas to the east and south. There is an existing storm drain that runs behind and to the south of the theater, and discharges with a 36” pipe to the Embudo Arroyo. It also captures offsite Basins 101a, 101b, & 101c.

This basin is not intended to change with this new layout, since the theater was only recently completed. No new infrastructure is required.

BASIN 110

Basin 110 includes the area south and west of the theater. Storm water from this basin will be captured and directed to the existing 36” storm drain from Basin 100. The existing storm drain has the capacity to handle this additional flow. (See Basin 100 - proposed Storm Drain calculations in Appendix C for storm drain sizing.)



BASIN 200

Basin 200 includes the northern portion of the site. As in the historic condition, sheet flows discharge to Indian School Road, or are directed to the storm drain in Indian School via an existing 60" storm drain west of Toys 'R' Us. The total flows are at or below the previous discharge to Indian School Road.

BASIN 300

This basin is the largest within the site. The area excludes Basin 300 Rooftops. Basin 300 discharges to the existing 84" storm drain that runs along the western side of the site.

A new storm drain system will need to be installed in this basin in order to collect all of the flows (See Basin 300 Storm Drain calculations in Appendix C for storm drain sizing.) The existing storm drains in this area will need to be removed or abandoned in place, with the exception of a stretch that currently picks up discharge from the BJ's Restaurant.

A total of 103,820 sf of rooftops from this basin drains to the water feature in Basin 500P.

The proposed total flows to the 84" storm drain (Basin 300 Rooftops excluded) are at or below the previous discharges.

BASIN 400

This is a small basin that surface drains towards the I-40 on-ramp. The storm water is collected in inlets at the base of the ramp.

The proposed flow to the on-ramp is at or below the previous discharges.

BASIN 500

This basin includes the southern portion of the site. The area excludes Basin 500 Rooftops. A new storm drain picks up flows and directs them to the existing 42" pipe that discharges to the I-40 channel. (See Basin 500 Storm Drain calculations in Appendix C for storm drain sizing.)

A total of 229,679 sf of rooftops from this basin drains to the water feature in Basin 500P.



BASIN 500P

Basin 500P includes the park/plaza. A water feature is planned within this basin that captures the flows from this basin. Basins 300 Rooftops, 500 Rooftops, and 510 Rooftops also contribute storm water to the water feature.

The water feature is planned to have a surface pond or stream in the park/plaza, with a possibility of waterfall components.

The water feature will serve as first flush treatment for all of the contributing basins. Each of the projects that contain “Rooftop” basins are required to provide infrastructure that can deliver the rooftop flow to the water feature upon its completion.

The storm water directed to this basin is intended strictly as supply for the water feature. Because no detention is needed to reduce 100-year discharge from the overall site, there is no minimum storage requirement. The water feature must have an overflow with a capacity of 59.1 cfs (the total 100-year flow from contributing basin and rooftops) that directs the overflow to the Basin 500 storm drain. (See Basin 500 Storm Drain calculations in Appendix C for storm drain sizing.)

The total contributing basins generate 100,120 cu. ft. in the 100-year, 6-hour storm. If the water feature’s surface ponding cannot hold the entire volume, an underground cistern may be installed, or the contributing storm water beyond the provided volume must be directed to the Basin 500 storm drain.

If the water feature is not built at the time of construction of the contributing basins, the contributing flows must be directed to the Basin 500 storm drain. A storm drain extension to the water feature must be designed for the ultimate condition.

BASIN 510

This is a basin between the proposed park and the theater. The area excludes Basin 510 Rooftops. Flows from this basin enter the Basin 500 storm drain.

A total of 78,686 sf of rooftops from this basin drains to the water feature in Basin 500P.

BASIN 520

This basin includes the area north of the theater and a portion of the road just to the west. Offsite flows from Basin 151 are directed through Basin 520. The combined flows drain through Basin 510, and enter the Basin 500 storm drain.

WINROCK TOWN CENTER



BASIN 530

Basin 530 is east of Basin 500. Storm water from this basin is directed to the Basin 500 storm drain.

BASIN 600

Basin 600 is adjacent to Uptown Loop, and surface discharges to the road. The flow to Uptown Loop is at or below the previous discharges.

OVERALL REQUIREMENTS

- Design each project using the land treatments called out for each basin in the Hydrology Calculations in Appendix B.
- Every new development is required to build downstream storm drains that are shown in this DMP. The improvements must meet City of Albuquerque standards.
- The developments are also required to design how flows are directed to that infrastructure. Examples include number and location of storm inlets, roof drain connections, sidewalk culverts, street flow capacity, etc.
- As part of the individual grading & drainage plans, every new development within the project is required to treat “first flush” storm water per City of Albuquerque DPM requirements. “Rooftop” basins will be directed to the water feature in Basin 500P for treatment.
- Existing storm drains that are under proposed buildings must be removed. Other existing storm drains that are not to be used may be abandoned in-place.



APPENDIX A

Basin Map





KEYED NOTES

- EXISTING STORM DRAIN TO BE ABANDONED IN PLACE OR REMOVED.
-

LEGEND

EXISTING STORM DRAIN LINE

— 30" SD —

NEW STORM DRAIN LINE

●

NEW MANHOLE

— RD —

NEW ROOF DRAIN

—

BASIN LINE

(400)

BASIN ID

ROOFTOP BASIN HATCH

ISAACSON & ARFMAN, P.A.

Consulting Engineering Associates

128 Monroe Street N.E.

Albuquerque, New Mexico 87108

Ph. 505-268-8828 www.isacarl.com

2031 C-701 DRAINAGE BASIN EXHIBIT.dwg Feb 06,2015

This design, calculations, and concepts are owned by and remain the property of Isaacson & Arfman, P.A. and no part thereof shall be utilized by any person, firm or corporation for any purpose whatsoever except with the written permission of Isaacson & Arfman, P.A. ©

WINROCK TOWN CENTER

(I-25 & LOUISIANA BLVD. NE)

GOODMAN REALTY GROUP

BASIN MAP

Date:	No. / Revision:	Date:	Job No.
Drawn By:			C-701
Ckd By:			SH. OF

M:\PROJECTS\2000-2099\2031 DWG\2031 C-701 DRAINAGE BASIN EXHIBIT.dwg, 2/6/2015 11:41:30 AM, GLD

APPENDIX B

Hydrology Calculations



Job Name:	Winrock Town Center
Client:	Winrock Partners, LLC c/o Goodman Realty Group
Date Prepared:	10/2/2014
Date Modified:	
Precipitation Zone:	3

CALCULATIONS: Winrock Town Center :

Based on Drainage Design Criteria for City of Albuquerque Section 22.2, DPM, Vol 2, dated Jan., 1993

