LOMR APPLICATION AND HYDRAULIC ANALYSIS FOR CYPRESS DRIVE STORM DRAIN

Prepared For:

2400 Broadway SE
Albuquerque, New Mexico 87102

Prepared By:

WESTON SOLUTIONS

3840 Commons Avenue, NE
Albuquerque, New Mexico 87109

September 2017

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

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PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

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A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

☐ CLOMR: A letter from DHS-FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60, 65 & 72).

☒ LOMR: A letter from DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

B. OVERVIEW

1. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
350002	Albuquerque, City of	NM	350001	0329H	08/16/12
350001	Bernalillo County - Unincorporated Areas	NM	350001	0329H	08/16/12

2. a. Flooding Source: N/A

   b. Types of Flooding: ☐ Riverine ☐ Coastal ☒ Shallow Flooding (e.g., Zones AO and AH)
   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Cypress Drive Storm Drain Improvements

4. FEMA zone designations affected: AH (choices: A, AH, AO, A1-A30, A99, AE, AR, V, V1-V30, VE, B, C, D, X)

5. Basis for Request and Type of Revision:

   a. The basis for this revision request is (check all that apply)

   ☒ Physical Change ☐ Improved Methodology/Data ☐ Regulatory Floodway Revision ☐ Base Map Changes
   ☐ Coastal Analysis ☒ Hydraulic Analysis ☒ Hydrologic Analysis ☐ Corrections
   ☐ Weir-Dam Changes ☐ Levee Certification ☐ Alluvial Fan Analysis ☐ Natural Changes
   ☒ New Topographic Data ☐ Other (Attach Description)

   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following structures (check all that apply)

Structures: ☐ Channelization ☐ Levee/Floodwall ☐ Bridge/Culvert

☐ Dam ☐ Fill ☒ Other (Attach Description)*

*local stormwater collection and conveyance system installed under existing Cypress Dr to alleviate flooding. No change in volume conveyed to discharge point.

6. ☐ Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.**

**Project area is 100% paved street. A critical habitat map is attached to the project narrative.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $8,250.00

☐ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for Fee Amounts and Exemptions.

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Richard Waters, CFM	Company: Weston Solutions, Inc.	
Mailing Address: 3840 Commons Ave, NE Albuquerque, NM 87109	Daytime Telephone No.: 505-837-6522	Fax No.:505-837-6595
	E-Mail Address: Richard.Waters@westonsolutions.com	
Signature of Requester (required): Richard Waters	Date: 9-8-17	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirements for when fill is placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Don Briggs, PE, CFM; Floodplain Administrator	Community Name: Bernalillo County, NM	
Mailing Address: Bernalillo County Public Works Division 2400 Broadway, SE Albuquerque, NM 87102	Daytime Telephone No.: 505-848-1511	Fax No.: 505-848-1510
	E-Mail Address: drbriggs@bernco.gov	
Community Official's Signature (required):	Date:	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: David Cooper, P.E.	License No.: NM 21683	Expiration Date: 12/31/2017	
Company Name: Weston Solutions, Inc.	Telephone No.: 505-837-6524	Fax No.: 505-837-6595	
Signature: David Cooper	Date: 9/8/17	E-Mail Address: Sonny.Cooper@westonsolutions.com	

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if …
☒ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
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Seal (Optional)

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   Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

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**Project area is 100% paved street. A critical habitat map is attached to the project narrative.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☒ Yes Fee amount: $8,250.00

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Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

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Signature of Requester (required):	Date:	

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Community Official's Name and Title: James D. Hughes, PE, CFM; Floodplain Administrator	Community Name: City of Albuquerque, NM	
Mailing Address: City of Albuquerque Planning Department 600 2nd Street N.W. Albuquerque, NM 87102	Daytime Telephone No.: 505-924-3986	Fax No.:
	E-Mail Address: JHughes@cabq.gov	
Community Official's Signature (required):	Date:	

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Seal (Optional)

U.S. DEPARTMENT OF HOMELAND SECURITY
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RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
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DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: N/A Project is a new section of storm water collection under Cypress Drive to alleviate existing flooding.

Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section B) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
Cypress Drive	0.0214	Not calculated	41.9

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☐ Precipitation/Runoff Model → Specify Model:
☐ Regional Regression Equations ☒ Other (please attach description) Modified Rational Method: Albuquerque 40-Acre and Smaller Basins

Please enclose all relevant models in digital format, maps, computations (including computation of parameters), and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Is the hydrology for the revised flooding source(s) affected by sediment transport? ☐ Yes ☒ No**

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation.

**All drainage basins in project area are fully developed.

B. HYDRAULICS

1. Reach to be Revised N/A

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit*				
Upstream Limit*				

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: Storm Sewer designed using SWMM5

3. Pre-Submittal Review of Hydraulic Models*

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

Models Submitted	Natural Run File Name:	Natural Run Plan Name:	Floodway Run File Name:	Floodway Run Plan Name:	Datum
Duplicate Effective Model*					
Corrected Effective Model*					
Existing or Pre-Project Conditions Model					
Revised or Post-Project Conditions Model	Cypress Drive As-Built System_LOMR_2-24-2017			N/A	NAVD88
Other - (attach description)					

* For details, refer to the corresponding section of the instructions.

No floodway delineation was performed for this project. The project proposes only to remove an isolated area designated as zone AH.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted (preferred) *

Topographic Information: Topographic and planimetric maps prepared by licensed survey firm (NAVD 88, State Plane NAD 83)

Source: Alpha Professional Surveying Date: 2009 and 2015

Accuracy: 1-ft vertical (* SEE ATTACHMENT A, THIS FORM)

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, at the same scale as the original, annotated to show the boundaries of the revised 1%-and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%-and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area on revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

   a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:

   - The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot compared to pre-project conditions.
   - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.

   b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? ☐ Yes ☒ No
   If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

   If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(A)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☒ No

   If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

ATTACHMENT A

CERTIFIED TOPOGRAPHIC MAP

(MT-2 FORM 2)

LEGEND

- 4950 — MAJOR CONTOUR
- 4949 — MINOR CONTOUR
- 51+00 — ROADWAY CENTERLINE
- SFHA ZONE AH
- SFHA ZONE X

EXISTING 1% ANNUAL CHANCE SFHA (ZONE AH) NOT IN THIS PROJECT

EOP STA: 69+00.20

EXISTING 1% ANNUAL CHANCE SFHA (ZONE AH)

EXISTING 0.2% ANNUAL CHANCE SFHA (ZONE X)

BOP STA 50+99.00

CYPRESS BUSINESS ADDITION

0 60' 120'
HORIZONTAL

SURVEY NOTES:

A. BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS.
B. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET.
C. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12".
STATION ELEVATION: 4965.627, STATION EASTING: 1511214.74
STATION NORTHING: 1487534.54 (NAD-83/NAVD-88 DATUM).

WESTON SOLUTIONS

3840 COMMONS AVE. NE
ALBUQUERQUE
NEW MEXICO

CYPRESS DRIVE STORM DRAIN PROJECT
LOMR APPLICATION
CERTIFIED TOPOGRAPHIC WORK MAP
ATTACHMENT A TO MT-2, FORM 2

FIGURE

I:\Projects\Bernalillo County\Cypress Drive Ph II\17.0 LOMR\Figures\13531 Cypress Certified Work Map.MT2F2.dwg May 31, 2017 - 11:03am

Table of Contents

Figures

Appendices

On CD:

1 INTRODUCTION

Weston Solutions, Inc. (Weston) was contracted by the Bernalillo County Public Works Department (County) to provide a design update of the Cypress Drive Road Improvements project, first designed in 2009 by Resources Technology, Inc. (RTI) (acquired by Weston in 2009). The project segment of Cypress Drive crossest the jurisdictional boundary between the City of Albuquerque (City) and Bernalillo County.

Design and construction of this project was split into two phases, with construction of the first phase completed in 2011 and construction of the second phase completed in 2016. Weston is preparing this Letter of Map Revision (LOMR) application for submittal to the Federal Emergency Management Agency (FEMA) with the intent of updating the Special Flood Hazard Area (SFHA) to reflect the change in conditions.

2 PROJECT LOCATION

Cypress Drive is residential street in southwest Albuquerque, New Mexico that runs east-west between Central Avenue and Atrisco Drive. The project segment of Cypress Drive starts at the intersection with Central Avenue, and runs east for approximately 1,800 feet where Cypress Drive crosses the Isleta Drain (See Figure 1 – Vicinity and Location Map).

The closest critical habitat from the Cypress Drive project site, which is for the Rio Grande Silvery Minnow, is approximately 0.55 miles to the east (See Figure 2 – Critical Habitat Map).

3 PROJECT DESCRIPTION

The Cypress Drive Storm Drain Project was conceived to eliminate or reduce flooding along Cypress Drive by capturing the stormwater flows in a new storm drain system and discharge into the existing Isleta Drain. Please see Appendix A for a more detailed project information.

4 TOPOGRAPHY

Alpha Professional Surveying, Inc. (Alpha) produced a topographic and planimetric map from field surveys of the right-of-way in 2009. Additional survey points were collected by Alpha in 2015 to supplement the current as-built conditions at that time. This data was used to prepare the storm drain and street design improvements. The coordinate system for the survey was tied to New Mexico State Plane Coordinates, Central Zone, North American Datum (NAD) 83, North American Vertical Datum (NAVD) 88 datum. Vertical control precision was for a 1-foot contour interval. For the drainage areas outside of the street right-of-way, the topographic survey was supplemented with contours from the Albuquerque/Bernalillo County LiDAR Mapping from 1999.

5 HYDROLOGIC ANALYSIS

The hydrologic analysis used in this study was prepared by RTI in the Cypress Drive Road Improvements Feasibility Study dated March 2009. That study employed the 40-Acre and

Smaller Basins method, whose procedure is provided in the City of Albuquerque Development Process Manual (DPM) in Part A of Chapter 22. The three drainage areas (A, B and C) delineated are shown on the map presented as Figure 3. The hydrologic results are presented in Table 1 (reproduced from the RTI study).

Table 1: Hydrologic Calculation Results

Basin ID	Area (acres)	10-Year Flow (cfs)	100-Year Flow (cfs)
A	5.17	9.7	17.0
B	6.08	13.1	21.7
C	2.46	5.3	8.8

In order to overcome the hydraulic difficulties poised by the flat grades of Cypress Drive, an alternative approach, termed peaks and valleys, was adopted. The underlying storm drain was designed with inlets at each valley and six new drainage areas were created, one for each inlet (See Figure 3). The 100-year flow rates reaching each inlet are presented in Table 2 (reproduced from the RTI study), along with the currently constructed conditions.

Table 2: Design Flow Rates at Storm Drain Inlets

Inlet-Basin ID	100-Year Flow (cfs)	Constructed Inlet Type and Number
1A	6.9	1 Modified MH Inlet (left) and 1 Double D (right)
1B	6.8	1 Modified MH Inlet (left) and 1 Double D (right)
2	9.3	2 Double Ds (1 each left and right)
3	5.2	1 Single D (left) & 1 Modified MH Inlet (right)
4	3.5	1 Single D (left) & 1 Modified MH Inlet (right)
5	10.2	2 Double Ds (1 each left and right)

Please see Appendix A for the detailed hydrologic analysis.

6 HYDRAULIC ANALYSIS

The hydraulic analysis for this study was accomplished with a model of the Cypress Drive storm drain system using the U.S. Environmental Protection Agency's (EPA) Storm Water Management Model (SWMM) Version 5.1.

SWMM is capable of modeling complex storm drain systems using conservation of mass and momentum equations for gradually varied, unsteady flow, and employs the Manning equation for non-pressurized flow and either the Hazen-Willams or Darcy-Weisback equation for pressurized flow.

6.1 Effective Model

An inquiry was placed to FEMA by the County, and an Effective Model does not exist for the project area. Therefore only a post-project hydraulic model was prepared for the current as-built conditions.

6.2 Hydraulic Analysis Results

The available as-built data (See Appendices B and C) was used to create a storm drain network in SWMM. Due to the presence of surcharging in manholes, Dynamic Wave routing was used as the flow routing method. A summary of the hydraulic results are listed in Table 3, the water surface profile and detailed output files are in Appendix D.

Table 3: Updated Storm Drain Hydraulics Summary

Pipe IDs	Manholes	Accumulated 100-Year Flow (cfs)	Pipe Size Rise x Span (inches)	Slope (%)	Percent Full (%)	Flow Velocity (ft/s)
P-8	MH A to B	10.6	19 x 30	0.37	76	3.96
P-7	MH B to C	14.1	24 x 38	0.29	62	4.61
P-6	MH C to D	19.3	24 x 38	0.25	92	3.92
P-5	MH D to D-2	28.6	29 x 45	0.35	63	4.56
P-4.5	MH D-2 to E	28.6	29 x 45	1.03	41	3.86
P-4	MH E to F	28.6	29 x 45	0.11	93	3.87
P-3	MH F to G	35.6	29 x 45	0.19	114	4.86
P-2	MH G to H	42.0	29 x 45	0.41	96	5.80
P-1	MH H to I (Water Quality Manhole)	41.9	29 x 45	1.47	47	6.18
P-0	MH I to Outfall	41.9	29 x 45	1.05	57	7.71

As shown in Table 3, the section of pipe between Manholes F and G will surcharge, causing Pipe P-3 to flow under pressure. Although there is slight surcharging, the SWMM model is not predicting that any manholes will overflow.

6.3 Floodplain Mapping

The floodplains from the current effective FIRM were mapped onto the Post-Project Conditions Work Map (Figure 4), which also shows the results of the post-project hydraulic analysis. Since the newly constructed Cypress Drive storm drain has capacity to contain and convey the 100-year design storm, this LOMR application proposes removal of the AH Zone at the eastern end of Cypress Drive. The Annotated FIRM, Figure 5, shows the AH Zone proposed for removal based on the post-project hydraulic analysis.

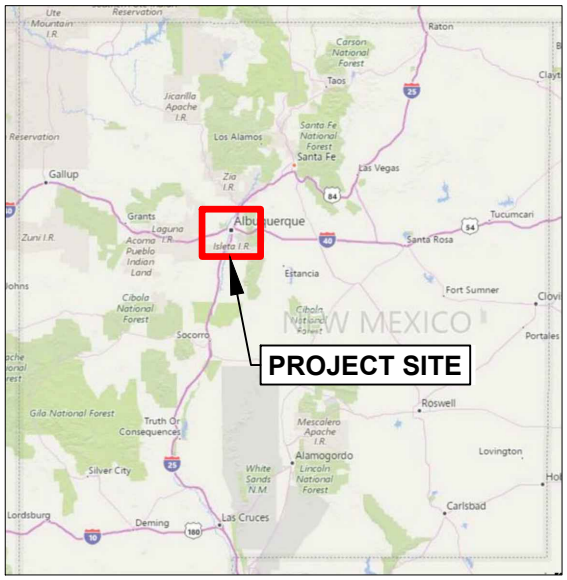
7 REFERENCES

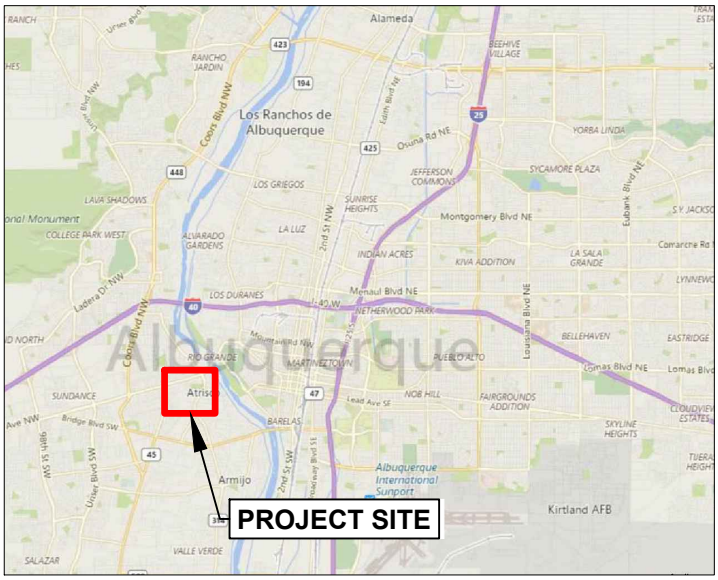
COA 2008. *Albuquerque Development Process Manual, Volume II- Design Criteria*. City of Albuquerque. 2008 Edition.

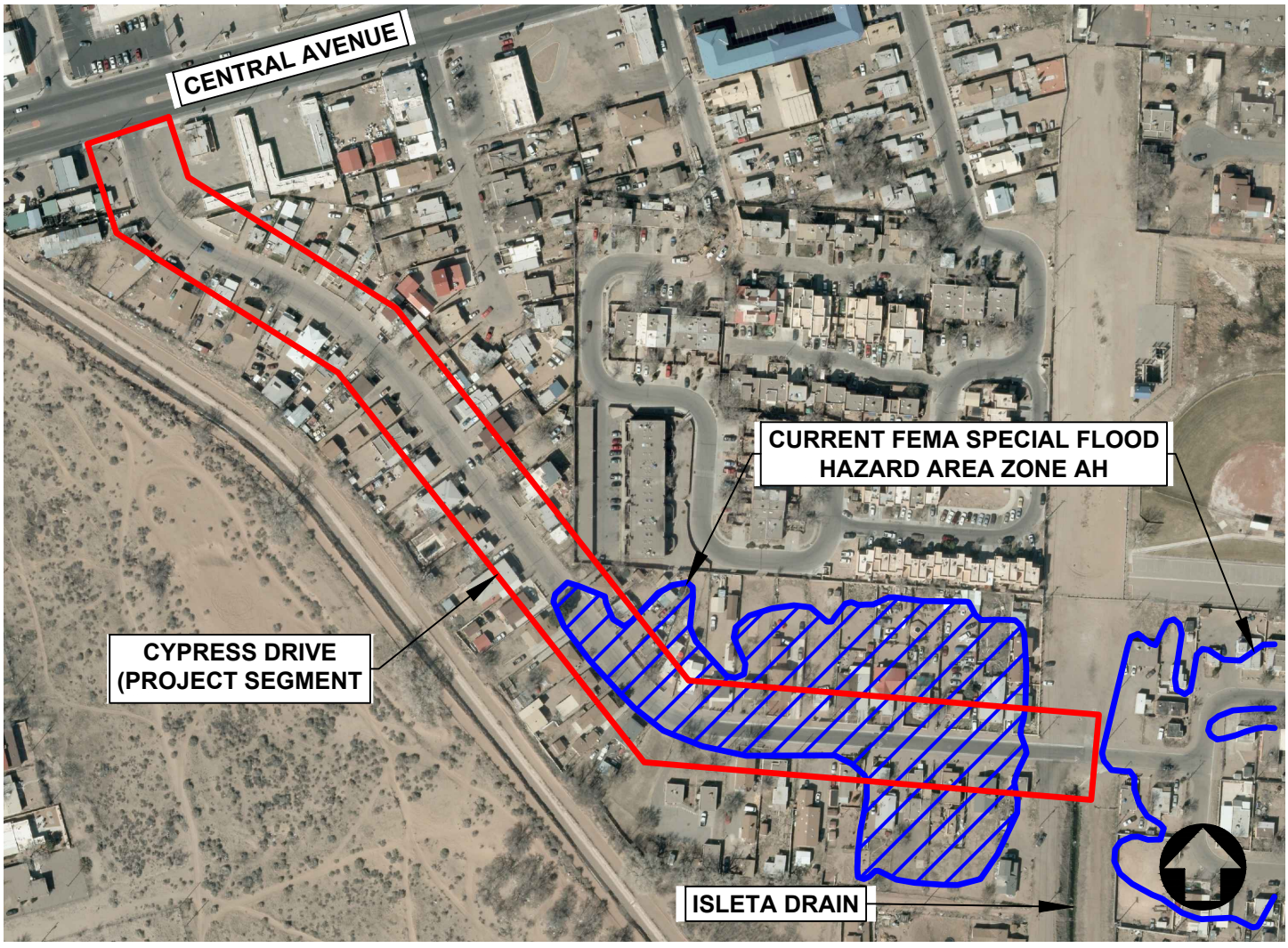
RTI 2009. *Cypress Drive Road Improvements Feasibility Study*. RTI. 2009.

WESTON 2016. *Design Basis Report, Cypress Drive Road Improvements (Phase II)*. Weston Solutions, Inc. (Weston). March 2016.

FIGURES







WESTON SOLUTIONS

3840 COMMONS AVE. NE
ALBUQUERQUE
NEW MEXICO

CYPRESS DRIVE STORM DRAIN PROJECT
LOMR APPLICATION
VICINITY AND LOCATION MAP
(NTS)

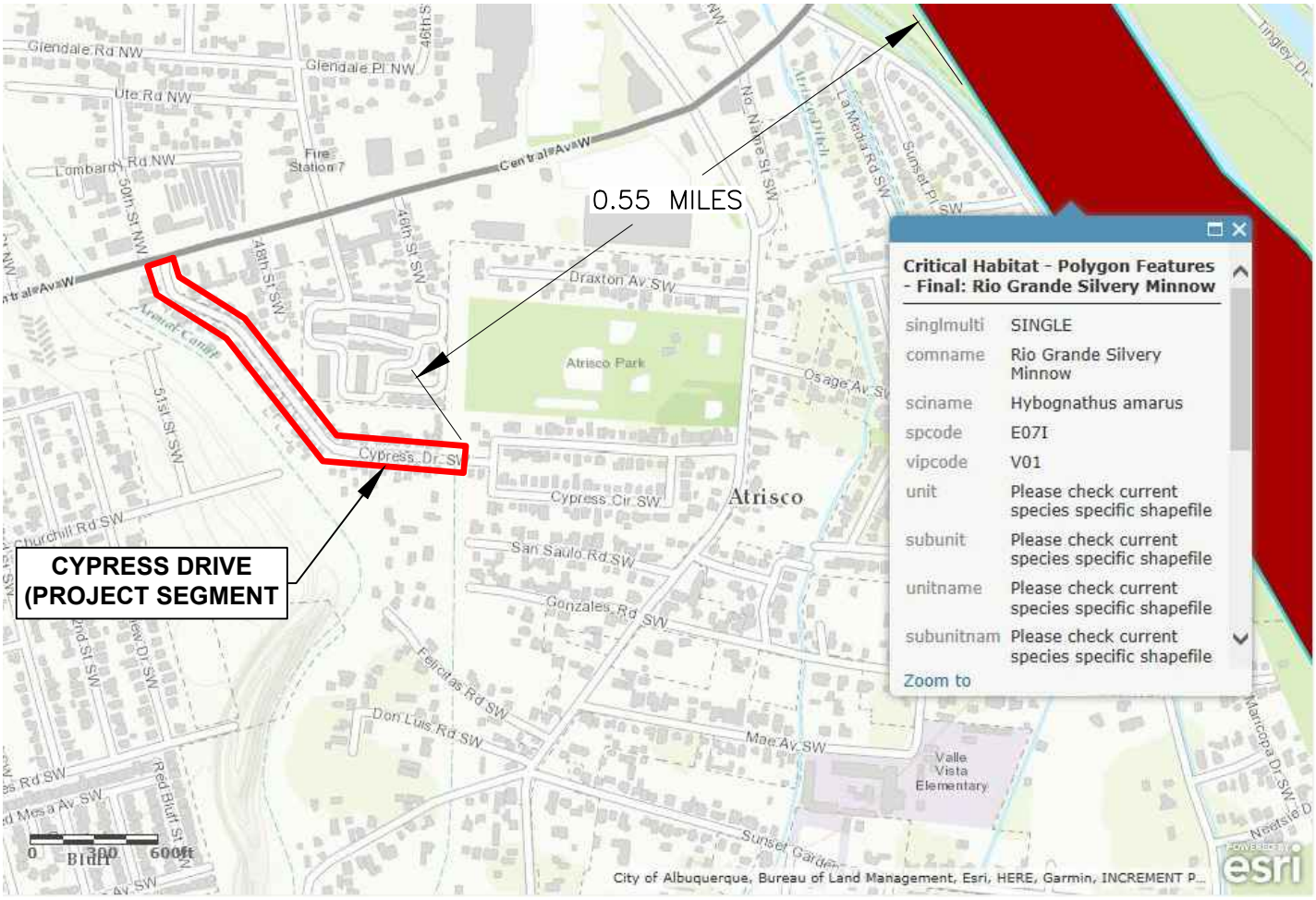
FIGURE

1

I:\Projects\Bernalillo County\Cypress Drive Ph II\17.0 LOMR\Figures\13531 Cypress LOMR Vicinity Map.dwg April 21, 2017 - 12:52pm

Critical Habitat for Threatened & Endangered Species [USFWS]

A specific geographic area(s) that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection.



