CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

September 26, 2017

Scott Eddings, P.E.
Huitt-Zollars
333 Rio Rancho Blvd., Suite 101
Rio Rancho, NM, 87124

RE: **Unser Boulevard Reconstruction Drainage Report Addendum 1**
Engineer's Stamp Date: 9/22/17
Hydrology File: K10D057

Dear Mr. Eddings:

Based on the information provided in your submittal received on 9/25/17, the Drainage Report- Addendum 1 is approved for Work Order. Prior to DRC sign-off, a floodplain permit will be required.

Please contact Mr. Rudy Rael, CFM (rrael@cabq.gov, 924-3977) for floodplain permit inquiries. If you have any other questions, please contact me at 924-3695 or dpeterson@cabq.gov.

Sincerely,

Dana Peterson, P.E.
Senior Engineer, Planning Dept.
Development Review Services

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Orig: Drainage File

DRAINAGE REPORT FOR UNSER BOULEVARD RECONSTRUCTION

ADDENDUM

Prepared For

Project Location:
Albuquerque, NM

COA Project No. 4383.91

SEPTEMBER 2017

Prepared By

HUITT-ZOLLARS
ENGINEERING ARCHITECTURE CONSTRUCTION MANAGEMENT SURVEY
333 Rio Rancho Blvd. NE, Suite 101
Rio Rancho, NM 87124
(505) 892-5141, Fax (505) 892-3259
www.huitt-zollars.com

ADDENDUM TO THE UNSER BOULEVARD RECONSTRUCTION DRAINAGE REPORT

CITY OF ALBUQUERQUE
PROJECT NO. 4383.91

PREPARED FOR:

PREPARED BY:

HUITT-ZOLLARS
333 RIO RANCHO BLVD., SUITE 101
RIO RANCHO, NEW MEXICO 87124

SEPTEMBER 2017

HZI Project No. R304101.01

Addendum to the Unser Boulevard Reconstruction Drainage Report

I, Scott A. Eddings, being first duly sworn upon my oath, state that I am a registered professional engineer, qualified in civil engineering and that the accompanying report was prepared by me or under my supervision and is true and correct to the best of my knowledge and belief.

SCOTT A. EDDINGS
NEW MEXICO
12856
REGISTERED PROFESSIONAL ENGINEER

9/22/17

APPENDICES

INTRODUCTION

The purpose of this addendum to the Drainage Report for Unser Boulevard Reconstruction is to include hydraulic calculations for a portion of the storm drain system in Central Avenue.

DRAINAGE REPORT FOR UNSER BOULEVARD RECONSTRUCTION

The Drainage Report for Unser Boulevard Reconstruction provides a conceptual design and analysis of proposed improvements to safely manage stormwater generated along Unser Boulevard and mitigate occasional flooding at the intersection of Central Avenue and Unser Boulevard. The Drainage Report was completed in April 2017 and approved in May 2017 by the City of Albuquerque Planning Department. Please refer to Appendix A for a copy of the approval letter.

During the construction plan approval process, additional analysis and design was required for a portion of the storm drain system in Central Avenue. This addendum provides the hydraulic calculations for the Central Avenue storm drain.

DRAINAGE ANALYSIS OF CENTRAL AVENUE FRONTAGE ROAD

As described in the Drainage Report, three contributing drainage basins surface flow towards Central Avenue and collect at an existing low point at the cul-de-sac terminus of the frontage road. The total 100-year storm event flow amount at the cul-de-sac is 278 cfs. (Please refer to the AHYMO Output Summary in Appendix B of the Drainage Report). To adequately convey this full flow amount into the Unser Boulevard storm drain system, a custom inlet structure connected to three storm drain pipes will connect to an existing storm drain that ultimately drains into the Unser Boulevard storm drain system.

The inlet structure is designed to be hydraulically efficient as it collects surface runoff from Central Avenue Frontage Road and discharges into the storm drain pipe system. At the cul-de-sac terminus, a proposed concrete pad slopes towards slanted inlet grates. This configuration provides a significant depression to collect all the surface runoff from Central Avenue Frontage Road. Please refer to Appendix C for a plan and profile view of the inlet structure located at Station 9+59. Refer to the final construction plans for additional details of the inlet structure.

Hydraulic calculations in Appendix B include street capacity calculations for Central Avenue Frontage Road, a weir calculation for the inlet structure, and pipe capacity calculations.