ON-SITE

AREA OF SITE: 3493574.825 SF = 80.2 Acres
100-year, 6-hour

ALLOWABLE DISCHARGE:**DEVELOPED FLOWS:****EXCESS PRECIP:**

	Treatment SF	%		Treatment SF	%	Precip. Zone	3
Area A =	0	100%	Area A =	0	0%	E_A	= 0.66
Area B =	0	0%	Area B =	419229	12%	E_B	= 0.92
Area C =	0	0%	Area C =	0	0%	E_C	= 1.29
Area D =	0	0%	Area D =	3074346	88%	E_D	= 2.36
Total Area =	3493574.825	100%	Total Area =	3493574.825	100%		

On-Site Weighted Excess Precipitation (100-Year, 6-Hour Storm)

$$\text{Weighted E} = \frac{E_A A_A + E_B A_B + E_C A_C + E_D A_D}{A_A + A_B + A_C + A_D}$$

Allowable E =	0.66 in.	Developed E =	2.19 in.
---------------	----------	---------------	----------

On-Site Volume of Runoff: $V_{360} = E \cdot A / 12$

Allowable V_{360} =	192147 CF	Developed V_{360} =	636762 CF
-----------------------	-----------	-----------------------	-----------

On-Site Peak Discharge Rate: $Q_p = Q_{pA} A_A + Q_{pB} A_B + Q_{pC} A_C + Q_{pD} A_D / 43,560$

For Precipitation Zone 3

Q_{pA} =	1.87	Q_{pC} =	3.45
Q_{pB} =	2.60	Q_{pD} =	5.02

Allowable Q_p =	150.0 CFS	Developed Q_p =	379.3 CFS
-------------------	-----------	-------------------	-----------

PROPOSED CONDITIONS									
BASIN NO.	100		DESCRIPTION 36" SD to Embudo Arroyo, includes Regal Cinema						
Area of basin flows =	177670	SF	=	4.1	Ac.				
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT			
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%		
	Weighted E	=	2.29	in.		B =	5%		
	Sub-basin Volume of Runoff (see formula above)					C =	0%		
	V ₃₆₀	=	33876	CF		D =	95%		
	Sub-basin Peak Discharge Rate: (see formula above)								
	Q _p	=	20.0	cfs					
BASIN NO.	101a		DESCRIPTION Offsite Basin-Winrock Villas Condos						
Area of basin flows =	289083	SF	=	6.6	Ac.				
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT			
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%		
	Weighted E	=	2.07	in.		B =	20%		
	Sub-basin Volume of Runoff (see formula above)					C =	0%		
	V ₃₆₀	=	49915	CF		D =	80%		
	Sub-basin Peak Discharge Rate: (see formula above)								
	Q _p	=	30.1	cfs					
BASIN NO.	101b		DESCRIPTION Offsite Basin-Road						
Area of basin flows =	16995	SF	=	0.4	Ac.				
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT			
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%		
	Weighted E	=	2.36	in.		B =	0%		
	Sub-basin Volume of Runoff (see formula above)					C =	0%		
	V ₃₆₀	=	3342	CF		D =	100%		
	Sub-basin Peak Discharge Rate: (see formula above)								
	Q _p	=	2.0	cfs					
BASIN NO.	101c		DESCRIPTION Offsite Basin-Landscape area discharges to 24" SD						
Area of basin flows =	22004	SF	=	0.5	Ac.				
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT			
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%		
	Weighted E	=	0.92	in.		B =	100%		
	Sub-basin Volume of Runoff (see formula above)					C =	0%		
	V ₃₆₀	=	1687	CF		D =	0%		
	Sub-basin Peak Discharge Rate: (see formula above)								
	Q _p	=	1.3	cfs					
BASIN NO.	110		DESCRIPTION Southwest of Regal Cinema						
Area of basin flows =	94549	SF	=	2.2	Ac.				
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT			
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%		
	Weighted E	=	2.23	in.		B =	9%		
	Sub-basin Volume of Runoff (see formula above)					C =	0%		
	V ₃₆₀	=	17573	CF		D =	91%		
	Sub-basin Peak Discharge Rate: (see formula above)								
	Q _p	=	10.4	cfs					

BASIN NO.	151		DESCRIPTION	Offsite Basin-Winrock Villas, surface drains to Basin 520				
Area of basin flows =	264228	SF		=	6.1	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%	
	Weighted E	=	2.07	in.		B =	20%	
	Sub-basin Volume of Runoff (see formula above)					C =	0%	
	V360	=	45623	CF		D =	80%	
	Sub-basin Peak Discharge Rate: (see formula above)							
	QP	=	27.5	cfs				
BASIN NO.	200		DESCRIPTION	Drains to Indian School Rd.				
Area of basin flows =	735252	SF		=	16.9	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%	
	Weighted E	=	2.23	in.		B =	9%	
	Sub-basin Volume of Runoff (see formula above)					C =	0%	
	V360	=	136659	CF		D =	91%	
	Sub-basin Peak Discharge Rate: (see formula above)							
	QP	=	81.1	cfs				
BASIN NO.	300		DESCRIPTION	84" SD, excludes Basin 300 Rooftop discharge to water feature				
Area of basin flows =	1135929	SF		=	26.1	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%	
	Weighted E	=	2.12	in.		B =	17%	
	Sub-basin Volume of Runoff (see formula above)					C =	0%	
	V360	=	200226	CF		D =	83%	
	Sub-basin Peak Discharge Rate: (see formula above)							
	QP	=	120.2	cfs				
BASIN NO.	300 ROOFTOPS		DESCRIPTION	Basin 300 Rooftop discharge to water feature				
Area of basin flows =	103820	SF		=	2.4	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%	
	Weighted E	=	2.36	in.		B =	0%	
	Sub-basin Volume of Runoff (see formula above)					C =	0%	
	V360	=	20418	CF		D =	100%	
	Sub-basin Peak Discharge Rate: (see formula above)							
	QP	=	12.0	cfs				
BASIN NO.	400		DESCRIPTION	I-40 Onramp				
Area of basin flows =	137580	SF		=	3.2	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
	Sub-basin Weighted Excess Precipitation (see formula above)					A =	0%	
	Weighted E	=	2.23	in.		B =	9%	
	Sub-basin Volume of Runoff (see formula above)					C =	0%	
	V360	=	25571	CF		D =	91%	
	Sub-basin Peak Discharge Rate: (see formula above)							
	QP	=	15.2	cfs				

BASIN NO.	500		DESCRIPTION	42" SD, excludes Basin 500 Rooftop & 500P discharge to water feature				
Area of basin flows =	295827	SF		=	6.8	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.07	in.	B =	20%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	51079	CF	D =	80%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	30.8	cfs			
BASIN NO.	500 ROOFTOPS		DESCRIPTION	Basin 500 Rooftop discharge to water feature				
Area of basin flows =	229679	SF		=	5.3	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.36	in.	B =	0%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	45170	CF	D =	100%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	26.5	cfs			
BASIN NO.	500P		DESCRIPTION	Park/plaza discharges to water feature				
Area of basin flows =	102923	SF		=	2.4	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	1.93	in.	B =	30%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	16536	CF	D =	70%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	10.1	cfs			
BASIN NO.	510		DESCRIPTION	West of Regal Theaters, excludes Basin 510 Rooftop discharge to water feature				
Area of basin flows =	83247	SF		=	1.9	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.10	in.	B =	18%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	14574	CF	D =	82%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	8.8	cfs			
BASIN NO.	510 ROOFTOP		DESCRIPTION	Basin 510 Rooftop discharge to water feature				
Area of basin flows =	78686	SF		=	1.8	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.36	in.	B =	0%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	15475	CF	D =	100%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	9.1	cfs			