City of Albuquerque, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
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Landscape Architecture
Planning
5501 Jefferson Blvd. NE, Suite 200
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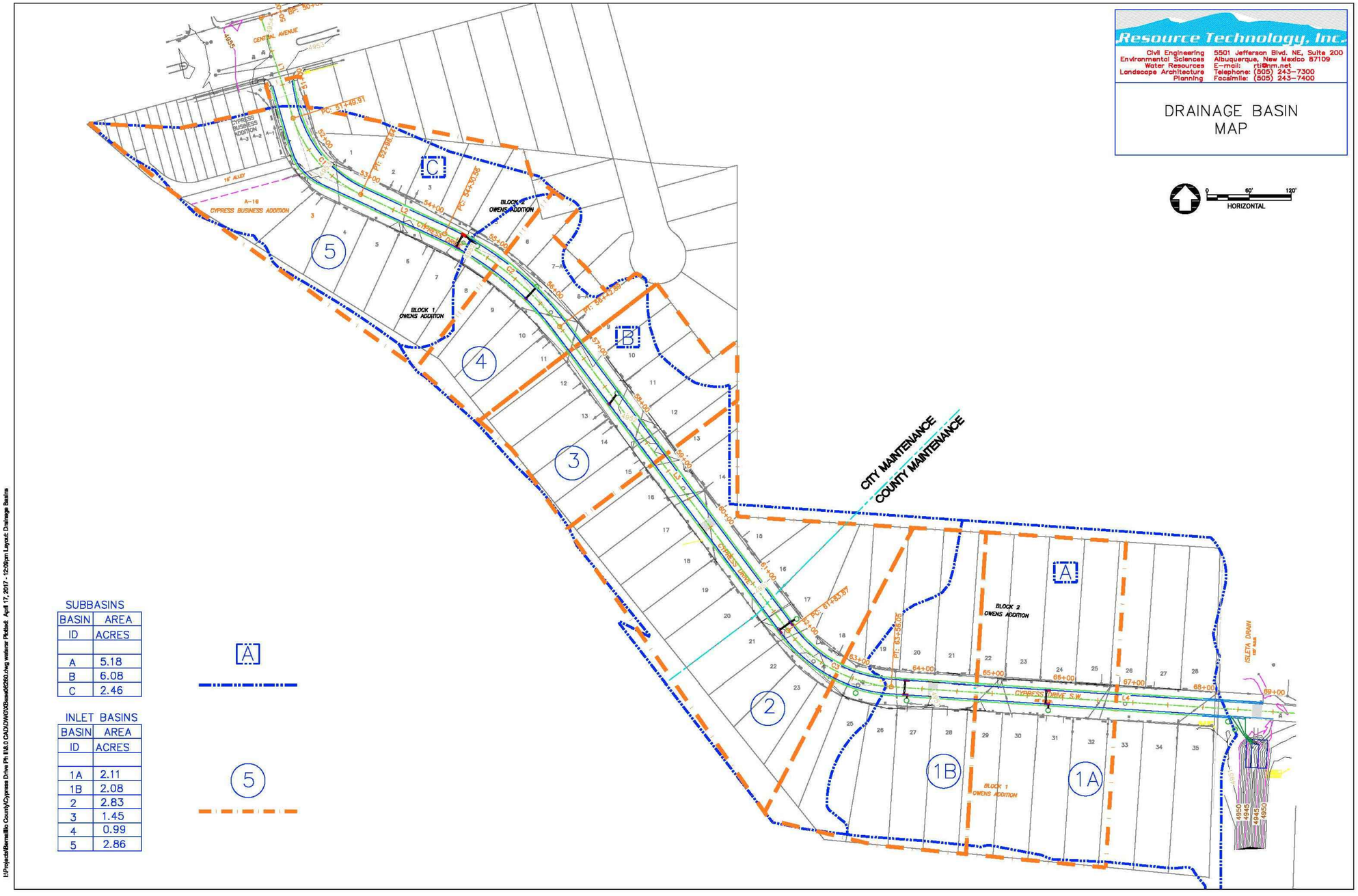
E-mail: rti@nm.net
Telephone: (505) 243-7300
Facsimile: (505) 243-7400

DRAINAGE BASIN MAP

0 60' 120'
HORIZONTAL



SUBBASINS

BASIN ID	AREA ACRES
A	5.18
B	6.08
C	2.46

INLET BASINS

BASIN ID	AREA ACRES
1A	2.11
1B	2.08
2	2.83
3	1.45
4	0.99
5	2.86

[A] — SUBBASIN BOUNDARY

5 — INLET BASIN BOUNDARY

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I:\Projects\Bernalillo County\Cypress Drive Ph II\8.0 CAD\DWG\DBase80280.dwg westerse Plotted: April 17, 2017 - 12:09pm Layout: Drainage Basins

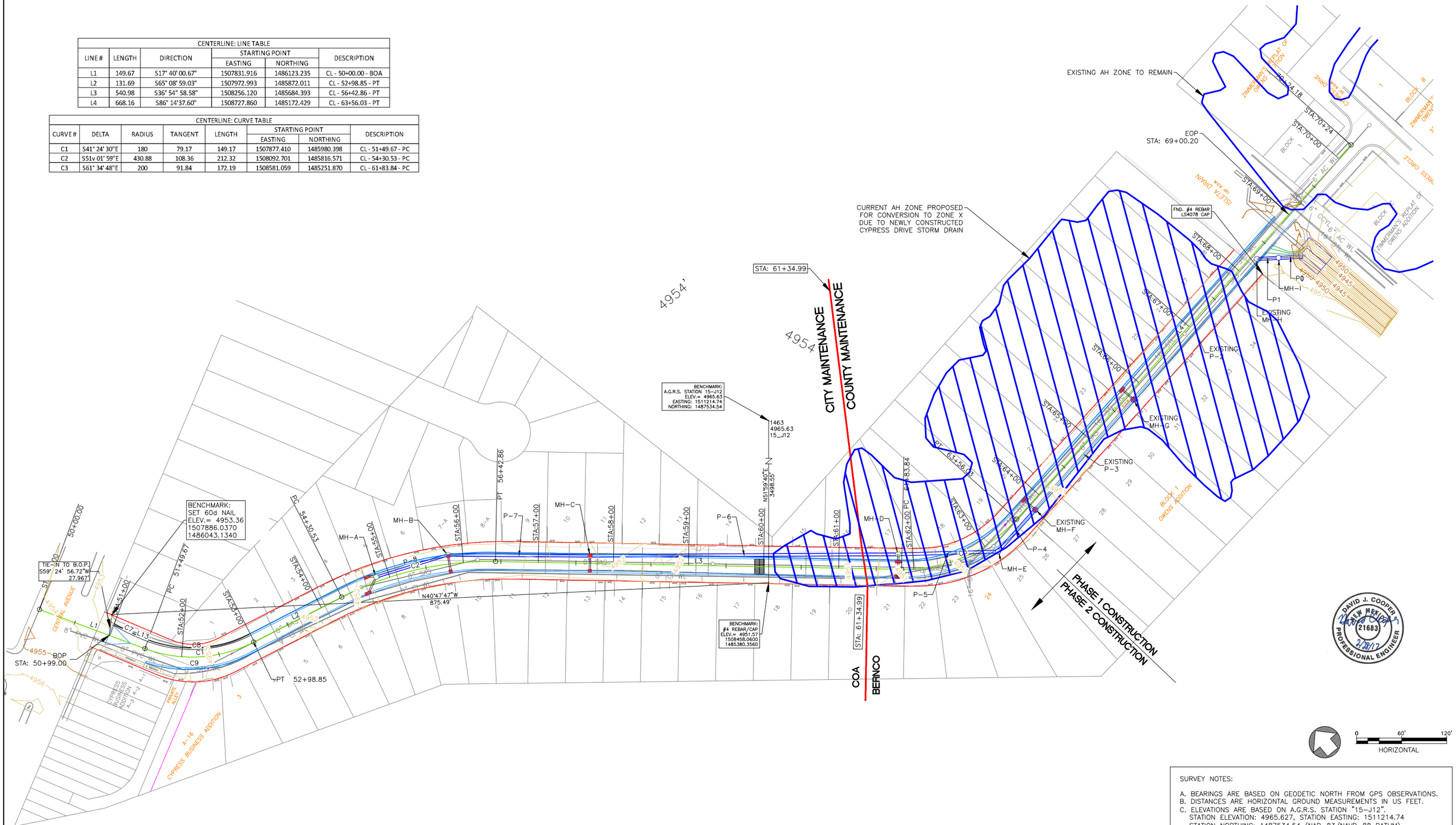
WESTON SOLUTIONS
3840 COMMONS AVE. NE
ALBUQUERQUE
NEW MEXICO

CYPRESS DRIVE STORM DRAIN PROJECT
LOMR APPLICATION
DRAINAGE BASIN MAP
(NTS)

FIGURE
3

CENTERLINE: LINE TABLE					
LINE #	LENGTH	DIRECTION	STARTING POINT		DESCRIPTION
			EASTING	NORTHING	
L1	149.67	S17° 40' 00.67"	1507831.916	1486123.235	CL - 50+00.00 - BOA
L2	131.69	S65° 08' 59.03"	1507972.993	1485872.011	CL - 52+98.85 - PT
L3	540.98	S36° 54" 58.58"	1508256.120	1485684.393	CL - 56+42.86 - PT
L4	668.16	S86° 14'37.60"	1508727.860	1485172.429	CL - 63+56.03 - PT

CENTERLINE: CURVE TABLE							
CURVE #	DELTA	RADIUS	TANGENT	LENGTH	STARTING POINT		DESCRIPTION
					EASTING	NORTHING	
C1	S41° 24' 30"E	180	79.17	149.17	1507877.410	1485980.398	CL - 51+49.67 - PC
C2	S51v 01' 59"E	430.88	108.36	212.32	1508092.701	1485816.571	CL - 54+30.53 - PC
C3	S61° 34' 48"E	200	91.84	172.19	1508581.059	1485251.870	CL - 61+83.84 - PC



SURVEY NOTES:

A. BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS.
B. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET.
C. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12".
STATION ELEVATION: 4965.627, STATION EASTING: 1511214.74
STATION NORTHING: 1487534.54 (NAD-83/NAVD-88 DATUM).

WESTON SOLUTIONS
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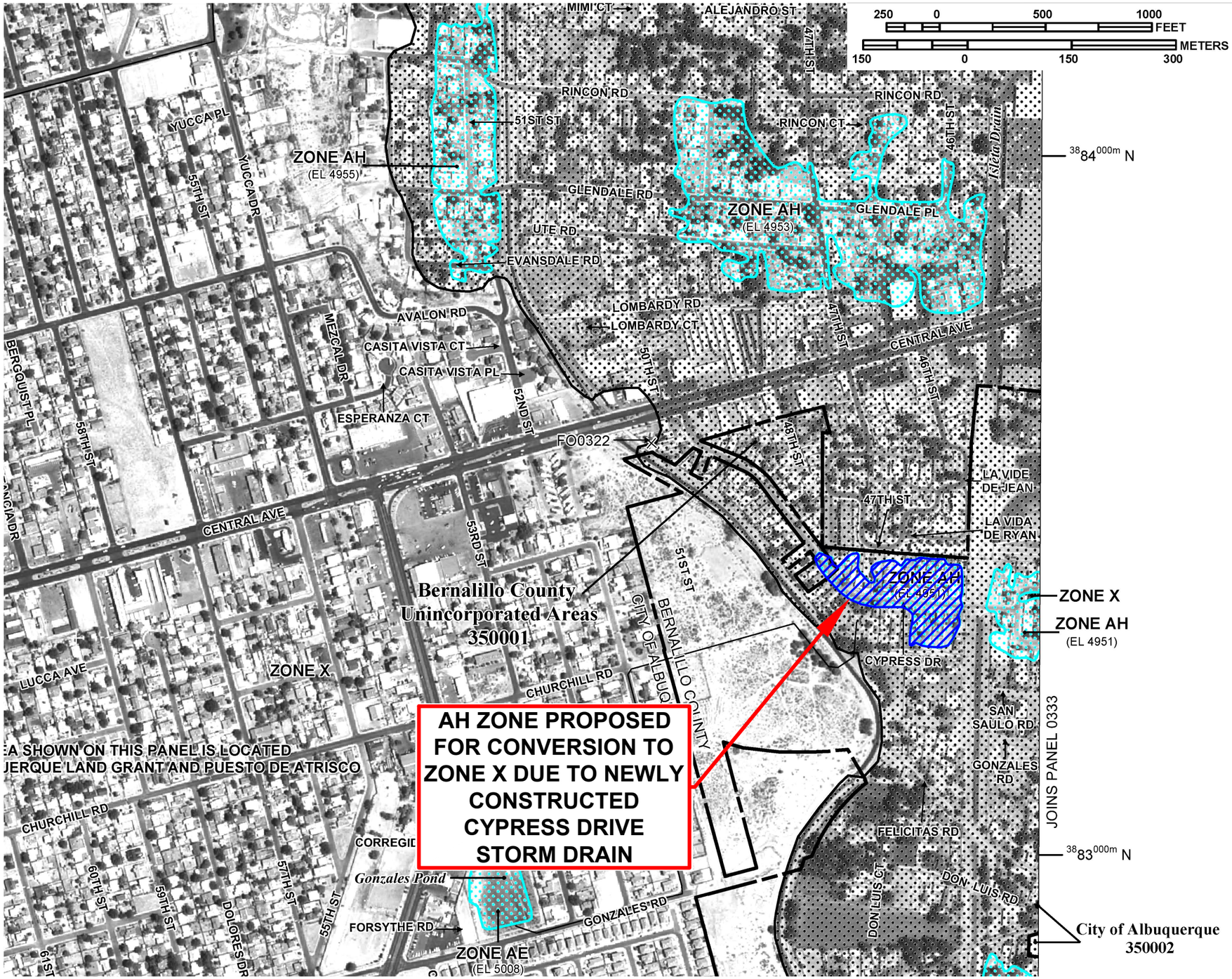
ALBUQUERQUE
NEW MEXICO

CYPRESS DRIVE STORM DRAIN PROJECT
LOMR APPLICATION
POST-PROJECT CONDITIONS WORK MAP

FIGURE
4



NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0329H

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 329 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0329	H
BERNALILLO COUNTY UNINCORPORATED AREAS	350001	0329	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
35001C0329H

MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

DAVID J. COOPER NEW MEXICO 21683 PROFESSIONAL ENGINEER 2/28/17

THIS IS AN OFFICIAL COPY OF THE ABOVE REFERENCED FLOOD MAP

WESTON SOLUTIONS
3840 COMMONS AVE. NE
ALBUQUERQUE
NEW MEXICO

CYPRESS DRIVE STORM DRAIN PROJECT
LOMR APPLICATION
REVISED FLOOD INSURANCE RATE MAP
35001C0329H (PREVIOUSLY REVISED AUG. 2012)

FIGURE
5

I:\Projects\Bernalillo County\Cypress Drive Ph II\17.0 LOMR\Figures\13531 Cypress LOMR Vicinity Map.dwg April 24, 2017 - 8:44am

APPENDIX A: CYPRESS DRIVE DESIGN BASIS REPORT (ON CD ONLY)

DESIGN BASIS REPORT
CYPRESS DRIVE ROAD IMPROVEMENTS (PHASE II)

Prepared For:

2400 Broadway SE
Albuquerque, New Mexico 87102

Prepared By:

3840 Commons Avenue, NE
Albuquerque, New Mexico 87109

March 2016

Table of Contents

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1 INTRODUCTION

Weston Solutions, Inc. (Weston) was contracted by the Bernalillo County Public Works Department (County) to provide a Design update of the Cypress Drive Road Improvements, first designed in 2009 by Resources Technology, Inc. (RTI) (acquired by Weston in 2009). Most of the county portion of this project was constructed in 2011 and this design update will largely address the portion located within the City of Albuquerque (City) and the small county portion that remains to be built. The main objectives of this project are as follows:

- Revise and complete the construction documents for the portion of the project located within the city limits.
- Obtain a Letter of Map revision (LOMR) from the Federal Emergency Management Agency (FEMA).

2 DISCUSSION OF THE PREVIOUS DESIGN FEASIBILITY STUDY

During the preliminary design of this project a feasibility study was conducted by RTI in order to facilitate the final design issued in the fall of 2009. Much of this information remains valid and this study is included as Appendix A. Key items and changes to the project since the issue of this document are discussed below.

2.1 Feasibility Study Introduction

The county portion of this project constructed in 2011 is commonly referred to as Phase I. The remaining portion is commonly referred to as Phase II. This 2016 update evaluates the 2009 study and adopts the effects of Phase I construction.

2.2 Existing Site Conditions

Aside from Phase I construction, the site conditions remain largely the same, although an old hotel at the intersection of Cypress and Central has since been demolished and converted to a vacant lot. The FEMA Floodplain Map which the project site is located on was updated in August of 2012, but the floodplain affecting the project site was unchanged.

2.3 Topographic Design Survey and Utilities

Alpha Surveying produced a topographic and planimetric map from field surveys of the right-of-way in 2009. This survey is incorporated into the Plan and Profile sheet included in Appendix A. Additional survey conducted in 2015 is discussed in subsequent sections.

2.4 Hydrology

The hydrologic analysis was conducted using the hydrologic method Part A – Procedure for 40 Acres and Smaller Basins contained in the Development Process Manual (DPM, Chapter 22, Part A) of the Albuquerque Planning and Public Works Department. The study used the June 1997 update of the DPM; this was verified as current to the October 2008 Revision. The three drainage areas (A, B and C) delineated are shown on the map presented in Appendix A. The hydrologic results are presented in Table 1 (reproduced from the study).

Table 1: Proposed Hydrologic Calculations			
Basin ID	Area (acres)	10-Year Flow (cfs)	100-Year Flow (cfs)
A	5.17	9.7	17.0
B	6.08	13.1	21.7
C	2.46	5.3	8.8

2.5 Hydraulics

In order to overcome the hydraulic difficulties poised by the flat grades of Cypress Drive, an alternative approach, termed peaks and valleys, was adopted. In recent site visits, this approach appears to have been successfully implemented for Phase I. The underlying stormdrain was designed with inlets at each valley and six new drainage areas were created (one for each inlet). The 100-year flows are presented in Table 2 (reproduced from the study) along with the 2009 design and constructed conditions.

Table 2: Proposed vs. Designed vs. Constructed Inlets				
Inlet-Basin ID	100-Year Flow (cfs)	Proposed Inlet Type and Number	2009 Design Inlet Type and Number	Constructed Inlet Type and Number
1A	6.9	2 Double Ds (1 each left and right)	2 Double Ds (1 each left and right)	1 Single D (left) and 1 Double D (right)
1B	6.8	2 Double Ds (1 each left and right)	2 Double Ds (1 each left and right)	1 Single D (left) and 1 Double D (right)
2	9.3	2 Double Ds (1 each left and right)	2 Double Ds (1 each left and right)	N/A
3	5.2	2 Single Ds (1 each left and right)	2 Single Ds (1 each left and right)	N/A
4	3.5	1 Single D (left) & 1 Slotted MH Cover	1 Single D (left) & 1 Slotted MH Cover	N/A
5	10.2	2 Double Ds (1 each left and right)	2 Double Ds (1 each left and right)	N/A

The storm drain hydraulics were computed using Bentley's FlowMaster utilized to determine the required pipe diameter for the accumulated flow. This detailed analysis is included in Appendix A and the results are summarized in Table 3 (reproduced from the study).

Table 3: Storm Drain Hydraulics Summary					
Basin ID	Pipe IDs	Accumulated 100-Year Flow (cfs)	Pipe Size Rise x Span (inches)	Round Equivalent Pipe (inches)	Slope (%)
5	P-8	10.2	19 x 30	24	0.26
4	P-7	13.8	22 x 34	27	0.25
3	P-6	18.9	24 x 38	30	0.25
2	P-5, P-4	28.3	24 x 38	30	0.35
1B	P-3	35.1	29 x 45	36	0.48
1A	P-2, P-1	42.0	29 x 45	36	0.48

2.6 Construction Considerations

The construction considerations of the previous study remain valid, which include:

- Construction will need to be carefully managed to facilitate homeowner access, maintain utility accessibility, and insure safety throughout the construction duration.
- The 16-inch waterline will need to be rerouted beneath the new storm drain. Proper clearances will need to be verified.
- The existing condition of the water main should be verified by the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) prior to construction due to past experiences with faulty service welds on cast iron waterline.
- For more details, refer to the previous study (RTI 2009a).

Changes to the alignment of the Phase I storm drain affected the final alignment of Phase II. The location of Manhole E had to be shifted several feet to the west in order to prevent a conflict with an existing sanitary sewer manhole. The adjustment is not expected to negatively affect the constructability of the storm drain.

2.7 Feasibility Study Conclusions and Cost Estimate

The findings of the feasibility study were largely implemented in the 2009 design and Phase I construction. The preliminary cost estimate prepared alongside the previous design is presented in Appendix A, although it is superseded by the new cost estimate prepared for this report (see Appendix D).

3 CURRENT DESIGN

The following sections discuss the investigations and design modifications made to the original Cypress Drive design due to changes during construction of Phase I of the project.

3.1 As-Builts

Weston was provided with the as-built data that the County had available, which was primarily for the wet utility service connections of the Phase I construction. No as-built data was available for the roadway or stormdrain improvements. Therefore, Weston subcontracted a surveyor to collect several as-built data points of the Phase I roadway and storm drain.

Although the storm drain inlets were constructed at approximately the correct locations of the original design, the design of two were modified during construction. Manholes F and G (see the construction plans) were modified to combine the manhole and drop inlet at each of those locations. The resulting structure is a concrete manhole with a flat lid that has a rectangular opening with a standard Type D grate inlet per the City's standard specifications. The original design was separate manhole and drop inlet box with a standard Double Type D inlet. Therefore, the capacity at each of these inlets was reduced by half.

The location of the furthest upstream manhole constructed during Phase I (Manhole F) is slightly different than the original design (moved about 10 feet further north than designed), however the finished invert elevation (4945.60 feet) is only 0.06 feet lower than the original

design invert. Therefore, the alignment of the Phase II storm drain was modified, but the pipeline grades were kept approximately the same.

The next two manholes constructed (Manholes G and H) have finished invert elevations such that the storm drain is flatter than designed for both sections. Between Manholes F and G, the constructed storm drain has a slope of 0.16%, versus a design of 0.35%. The section between Manholes G and H has a constructed slope of 0.39%, versus a design of 0.48%. Due to this, the hydraulics of these modifications were checked as part of this design.

3.2 Design Update

As discussed above, the hydrology is unchanged, and the Phase I portion of the Cypress Drive pavement appears to be constructed according to plan. As-built data is not available for the pavement, however "peaks" and "valleys" along street alignment were visible, with the valleys centered on the constructed storm drain inlets. This drainage approach was the intent of the original design, and appears to have been constructed as designed. Therefore, the Phase II street grades did not require design modifications due to the Phase I construction.

However, the section of storm drain constructed during Phase I required design modifications to the Phase II section of storm drain, which required updates to the hydraulics and alignment of the pipeline.

3.2.1 Storm Drain Hydraulics

Due to the as-built results of the section constructed during Phase I, Weston recalculated the pipeline hydraulics. As with the last design, FlowMaster was used to calculate the hydraulics using Manning's Formula for open-channel flow. However, the section of pipeline between Manholes F and G did not converge in the software, and required further analysis. To do this, Weston performed a calculation using Autodesk's Storm and Sanitary Analysis software which is capable of analyzing complex pipeline systems. A summary of the hydraulic results are listed in Table 4, and detailed output files are in Appendix B.

Table 4: Updated Storm Drain Hydraulics Summary

Pipe IDs	Manholes	Accumulated 100-Year Flow (cfs)	Pipe Size Rise x Span (inches)	Slope (%)	Percent Full (%)	Flow Velocity (ft/s)
P-8	MH A to B	10.2	19 x 30	0.26	73	4.2
P-7	MH B to C	13.8	22 x 34	0.25	71	4.5
P-6	MH C to D	18.9	24 x 38	0.25	74	4.8
P-5	MH D to E	28.3	27 x 42	0.36	70	6.1
P-5	MH E to F	28.3	27 x 42	0.35	71	6.1
P-3	MH F to G	35.1	29 x 45*	0.16 (existing)	100**	4.1
P-2	MH G to H	42.0	29 x 45*	0.39 (existing)	81	6.8
P-1	MH H to Water Quality Manhole	42.0	29 x 45*	Pipe section might have been constructed. Existing conditions are not known		

* Pipe size was assumed. No as-built data is available.

** Based on the hydraulic calculations of this section, Manhole F will be surcharged and overflow approximately 7.5 cfs.

As shown in Table 4, the section of pipe between Manholes F and G was constructed flatter than designed and will surcharge, causing Manhole F to overflow approximately 7.5 cfs. Due to the peak and valley configuration of the street design, water will pond over the inlet at Manhole F until reaching a depth that will allow some runoff to flow east along Cypress Drive. Since Single Type D inlets (rather than the Double Type D inlets from the original design) were constructed on the south side of Cypress Drive at both Manholes F and G, this will compound the situation at Manhole F. The potential for ponding was further investigated by analyzing the street hydraulics.

3.2.2 Street Hydraulics

With approximately 7.5 cfs overflowing Manhole F during a 100-year rainfall event, the street hydraulics were checked to determine if the overflow would be contained within the curbs. Between storm drain inlets, the street surface design grades create peaks and valleys, with the valleys centered at the inlets. Therefore, the overflow would overtop one of the peaks, flowing into the next valley, so on until the water reached the rundown into the Isleta Drain. The street cross section hydraulics were calculated using the Manning's Formula in FlowMaster (See Appendix C).

The runoff flowing to Manhole F during a 100-year rainfall event is approximately 6.8 cfs. If the drop inlets at Manhole F overflow, the possible flow rate in the street is the sum of the runoff and the overflow, which is 14.3 cfs. At this flow rate, the flow depth was estimated to be 0.29 feet (from the curb flow line). The design curb height from the flow line is approximately 0.23 feet; therefore the 14.3 cfs would overtop the curbs and spread approximately 3 feet past the outside edge of curb.

3.2.3 Storm Drain Construction

Class IV reinforce concrete pipe is specified for storm drains instead of the typical Class III. This was done because of the minimal cover over many sections, some as low as 0.7 feet. Tables published by the American Concrete Pipe Association (ACPA) are provided as Appendix D for horizontal elliptical reinforced concrete pipe. Although Class III round pipe is suitable in some cases for this project (where cover is greater than 1 foot), Class IV horizontal ellipical pipe was specified throughout, which has a minimum allowable cover of 0.5 feet. This provided a more conservative approach, and a greater degree of safety with regard to the low available cover.

4 ENGINEER'S OPINION OF ESTIMATED CONSTRUCTION COSTS

An updated cost estimate was prepared in conjunction with this design, which is included as Appendix E. The engineer's opinion of estimated construction cost is $450,844 (excluding New Mexico Gross Receipts Tax).

4.1 Unit Prices

The estimated construction costs for Phase II were determined using the *City Engineer's Estimated Unit Prices for Contract Items 2009,* published by the City of Albuquerque. The unit item costs were fixed to the Construction Cost Index (CCI) at a value of 221.7 as published by the American City and County Magazine. These values were adjusted using the December

2015 CCI of 259.7 (latest available value). This inflation adjustment increased the unit prices by 17.1%.

4.2 Quantities

The estimated quantities were determined through analysis of the Phase II design plans and the AutoCAD Civil 3D design model. The quantities of some items are likely to change during construction since some existing items from Phase I construction are not fully known. This includes the exact length of reinforced concrete pipe that has been installed and the water quality manhole at the downstream end of the storm drain. Some investigation by the contractor will be required to determine the full scope of work for construction; therefore change orders are likely to be requested for changes in quantity.

5 REFERENCES

RTI 2009a. *Cypress Drive Road Improvements Feasibility Study*. RTI. 2009.

RTI 2009b. *Cypress Drive Road Improvements Construction Plans*. RTI 2009

COA 2009. *City Engineer's Estimated Unit Prices for Contract Items 2009*, City of Albuquerque.