CONCLUSION

This addendum provides additional analysis of a custom inlet located in the frontage road of Central Avenue. The analysis confirms that the proposed design of the inlet structure can adequately convey 278 cfs without inundating Central Avenue and adjacent properties. Following construction of the proposed improvements presented in this addendum and the Drainage Report, flooding at the intersection of Unser Boulevard and Central Avenue due to the 100-year storm event should be alleviated.

CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

May 5, 2017

Scott Eddings, P.E.
Huitt-Zollars
333 Rio Rancho Blvd., Suite 101
Rio Rancho, NM, 87124

RE: **Unser Boulevard Reconstruction Drainage Report**
Engineer's Stamp Date: 4/27/17
Hydrology File: K10D057

Dear Mr. Eddings:

Based on the information provided in your submittal received on 5/4/17, the Drainage Report is approved for Work Order. Prior to DRC sign-off, a floodplain permit will be required.

Please contact Mr. Rudy Rael, CFM (rrael@cabq.gov, 924-3977) for floodplain permit inquiries. If you have any other questions, please contact me at 924-3695 or dpeterson@cabq.gov.

Sincerely,

Dana Peterson, P.E.
Senior Engineer, Planning Dept.
Development Review Services

PO Box 1293

Albuquerque

NM 87103

www.cabq.gov

Orig: Drainage File

Street Capacity for Central Frontage Road at Western Edge (STA 7+00)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Discharge	278.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5104.35
0+31	5102.82
0+52	5102.90
0+80	5104.37

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5104.35)	(0+80, 5104.37)	0.016

Options

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

Results

Normal Depth	1.07	ft
Elevation Range	5102.82 to 5104.37 ft	
Flow Area	42.75	ft²
Wetted Perimeter	61.71	ft
Hydraulic Radius	0.69	ft
Top Width	61.65	ft
Normal Depth	1.07	ft
Critical Depth	1.26	ft
Critical Slope	0.00403	ft/ft

Street Capacity for Central Frontage Road at Western Edge (STA 7+00)

Results

Velocity		6.50	ft/s
Velocity Head		0.66	ft
Specific Energy		1.73	ft
Froude Number		1.38	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.26	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.00403	ft/ft

Cross Section for Central Frontage Road (STA 7+00)

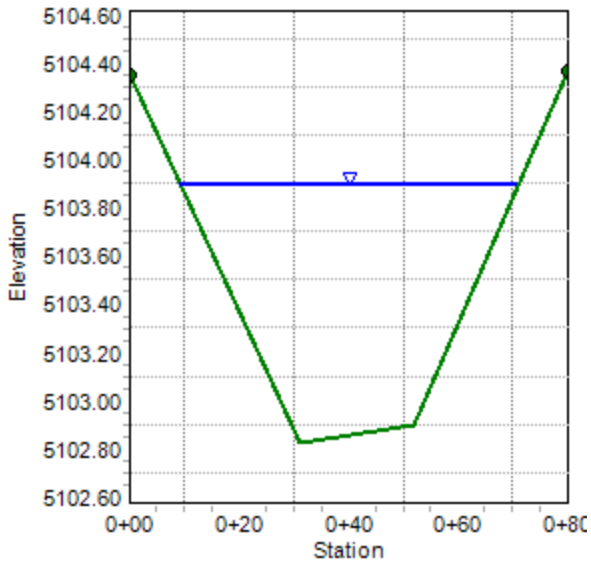
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Normal Depth	1.07	ft
Discharge	278.00	ft³/s

Cross Section Image



Street Capacity for Central Frontage Road at Typical Section (STA 8+50)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Discharge	278.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5103.06
0+24	5101.87
0+24	5101.37
0+54	5101.18
0+54	5101.68
0+76	5102.77

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5103.06)	(0+76, 5102.77)	0.016

Options

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

Results

Normal Depth	1.21	ft
Elevation Range	5101.18 to 5103.06 ft	
Flow Area	41.02	ft²
Wetted Perimeter	55.67	ft
Hydraulic Radius	0.74	ft
Top Width	54.64	ft
Normal Depth	1.21	ft

Street Capacity for Central Frontage Road at Typical Section (STA 8+50)

Results

Critical Depth		1.41	ft
Critical Slope		0.00403	ft/ft
Velocity		6.78	ft/s
Velocity Head		0.71	ft
Specific Energy		1.92	ft
Froude Number		1.38	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.21	ft
Critical Depth	1.41	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.00403	ft/ft