BASIN NO.	520		DESCRIPTION	North and west of Regal Cinema				
Area of basin flows =	59956	SF		=	1.4	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.23	in.	B =	9%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	11144	CF	D =	91%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	6.6	cfs			
BASIN NO.	530		DESCRIPTION	East of Bed Bath & Beyond parking lot				
Area of basin flows =	90787	SF		=	2.1	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.23	in.	B =	9%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	16874	CF	D =	91%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	10.0	cfs			
BASIN NO.	600		DESCRIPTION	Surface drains to Uptown Loop				
Area of basin flows =	167319	SF		=	3.8	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.23	in.	B =	9%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	31099	CF	D =	91%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	18.4	cfs			
BASIN NO.	OVERALL -EXISTING		DESCRIPTION	Surface drains to Uptown Loop				
Area of basin flows =	3493223	SF		=	80.2	Ac.		
The following calculations are based on Treatment areas as shown in table to the right						LAND TREATMENT		
		Sub-basin Weighted Excess Precipitation (see formula above)				A =	0%	
		Weighted E	=	2.19	in.	B =	12%	
		Sub-basin Volume of Runoff (see formula above)				C =	0%	
		V360	=	636698	CF	D =	88%	
		Sub-basin Peak Discharge Rate: (see formula above)						
		QP	=	379.3	cfs			

BASIN SUMMARY

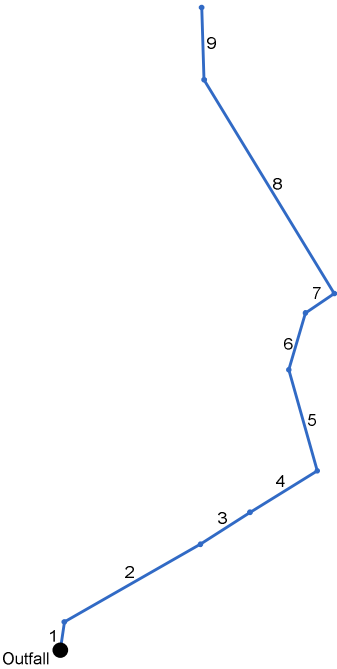
Basin No.	Description	100-year Flow (cfs)	EX 36" SD (Basin 100) Contributing Basins (cfs)	42" SD (Basin 500) Contributing Basins (cfs)	Water Feature Contributing Basins (cfs)	Total Offsites (cfs)	Discharge from Previous Studies for Comparison (cfs)
100	36" SD to Embudo Arroyo, includes Regal Cinema	20.0	20.0				
101a	Offsite Basin-Winrock Villas Condos	30.1	30.1			30.1	30.5
101b	Offsite Basin-Road	2.0	2.0			2.0	
101c	Offsite Basin-Landscape area discharges to 24" SD	1.3	1.3			1.3	
110	Southwest of Regal Cinema	10.4	10.4				
151	Offsite Basin-Winrock Villas, surface drains to Basin 520	27.5	18.0	9.5		27.5	
200	Drains to Indian School Rd.	81.1					82.2
300	84" SD, excludes Basin 300 Rooftop discharge to water feature	120.2					120.4
300 ROOFTOPS	Basin 300 Rooftop discharge to water feature	12.0		12.0	12.0		
400	I-40 Onramp	15.2					15.5
500	42" SD, excludes Basin 500 Rooftop & 500P discharge to water feature	30.8		30.8			
500 ROOFTOPS	Basin 500 Rooftop discharge to water feature	26.5		26.5	26.5		
500P	Park/plaza discharges to water feature	10.1		10.1	10.1		
510	West of Regal Theaters, excludes Basin 510 Rooftop discharge to water feature	8.8		8.8			
510 ROOFTOP	Basin 510 Rooftop discharge to water feature	9.1		9.1	9.1		
520	North and west of Regal Cinema	6.6		6.6			
530	East of Bed Bath & Beyond parking lot	10.0		10.0			
600	Surface drains to Uptown Loop	18.4					18.4
	TOTAL EX 36" SD DISCHARGE (BASIN 100)		81.8				
	TOTAL 42" SD DISCHARGE (BASIN 500)			123.4			
	TOTAL 36" SD DISCHARGE (BASIN 150)						
	TOTAL DISCHARGE TO EMBUDO ARROYO			205.2			174.5
	TOTAL WATER FEATURE INFLOW				57.7		
	TOTAL DISCHARGE FROM ONSITE AND OFFSITE BASINS	440.1				60.9	441.1