COA 2008. *Albuquerque Development Process Manual, Volume II- Design Criteria*. City of Albuquerque. 2008 Edition.

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

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Cypress Drive Road Improvements Feasibility Study

Prepared For:

BERNALILLO COUNTY
STATE OF NEW MEXICO

By:

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
5501 Jefferson NE, Suite 200
Albuquerque, New Mexico 87109
(505) 243-7300
(505) 243-7400 Fax
E-mail: rti@rtiabq.com

RTI Project Number: 08-260

March 2009

TABLE OF CONTENTS

1.0 INTRODUCTION

Cypress Drive is located in Bernalillo County, situated in the Southwest Valley, south of Central Avenue between 48th Street and 51st Street. See the vicinity map on the cover sheet in the Exhibits. It is a two-lane asphalt paved road that stretches from Central Avenue to Atrisco Drive. There is essentially no curb and gutter on Cypress between Central and the Isleta Drain, and there is roll curb and gutter between the Isleta Drain and Atrisco.

The Cypress Drive Feasibility Study addresses the section from Central to the Isleta Drain and evaluates the feasibility of constructing a storm drain with associated road improvements including pavement removal and replacement and roll curb and gutter installation.

2.0 EXISTING SITE CONDITIONS

Cypress Drive is primarily a residential street with several businesses located at Central. On the east side and fronting Central Avenue is a motel and across the street to the west is a tire shop that also fronts Central Avenue. South of the tire shop is an auto repair business that fronts Cypress. On the west side of Cypress, adjacent to the tire shop, there is standard curb and gutter with a drive pad running approximately 100 feet next to the property. On the east side of Cypress there is an existing handicap ramp.

Cypress Drive is currently classified as a Local Residential Street with a 25 mph posted speed limit and is not projected to be classified as a collector or higher volume road according to Mid-Region Council of Government (MR COG), *Long Range Roadway System, Albuquerque Metropolitan Planning Area, 2004*. The Cypress Drive right-of-way width is 50 feet. In addition, there are "Deaf Child Ahead" warning signs located in conjunction with two speed humps situated near the southern portion of the study area.

Cypress Drive and its drainage area are located within one of two FEMA floodplain designations: Zone X or Zone AH with a base flood elevation of 4951 feet (NAVD '88). A copy of the FEMA Firmette and legend can be found in Appendix A.

3.0 TOPOGRAPHIC DESIGN SURVEY AND UTILITIES

Alpha Surveying produced a topographic and planimetric map from field surveys of the right-of-way. See the Plan and Profile sheet in Appendix B. All of the electronic survey data was used to create a digital terrain model (DTM) which was used to generate contours. The coordinate system for the survey is tied to Albuquerque Geodetic Reference System control referenced to New Mexico State Plane Coordinates, Central Zone, North American Datum (NAD) 83, North American Vertical Datum (NAVD) 88 datum. Vertical control precision was for a 1-foot contour interval. For the drainage area outside the right-of-way, the topographic survey was supplemented with contours from the Albuquerque/Bernalillo County LIDAR Mapping, 1999.

There are a number of overhead and underground utilities within the project corridor. These utilities include: 8" vitrified clay pipe sanitary sewer located approximately on the road centerline, 2" high pressure gas line in the south side of the right-of-way, 8" waterline in the south side of the right-of-way transitioning to a 16" waterline in the north side of the right-of-way, cable television lines, telephone lines in both sides of the right-of-way at the eastern end of the study area, and overhead power lines on both sides of the right-of-way. In addition, there is a fiber optic communication line crossing Cypress Drive running north south along the western edge of the Isleta Drain right-of-way. The utility information was derived from the planimetric survey, as-builts, potholing, and information provided by all utility companies with facilities on Cypress. See the plan and profile sheets in Appendix B.

To determine the depth of several utility lines, five potholes locations were investigated by Abasto Utility Locating Company, LC. Immediately prior to construction, it may be advantageous for the contractor or the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) to investigate the utility depth at several additional locations. In particular, an investigation between stations 61+50 and 63+00 may be beneficial since there appears to be an additional 8" waterline crossing of the SAS that is not shown in the as-builts. The utility type, material, depth and notes are shown below in Table 1.

Table 1: Pothole Summary					
Pothole Number	Approx. Station	Utility	Material	Depth to Top (inches)	Notes
1	63+40	Water	Metallic	48	Although identified as 12", this is most likely a 16" Waterline.
2	64+80	Water	Metallic	44	Although identified as 12", this is most likely a 16" Waterline.
3	68+20	Water	Metallic	36	Although identified as 12", this is most likely a 16" Waterline.
4	53+20	SAS	VCP	56	8" SAS, Gas service line not located. Waterline not located at this location, there was a blue stake mistake.
5	52+50	Water	Metallic	21	8" waterline is very shallow at this location.

4.0 HYDROLOGY

4.1 Analysis Method

This study employs hydrologic method Part A – Procedure for 40 Acres and Smaller Basins contained in the Development Process Manual (DPM, Chapter 22, Part A) of the Albuquerque Planning and Public Works Department, which was also developed for Bernalillo County. This simplified procedure utilizes initial abstraction/uniform infiltration precipitation losses and the Rational Method. Cypress Drive is located in Precipitation Zone 1, "west of the Rio Grande."

4.2 Drainage Areas

Three drainage basins (A, B, and C) were delineated based upon the existing topography, and the areas were measured using AutoCAD. The total contributing watershed is approximately 13.7 acres. The computed total runoff volume and peak discharge rate were then calculated for both the 10-year, 6-hour storm and the 100-year, 6-hour storm. The resulting flows were the basis for sizing the drainage structures. See Appendix C for the Drainage Basin Map, and see Table 2 for the drainage areas.

This drainage area is included in the Southwest Valley Flood Damage Reduction Feasibility Study (Resource Technology, Inc., multiple volumes, multiple dates) and is identified as Subbasin 56. Subbasin 56 encompasses approximately 36 acres and is bounded by Central Avenue to the north, Isleta Drain to the east, the Arenal Main Canal to the west, and a berm immediately south of Cypress Drive lots. Draining just over one third of Subbasin 56, storm drain K-12-A was designated to convey runoff from Cypress Drive to the Isleta Drain. Storm drain K-12-A included 774 feet of 30" RCP, 956 feet of 36" RCP, 6 manholes and groups of inlets, and one branch that includes one additional manhole with inlets connected by 343 feet of 24" RCP. The branch was intended to drain the southwest corner of La Vida Nueva Subdivision; however, this branch is no longer needed since construction of the apartments at this location.

4.3 Land Treatment

The land treatments for each basin were determined by reviewing an updated orthophoto and identifying the land treatment of several typical lots from each basin. Also factored in were the roadway and the remainder of the right-of-way. For this developed neighborhood, only land treatment C (soil compacted by human activity) and land treatment D (impervious areas, pavements, and roofs) were used. The percentages of each land treatment can be found in Appendix C.

4.4 Hydrologic Results

Table 2 identifies the total estimated flow for each basin for the 10-year (10%-chance) and 100-year (1%-chance) storm events. See Appendix C for detailed hydrologic output.

Table 2: Proposed Hydrologic Calculations

Basin ID	Area (acres)	10-Year Flow (cfs)	100-Year Flow (cfs)
A	5.17	9.7	17.0
B	6.08	13.1	21.7
C	2.46	5.3	8.8

5.0 HYDRAULICS

5.1 Street Hydraulics

The existing street falls approximately 2.6 ft over 1760 feet resulting in a very flat slope of 0.00148 ft/ft (0.148%). With the use of a typical crown (2% cross slope) and roll type mountable curbs which have a depth of 0.333 feet, the carrying capacity of Cypress with a slope of 0.148% is 1.5 cfs per side for a total of 3.0 cfs. The number of inlets that would be required for this scenario is very cost prohibitive. Therefore, the carrying capacity of a street with an inverted crown and a slope of 0.148% was investigated. The street in this scenario would have a capacity of 13.4 cfs. Although this option works from a hydraulic standpoint, this option causes maintenance problems for Bernalillo County and therefore was rejected. It should be noted that a standard curb and gutter was not considered due to the increased cost of adding numerous drive pads, the logistics of locating the drive pads, and probable resistance of the neighborhood.

An alternative approach, termed peaks and valleys, was investigated. This approach requires regrading of the road to create a series of peaks and valleys resulting in an increased slope and therefore an increased carrying capacity of the street. This approach must be carefully employed in an existing development to insure that all properties continue to drain to the roadway. Since the existing properties are just above the existing road grade, six valleys of 0.5 feet deep were created by grading the roadway down at 0.5% and then up at 0.5%, matching existing ground at each end (the peaks). The street carrying capacity for this scenario of roll type mountable curbs with a longitudinal slope of 0.5% and a cross slope of 1.0% is 9.0 cfs. Detailed street hydraulic computations can be found in Appendix D. See the Exhibits for the Overall Plan and Profile and individual plan and profile sheets.

Six new drainage areas (1A through 5) were delineated for each valley where inlets will be placed. The locations of the proposed inlets are shown on the individual plan and profile sheets. Note, to avoid horizontal conflict with the SAS and to reduce construction cost by reducing the number of manholes by two, the storm drain alignment was modified necessitating the use of a slotted manhole cover in place of an inlet. Grating capacities were

determined from PLATE 22.3 D-5 and PLATE 22.3 D-6 from Chapter 22 in the Albuquerque Development Process Manual. Table 3 identifies the 100-year flows per basin and the required inlet type and number of inlets.

Table 3: Proposed Inlets

Inlet-Basin ID	100-Year Flow (cfs)	Inlet Type and Number
1A	6.9	2 Double Ds (1 each left and right)
1B	6.8	2 Double Ds (1 each left and right)
2	9.3	2 Double Ds (1 each left and right)
3	5.2	2 Single Ds (1 each left and right)
4	3.5	1 Single D (left) & 1 Slotted MH Cover
5	10.2	2 Double Ds (1 each left and right)

5.2 Storm Drain Hydraulics

The slope of the storm drain was limited by the relatively flat terrain and the necessity to cross the 8" sanitary sewer upstream of the Isleta Drain. Therefore, elliptical pipes were utilized at slopes from 0.25% to 0.48%. Bentley's FlowMaster was utilized to determine the required pipe diameter for the accumulated flow. Table 4 identifies the accumulated flow, internal pipe diameter, and the slope. See Appendix D for the detailed storm drain output information.

Table 4: Storm Drain Summary

Basin ID	Pipe IDs	Accumulated 100-Year Flow (cfs)	Pipe Size Rise/Span (inches)	Round Equivalent Pipe (inches)	Slope (%)
5	P-8	10.2	19/30	24	0.26
4	P-7	13.8	22/34	27	0.25
3	P-6	18.9	24/38	30	0.25
2	P-5, P-4	28.3	24/38	30	0.35
1B	P-3	35.1	29/45	36	0.48
1A	P-2, P-1	42.0	29/45	36	0.48

6.0 CONSTRUCTION CONSIDERATIONS

Construction will need to be carefully managed to facilitate homeowner access, maintain utility accessibility, and insure safety throughout the construction duration.

6.1 Waterline and Services

There are several construction considerations to take into account that could be clarified with additional potholing. The 16" waterline will need to be rerouted under the storm drain, and twenty-three water services will need to be rerouted over/under the storm drain. The alternative to rerouting these services is the addition of a water main; however, the cost for the additional main is most likely cost prohibitive. There are two surveyed waterline valves that do not match the as-built locations and an additional waterline valve not shown on the as-builts. Although the majority of the sanitary sewer line is VCP, there is 175 feet of ductile iron (DI) pipe. The DI pipe was utilized where the 8" (suspected crossing) and 16" waterlines cross the sanitary sewer with less than 1 foot of clearance.

The Albuquerque Bernalillo County Water Utility Authority expressed concerns regarding the service welds on the cast iron waterline main. ABCWUA discovered problems with the welds on a similar line in the general vicinity of this project. In order to prevent a delay during construction that would increase construction cost and cause additional inconvenience to homeowners, it is recommended that ABCWUA inspect the lines prior to construction to ascertain the soundness of the connections. If the connections are deteriorating, ABCWUA could prepare a Memo of Understanding with Bernalillo County to extend the scope to include replacing the waterline main and service lines.

6.2 Sanitary Sewer and Services

There will be approximately 0.48 feet (5.81 inches) of clearance for the storm drain over the 8" sanitary sewer; therefore, encasing the sanitary sewer line should be considered. To avoid horizontal conflict with the SAS main, one manhole with a slotted cover will be using in place of an inlet and two manholes will need to be placed outside the roadway within the right-of-way. With the exception of several tees near Central Avenue, risers from the 8" SAS main

line to the sewer services are used throughout the entire study area. From Station 54+81.76 (beginning of storm drain) to Station 66+00, the SAS main line is below the storm drain, and the sewer services could be easily reconnected after eliminating the risers and increasing the slope to the property line. This should only be required for the services on the north/east from Station 54+81.76 to approximately Station 63+00 (where storm drain crosses SAS) and on the south/west from Station 63+00 to Station 66+00. From Station 66+00 to Station 68+25 (last service before Isleta Drain), four to five services will need to be rerouted over the storm drain by extending the existing risers.

6.3 Other Utilities

A utility coordination meeting will need to be held at the inception of the design process with all utility companies with service in the project area. With the exception of water and sewer services, utilities will need to be relocated prior to construction to expedite completion of this project.

6.4 Roadway at Isleta Drain

A rundown into the Isleta Drain will be constructed to drain Cypress Drive and its contributing drainage area. From the last roadway "peak", Cypress will drain east approximately 170 feet to the rundown, and it will drain west the area over the Isleta Drain (approximately 50 feet). The existing rundown east of the drain will need minor rehabilitation to stabilize the structure against continued erosion along its edges.

7.0 CONCLUSIONS AND COST ESTIMATE

It is recommended that roll type mountable curbs and 1% crown be utilized in conjunction with peaks and valleys. This Draft Feasibility Study identifies a viable preliminary plan to present to the neighbors at a public meeting, date and time to be determined. Input from the neighbors will be collected at the meeting, summarized, and potential modifications discussed with Bernalillo County.

The engineer's estimated preliminary cost for this project with a detailed breakdown is included as Appendix E. This breakdown includes differentiation between the County's maintained portion of the roadway and the City's maintained portion of the roadway.

It should be noted that a portion of Cypress Drive is located within the City of Albuquerque, and the County will present this design to the City for input.

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

APPENDIX A: FEMA FIRMETTE AND LEGEND

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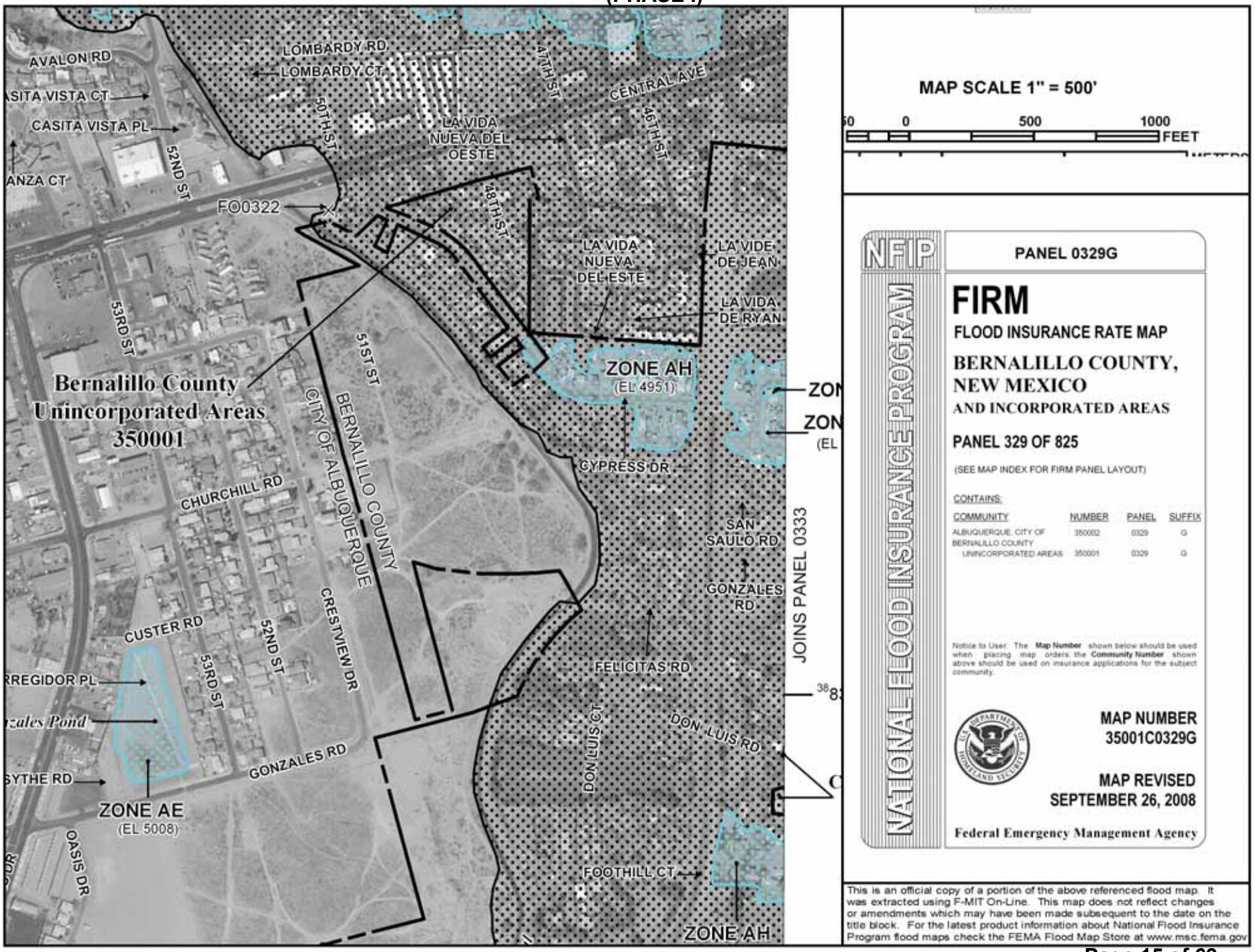
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CASITA VISTA CT
CASITA VISTA PL
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52ND ST
LA VIDA NUEVA DEL OESTE
47TH ST
CENTRAL AVE
46TH ST
48TH ST
FO0322
LA VIDA NUEVA DEL ESTE
LA VIDE DE JEAN
LA VIDA DE RYAN
53RD ST
51ST ST
Bernalillo County Unincorporated Areas 350001
ZONE AH
(EL 4951)
CITY OF ALBUQUERQUE
BERNALILLO COUNTY
CYPRESS DR
CHURCHILL RD
SAN SAULO RD
GONZALES RD
CRESTVIEW DR
CUSTER RD
FELICITAS RD
JOINS PANEL 0333
DON LUIS CT
DON LUIS RD
GONZALES RD
ZONE AE
(EL 5008)
OASIS DR
FOOTHILL CT
ZONE AH
MAP SCALE 1" = 500'
0
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FEET
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0329G
FIRM
FLOOD INSURANCE RATE MAP
BERNALILLO COUNTY, NEW MEXICO
AND INCORPORATED AREAS
PANEL 329 OF 825
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY | NUMBER | PANEL | SUFFIX
ALBUQUERQUE, CITY OF | 350002 | 0329 | G
BERNALILLO COUNTY
UNINCORPORATED AREAS | 350001 | 0329 | G
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
35001C0329G
MAP REVISED
SEPTEMBER 26, 2008
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

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

APPENDIX B: POTHOLE RESULTS

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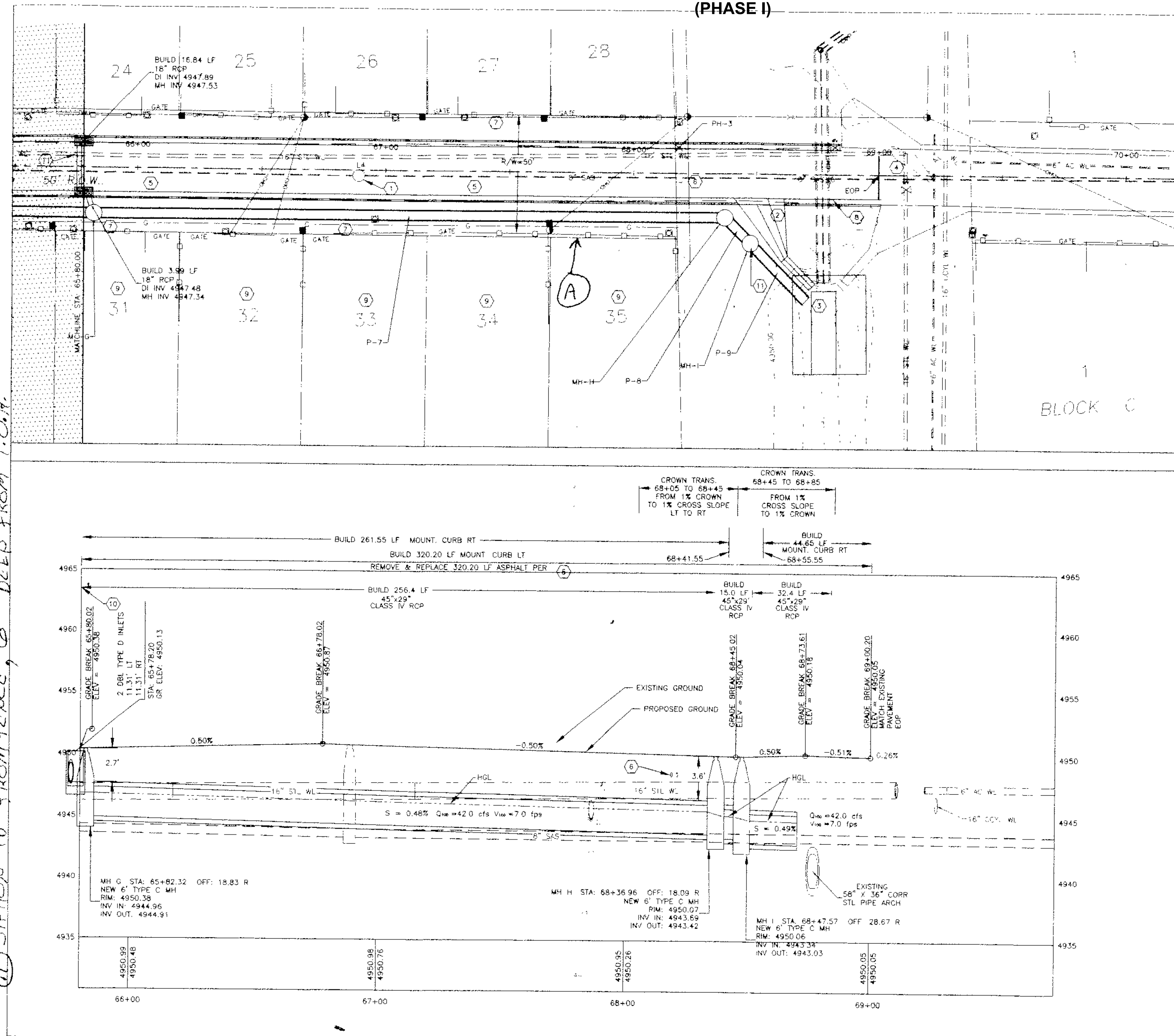

GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
2. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION
3. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
5. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLE.
6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1. ADJUST MANHOLE ELEV TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.
2. SEE SHEET 11 FOR RUNDOWN DETAILS
3. SEE SHEET 11 FOR EROSION PROTECTION DETAILS
4. SAWCUT PAVEMENT STA: 69+00.09
5. REMOVE AND DISPOSE OF EXISTING ASPHALT.
6. FIBER OPTIC LINE AND TELEPHONE LINE ELEVATIONS ARE APPROXIMATE. BOTH LINES SHALL BE SUPPORTED AND PROTECTED DURING CONSTRUCTION. CONTACT AT&T REP FOR STANDBY THREE DAYS PRIOR TO CONSTRUCTION NEAR FIBER OPTIC LINE
7. GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS)
8. REPLACE SPEED HUMP PER SHEET 10.
9. SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND DETAIL 4 FOR WATER SERVICE MODIFICATION.
10. SEE SHEET 7 FOR RCP LENGTH AND TYPE
11. WATER QUALITY MH STC900 PRECAST CONCRETE STORMCEPTOR OR APPROVED EQUIVALENT.

BENCH MARKS: BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12", ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

AS-BUILT INFORMATION | SURVEY INFORMATION | FIELD NOTES | ENGINEER'S SEAL | MICRO-FILM INFORMATION | REMARKS | REVISIONS | DESIGN

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 65+80 TO EOP

Design Review Committee | City Engineer Approval

County Project No. TS08-04 | City Project No. 601791 | Zone Map No. K-11/12 | Sheet 8 | Of

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
2. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.
3. INLET OFFSET AND ELEV REFERS TO BACK OF GRATE.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION
5. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
5. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLE
6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV. TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 8 FOR RCP END STATION.

3 REPLACE SPEED HUMP PER SHEET 10.

4 SEE SHEET 9 FOR WATERLINE MODIFICATION.

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

6 NOTIFY FIRE MARSHAL SEVEN (7) DAYS PRIOR TO WATERLINE SHUTOFF THAT THE HYDRANT WILL BE TEMPORARILY OUT OF SERVICE. COVER IN BLACK PLASTIC WHILE OUT OF SERVICE.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND DETAIL 4 FOR WATER SERVICE MODIFICATION.