Cross Section for Typical Section (STA 8+50)

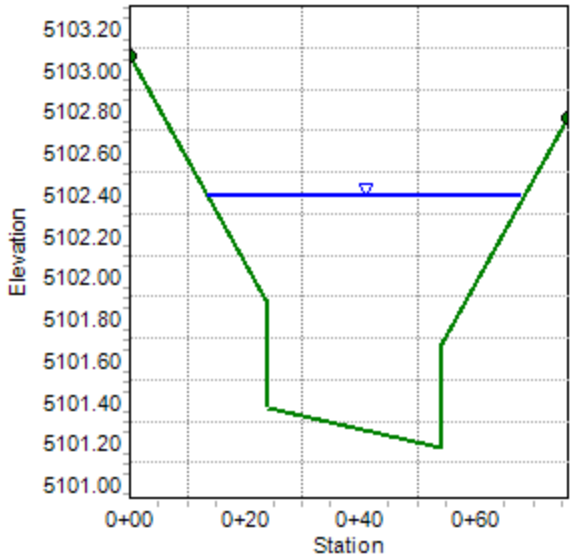
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Normal Depth	1.21	ft
Discharge	278.00	ft^3/s

Cross Section Image



Street Capacity for Central Frontage Road at Concrete Apron (STA 9+40)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Discharge	278.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5101.70
0+14	5100.83
0+57	5100.83
0+57	5101.33
0+76	5102.40

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5101.70)	(0+76, 5102.40)	0.013

Options

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

Results

Normal Depth	0.75	ft
Elevation Range	5100.83 to 5102.40 ft	
Flow Area	37.32	ft²
Wetted Perimeter	60.03	ft
Hydraulic Radius	0.62	ft
Top Width	59.50	ft
Normal Depth	0.75	ft
Critical Depth	1.02	ft

Street Capacity for Central Frontage Road at Concrete Apron (STA 9+40)

Results

Critical Slope		0.00267	ft/ft
Velocity		7.45	ft/s
Velocity Head		0.86	ft
Specific Energy		1.61	ft
Froude Number		1.66	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	1.02	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.00267	ft/ft

Cross Section at Concrete Apron (STA 9+40)

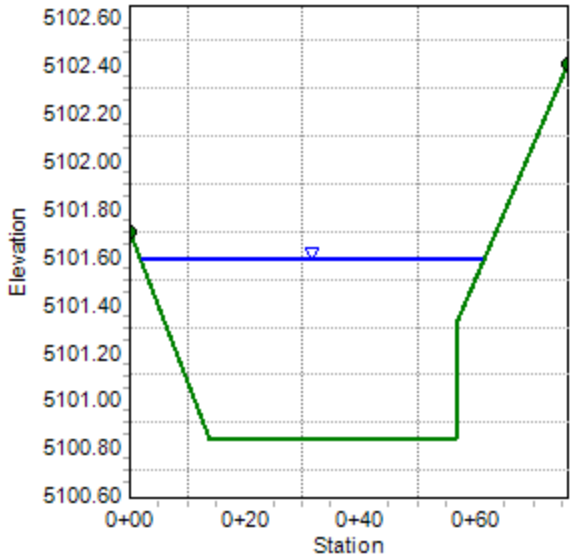
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00800	ft/ft
Normal Depth	0.75	ft
Discharge	278.00	ft^3/s

Cross Section Image



Street Capacity for Central Frontage Road at Inlet (STA 9+64)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.25000	ft/ft
Discharge	278.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5102.00
0+00	5100.00
0+02	5096.40
0+24	5096.40
0+27	5100.00
0+27	5102.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5102.00)	(0+27, 5102.00)	0.013

Options

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

Results

Normal Depth	0.41	ft
Elevation Range	5096.40 to 5102.00 ft	
Flow Area	9.05	ft²
Wetted Perimeter	22.99	ft
Hydraulic Radius	0.39	ft
Top Width	22.56	ft
Normal Depth	0.41	ft

Street Capacity for Central Frontage Road at Inlet (STA 9+64)

Results

Critical Depth		1.68	ft
Critical Slope		0.00231	ft/ft
Velocity		30.71	ft/s
Velocity Head		14.65	ft
Specific Energy		15.06	ft
Froude Number		8.55	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.41	ft
Critical Depth	1.68	ft
Channel Slope	0.25000	ft/ft
Critical Slope	0.00231	ft/ft