APPENDIX C

Storm Drain Calculations



WINROCK TOWN CENTER BASIN 100

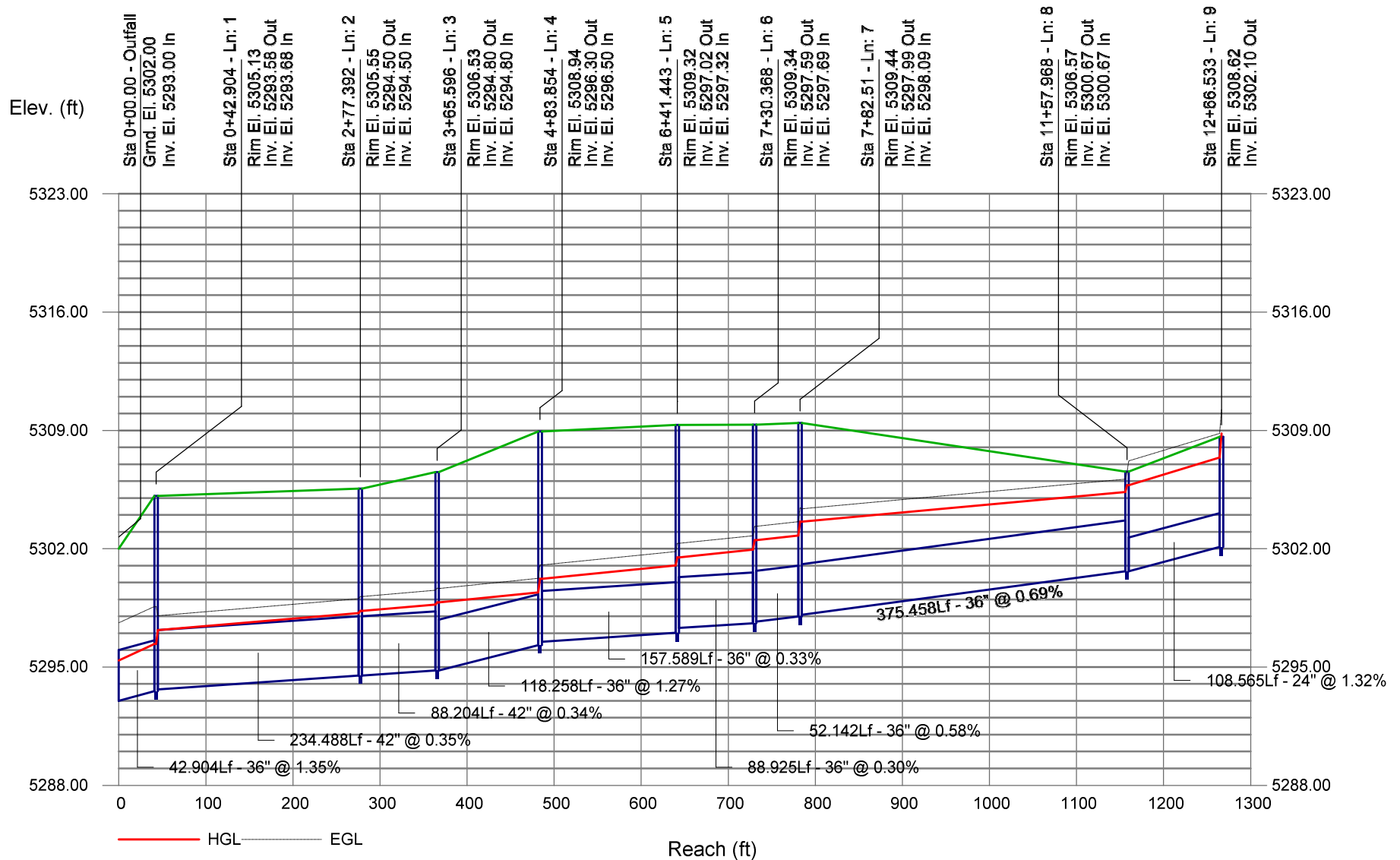


SD RESULT

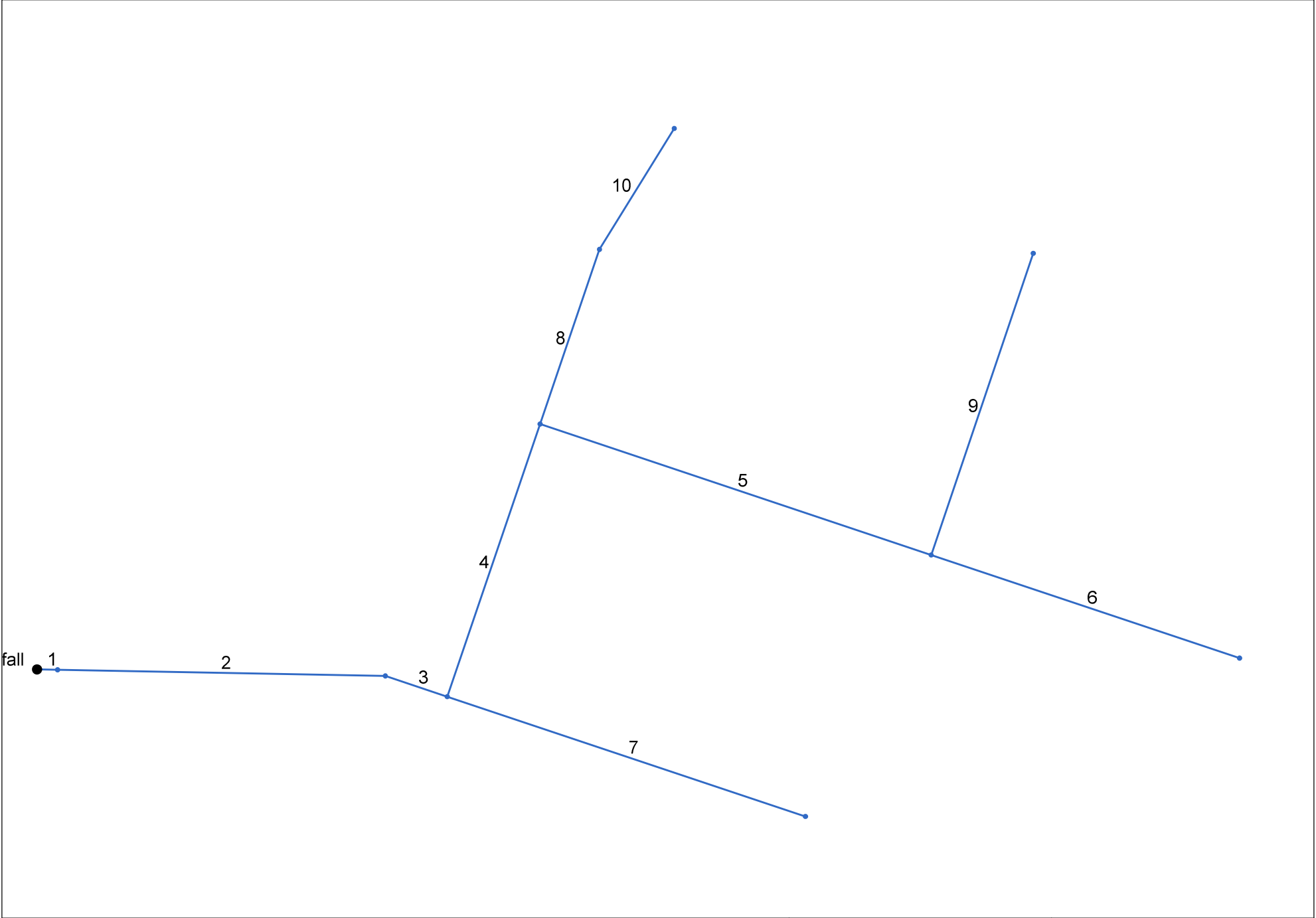
Line No.	Line ID	DnStm Ln No	Line Length (ft)	Line Size (in)	Line Slope (%)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	
1		Outfall	42.904	36	1.35	10.40	81.80	84.01	12.75	5293.00	5293.58	5295.39	5296.37	5296.37	5302.00	5305.13	
2		1	234.488	42	0.35	0.00	71.40	64.45	7.42	5293.68	5294.50	5297.18	5298.19	5298.32	5305.13	5305.55	
3		2	88.204	42	0.34	20.00	71.40	63.54	7.42	5294.50	5294.80	5298.32	5298.69	5298.82	5305.55	5306.53	
4		3	118.258	36	1.27	0.00	51.40	81.37	7.27	5294.80	5296.30	5298.82	5299.42	5300.22	5306.53	5308.94	
5		4	157.589	36	0.33	0.00	51.40	41.50	7.27	5296.50	5297.02	5300.22	5301.02	5301.49	5308.94	5309.32	
6		5	88.925	36	0.30	0.00	51.40	39.81	7.27	5297.32	5297.59	5301.49	5301.94	5302.51	5309.32	5309.34	
7		6	52.142	36	0.58	2.00	51.40	54.83	7.27	5297.69	5297.99	5302.51	5302.77	5303.60	5309.34	5309.44	
8		7	375.458	36	0.69	19.30	49.40	59.89	6.99	5298.09	5300.67	5303.60	5305.35	5305.76	5309.44	5306.57	
9		8	108.565	24	1.32	30.10	30.10	28.12	9.58	5300.67	5302.10	5305.76	5307.40	5308.83	5306.57	5308.62	
WINROCK TOWN CENTER BASIN 100										Number of lines: 9			Date: 2/5/2015				
NOTES: ** Critical depth																	