9 SEE SHEET 9 DETAIL 1 FOR SAS SERVICE MODIFICATION

10 SEE SHEET 9 DETAIL 3 FOR RCP CROSSING OF SAS MAIN.

11 SEE SHEET 9 DETAIL 5 FOR LEAN FILL DETAIL.

AS-BUILT INFORMATION

BENCH MARKS: BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

SURVEY INFORMATION | FIELD NOTES | NO. | BY | DATE

ENGINEER'S SEAL

REMARKS | REVISIONS | DESIGN

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 61+90 TO 65+80

Design Review Committee | City Engineer Approval

County Project No. TS08-04 | City Project No. 601791 | Zone Map No. K-11/12 | Sheet 7 | Of

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

APPENDIX C: LAND TREATMENTS, 40 ACRE METHOD COMPUTATION SHEETS

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PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 1/6/2009
BASIN : Basin A
CONDITION: Existing

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	5.1700	A	0.00
2			B	0.00
3			C	72.00
4			D	28.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.1241	**Q-Peak**	2-YR	4.196
		24-hr	0.1796	**6-Hour**	10-YR	9.730
		4-day	0.2351		100-YR	17.009
		10-day	0.3014			
	10-YR	6-hr	0.2861			
		24-hr	0.3416			
		4-day	0.3971			
		10-day	0.4634			
	100-YR	6-hr	0.5447	**(cu ft)**	23729	
		24-hr	0.6002			
		4-day	0.6557			
		10-day	0.7221			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 1/6/2009
BASIN : Basin B
CONDITION: Existing

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	6.0800	A	0.00
2			B	0.00
3			C	53.00
4			D	47.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.2037	**Q-Peak**	2-YR	6.344
		24-hr	0.3132	**6-Hour**	10-YR	13.060
		4-day	0.4228		100-YR	21.736
		10-day	0.5537			
	10-YR	6-hr	0.4134			
		24-hr	0.5230			
		4-day	0.6325			
		10-day	0.7635			
	100-YR	6-hr	0.7350	**(cu ft)**	32015	
		24-hr	0.8445			
		4-day	0.9541			
		10-day	1.0850			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 1/6/2009
BASIN : Basin C
CONDITION: Existing

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	2.4600	A	0.00
2			B	0.00
3			C	53.00
4			D	47.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0824	**Q-Peak**	2-YR	2.567
		24-hr	0.1267	**6-Hour**	10-YR	5.284
		4-day	0.1711		100-YR	8.795
		10-day	0.2240			
	10-YR	6-hr	0.1673			
		24-hr	0.2116			
		4-day	0.2559			
		10-day	0.3089			
	100-YR	6-hr	0.2974	**(cu ft)**	12954	
		24-hr	0.3417			
		4-day	0.3860			
		10-day	0.4390			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 1A
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	2.1100	A	0.00
2			B	0.00
3			C	72.00
4			D	28.00
				100.00

Output

			(ac-ft)				(cfs)
Volume	2-YR	6-hr	0.0506	**Q-Peak**	2-YR		1.712
		24-hr	0.0733	**6-Hour**	10-YR		3.971
		4-day	0.0959		100-YR		6.942
		10-day	0.1230				
	10-YR	6-hr	0.1168				
		24-hr	0.1394				
		4-day	0.1620				
		10-day	0.1891				
	100-YR	6-hr	0.2223	**(cu ft)**	9684		
		24-hr	0.2450				
		4-day	0.2676				
		10-day	0.2947				

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 1B
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	2.0800	A	0.00
2			B	0.00
3			C	72.00
4			D	28.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0499	**Q-Peak**	2-YR	1.688
		24-hr	0.0722	**6-Hour**	10-YR	3.915
		4-day	0.0946		100-YR	6.843
		10-day	0.1213			
	10-YR	6-hr	0.1151			
		24-hr	0.1374			
		4-day	0.1597			
		10-day	0.1864			
	100-YR	6-hr	0.2192	**(cu ft)**	9547	
		24-hr	0.2415			
		4-day	0.2638			
		10-day	0.2905			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 2
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	2.8300	A	0.00
2			B	0.00
3			C	72.00
4			D	28.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0679	**Q-Peak**	2-YR	2.297
		24-hr	0.0983	**6-Hour**	10-YR	5.326
		4-day	0.1287		100-YR	9.311
		10-day	0.1650			
	10-YR	6-hr	0.1566			
		24-hr	0.1870			
		4-day	0.2173			
		10-day	0.2537			
	100-YR	6-hr	0.2982	**(cu ft)**	12989	
		24-hr	0.3286			
		4-day	0.3589			
		10-day	0.3953			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 3
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	1.4500	A	0.00
2			B	0.00
3			C	53.00
4			D	47.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0486	**Q-Peak**	2-YR	1.513
		24-hr	0.0747	**6-Hour**	10-YR	3.115
		4-day	0.1008		100-YR	5.184
		10-day	0.1321			
	10-YR	6-hr	0.0986			
		24-hr	0.1247			
		4-day	0.1508			
		10-day	0.1821			
	100-YR	6-hr	0.1753	**(cu ft)**	7635	
		24-hr	0.2014			
		4-day	0.2275			
		10-day	0.2588			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 4
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	0.9900	A	0.00
2			B	0.00
3			C	53.00
4			D	47.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0332	**Q-Peak**	2-YR	1.033
		24-hr	0.0510	**6-Hour**	10-YR	2.127
		4-day	0.0688		100-YR	3.539
		10-day	0.0902			
	10-YR	6-hr	0.0673			
		24-hr	0.0852			
		4-day	0.1030			
		10-day	0.1243			
	100-YR	6-hr	0.1197	**(cu ft)**	5213	
		24-hr	0.1375			
		4-day	0.1553			
		10-day	0.1767			

PROJECT: Cypress Dr **Project No.** 08-260 **Date:** 3/5/2009
BASIN : Basin 5
CONDITION: Proposed

Part A -- Procedure for 40 Acre and Smaller Basins*

Input

zone (x)		area (acres)	land treatment (%)	
1	X	2.8600	A	0.00
2			B	0.00
3			C	53.00
4			D	47.00
				100.00

Output

			(ac-ft)			(cfs)
Volume	2-YR	6-hr	0.0958	**Q-Peak**	2-YR	2.984
		24-hr	0.1473	**6-Hour**	10-YR	6.143
		4-day	0.1989		100-YR	10.225
		10-day	0.2605			
	10-YR	6-hr	0.1945			
		24-hr	0.2460			
		4-day	0.2975			
		10-day	0.3591			
	100-YR	6-hr	0.3457	**(cu ft)**	15060	
		24-hr	0.3973			
		4-day	0.4488			
		10-day	0.5104			

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

APPENDIX D: STREET AND STORM DRAIN HYDRAULICS

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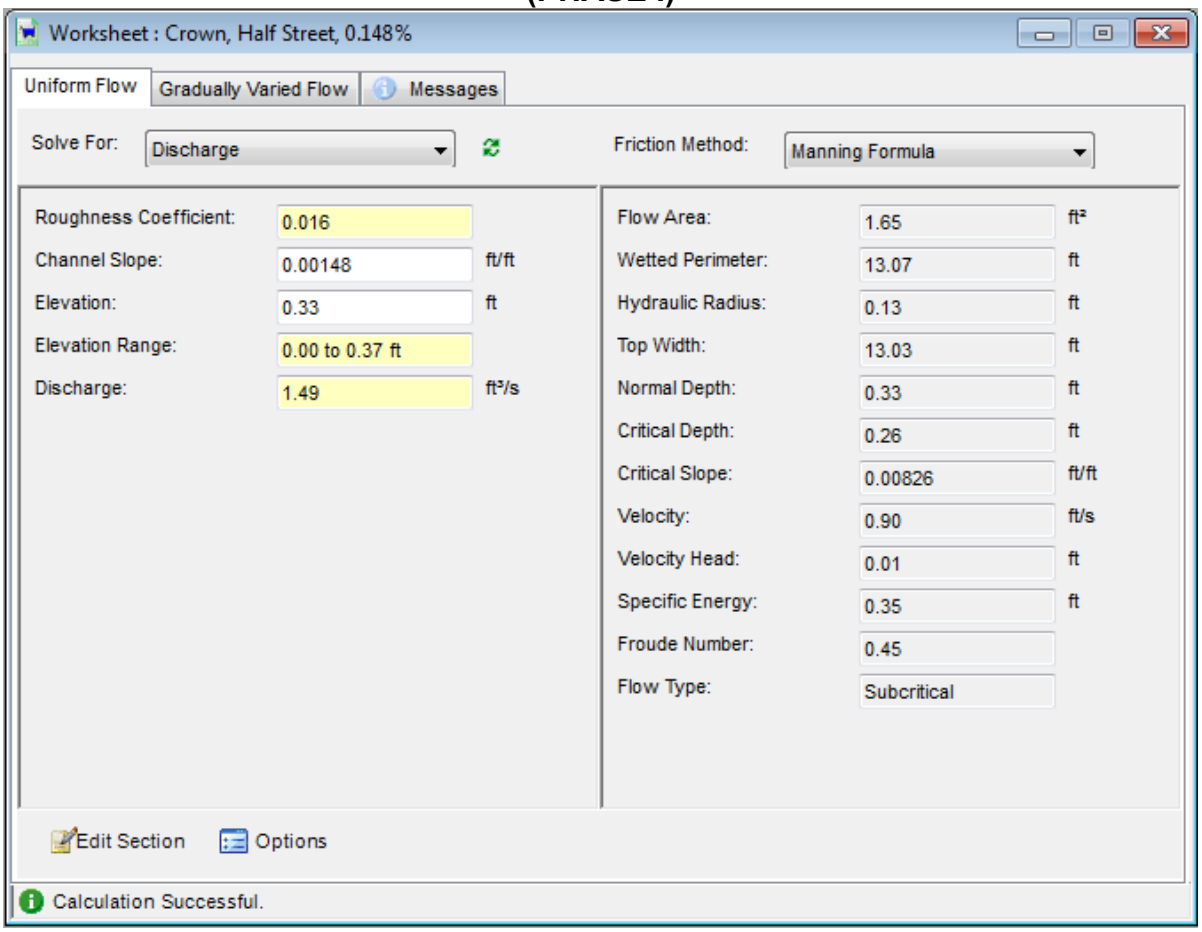
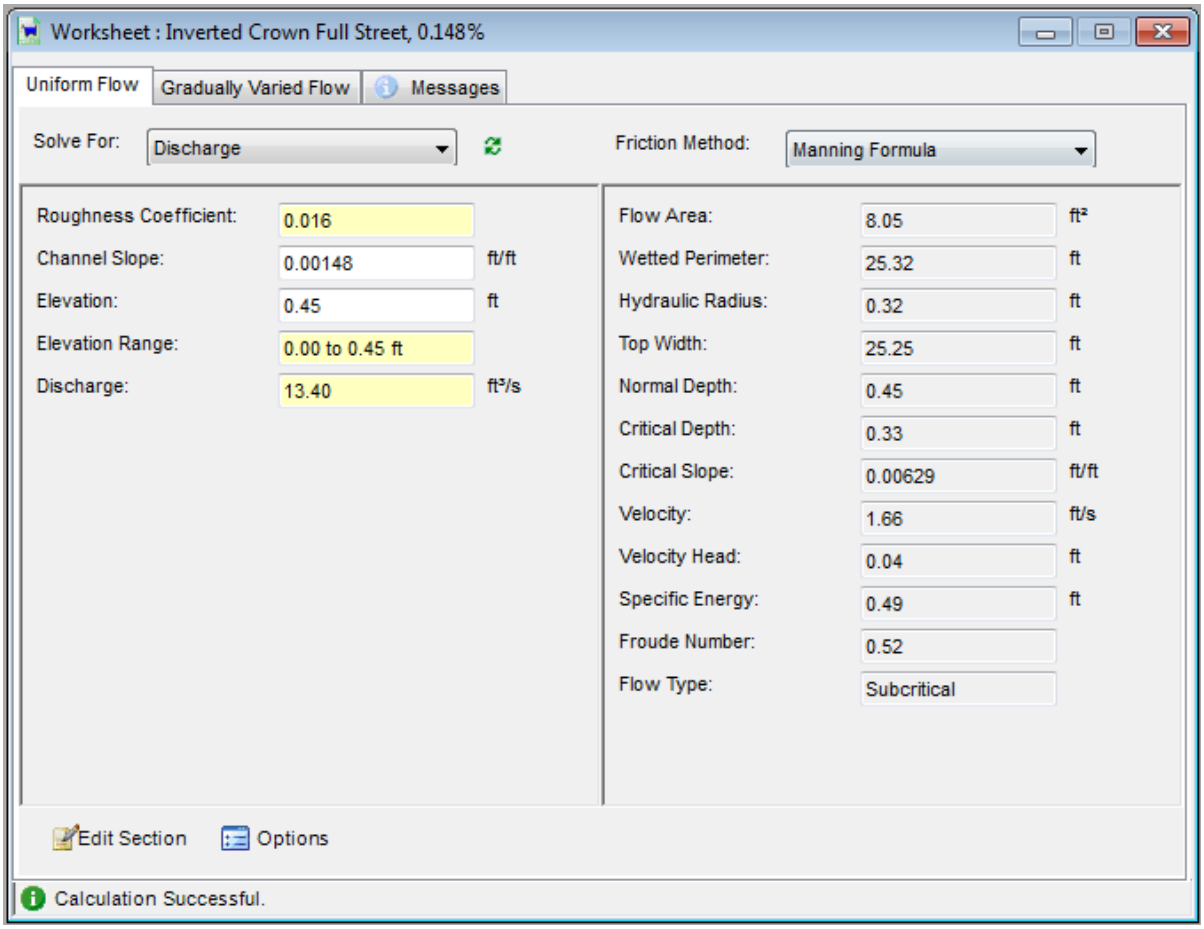
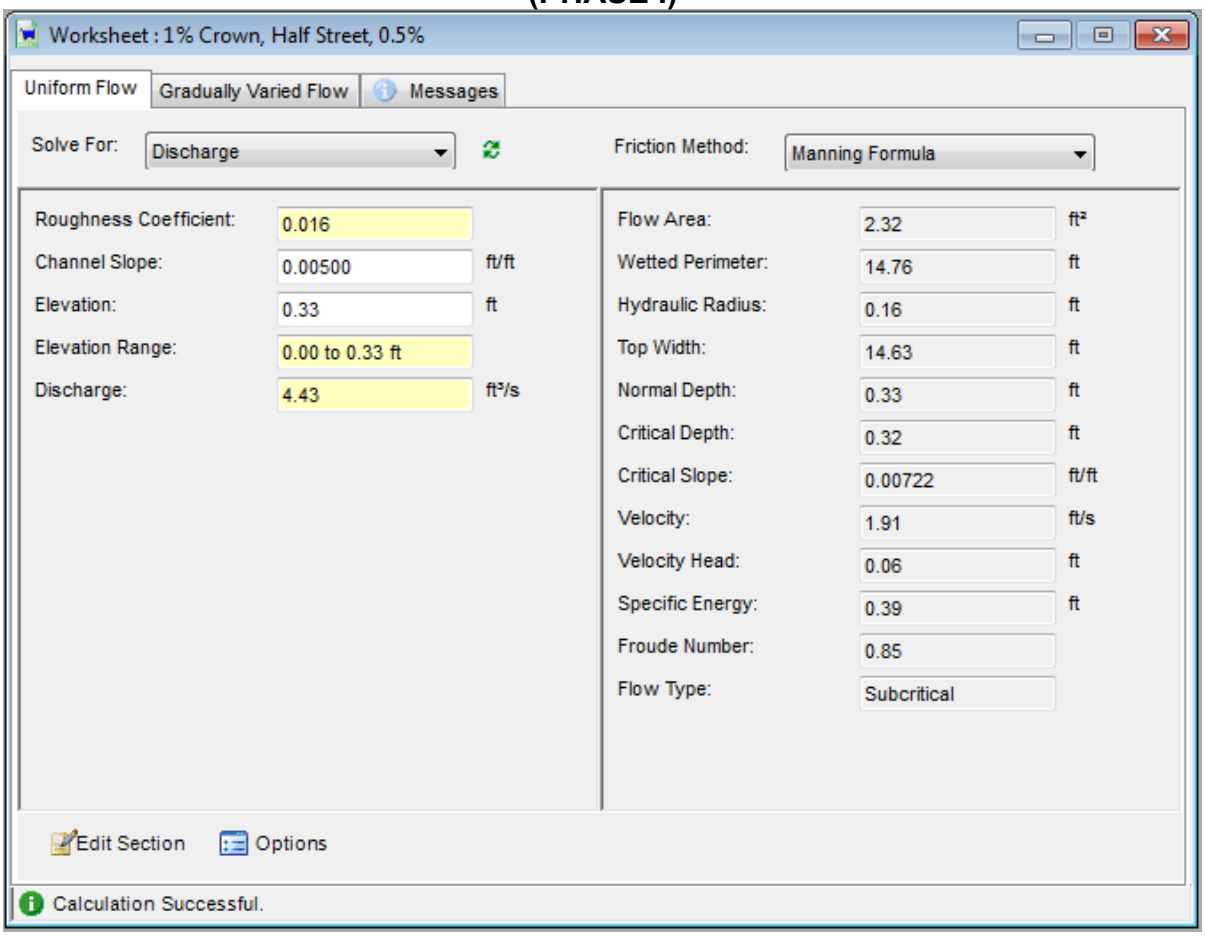
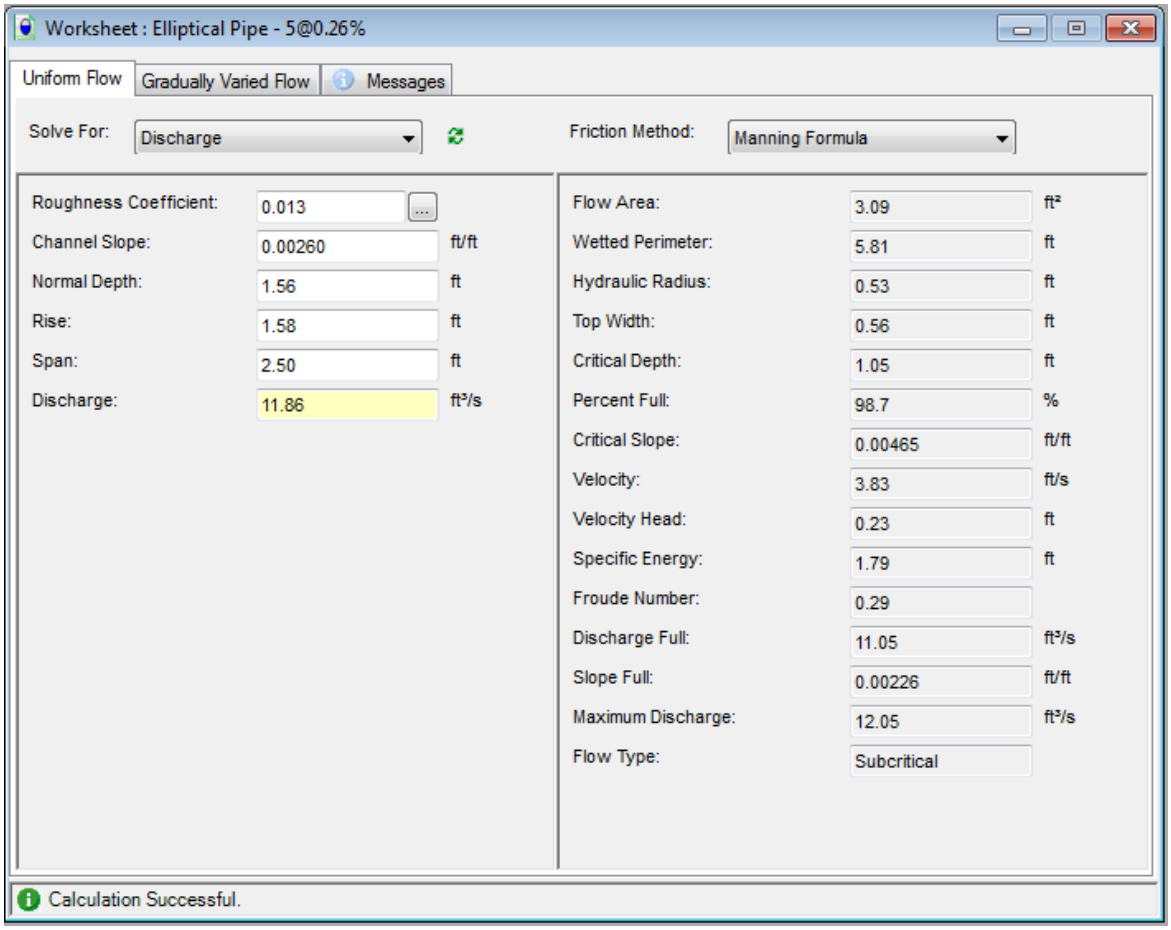
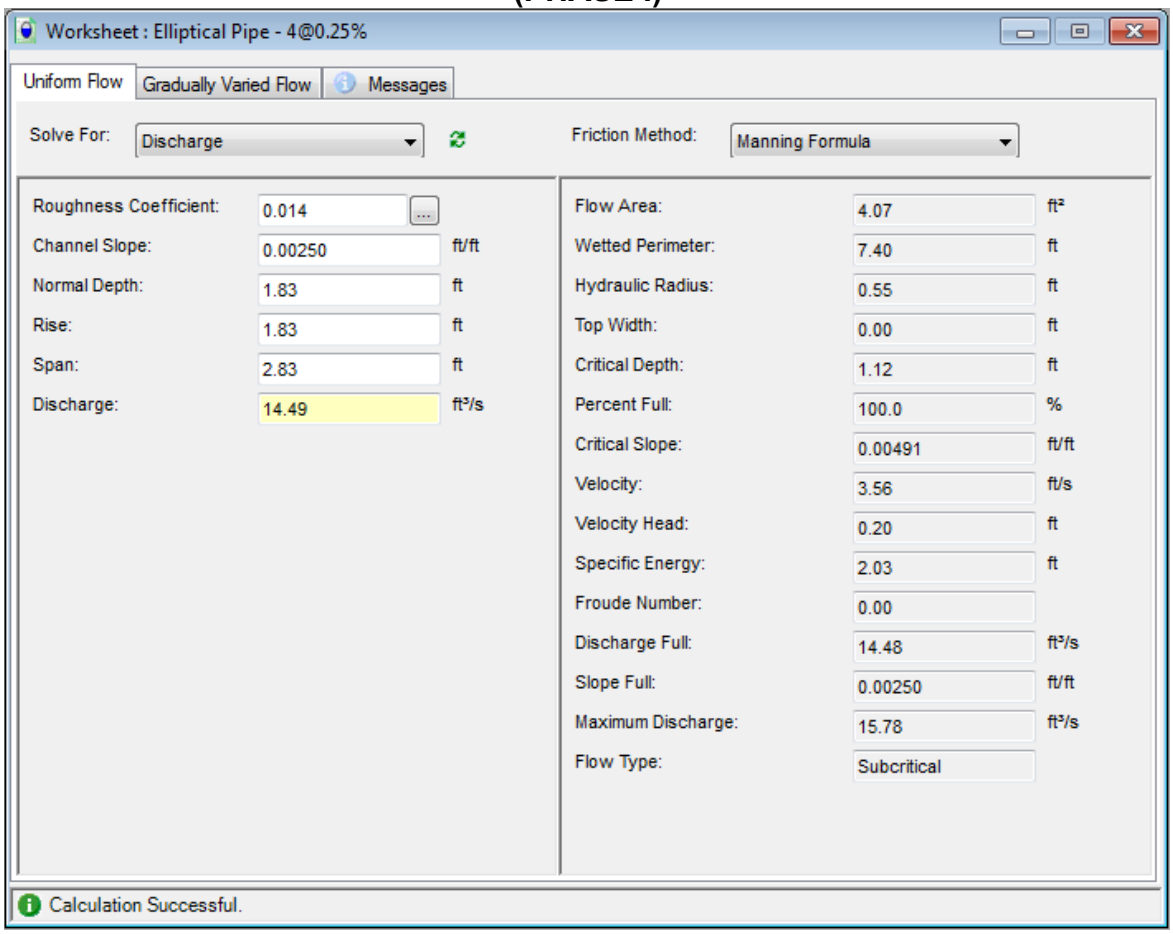
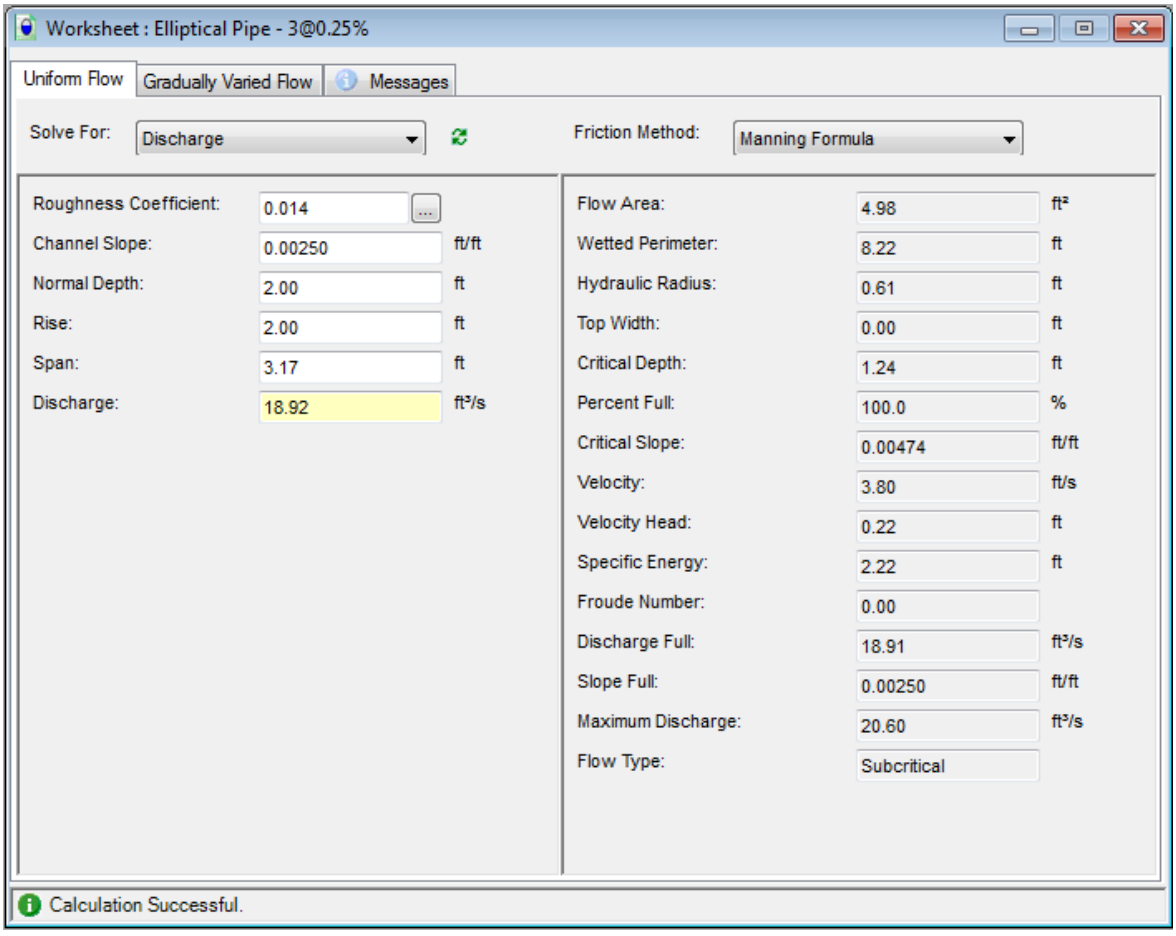

Worksheet : Crown, Half Street, 0.148%
Uniform Flow
Gradually Varied Flow
Messages
Solve For:
Discharge
Friction Method:
Manning Formula
Roughness Coefficient: 0.016
Channel Slope: 0.00148 ft/ft
Elevation: 0.33 ft
Elevation Range: 0.00 to 0.37 ft
Discharge: 1.49 ft³/s
Flow Area: 1.65 ft²
Wetted Perimeter: 13.07 ft
Hydraulic Radius: 0.13 ft
Top Width: 13.03 ft
Normal Depth: 0.33 ft
Critical Depth: 0.26 ft
Critical Slope: 0.00826 ft/ft
Velocity: 0.90 ft/s
Velocity Head: 0.01 ft
Specific Energy: 0.35 ft
Froude Number: 0.45
Flow Type: Subcritical
Edit Section
Options
Calculation Successful.