Cross Section at Inlet (STA 9+64)

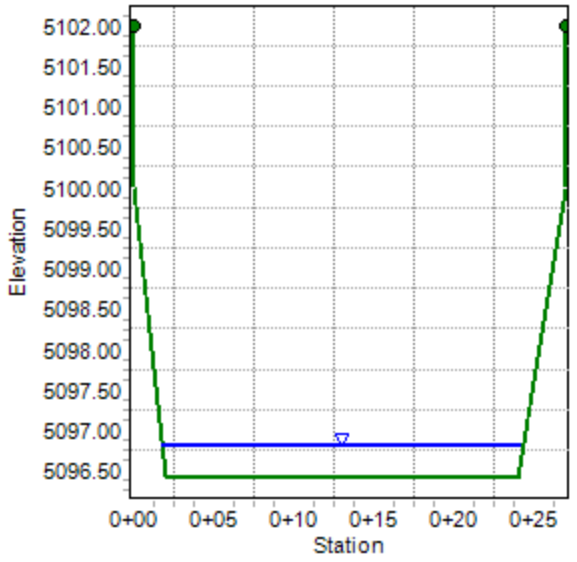
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.25000	ft/ft
Normal Depth	0.41	ft
Discharge	278.00	ft^3/s

Cross Section Image



Weir Calculation for Central Frontage Road Inlet Structure

Project Description

Solve For	Discharge

Input Data

Headwater Elevation	5100.00	ft
Crest Elevation	5096.40	ft
Weir Coefficient	3.00	US
Crest Length	17.25	ft

Results

Discharge	353.48	ft^3/s
Headwater Height Above Crest	3.60	ft
Flow Area	62.10	ft^2
Velocity	5.69	ft/s
Wetted Perimeter	24.45	ft
Top Width	17.25	ft

Culvert Calculator Report
Pipe Capacity from Central Frontage Road Inlet Structure

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	5,100.00	ft	Headwater Depth/Height	1.23	
Computed Headwater Elev	5,099.74	ft	Discharge	278.00	cfs
Inlet Control HW Elev.	5,099.65	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	5,099.74	ft	Control Type	Outlet Control	

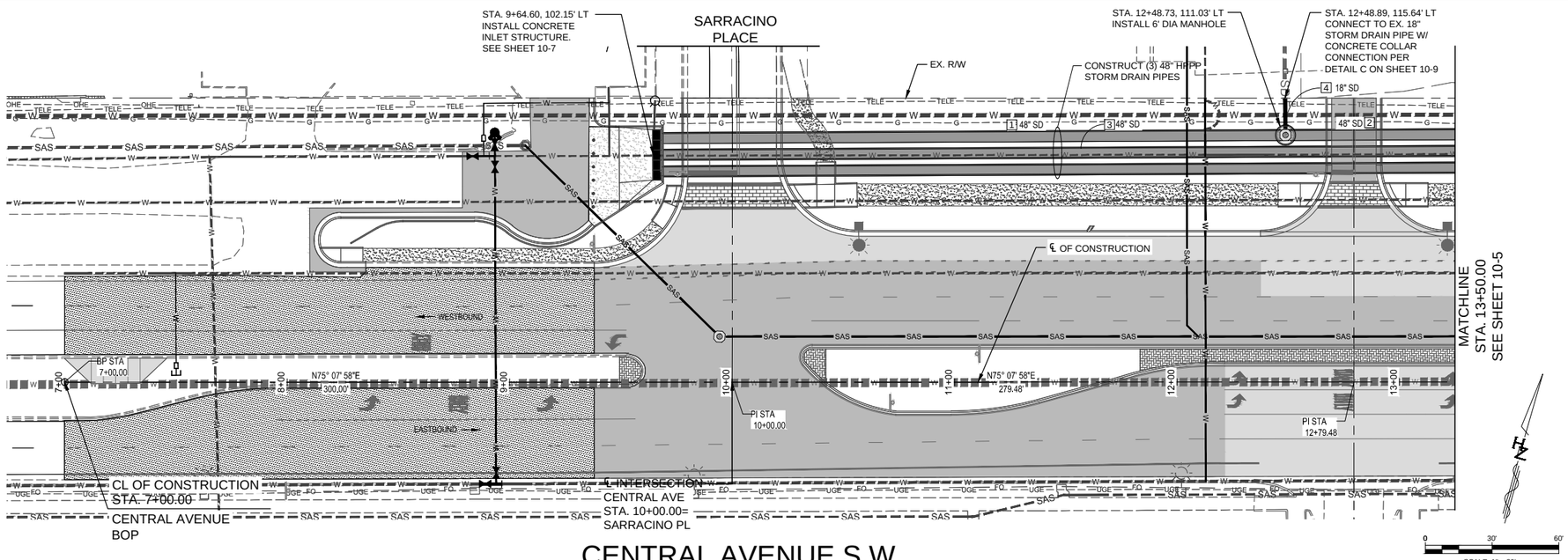
Grades					
Upstream Invert	5,094.80	ft	Downstream Invert	5,093.00	ft
Length	450.00	ft	Constructed Slope	0.004000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.92	ft
Slope Type	Mild		Normal Depth	3.09	ft
Flow Regime	Subcritical		Critical Depth	2.92	ft
Velocity Downstream	9.43	ft/s	Critical Slope	0.004554	ft/ft