Storm Sewer Profile

Proj. file: 2031 SD BASIN 100-proposed.stm



WINROCK TOWN CENTER-BASIN 300



SD RESULT

Line No.	Line ID	DnStm Ln No	Line Length (ft)	Line Size (in)	Line Slope (%)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Invert Dn (ft)	Invert Up (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	
1		Outfall	24.755	42	1.01	6.70	120.20	109.53	12.49	5272.00	5272.25	5276.00	5276.30	5276.67	5280.00	5281.00	
2		1	395.194	42	1.51	19.60	113.50	133.74	12.06	5272.40	5278.35	5276.67	5281.55	5281.55	5281.00	5291.00	
3		2	78.741	42	1.02	0.00	93.90	109.85	11.69	5278.50	5279.30	5281.55	5281.79	5281.79	5291.00	5293.00	
4		3	348.448	36	1.02	0.00	70.30	72.93	11.75	5279.45	5283.00	5281.82	5285.37	5285.37	5293.00	5290.00	
5		4	497.428	30	1.02	0.00	28.00	44.77	7.85	5283.15	5288.20	5285.37	5289.63 j	5289.63	5290.00	5294.50	
6		5	392.163	24	0.46	14.00	14.00	16.69	5.95	5288.30	5290.12	5289.70	5291.52	5292.07	5294.50	5297.00	
7		3	455.448	30	0.56	23.60	23.60	33.31	6.15	5279.45	5282.01	5281.79	5283.56 j	5283.56	5293.00	5297.50	
8		4	223.181	30	1.28	24.30	42.30	50.21	10.33	5283.15	5286.00	5285.37	5287.76	5287.76	5290.00	5293.00	
9		5	385.286	24	1.52	14.00	14.00	30.19	7.52	5288.15	5294.00	5289.63	5294.96 j	5294.96	5294.50	5301.40	
10		8	171.896	24	1.00	18.00	18.00	24.51	7.49	5286.10	5287.82	5287.76	5289.09 j	5289.09	5293.00	5294.00	