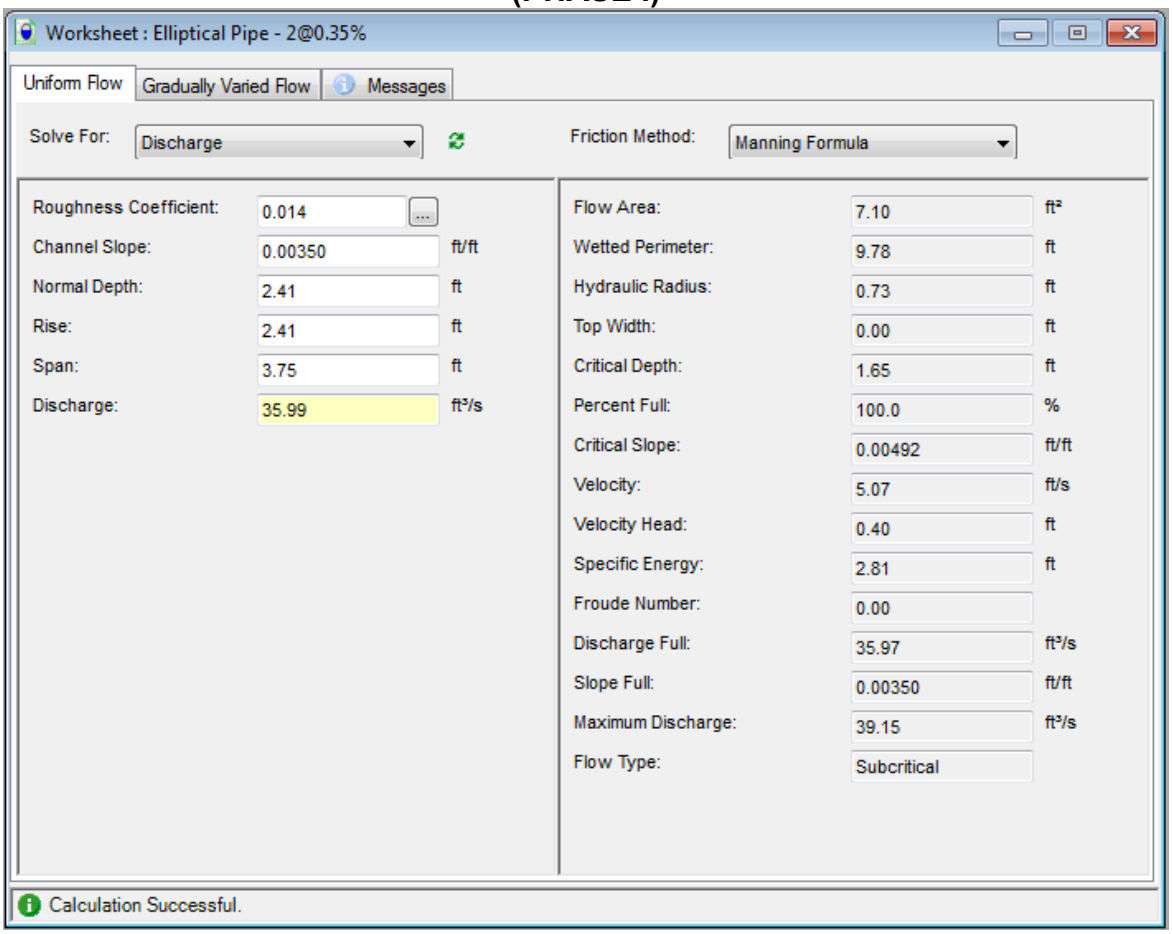

Worksheet : Inverted Crown Full Street, 0.148%
Uniform Flow
Gradually Varied Flow
Messages
Solve For:
Discharge
Friction Method:
Manning Formula
Roughness Coefficient: 0.016
Channel Slope: 0.00148 ft/ft
Elevation: 0.45 ft
Elevation Range: 0.00 to 0.45 ft
Discharge: 13.40 ft³/s
Flow Area: 8.05 ft²
Wetted Perimeter: 25.32 ft
Hydraulic Radius: 0.32 ft
Top Width: 25.25 ft
Normal Depth: 0.45 ft
Critical Depth: 0.33 ft
Critical Slope: 0.00629 ft/ft
Velocity: 1.66 ft/s
Velocity Head: 0.04 ft
Specific Energy: 0.49 ft
Froude Number: 0.52
Flow Type: Subcritical
Edit Section
Options
Calculation Successful.


Worksheet : 1% Crown, Half Street, 0.5%
Uniform Flow
Gradually Varied Flow
Messages
Solve For:
Discharge
Friction Method:
Manning Formula
Roughness Coefficient: 0.016
Channel Slope: 0.00500 ft/ft
Elevation: 0.33 ft
Elevation Range: 0.00 to 0.33 ft
Discharge: 4.43 ft³/s
Flow Area: 2.32 ft²
Wetted Perimeter: 14.76 ft
Hydraulic Radius: 0.16 ft
Top Width: 14.63 ft
Normal Depth: 0.33 ft
Critical Depth: 0.32 ft
Critical Slope: 0.00722 ft/ft
Velocity: 1.91 ft/s
Velocity Head: 0.06 ft
Specific Energy: 0.39 ft
Froude Number: 0.85
Flow Type: Subcritical
Edit Section
Options
Calculation Successful.


Worksheet : Elliptical Pipe - 5@0.26%
Uniform Flow
Gradually Varied Flow
Messages
Solve For:
Discharge
Friction Method:
Manning Formula
Roughness Coefficient: 0.013
Channel Slope: 0.00260 ft/ft
Normal Depth: 1.56 ft
Rise: 1.58 ft
Span: 2.50 ft
Discharge: 11.86 ft³/s
Flow Area: 3.09 ft²
Wetted Perimeter: 5.81 ft
Hydraulic Radius: 0.53 ft
Top Width: 0.56 ft
Critical Depth: 1.05 ft
Percent Full: 98.7 %
Critical Slope: 0.00465 ft/ft
Velocity: 3.83 ft/s
Velocity Head: 0.23 ft
Specific Energy: 1.79 ft
Froude Number: 0.29
Discharge Full: 11.05 ft³/s
Slope Full: 0.00226 ft/ft
Maximum Discharge: 12.05 ft³/s
Flow Type: Subcritical
Calculation Successful.


Worksheet : Elliptical Pipe - 4@0.25%
Uniform Flow
Gradually Varied Flow
Messages
Solve For: Discharge
Friction Method: Manning Formula
Roughness Coefficient: 0.014
Channel Slope: 0.00250 ft/ft
Normal Depth: 1.83 ft
Rise: 1.83 ft
Span: 2.83 ft
Discharge: 14.49 ft³/s
Flow Area: 4.07 ft²
Wetted Perimeter: 7.40 ft
Hydraulic Radius: 0.55 ft
Top Width: 0.00 ft
Critical Depth: 1.12 ft
Percent Full: 100.0 %
Critical Slope: 0.00491 ft/ft
Velocity: 3.56 ft/s
Velocity Head: 0.20 ft
Specific Energy: 2.03 ft
Froude Number: 0.00
Discharge Full: 14.48 ft³/s
Slope Full: 0.00250 ft/ft
Maximum Discharge: 15.78 ft³/s
Flow Type: Subcritical
Calculation Successful.


Worksheet : Elliptical Pipe - 3@0.25%
Uniform Flow
Gradually Varied Flow
Messages
Solve For: Discharge
Friction Method: Manning Formula
Roughness Coefficient: 0.014
Channel Slope: 0.00250 ft/ft
Normal Depth: 2.00 ft
Rise: 2.00 ft
Span: 3.17 ft
Discharge: 18.92 ft³/s
Flow Area: 4.98 ft²
Wetted Perimeter: 8.22 ft
Hydraulic Radius: 0.61 ft
Top Width: 0.00 ft
Critical Depth: 1.24 ft
Percent Full: 100.0 %
Critical Slope: 0.00474 ft/ft
Velocity: 3.80 ft/s
Velocity Head: 0.22 ft
Specific Energy: 2.22 ft
Froude Number: 0.00
Discharge Full: 18.91 ft³/s
Slope Full: 0.00250 ft/ft
Maximum Discharge: 20.60 ft³/s
Flow Type: Subcritical
Calculation Successful.



Worksheet : Elliptical Pipe - 2@0.35%

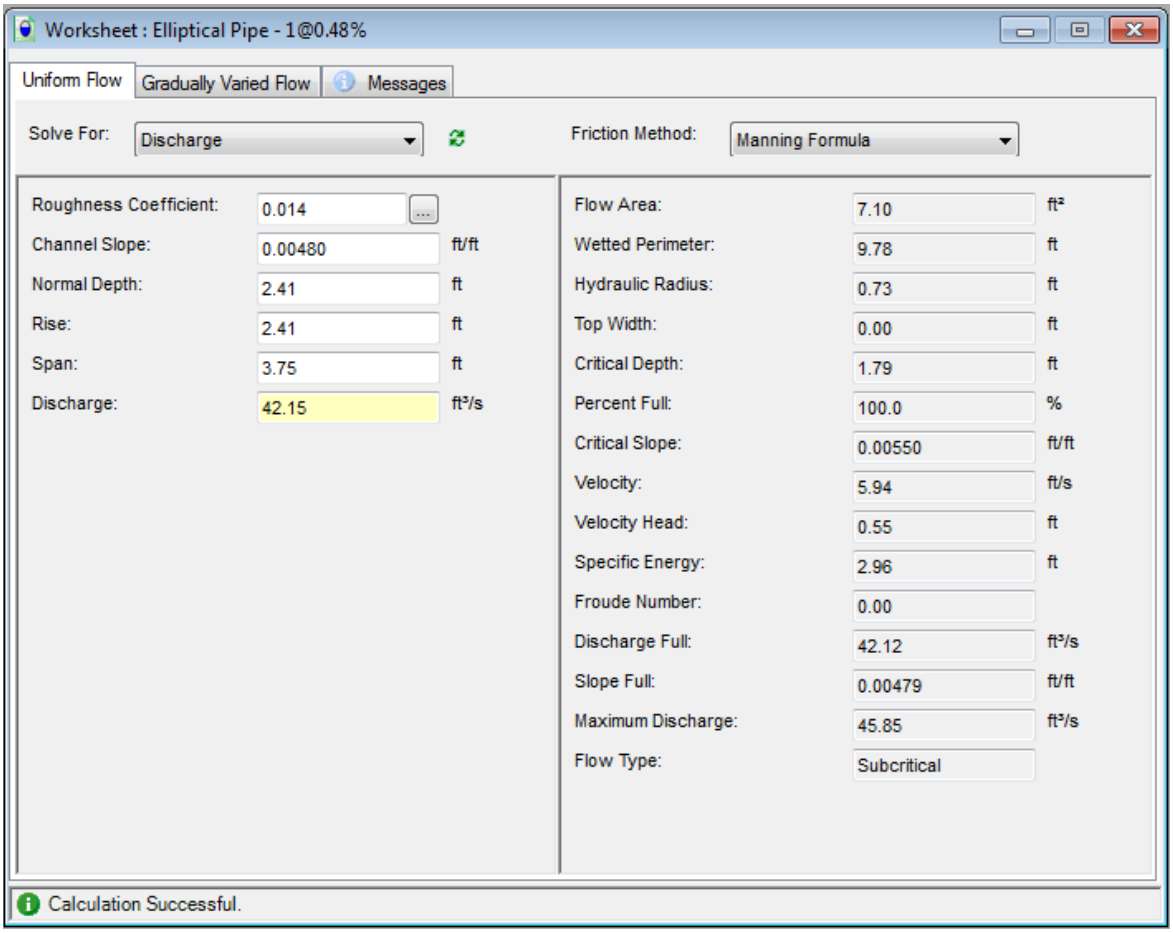
Uniform Flow | Gradually Varied Flow | Messages

Solve For: Discharge

Friction Method: Manning Formula

Roughness Coefficient:	0.014		Flow Area:	7.10	ft²
Channel Slope:	0.00350	ft/ft	Wetted Perimeter:	9.78	ft
Normal Depth:	2.41	ft	Hydraulic Radius:	0.73	ft
Rise:	2.41	ft	Top Width:	0.00	ft
Span:	3.75	ft	Critical Depth:	1.65	ft
Discharge:	35.99	ft³/s	Percent Full:	100.0	%
			Critical Slope:	0.00492	ft/ft
			Velocity:	5.07	ft/s
			Velocity Head:	0.40	ft
			Specific Energy:	2.81	ft
			Froude Number:	0.00	
			Discharge Full:	35.97	ft³/s
			Slope Full:	0.00350	ft/ft
			Maximum Discharge:	39.15	ft³/s
			Flow Type:	Subcritical	

Calculation Successful.



Worksheet : Elliptical Pipe - 1@0.48%

Uniform Flow | Gradually Varied Flow | Messages

Solve For: Discharge

Friction Method: Manning Formula

Roughness Coefficient:	0.014		Flow Area:	7.10	ft²
Channel Slope:	0.00480	ft/ft	Wetted Perimeter:	9.78	ft
Normal Depth:	2.41	ft	Hydraulic Radius:	0.73	ft
Rise:	2.41	ft	Top Width:	0.00	ft
Span:	3.75	ft	Critical Depth:	1.79	ft
Discharge:	42.15	ft³/s	Percent Full:	100.0	%
			Critical Slope:	0.00550	ft/ft
			Velocity:	5.94	ft/s
			Velocity Head:	0.55	ft
			Specific Energy:	2.96	ft
			Froude Number:	0.00	
			Discharge Full:	42.12	ft³/s
			Slope Full:	0.00479	ft/ft
			Maximum Discharge:	45.85	ft³/s
			Flow Type:	Subcritical	

Calculation Successful.

APPENDIX E: ENGINEER'S ESTIMATE

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APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

This appendix contains four conceptual plan level engineer's estimates including a 20% contingency and NMGRT:

Complete Project Cost*	$702,611.85
Complete Project Cost for ABCWUA	$76,601.24
County Portion of Cost*	$387,817.88
County Portion of Cost for ABCWUA	$41,448.80
County Portion without ABCWUA	$346,369.08

* Includes ABCWUA cost

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

CONCEPTUAL DESIGN - ENGINEERS ESTIMATE -COMPLETE PROJECT

USES TLC BID LOT ITEMS AND VALUES WHERE APPLICABLE (THESE VALUES ARE DESIGNATED BY BID LOT NUMBERS WITHOUT DECIMALS)
ADDITIONAL ITEMS FROM RECENT BID TABS OR COA CIVIL ENGINEERS ESTIMATED UNIT PRICES FOR CONTRACT ITEMS, 2009

BID LOT 1

BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
6.050, 6.060	MOBILIZATION AND DEMOBILIZATION, 7%	LUMP	1	$ 35,915.00	$ 35,915.00
630.010	NPDES COMPLIANCE PERMITTING/SWPPP	LUMP	1	8000	$ 8,000.00
3	Construction Staking	HR	80	$ 150.00	$ 12,000.00
4	Site Density Testing or Material Sample Collection	HR	20	$ 100.00	$ 2,000.00
5	Laboratory Evaluation of Material Sample	UNIT	10	$ 750.00	$ 7,500.00
17	Export excess material	CY	400	$ 8.00	$ 3,200.00
28	Grading of areas to be paved, less than 2' excavation., no import or export of material. Complete in place, per SY (for quantities more than 3,000 SY per site.) INCLUDES AREAS NOT TO BE PAVED	SY	6420	$ 2.50	$ 16,050.00
33	Subgrade Preparation for Arterial, Collector, Residential roadways, 12" at 95% per ASTM D-1557, County Ordinances, and County Street Standards. Complete in place, per SY.	SY	5420	$ 1.00	$ 5,420.00
54	3” B Res. w/PG 70-22, Machine laydown CIP	SY	4500	$ 14.00	$ 63,000.00
68	Tack Coat	TON	1.5	$ 900.00	$ 1,350.00
87	Sawcut, Remove & Dispose Existing Asphalt 3.5" to 6" thickness, over 100sy	SY	4500	$ 3.00	$ 13,500.00
91	PCC Curb and gutter, all types in place in accordance with Bernalillo County Street Standards.	LF	3400	$ 30.00	$ 102,000.00
102	Adjust Existing Water Valve Box and Stem to Grade in accordance with City of Albuquerque requirements Dwgs 2330-2332. Complete in place, per EA.	EA	4	$ 400.00	$ 1,600.00
109	Adjust Existing Sewer Manhole Frame and Cover to Grade, to maximum allowable with adjusting rings and blocks. Complete in place, per EA.	EA	7	$ 550.00	$ 3,850.00
125	Speed Humps are to be bid per each, complete in place, in accordance with the latest Bernalillo County Speed Hump Design Standards. Unit bid price shall include all materials and labor for completed speed humps including speed hump ahead warning sign at the start of each new block, two delineators installed per Bernalillo County Traffic Engineering and associated thermoplastic pavement markings at each hump. See drawings attached at the end of this section.	EA	2	$ 1,800.00	$ 3,600.00
144	Traffic control per week (7days). Residential Road Classification, Through Streets. (20 lighted devices or less) Must comply with the most current edition of the Manual on Uniform Traffic Control Devices	WK	14	$ 600.00	$ 8,400.00
154	Flagmen, 2, for flagging operation for any traffic control set up, including two-way communication devices and signs for flagging operation complete per MUTCD.	DAY	10	$ 585.00	$ 5,850.00
233	Rip Rap wire enclosed 8 to 4 VL per COA specifications	CY	7	$ 250.00	$ 1,750.00

SUBTOTAL BID LOT 1 $ 294,985.00

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

BID LOT 2 BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
710.XXX	18" STEEL CARRIER PIPE AND APPURTENANCES, COMPL.	LF	25	$ 130.00	$ 3,250.00
801.007	16” PVC C-900 WTRLINE	LF	50	$ 71.00	$ 3,550.00
801.158	JOINT RESTRAINING HARNESS, DI & PVC PUSH ON BELLS, 14" - 24", CIP	EA	10	$ 650.00	
8	REM & DISP WATERLINE	LF	50	$ 3.50	$ 175.00
801.XXX	16" 45 DEGREE BEND, CIP	EA	4	$ 450.00	$ 1,800.00
802.300	3/4" SERVICE LINE REPLACEMENT & TRANSFER, INCL. TAPPING SADDLE & TUBING, CIP. SD 2362	EA	23	$ 755.00	$ 17,365.00
51	REM & DISP 4”-12” SAS	LF	560	$ 2.00	$ 1,120.00
905.030	4" SEWER SERVICE RISER, INCL. PLASTIC PIPE W/CASING, SADDLE & CONN, CIP, SD 2135	LF	20	$ 7.80	$ 156.00
905.200	RECONNECT EXISTING 4" SEWER SERVICE LINE TO REPLACEMENT MAIN, INCL. FIRST 5' OF NEW SERVICE LINE, CIP. SD 2134	EA	28	$ 944.00	$ 26,432.00
56	24” RCP CL III **(EQUIVALENT)**	LF	103	$ 37.00	$ 3,811.00
XXX.XXX	27 "RCP CL III **(EQUIVALENT)**	LF	190	$ 45.00	$ 8,550.00
57	30” RCP CL III **(EQUIVALENT)**	LF	411	$ 45.00	$ 18,495.00
58	36” RCP CL III **(EQUIVALENT)**	LF	748	$ 63.00	$ 47,124.00
67	CTH BSN D SGL 0-8'	EA	3	$ 1,600.00	$ 4,800.00
68	CTH BSN D DBL 0-8'	EA	8	$ 4,100.00	$ 32,800.00
70	TRCHG BF 16-36” 0’-8’	LF	293	$ 21.00	$ 6,153.00
72	TRCHG BF 42-48” 0’-8’	LF	1158	$ 26.00	$ 30,108.00
77	6’ DIA MH 0’-6’	EA	5	$ 3,100.00	$ 15,500.00
920.210	MANHOLE, 8' DIA, TYPE C OR E, 6' TO 10' DEEP, CIP. SD2101	EA	3	$ 10,771.00	$ 32,313.00

SUBTOTAL BID LOT 2	$ 253,502.00
SUBTOAL BID LOTS 1 AND 2	$ 548,487.00
CONTINGENCY @ 20%	$ 109,697.40
SUBTOTAL BID LOTS AND CONTINGENCY	$ 658,184.40
NMGRT @ 6.75%	$ 44,427.45
TOTAL ENGINEERS ESTIMATE	$ 702,611.85

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY
(PHASE I)
CONCEPTUAL DESIGN - ENGINEERS ESTIMATE -COMPLETE PROJECT for ABCWUA

USES TLC BID LOT ITEMS AND VALUES WHERE APPLICABLE (THESE VALUES ARE DESIGNATED BY BID LOT NUMBERS WITHOUT DECIMALS)
ADDITIONAL ITEMS FROM RECENT BID TABS OR COA CIVIL ENGINEERS ESTIMATED UNIT PRICES FOR CONTRACT ITEMS, 2009

BID LOT 1

BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
4	Site Density Testing or Material Sample Collection	HR	5	$ 100.00	$ 500.00
102	Adjust Existing Water Valve Box and Stem to Grade in accordance with City of Albuquerque requirements Dwgs 2330-2332. Complete in place, per EA.	EA	4	$ 400.00	$ 1,600.00
109	Adjust Existing Sewer Manhole Frame and Cover to Grade, to maximum allowable with adjusting rings and blocks. Complete in place, per EA.	EA	7	$ 550.00	$ 3,850.00

SUBTOTAL BID LOT 1 $ 5,950.00

BID LOT 2 BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
710.XXX	18" STEEL CARRIER PIPE AND APPURTENANCES, COMPL.	LF	25	$ 130.00	$ 3,250.00
801.007	16” PVC C-900 WTRLINE	LF	50	$ 71.00	$ 3,550.00
801.158	JOINT RESTRAINING HARNESS, DI & PVC PUSH ON BELLS, 14" - 24", CIP	EA	10	$ 650.00	
8	REM & DISP WATERLINE	LF	50	$ 3.50	$ 175.00
801.XXX	16" 45 DEGREE BEND, CIP	EA	4	$ 450.00	$ 1,800.00
802.300	3/4" SERVICE LINE REPLACEMENT & TRANSFER, INCL. TAPPING SADDLE & TUBING, CIP. SD 2362	EA	23	$ 755.00	$ 17,365.00
51	REM & DISP 4”-12” SAS	LF	560	$ 2.00	$ 1,120.00
905.030	4" SEWER SERVICE RISER, INCL. PLASTIC PIPE W/CASING, SADDLE & CONN, CIP, SD 2135	LF	20	$ 7.80	$ 156.00
905.200	RECONNECT EXISTING 4" SEWER SERVICE LINE TO REPLACEMENT MAIN, INCL. FIRST 5' OF NEW SERVICE LINE, CIP. SD 2134	EA	28	$ 944.00	$ 26,432.00

SUBTOTAL BID LOT 2	$	53,848.00
SUBTOAL BID LOTS 1 AND 2	$	59,798.00
CONTINGENCY @ 20%	$	11,959.60
SUBTOTAL BID LOTS AND CONTINGENCY	$	71,757.60
NMGRT @ 6.75%	$	4,843.64
TOTAL ENGINEERS ESTIMATE	$	76,601.24

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

CONCEPTUAL DESIGN - ENGINEERS ESTIMATE -BERNALILLO COUNTY PORTION

USES TLC BID LOT ITEMS AND VALUES WHERE APPLICABLE (THESE VALUES ARE DESIGNATED BY BID LOT NUMBERS WITHOUT DECIMALS)
ADDITIONAL ITEMS FROM RECENT BID TABS OR COA CIVIL ENGINEERS ESTIMATED UNIT PRICES FOR CONTRACT ITEMS, 2009