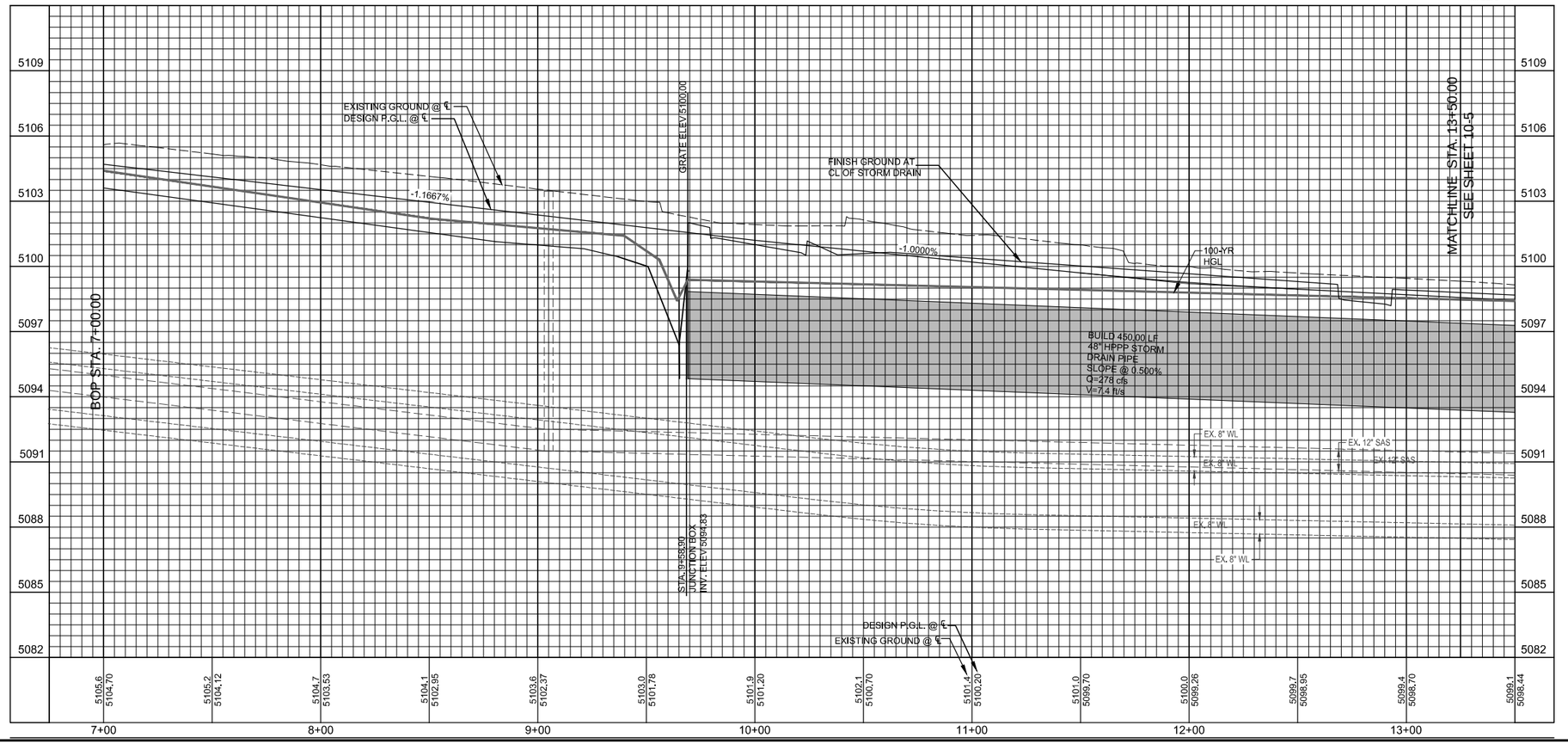
Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	5,099.74	ft	Upstream Velocity Head	1.23	ft
Ke	0.50		Entrance Loss	0.62	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,099.65	ft	Flow Control	Transition	
Inlet Type	Square edge w/headwall		Area Full	37.7	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				