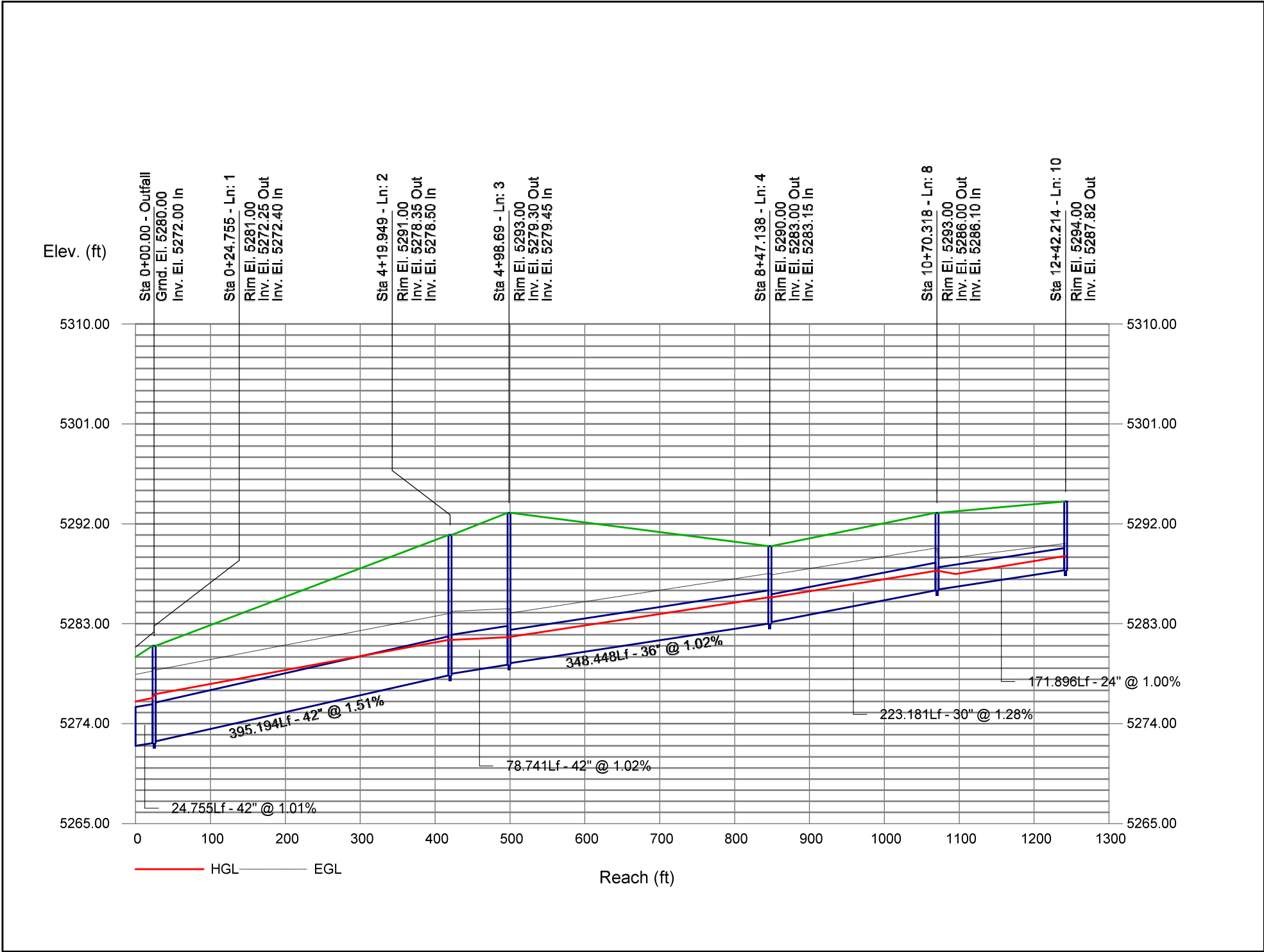
WINROCK TOWN CENTER-BASIN 300

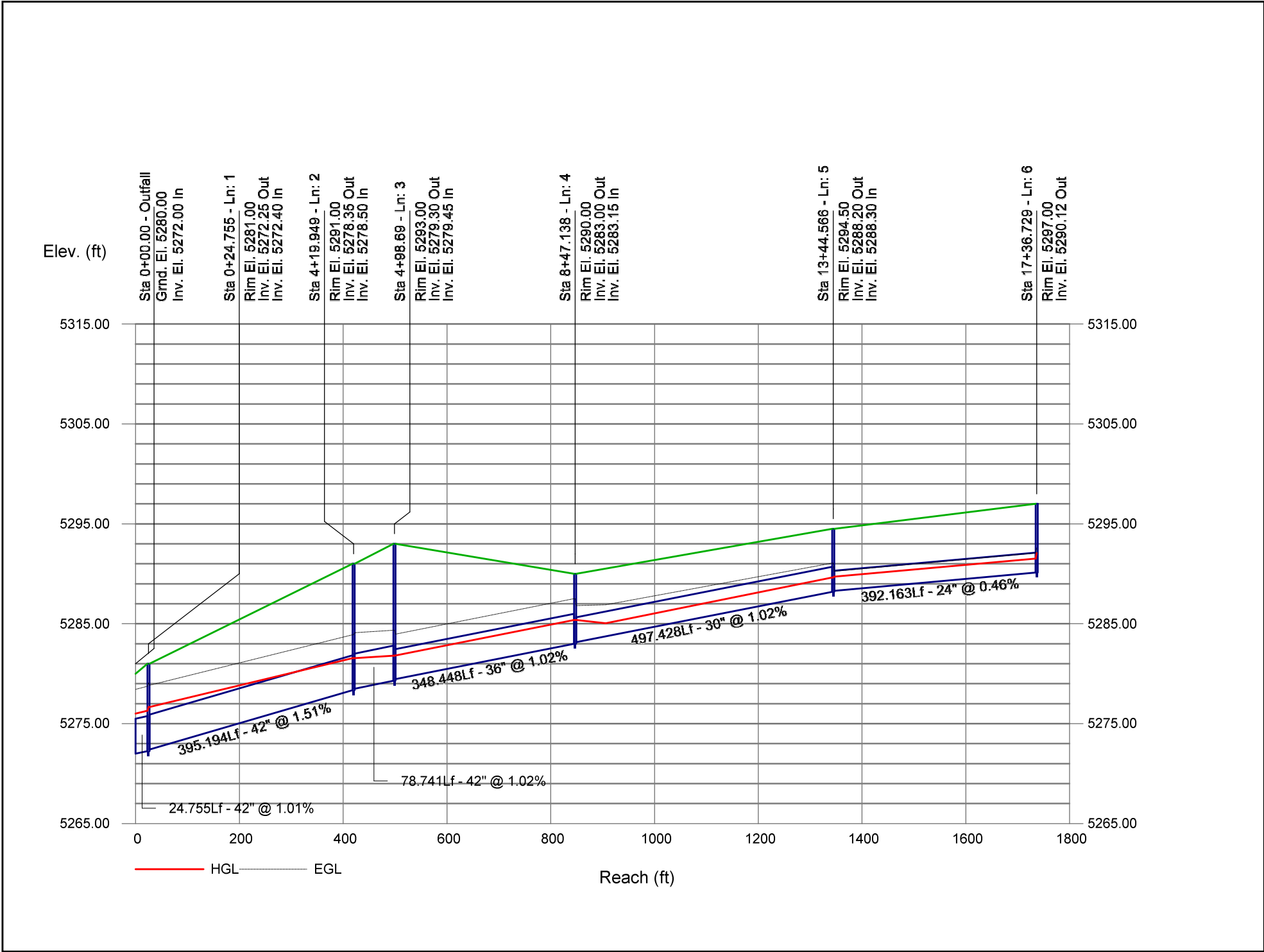
Number of lines: 10

Date: 2/5/2015

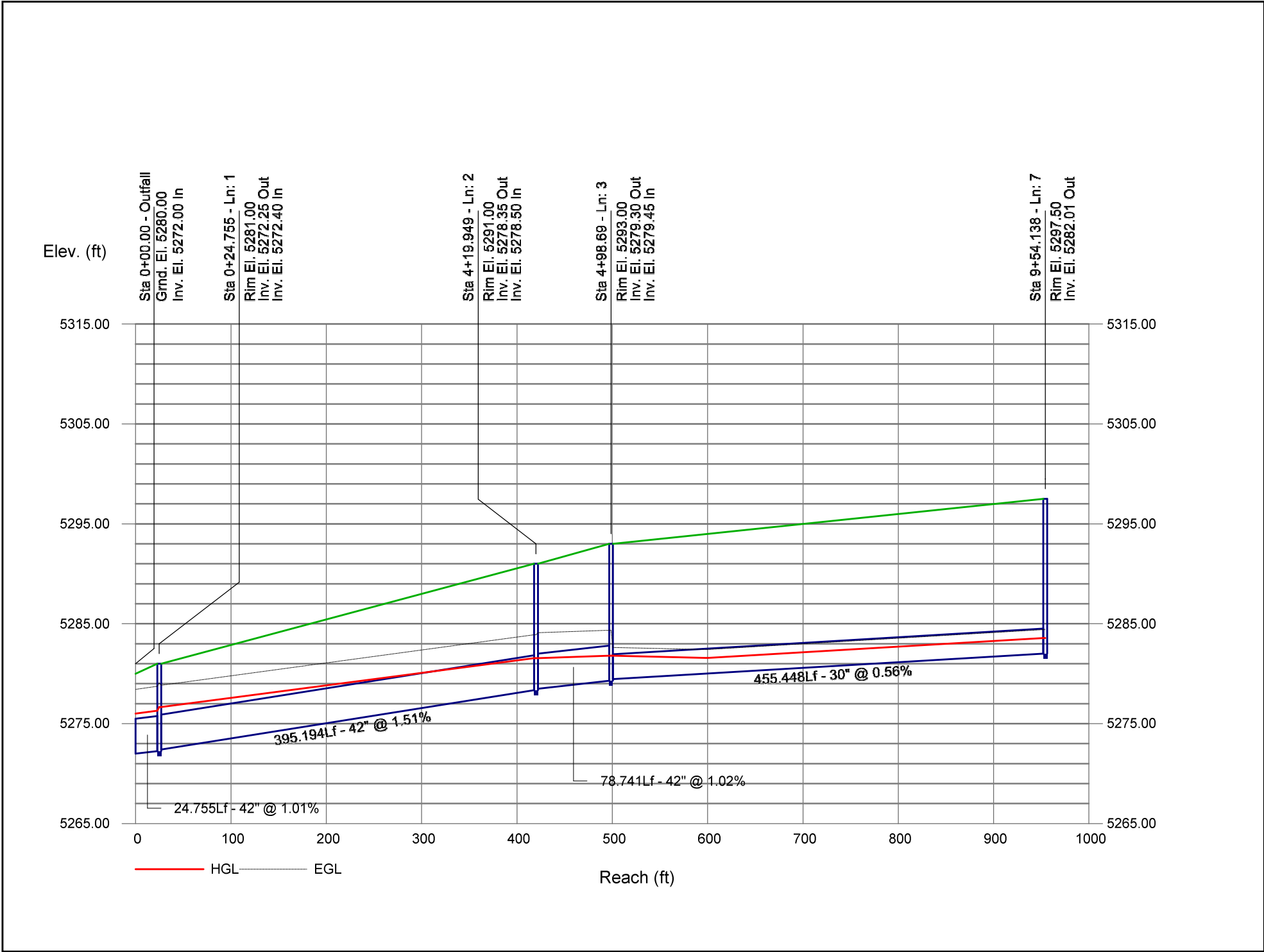
NOTES: ** Critical depth

Storm Sewer Profile



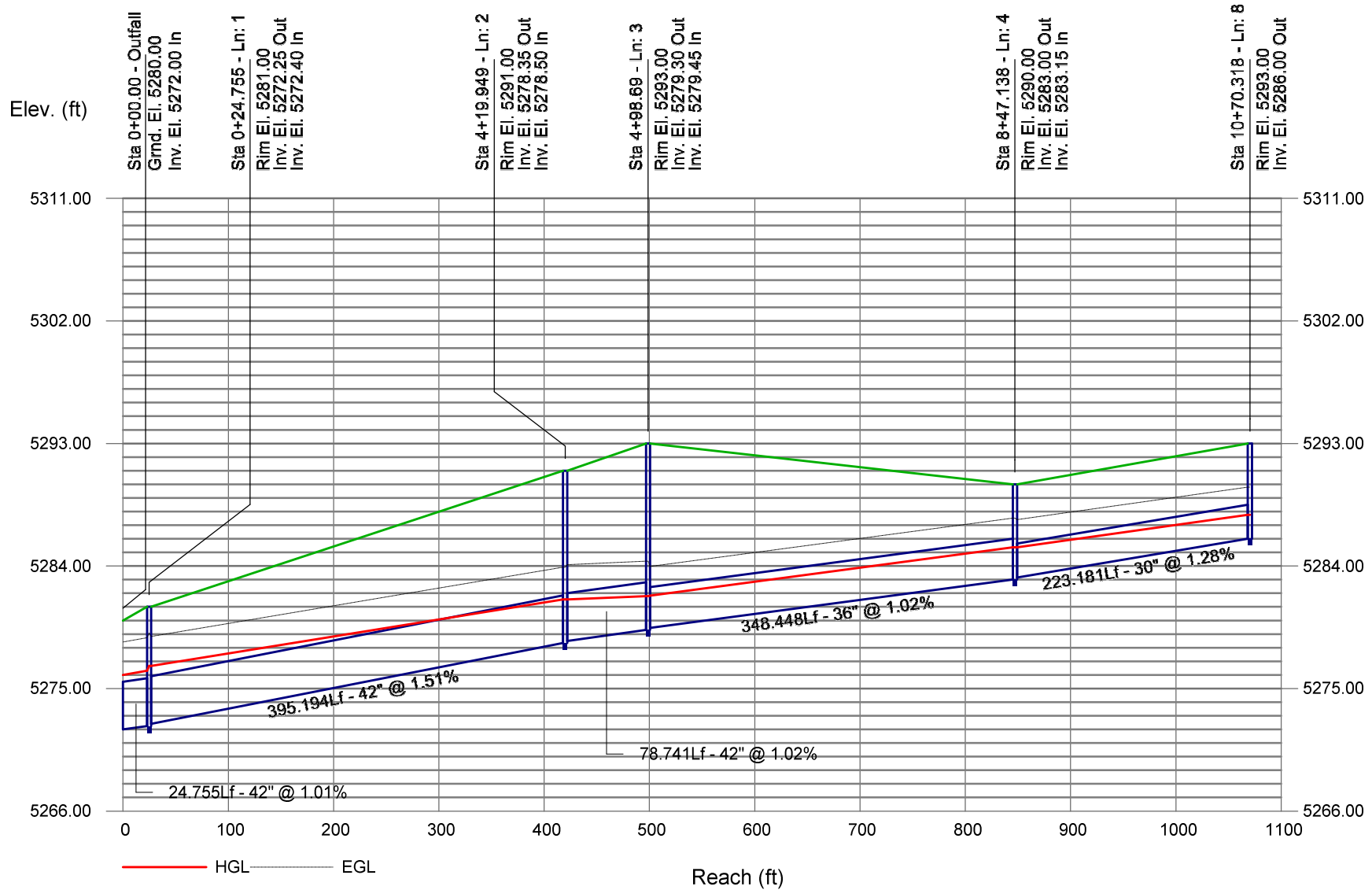


Storm Sewer Profile

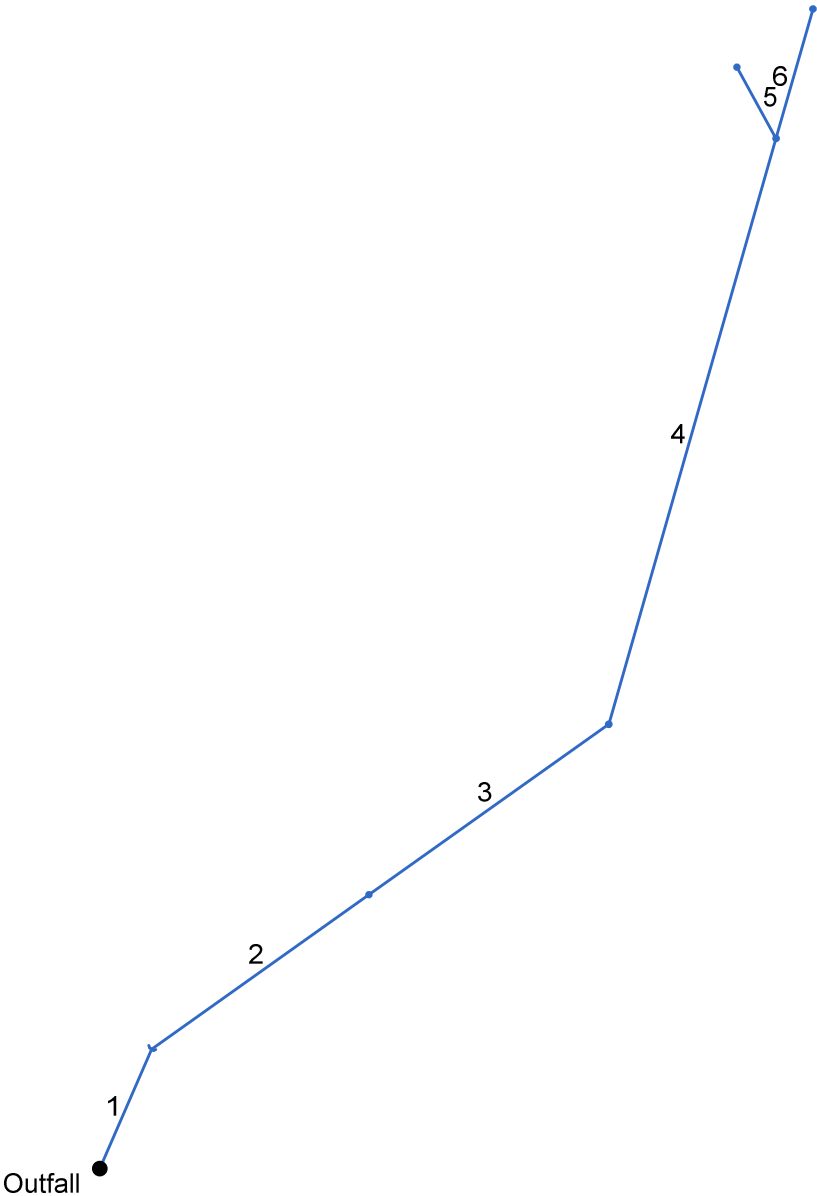


Storm Sewer Profile

Proj. file: 2031 SD BASIN 300.stm



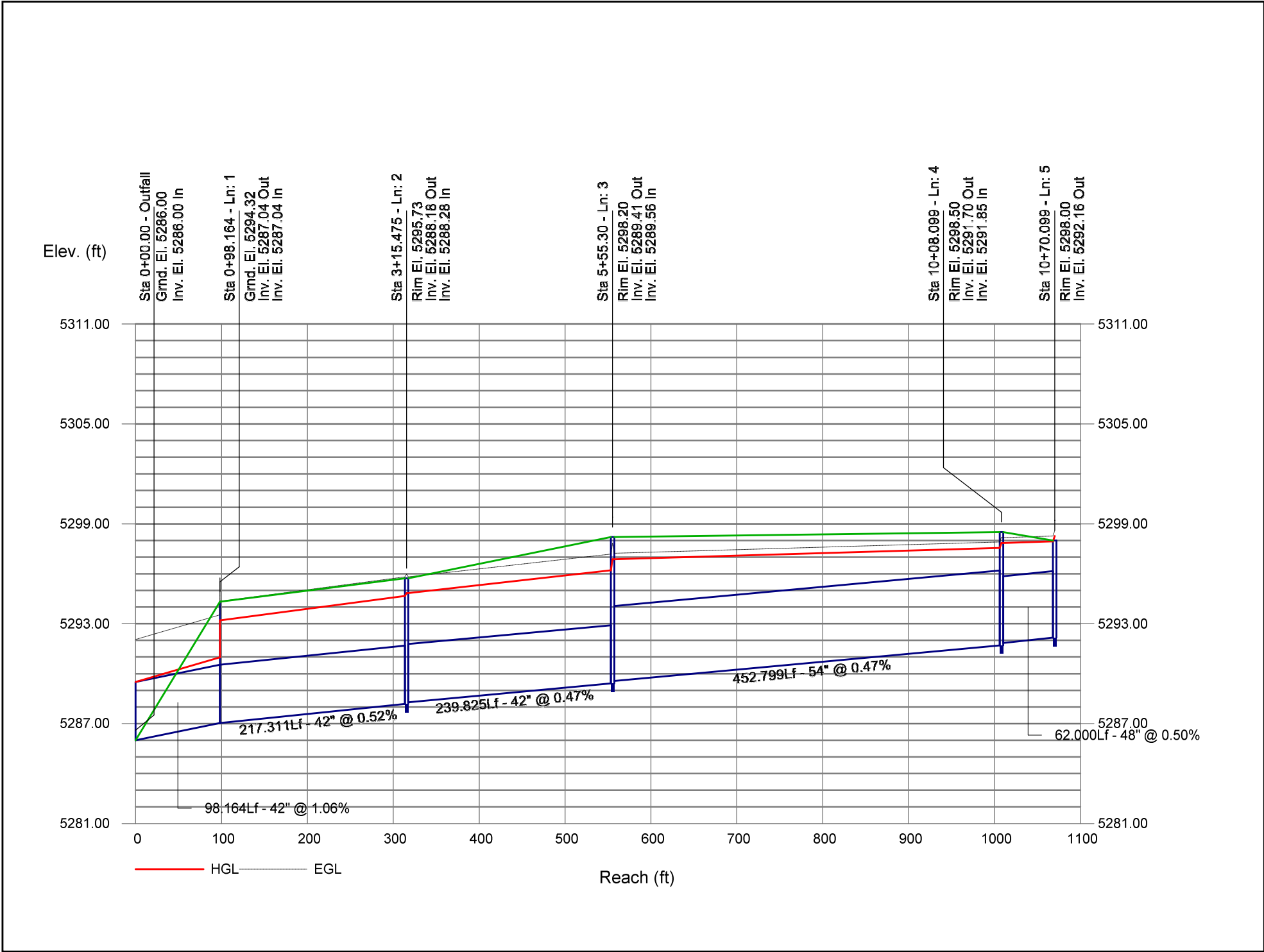
WINROCK TOWN CENTER BASIN 500



SD RESULT