BID LOT 1

BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
6.050, 6.060	MOBILIZATION AND DEMOBILIZATION, 7%	LUMP	1	$ 19,806.00	$ 19,806.00
630.010	NPDES COMPLIANCE PERMITTING/SWPPP	LUMP	1	8000	$ 3,440.00
3	Construction Staking	HR	34.4	$ 150.00	$ 5,160.00
4	Site Density Testing or Material Sample Collection	HR	8.6	$ 100.00	$ 860.00
5	Laboratory Evaluation of Material Sample	UNIT	4.3	$ 750.00	$ 3,225.00
17	Export excess material	CY	172	$ 8.00	$ 1,376.00
28	Grading of areas to be paved, less than 2' excavation., no import or export of material. Complete in place, per SY (for quantities more than 3,000 SY per site.) INCLUDES AREAS NOT TO BE PAVED	SY	2760.6	$ 2.50	$ 6,901.50
33	Subgrade Preparation for Arterial, Collector, Residential roadways, 12" at 95% per ASTM D-1557, County Ordinances, and County Street Standards. Complete in place, per SY.	SY	2330.6	$ 1.00	$ 2,330.60
54	3” B Res. w/PG 70-22, Machine laydown CIP	SY	1935	$ 14.00	$ 27,090.00
68	Tack Coat	TON	0.645	$ 900.00	$ 580.50
87	Sawcut, Remove & Dispose Existing Asphalt 3.5" to 6" thickness, over 100sy	SY	1935	$ 3.00	$ 5,805.00
91	PCC Curb and gutter, all types in place in accordance with Bernalillo County Street Standards.	LF	1462	$ 30.00	$ 43,860.00
102	Adjust Existing Water Valve Box and Stem to Grade in accordance with City of Albuquerque requirements Dwgs 2330-2332. Complete in place, per EA.	EA	4	$ 400.00	$ 1,600.00
109	Adjust Existing Sewer Manhole Frame and Cover to Grade, to maximum allowable with adjusting rings and blocks. Complete in place, per EA.	EA	3	$ 550.00	$ 1,650.00
125	Speed Humps are to be bid per each, complete in place, in accordance with the latest Bernalillo County Speed Hump Design Standards. Unit bid price shall include all materials and labor for completed speed humps including speed hump ahead warning sign at the start of each new block, two delineators installed per Bernalillo County Traffic Engineering and associated thermoplastic pavement markings at each hump. See drawings attached at the end of this section.	EA	2	$ 1,800.00	$ 3,600.00
144	Traffic control per week (7days). Residential Road Classification, Through Streets. (20 lighted devices or less) Must comply with the most current edition of the Manual on Uniform Traffic Control	WK	6	$ 600.00	$ 3,600.00
154	Flagmen, 2, for flagging operation for any traffic control set up, including two-way communication devices and signs for flagging operation complete per MUTCD.	DAY	4	$ 585.00	$ 2,340.00
233	Rip Rap wire enclosed 8 to 4 VL per COA specifications	CY	7	$ 250.00	$ 1,750.00

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

BID LOT 2 BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
710.XXX	18" STEEL CARRIER PIPE AND APPURTENANCES, COMPL.	LF	25	$ 130.00	$ 3,250.00
801.007	16” PVC C-900 WTRLINE	LF	50	$ 71.00	$ 3,550.00
801.158	JOINT RESTRAINING HARNESS, DI & PVC PUSH ON BELLS, 14" - 24", CIP	EA	10	$ 650.00	
8	REM & DISP WATERLINE	LF	50	$ 3.50	$ 175.00
801.XXX	16" 45 DEGREE BEND, CIP	EA	4	$ 450.00	$ 1,800.00
802.300	3/4" SERVICE LINE REPLACEMENT & TRANSFER, INCL. TAPPING SADDLE & TUBING, CIP. SD 2362	EA	12	$ 755.00	$ 9,060.00
51	REM & DISP 4”-12” SAS	LF	240.8	$ 2.00	$ 481.60
905.030	4" SEWER SERVICE RISER, INCL. PLASTIC PIPE W/CASING, SADDLE & CONN, CIP, SD 2135	LF	20	$ 7.80	$ 156.00
905.200	RECONNECT EXISTING 4" SEWER SERVICE LINE TO REPLACEMENT MAIN, INCL. FIRST 5' OF NEW SERVICE LINE, CIP. SD 2134	EA	11	$ 944.00	$ 10,384.00
56	24” RCP CL III **(EQUIVALENT)**	LF	0	$ 37.00	$ -
XXX.XXX	27 "RCP CL III **(EQUIVALENT)**	LF	0	$ 45.00	$ -
57	30” RCP CL III **(EQUIVALENT)**	LF	130	$ 45.00	$ 5,850.00
58	36” RCP CL III **(EQUIVALENT)**	LF	748	$ 63.00	$ 47,124.00
67	CTH BSN D SGL 0-8'	EA	0	$ 1,600.00	$ -
68	CTH BSN D DBL 0-8'	EA	6	$ 4,100.00	$ 24,600.00
70	TRCHG BF 16-36” 0’-8’	LF	0	$ 21.00	$ -
72	TRCHG BF 42-48” 0’-8’	LF	878	$ 26.00	$ 22,828.00
77	6’ DIA MH 0’-6’	EA	2	$ 3,100.00	$ 6,200.00
920.210	MANHOLE, 8' DIA, TYPE C OR E, 6' TO 10' DEEP, CIP. SD2101	EA	3	$ 10,771.00	$ 32,313.00

SUBTOTAL BID LOT 2	$	167,771.60
SUBTOAL BID LOTS 1 AND 2	$	302,746.20
CONTINGENCY @ 20%	$	60,549.24
SUBTOTAL BID LOTS AND CONTINGENCY	$	363,295.44
NMGRT @ 6.75%	$	24,522.44
TOTAL ENGINEERS ESTIMATE	$	387,817.88

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY
(PHASE I)
CONCEPTUAL DESIGN - ENGINEERS ESTIMATE -BERNALILLO COUNTY PORTION OF ABCWUA

USES TLC BID LOT ITEMS AND VALUES WHERE APPLICABLE (THESE VALUES ARE DESIGNATED BY BID LOT NUMBERS WITHOUT DECIMALS)
ADDITIONAL ITEMS FROM RECENT BID TABS OR COA CIVIL ENGINEERS ESTIMATED UNIT PRICES FOR CONTRACT ITEMS, 2009

BID LOT 1

BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
4	Site Density Testing or Material Sample Collection	HR	2.5	$ 100.00	$ 250.00
102	Adjust Existing Water Valve Box and Stem to Grade in accordance with City of Albuquerque requirements Dwgs 2330-2332. Complete in place, per EA.	EA	4	$ 400.00	$ 1,600.00
109	Adjust Existing Sewer Manhole Frame and Cover to Grade, to maximum allowable with adjusting rings and blocks. Complete in place, per EA.	EA	3	$ 550.00	$ 1,650.00

SUBTOTAL BID LOT 1 $ 3,500.00

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

BID LOT 2 BID LOT ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL AMOUNT
710.XXX	18" STEEL CARRIER PIPE AND APPURTENANCES, COMPL.	LF	25	$ 130.00	$ 3,250.00
801.007	16” PVC C-900 WTRLINE	LF	50	$ 71.00	$ 3,550.00
801.158	JOINT RESTRAINING HARNESS, DI & PVC PUSH ON BELLS, 14" - 24", CIP	EA	10	$ 650.00	
8	REM & DISP WATERLINE	LF	50	$ 3.50	$ 175.00
801.XXX	16" 45 DEGREE BEND, CIP	EA	4	$ 450.00	$ 1,800.00
802.300	3/4" SERVICE LINE REPLACEMENT & TRANSFER, INCL. TAPPING SADDLE & TUBING, CIP. SD 2362	EA	12	$ 755.00	$ 9,060.00
51	REM & DISP 4”-12” SAS	LF	240.8	$ 2.00	$ 481.60
905.030	4" SEWER SERVICE RISER, INCL. PLASTIC PIPE W/CASING, SADDLE & CONN, CIP, SD 2135	LF	20	$ 7.80	$ 156.00
905.200	RECONNECT EXISTING 4" SEWER SERVICE LINE TO REPLACEMENT MAIN, INCL. FIRST 5' OF NEW SERVICE LINE, CIP. SD 2134	EA	11	$ 944.00	$ 10,384.00

SUBTOTAL BID LOT 2	$	28,856.60
SUBTOAL BID LOTS 1 AND 2	$	32,356.60
CONTINGENCY @ 20%	$	6,471.32
SUBTOTAL BID LOTS AND CONTINGENCY	$	38,827.92
NMGRT @ 6.75%	$	2,620.88
TOTAL ENGINEERS ESTIMATE	$	41,448.80

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

EXHIBITS:

DRAINAGE BASIN MAP

OVERALL PLAN AND PROFILE

PLAN SET COVER SHEET

INDIVIDUAL PLAN AND PROFILE SHEETS

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Resource Technology, Inc.
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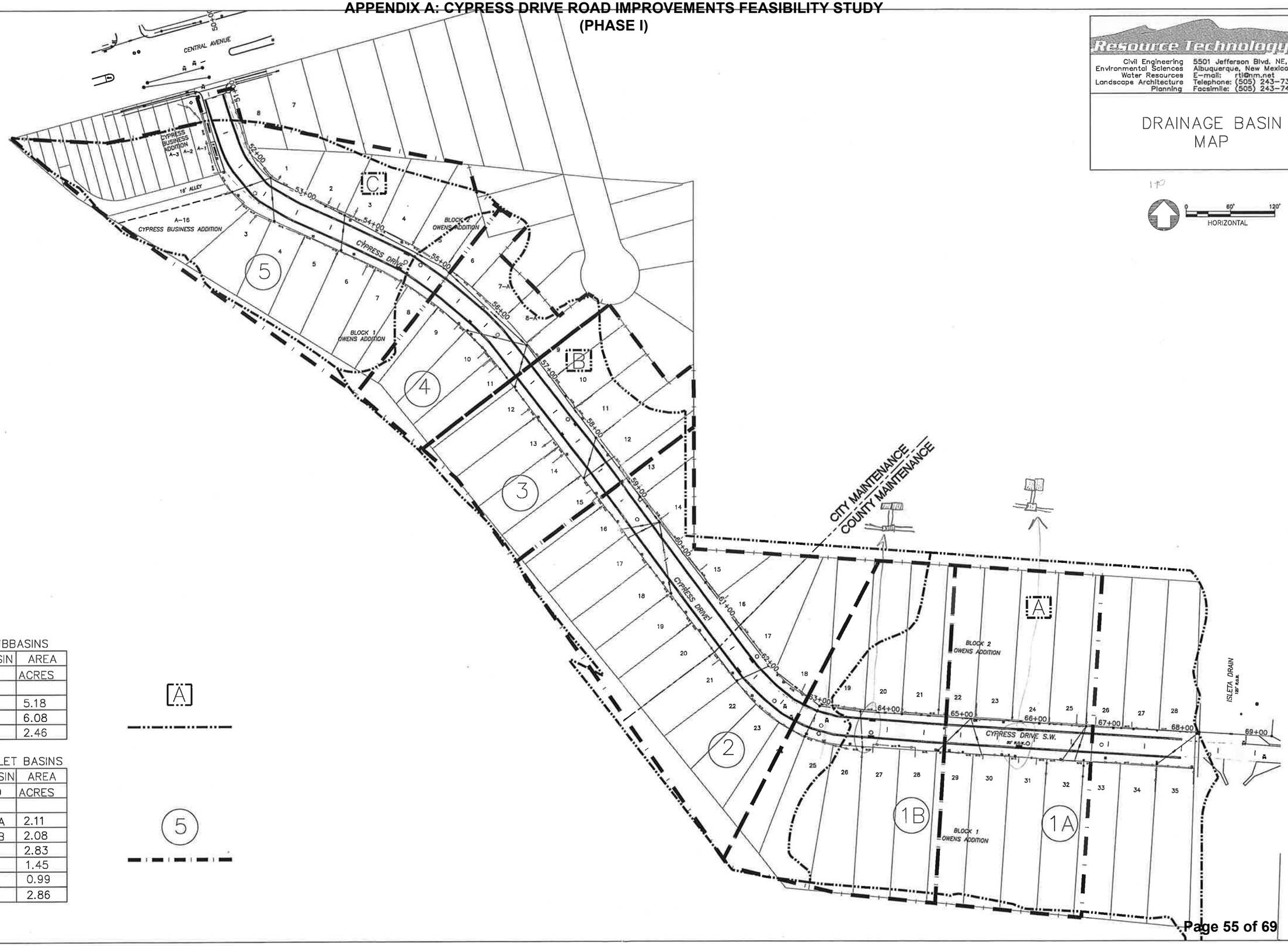
Facsimile: (505) 243-7400

DRAINAGE BASIN MAP

0 60' 120'
HORIZONTAL



SUBBASINS

BASIN ID	AREA ACRES
A	5.18
B	6.08
C	2.46

INLET BASINS

BASIN ID	AREA ACRES
1A	2.11
1B	2.08
2	2.83
3	1.45
4	0.99
5	2.86

[A] — SUBBASIN BOUNDARY

(5) — INLET BASIN BOUNDARY

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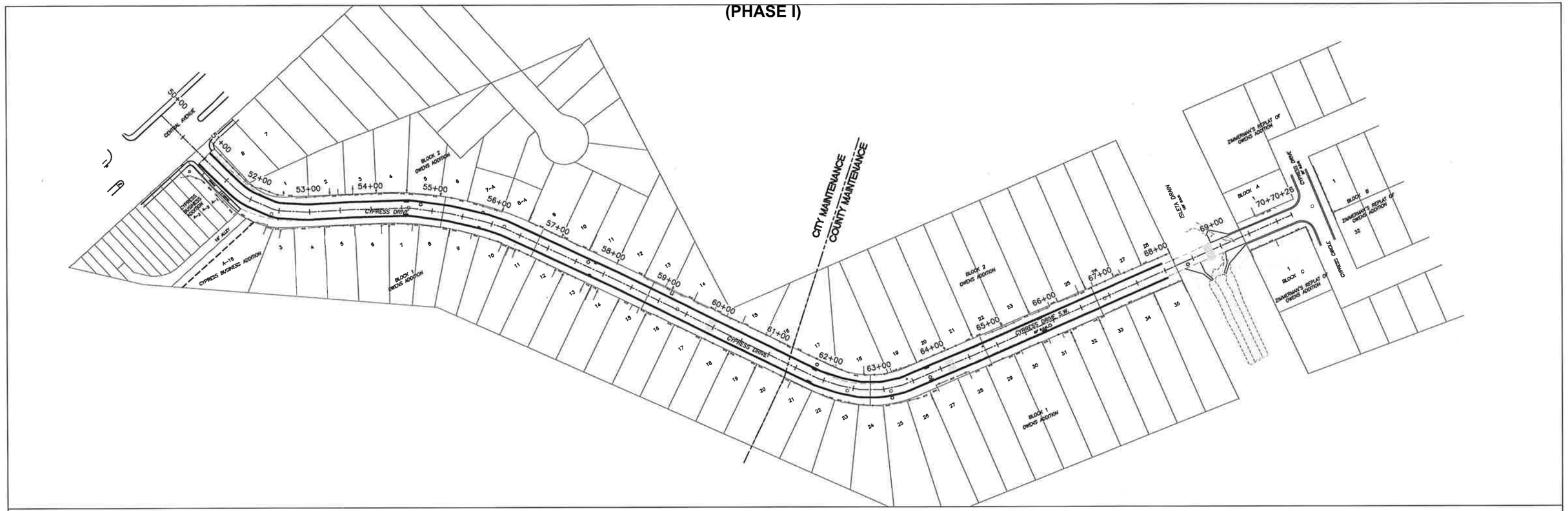
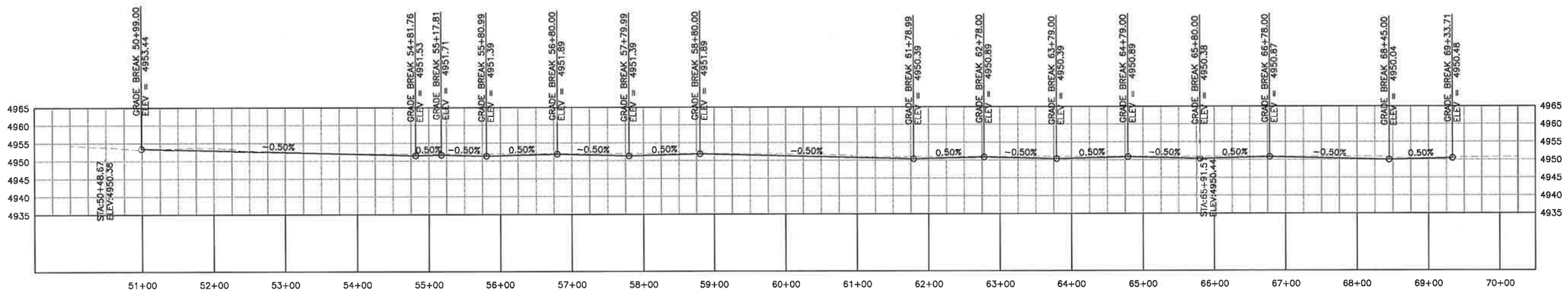
APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

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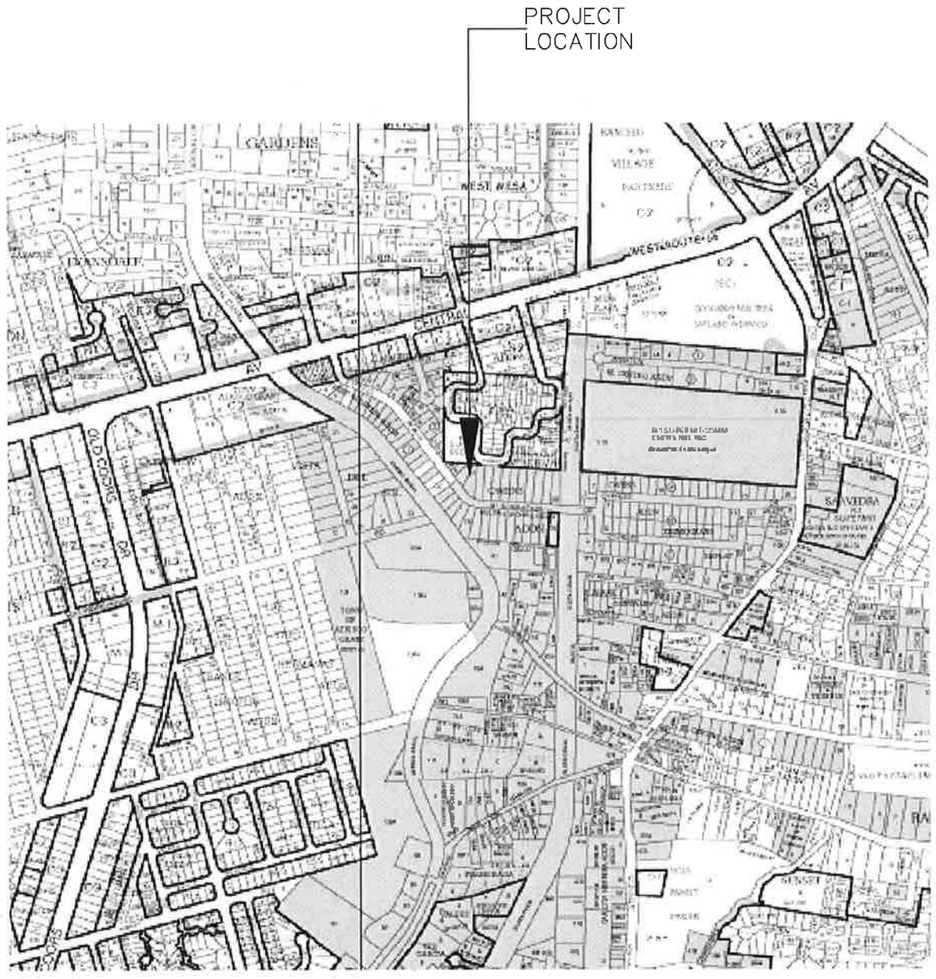
OVERALL PLAN AND PROFILE

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)

CYPRESS DRIVE STORM DRAIN

CONSTRUCTION PLANS
BERNALILLO COUNTY, NEW MEXICO



VICINITY MAP
NOT TO SCALE

BERNALILLO COUNTY
STATE OF NEW MEXICO

INDEX OF SHEETS

VERTICAL DATUM IS NAVD 88

Resource Technology, Inc.

REV.	SHEETS	CITY ENGINEER	DATE	USER DEPARTMENT	DATE	USER DEPARTMENT	DATE

ENGINEERS STAMP & SIGNATURE	APPROVALS	ENGINEER	DATE	APPROVED FOR CONSTRUCTION
				ENGINEER DATE
	COUNTY PROJECT NO. XXXXXX			SHEET 1 OF 9

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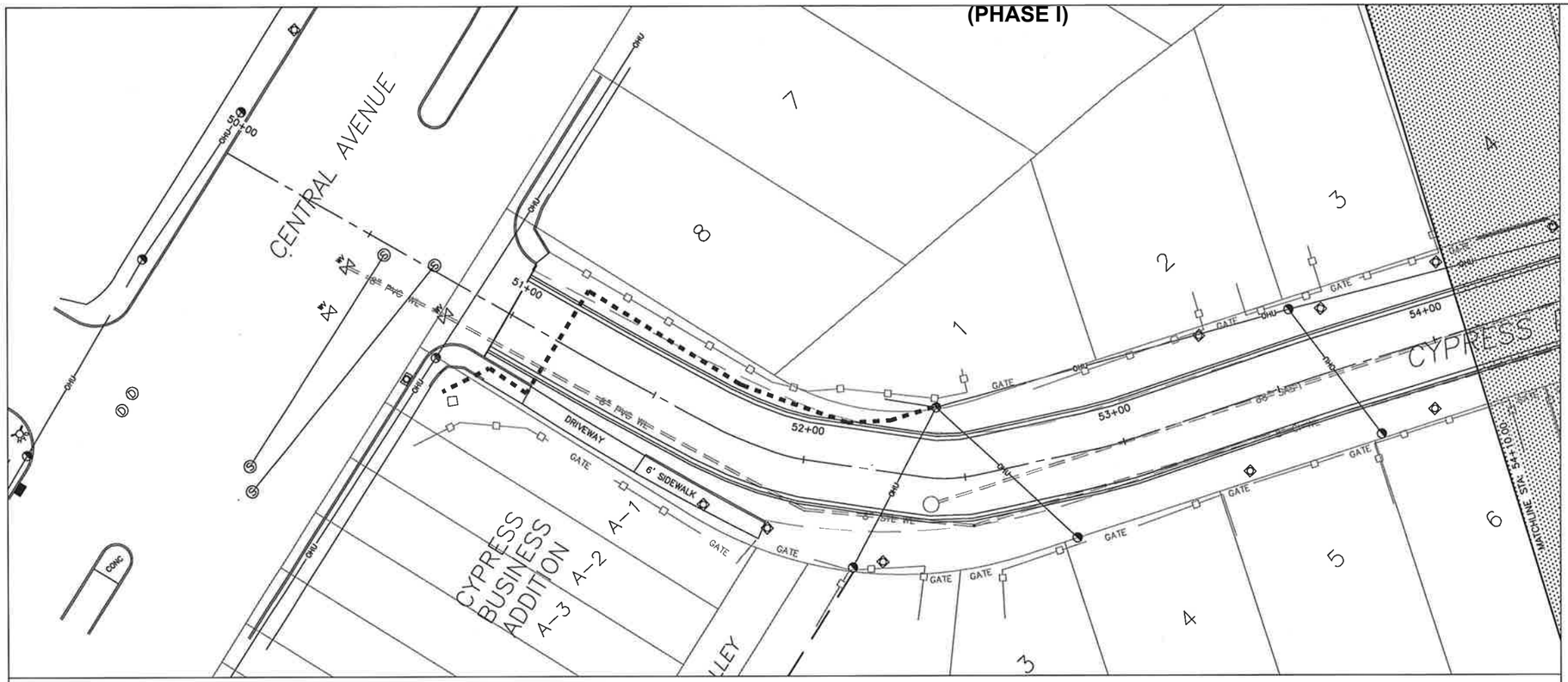
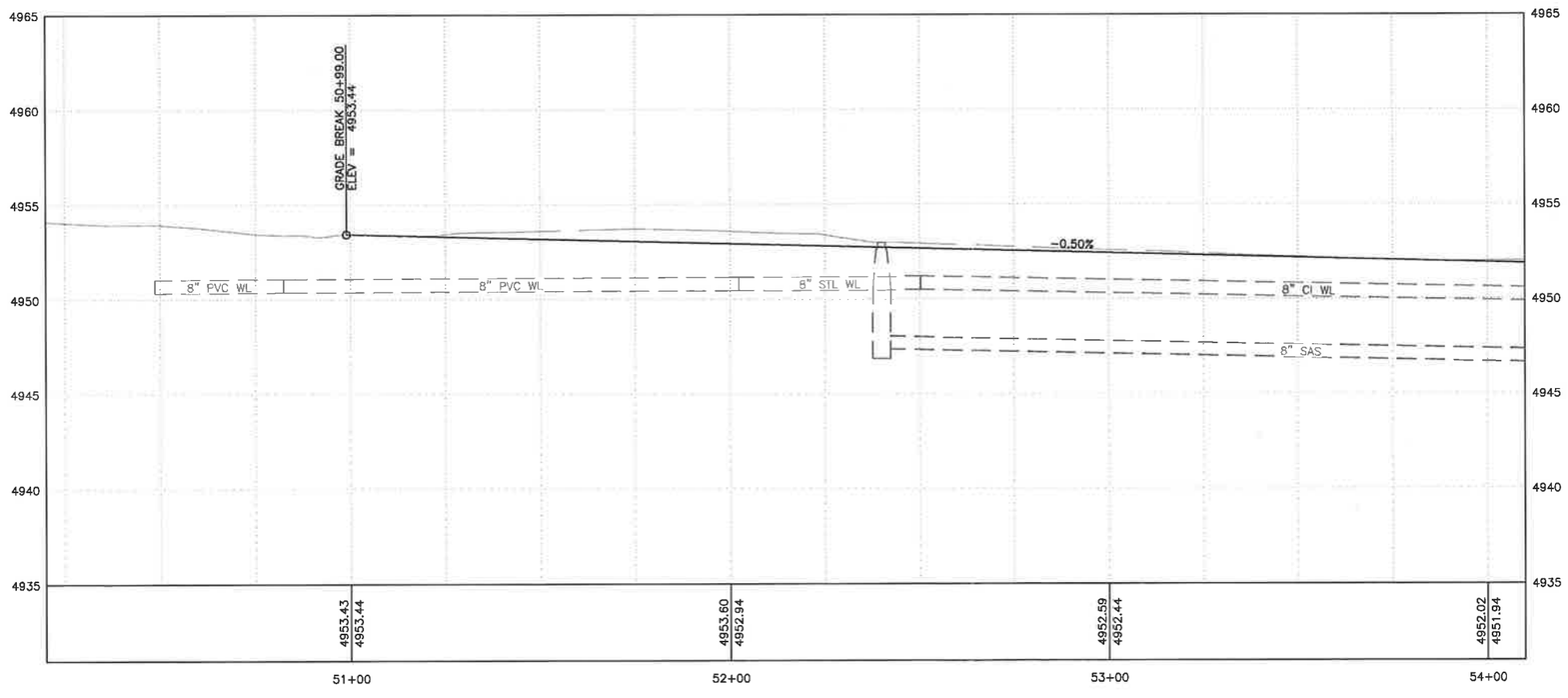
APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





AS-BUILT INFORMATION	
CONTRACTOR	DATE
WORK STAKED BY	DATE
INSPECTIONS BY	DATE
FIELD OBSERVATIONS BY	DATE
DRAWINGS CORRECTED BY	DATE
MICRO-FILM INFORMATION	
RECORDED BY	DATE
NO.	