CENTRAL AVENUE S.W.



STORM DRAIN LINE DATA

	BEARING	LENGTH
1	N 74°51'40" E	280.00'
2	N 74°51'40" E	170.00'
3	N 74°51'40" E	450.00'
4	N 15°20'20" W	16.50'

LEGEND

- ASPHALT PAVED ROADWAY
- CONCRETE PAVED ROADWAY
- ASPHALT TRAIL
- SIDEWALK
- GRAVEL LANDSCAPE
- CURB OPENING SEE DETAIL E, F & G ON SHEET 2-19
- FLOW ARROW DIRECTION

SCALE: 1" = 30'
SCALE: 1" = 3'

AS BUILT INFORMATION
CONTRACTOR DATE
WORK STARTED DATE
WORK COMPLETED DATE
INSPECTOR'S CERTIFICATE BY
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
FOUND MONUMENT 7" K100"
STANDARD 3 1/4" ALUMINUM DISC
NEW MEXICO STATE PLANE COORDINATES (CENTRAL ZONE-N.A.D. 1983)
N=1 483 729.165
E=1 498 962.651
PUBLISHED EL=5097.854 (NAVD 1988)
GROUND TO GRID FACTOR=0.999683006
MAPPING ANGLE=-0°16'8.14"

SURVEY INFORMATION
FIELD NOTES BY DATE
NO.

ENGINEER'S SEAL
SCOTT A. EDDINGS
NEW MEXICO
12856
REGISTERED PROFESSIONAL ENGINEER

NO.	REMARKS	BY	DATE
	REVISIONS		
	DESIGN		

DESIGNED BY: GM DATE: SEPT. 6, 2017
DRAWN BY: LRT DATE: SEPT. 6, 2017
DWG NAME: 10-1 SD P&P-50.dwg PROJ #: R304101.01
CHECKED BY: SAE DATE: SEPT. 6, 2017

nm811 Know what's below. Call before you dig.
TWO WORKING DAYS BEFORE YOU DIG CALL 811 OR 260-1990

Designed By:

HUITT-ZOLLARS
Huitt-Zollars, Inc. Albuquerque
6501 Americas Pkwy NE, Suite 550
Albuquerque, New Mexico 87110
Phone (505) 883-8114 Fax (505) 883-5022

CITY OF ALBUQUERQUE
DEPARTMENT OF MUNICIPAL DEVELOPMENT
ENGINEERING DIVISION

TITLE: UNSER BOULEVARD RECONSTRUCTION
STORM DRAIN PLAN & PROFILE
STA. 7+00.00 TO STA. 13+50.00

Design Review Committee	City Engineer	Last Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No. 4383.91
Zone Map No. J-09-Z, J-10-Z, K-09-Z, K-10-Z
Sheet 81 Of 114

CONTROL NO. A302050
SHEET 10-4

Office Locations

Albuquerque, New Mexico (505) 883-8114

Austin, Texas (512) 237-1129

Dallas, Texas (214) 871-3311

Denver, Colorado (303) 740-7325

El Paso, Texas (915) 587-4339

Fort Worth, Texas (817) 335-3000

Glendale, California (818-456-1833

Houston (Downtown), Texas (713) 622-1180

Houston (West), Texas (281) 496-0066

Irvine, California (949) 988-5815

Los Angeles, California (310) 820-4600

Oklahoma City, Oklahoma (405) 842-0363

Ontario, California (909) 941-7799

Orlando , Florida (407) 839-0414

Phoenix, Arizona (602) 952-9123

Rio Rancho, New Mexico (505) 892-5141

Seattle, Washington (206) 324-5500

Tacoma, Washington (253) 627-9131

Thousand Oaks, California (805) 418-1802

HUITT-ZOLLARS