Line No.	Line ID	DnStm Ln No	Line Length	Line Size	Line Slope	Known Q	Flow Rate	Capac Full	Vel Ave	Invert Dn	Invert Up	HGL Dn	HGL Up	HGL Jnct	Gnd/Rim El Dn	Gnd/Rim El Up
			(ft)	(in)	(%)	(cfs)	(cfs)	(cfs)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	EX 42IN UNDER I-25	Outfall	98.164	42	1.06	40.80	123.40	103.56	12.83	5286.00	5287.04	5289.50	5290.98	5293.20	5286.00	5294.32
2	EX 42IN ACROSS PARKING LOT	1	217.311	42	0.52	6.60	82.60	72.87	8.59	5287.04	5288.18	5293.20	5294.67	5294.84	5294.32	5295.73
3	EX 42IN ACROSS PARKING LOT	2	239.825	42	0.47	0.00	76.00	69.07	7.90	5288.28	5289.41	5294.84	5296.21	5296.88	5295.73	5298.20
4	PROPOSED 54IN SD	3	452.799	54	0.47	0.00	76.00	135.20	4.78	5289.56	5291.70	5296.88	5297.56	5297.84	5298.20	5298.50
5	PROPOSED STANDPIPE IN POND	4	62.000	48	0.50	57.70	57.70	101.58	4.59	5291.85	5292.16	5297.84	5297.94	5298.27	5298.50	5298.00
6	PROPOSED 30IN SD	4	100.000	30	0.25	18.30	18.30	20.51	3.73	5291.80	5292.05	5297.84	5298.04	5298.26	5298.50	5298.50
WINROCK TOWN CENTER BASIN 500										Number of lines: 6			Date: 2/5/2015			
NOTES: ** Critical depth																

Storm Sewer Profile



Storm Sewer Profile

Proj. file: 2031 SD BASIN 500.stm