BENCH MARKS

BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

PRELIMINARY NOT FOR CONSTRUCTION

VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

No.	Date	By	REMARKS
			REVISIONS
			DESIGN
			Designed By: MDS DATE: MAR09
			Drawn By: RW DATE: MAR09
			Checked By: EVD DATE: MAR09

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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN AND PROFILE STA 50+00 TO 54+10

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

City Project No. 9999.99 | Zone Map No. C-19 | Sheet 4 | Of 9

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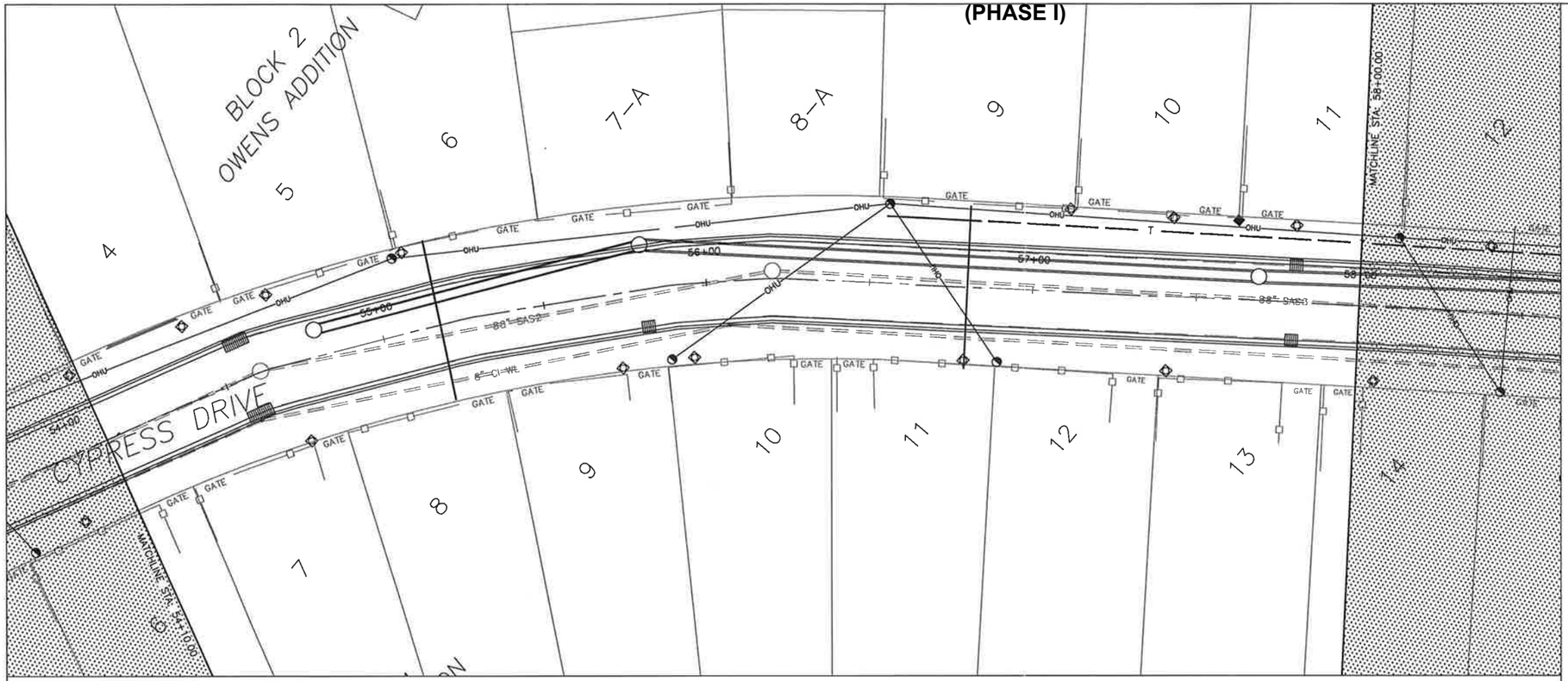
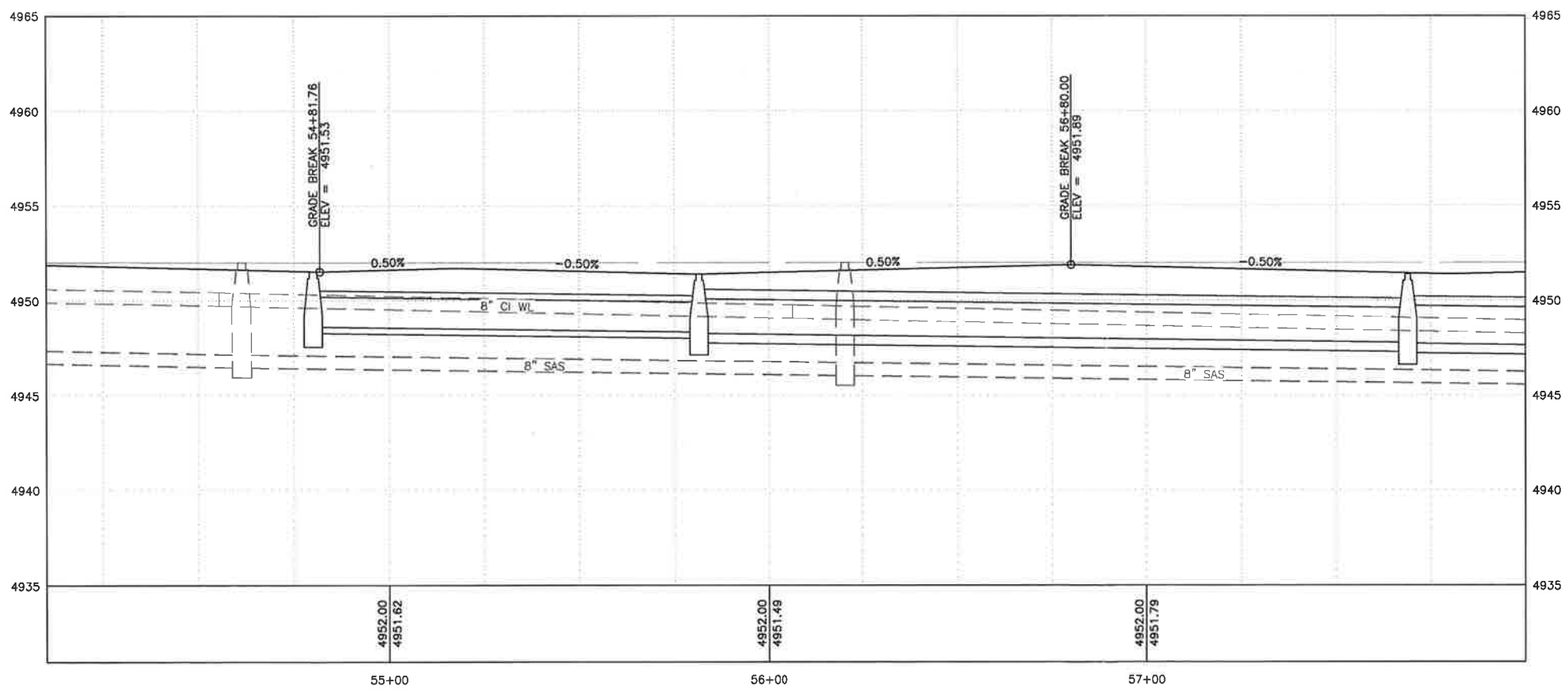
APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

BENCH MARKS

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AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTORS NOTES MADE BY — DATE
FIELD VERIFICATION BY — DATE
MARKUPS CORRECTED BY — DATE

MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

ENGINEER'S SEAL

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	Date	REMARKS / REVISIONS / DESIGN	By
		Designed By: MDS	DATE: MAR09
		Drawn By: RW	DATE: MAR09
		Checked By: EVD	DATE: MAR09

VERTICAL 0 4' 8'
HORIZONTAL 0 20' 40'

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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN AND PROFILE STA 54+10 TO 58+00

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

City Project No. 9999.99 | Zone Map No. C-19 | Sheet 5 Of 9

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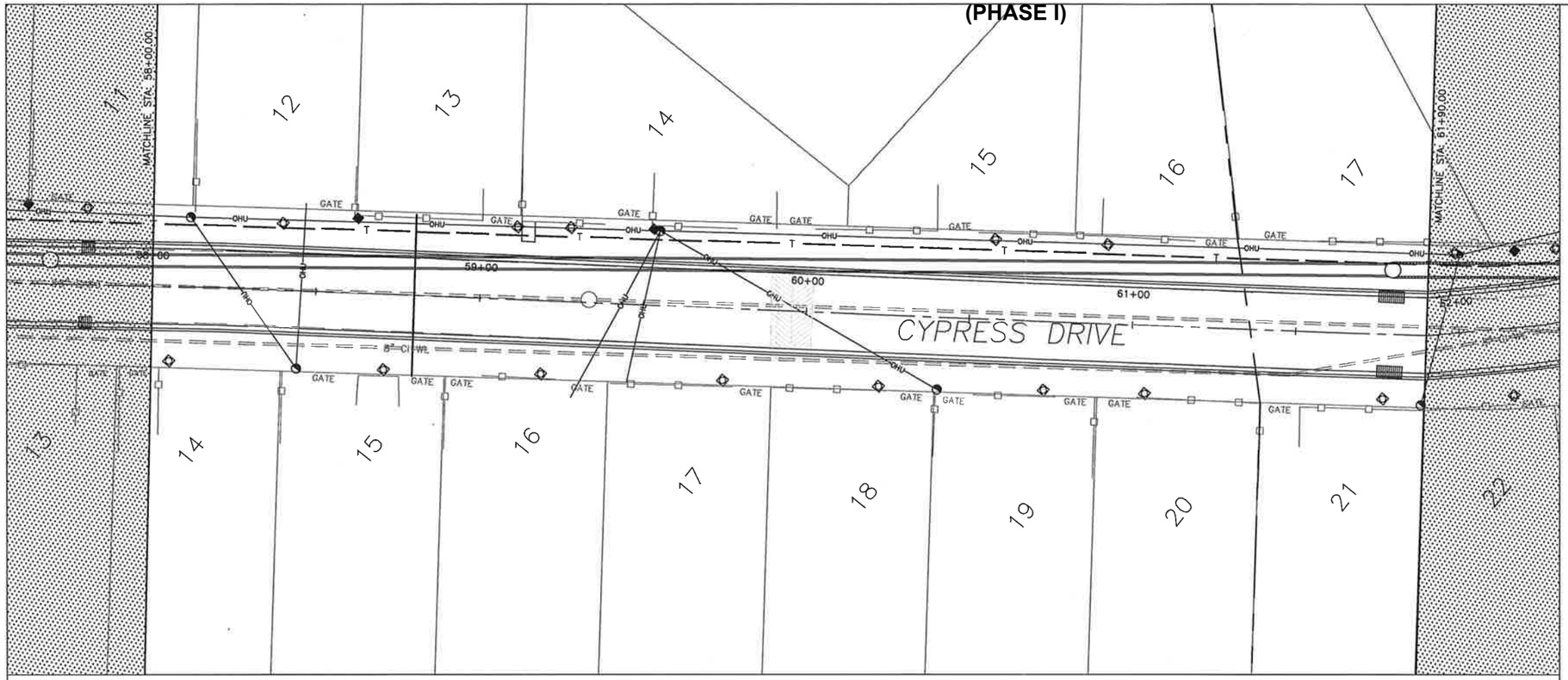
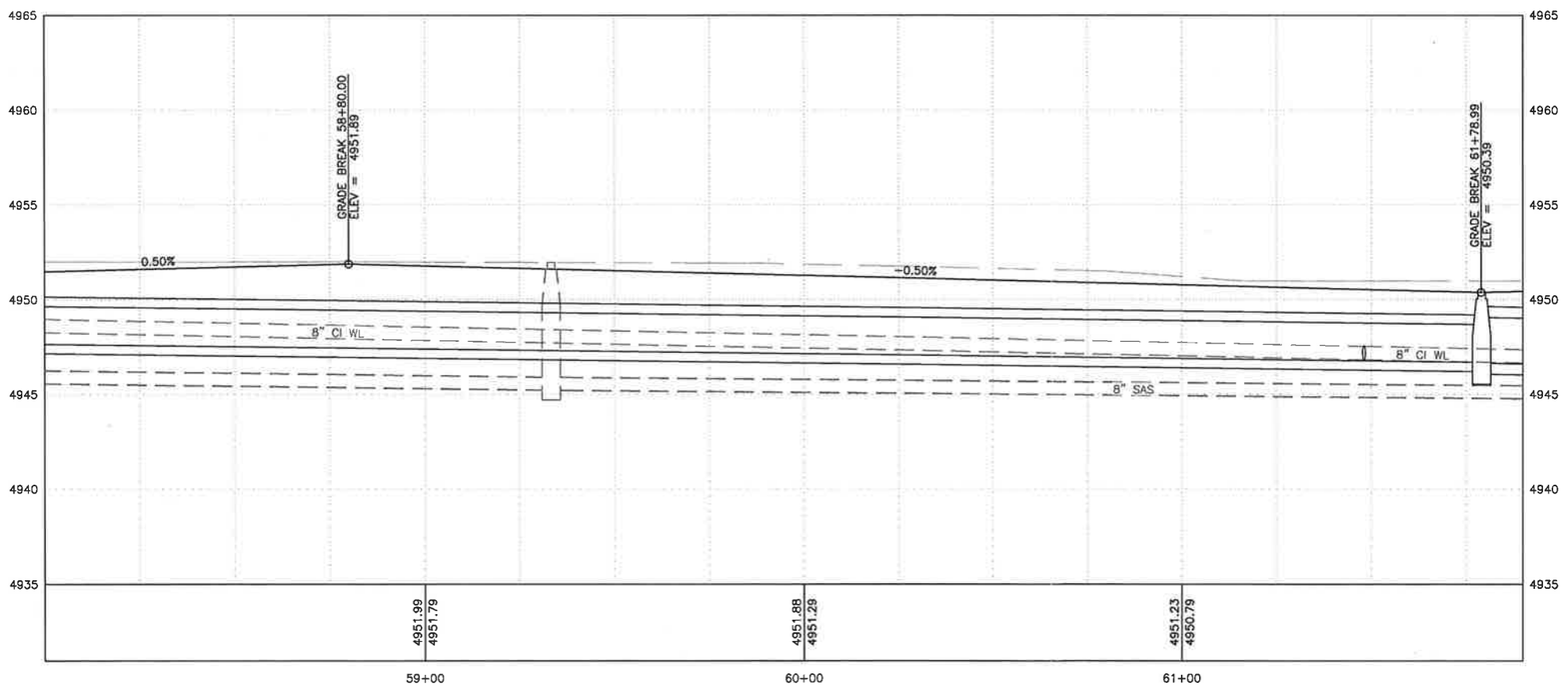
APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

BENCH MARKS

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AS-BUILT INFORMATION

CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTION'S NOTATIONS BY — DATE
FIELD VERIFICATION BY — DATE
PLANS REVISED BY — DATE
CORRECTED BY

MICRO-FILM INFORMATION

RECORDED BY — DATE
NO.

ENGINEER'S SEAL

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	Date	By	REMARKS

REVISIONS

DESIGN
Designed By: MDS — DATE: MAR09
Drawn By: RW — DATE: MAR09
Checked By: EVD — DATE: MAR09

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

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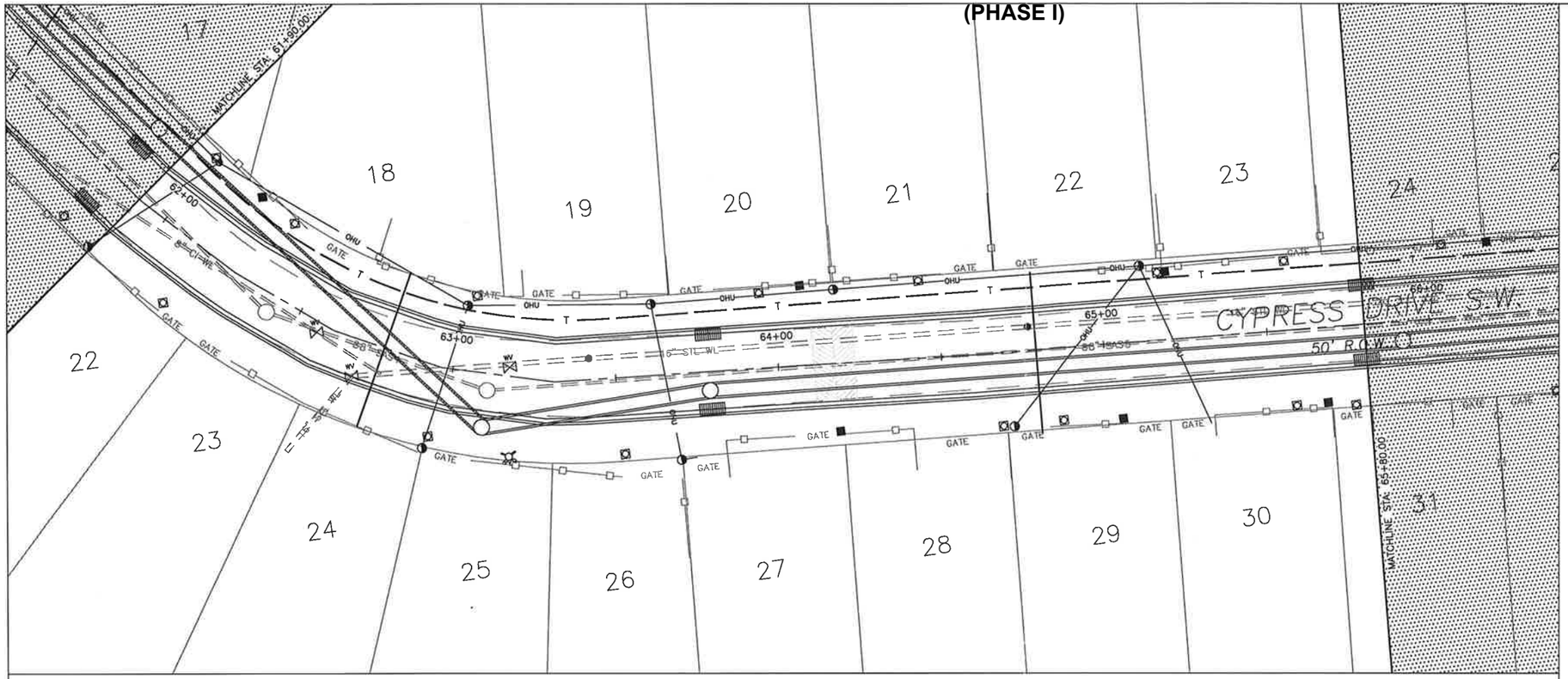
BERNALILLO COUNTY

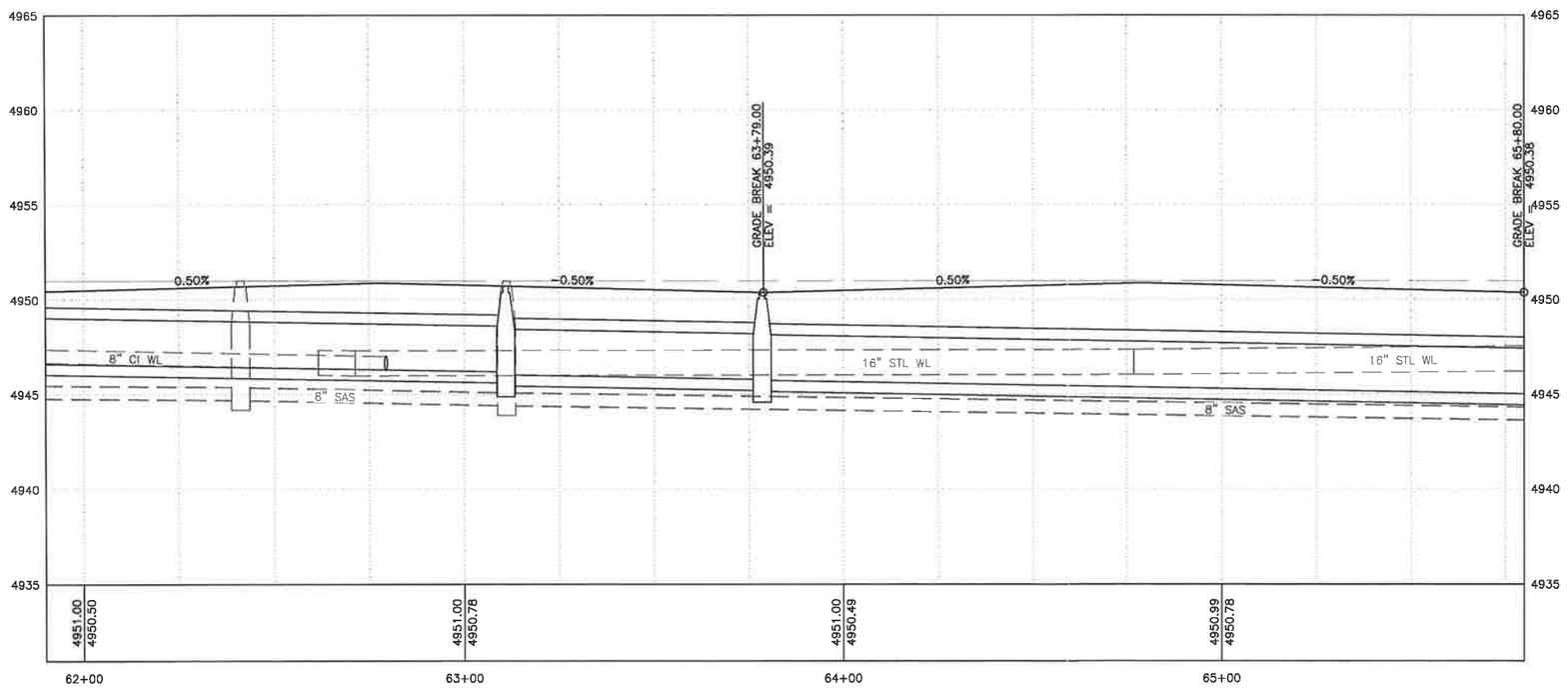
CYPRESS DRIVE STORM DRAIN
PLAN AND PROFILE STA 58+00 TO 61+90

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

City Project No. 9999.99 | Zone Map No. C-19 | Sheet 6 | Of 9

APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

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AS-BUILT INFORMATION

CONTRACTOR — DATE
SURVEY BY — DATE
INSPECTOR'S FIELD REMARKS BY — DATE
FIELD VERIFICATION BY — DATE
AS-BUILTS CORRECTED BY — DATE

MICRO-FILM INFORMATION

RECORDED BY: — DATE
NO.

ENGINEER'S SEAL

PRELIMINARY
NOT FOR
CONSTRUCTION

VERTICAL 0 4' 8'
HORIZONTAL 0 20' 40'

No.	Date	REVISIONS / REMARKS	By
		DESIGN	
		Designed By: MDS	DATE: MAR09
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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN AND PROFILE STA 61+90 TO 65+80

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

City Project No. 9999.99 | Zone Map No. C-19 | Sheet 7 Of 9

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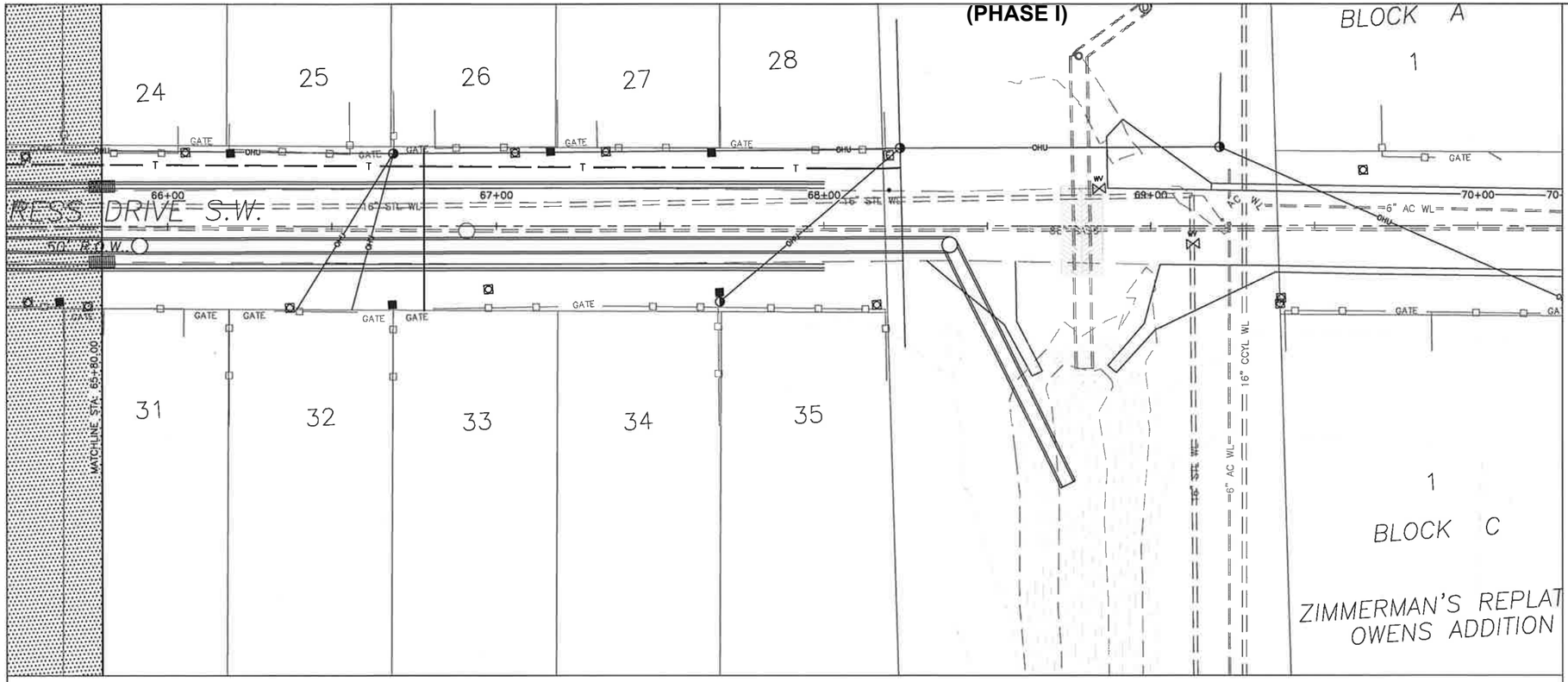
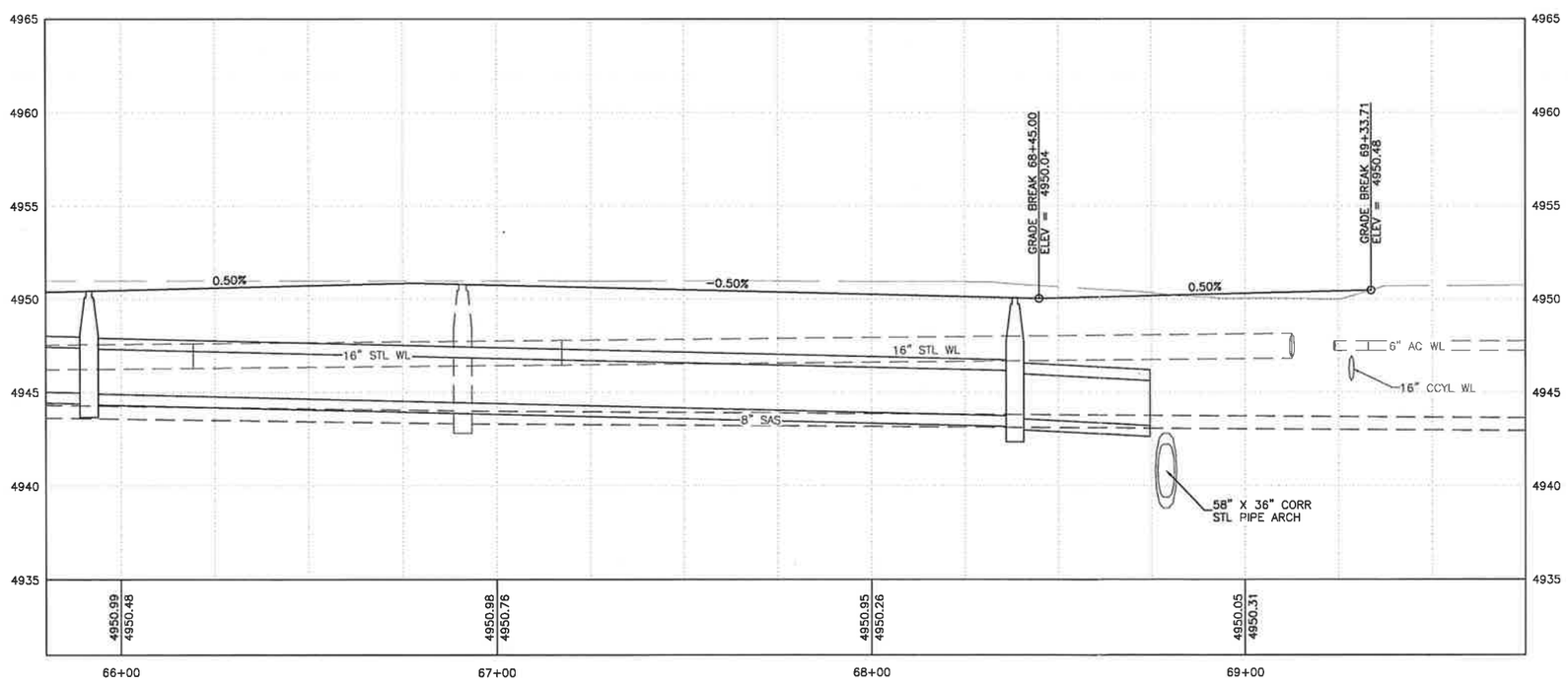
APPENDIX A: CYPRESS DRIVE ROAD IMPROVEMENTS FEASIBILITY STUDY (PHASE I)





SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

BENCH MARKS

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AS-BUILT INFORMATION

CONTRACTOR DATE
WORK STAKED BY DATE
INSPECTORS FIELD MEASUREMENTS BY DATE
FIELD VERIFICATION BY DATE
DRAWING CORRECTED BY DATE

MICRO-FILM INFORMATION

RECORDED BY DATE
NO.

ENGINEER'S SEAL

PRELIMINARY
NOT FOR
CONSTRUCTION

No.	Date	By	REMARKS
			REVISIONS

DESIGN
Designed By: MDS DATE: MAR09
Drawn By: RW DATE: MAR09
Checked By: EVD DATE: MAR09

VERTICAL 0 4' 8'
HORIZONTAL 0 20' 40'

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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN AND PROFILE STA 65+80 TO EOP

Design Review Committee	City Engineer Approval	Post Design Update	Mo./Day/Yr.	Mo./Day/Yr.

City Project No. 9999.99 | Zone Map No. C-19 | Sheet 8 Of 9

APPENDIX B: PHASE II STORM DRAIN HYDRAULIC CALCULATIONS

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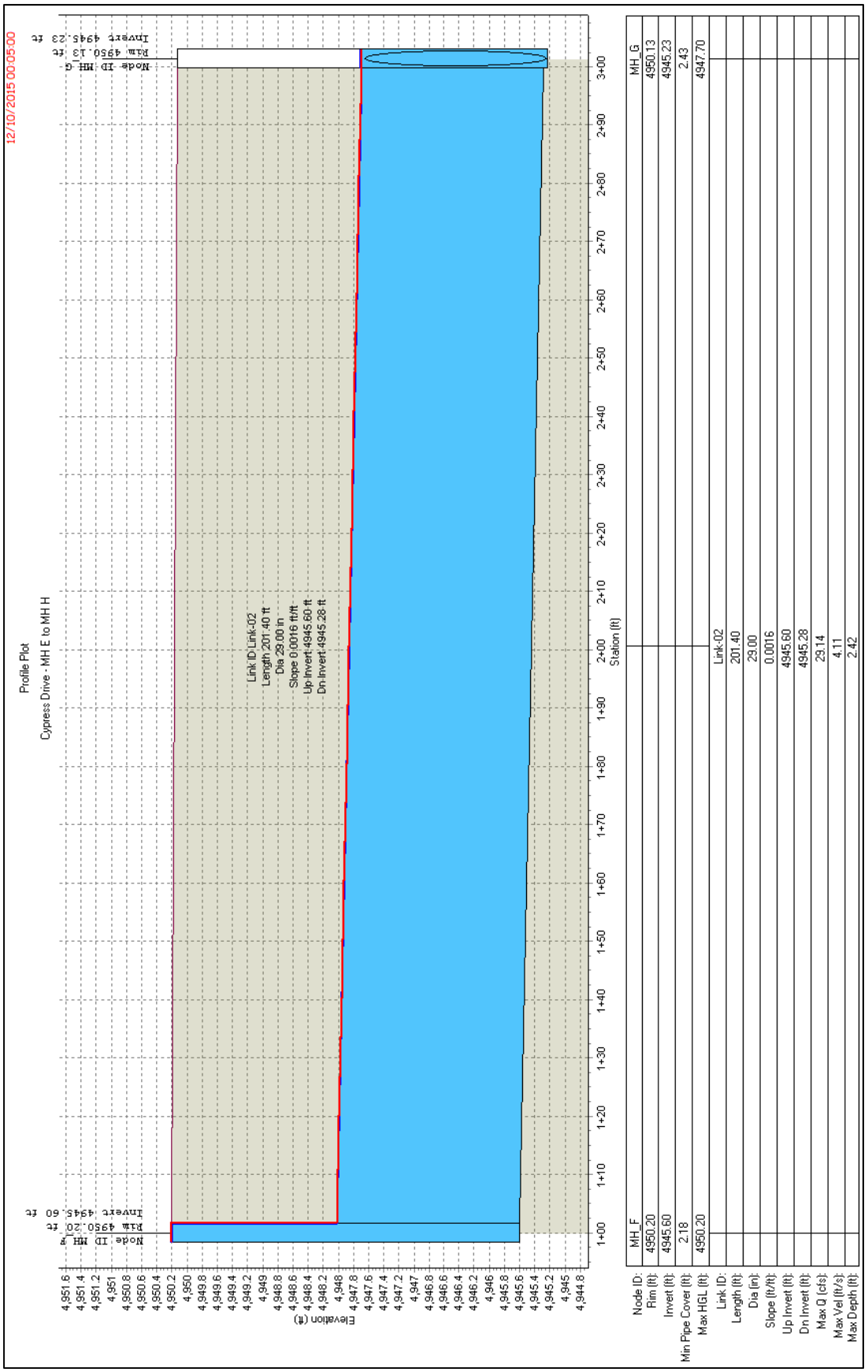
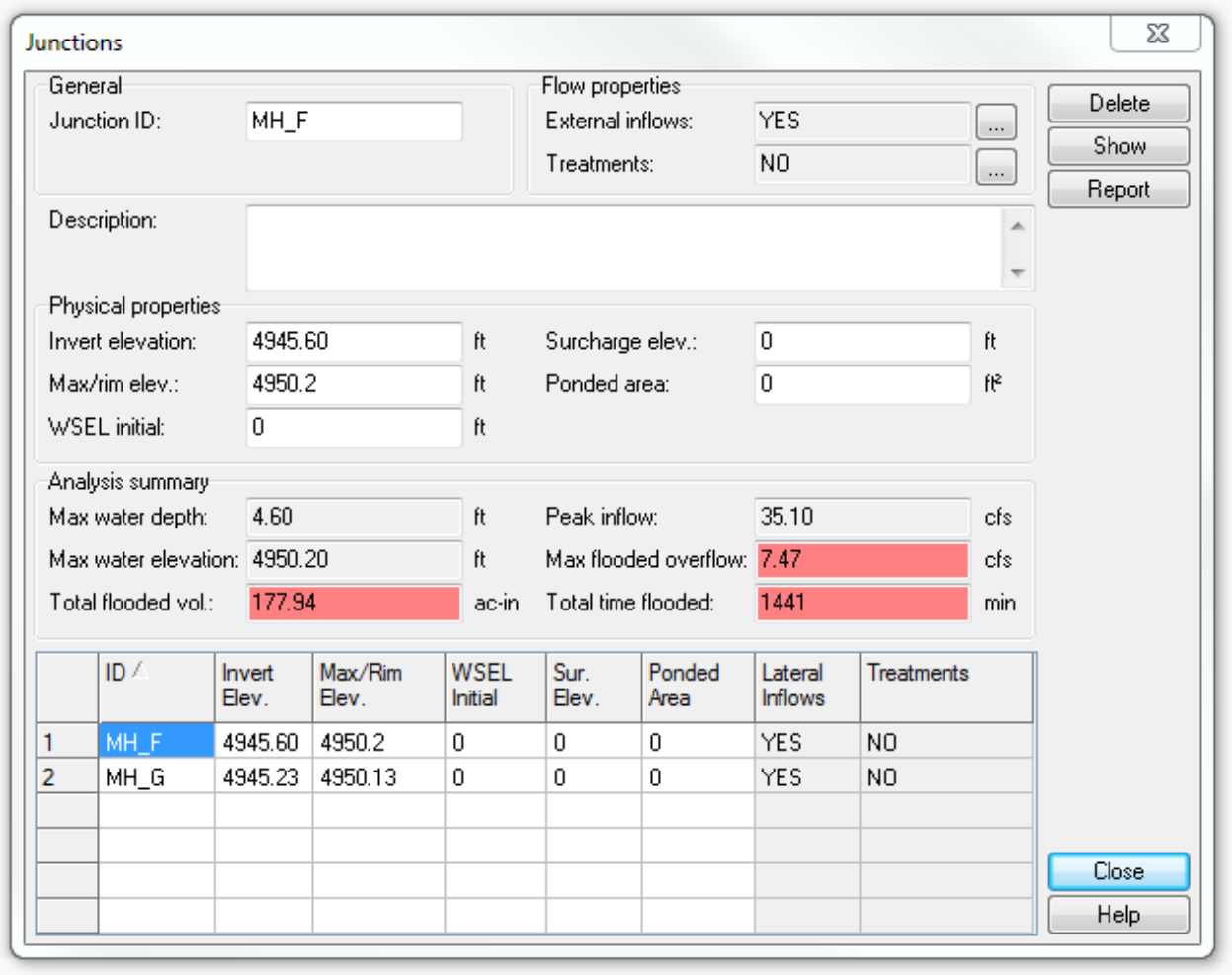
Elliptical Pipe (Cypres Drive Phase II.fm8) Report

Label	Roughness Coefficient	Channel Slope (%)	Normal Depth (ft)	Rise (in)	Span (in)
MH A to MH B - 30x19	0.013	0.26000	1.16	19.00	30.00
MH B to MH C - 34x22	0.013	0.25000	1.30	22.00	34.00
MH C to MH D - 38x24	0.013	0.25000	1.48	24.00	38.00
MH D to MH E - 42x27	0.013	0.36000	1.57	27.00	42.00
MH E to MH F - 42x27	0.013	0.35000	1.59	27.00	42.00
MH F to MH G - 45x29 - Existing	0.013	0.16000	1.92	29.00	45.00
MH G to MH H - 45x29 - Existing	0.013	0.39000	1.97	29.00	45.00

Discharge (cfs)	Flow Area (ft^2)	Percent Full (%)	Velocity (ft/s)	Discharge Full (ft^3/s)	Max Discharge (ft^3/s)
10.20	2.44	73.3	4.18	11.09	12.09
13.80	3.09	70.9	4.46	15.66	17.06
18.90	3.94	73.9	4.80	20.34	22.16
28.30	4.62	69.9	6.13	32.70	35.63
28.30	4.67	70.7	6.06	32.24	35.13
35.10	6.05	79.3	5.80	35.08	38.17
42.00	6.20	81.3	6.77	41.05	44.67

APPENDIX B: PHASE II STORM DRAIN HYDRAULIC CALCULATIONS





	ID	Invert Elev.	Max/Rim Elev.	WSEL Initial	Sur. Elev.	Ponded Area	Lateral Inflows	Treatments
1	MH_F	4945.60	4950.2	0	0	0	YES	NO
2	MH_G	4945.23	4950.13	0	0	0	YES	NO

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APPENDIX C: PHASE II STREET HYDRAULIC CALCULATIONS

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Worksheet for Cypress Drive Street Section Overflow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Discharge	14.30	cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.33
0+05	0.23
0+07	0.00
0+20	0.15
0+34	0.00
0+36	0.23
0+41	0.33

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.33)	(0+05, 0.23)	0.020
(0+05, 0.23)	(0+36, 0.23)	0.015
(0+36, 0.23)	(0+41, 0.33)	0.020

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	0.29	ft
Elevation Range	0.00 to 0.33 ft	
Flow Area	6.75	ft²
Wetted Perimeter	36.91	ft

Worksheet for Cypress Drive Street Section Overflow

Results

Hydraulic Radius		0.18	ft
Top Width		36.88	ft
Normal Depth		0.29	ft
Critical Depth		0.27	ft
Critical Slope		0.00668	ft/ft
Velocity		2.12	ft/s
Velocity Head		0.07	ft
Specific Energy		0.36	ft
Froude Number		0.87	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.27	ft
Channel Slope	0.50000	%
Critical Slope	0.00668	ft/ft

Messages

Notes

Calculated flow rate (14.3 cfs) is the sum of the estimated runoff of the small sub-basin that drains to Manhole F (6.8 cfs) and the estimated overflow of Manhole F (7.5 cfs) from surcharging.

Cross Section for Cypress Drive Street Section Overflow

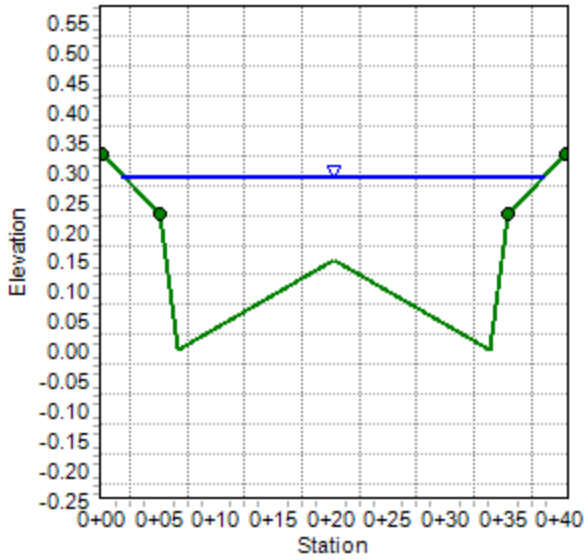
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.50000	%
Normal Depth	0.29	ft
Discharge	14.30	cfs

Cross Section Image



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APPENDIX D: ACPA FILL HEIGHT TABLES FOR HORIZONTAL ELLIPTICAL PIPE

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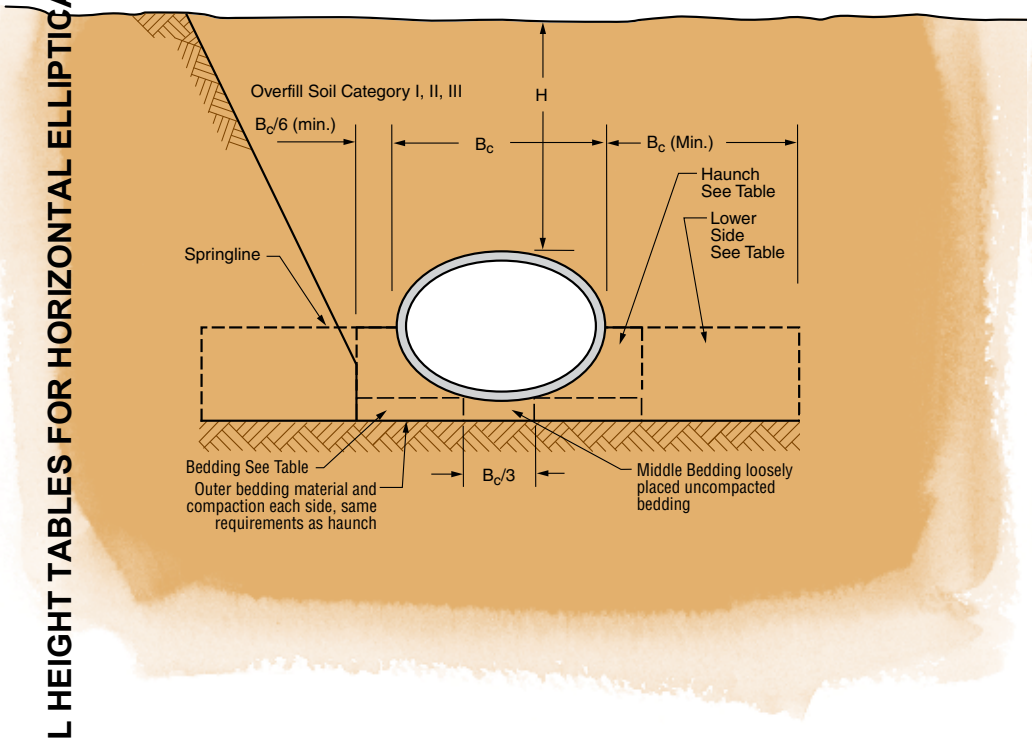
LRFD FILL HEIGHT TABLES

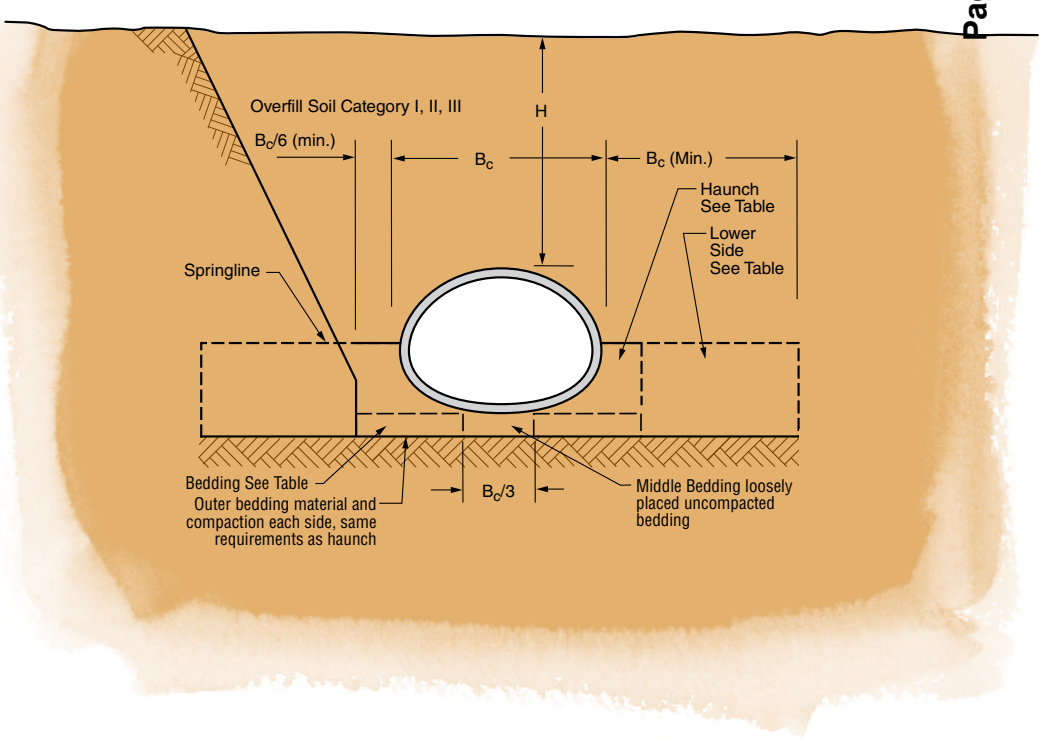
FOR HORIZONTAL ELLIPTICAL AND ARCH CONCRETE PIPE

American Concrete Pipe Association

Standard Trench/Embankment Installation

Concrete pipe should be installed in accordance with the AASHTO LRFD Bridge Construction Specifications, Section 27 or ASTM C1479. Figure 1 shows the basic pipe and soil terminology.





There are two types of Standard Installations for horizontal elliptical and arch concrete pipe, each with its own soil and compaction requirements. Type 2 bedding provides better support using well compacted granular material, while Type 3 provides for less support allowing the use of silts. These choices provide flexibility and versatility for the designer and contractor, as well as performance and economy for the owner that are not available with other types of pipe.

The soil and compaction requirements are provided in Table 1. Table 2 shows the equivalent soil designations per the Unified Soil Classification System (USCS) and AASHTO.

To facilitate your selection of the proper reinforced concrete pipe using the most beneficial Standard Installation for the conditions at the site, fill height tables are provided on the following pages. The required 0.01 inch crack D-Loads in units of lbs per linear foot per foot of span are provided numerically and the class of pipe per ASTM C506 (AASHTO M 206) or ASTM C507 (AASHTO M 207) meeting this requirement is designated by color of the cell.

Table 1: Standard Installation Soils and Minimum Compaction Requirements

Installation Type	Bedding Thickness	Haunch and Outer Bedding	Lower Side
Type 2	D_0/24 minimum, not less than 3" (75 mm) If rock foundation, use D_0/12 minimum, not less than 6" (150 mm)	90% Category I or 95% Category II	85% Category I, 90% Category II, or 95% Category III
Type 3	D_0/24 minimum, not less than 3" (75 mm) If rock foundation, use D_0/12 minimum, not less than 6" (150 mm)	85% Category I, 90% Category II, or 95% Category III	85% Category I, 90% Category II, or 95% Category III

Reference: AASHTO LRFD Bridge Construction Specifications, Section 27

Table 3: Reinforced Pipe Classes for 0.01 inch Crack Per ASTM C 506 (lbs/ft/ft)

Class A-II	≤ 1000
Class A-III	≤ 1350
Class A-IV	≤ 2000
Special Design	> 2000

Table 4: Reinforced Pipe Classes for 0.01 inch Crack Per ASTM C 507 (lbs/ft/ft)

Class HE-A	≤ 600
Class HE-I	≤ 800
Class HE-II	≤ 1000
Class HE-III	≤ 1350
Class HE-IV	≤ 2000
Special Design	> 2000

Table 2: Equivalent USCS and AASHTO Soil Classifications for Standard Installation Soil Designations

Representative Soil Types			Percent Compaction	
SIDD	USCS	AASHTO	Standard Proctor	Modified Proctor
Gravelly Sand (Category I)	SW, SP, GW, GP	A1, A3	100 95 90 85 80 61	95 90 85 80 75 59
Sandy Silt (Category II)	GM, SM, ML, Also GC, SC with less than 20% passing #200 sieve	A2, A4	100 95 90 85 80 49	95 90 85 80 75 46
Silty Clay (Category III)	CL, MH, GC, SC	A5, A6	100 95 90 85 80 45	90 85 80 75 70 40
	CH Not allowed for haunch or bedding	A7	100 95 90 45	90 85 80 40

Reference: AASHTO LRFD Bridge Construction Specifications, Section 27

NOTES:
1. Compaction and soil symbols – i.e. "95% Category I" refers to Category I soil material with a minimum Standard Proctor compaction of 95%. See Table 2 for equivalent Modified Proctor values.
2. Soil in the outer bedding, haunch, and lower side zones shall be compacted to at least the same compaction as the majority of soil in the overfill zone.

Horizontal Elliptical Pipe

The following Fill Height Tables have been developed by the American Concrete Pipe Association (ACPA) using the indirect design method in accordance with Section 12.10.4.3 of the AASHTO LRFD Bridge Design Specification, 4th Edition, 2007 with 2008 Interim. Live load was distributed through the pipe in accordance with Chapter 4 of the ACPA Concrete Pipe Design Manual.

Fill Height Tables are based on:

1. γ_s = 120 pcf
2. AASHTO HL-93 live load
3. Positive Projecting Embankment Condition - this gives conservative results in comparison to trench conditions
4. A projection ratio of 0.9.

D-Load (lb/ft/ft) for Type 2 Bedding

Class HE-A
Class HE-I
Class HE-II
Class HE-III
Class HE-IV
Special Design

Inside Rise x Inside Span (inches)	Fill Height (feet)														
	0.5	1	1.5	2	2.5	3	4	5	6	7	8	9	10	11	12
14 x 23	1398	1197	1087	904	796	733	682	686	724	780	843	915	991	1069	1148
19 x 30	1265	989	895	852	757	703	662	671	712	768	831	903	978	1055	1133
22 x 34	1084	857	785	773	737	686	651	662	704	761	824	896	970	1047	1125
24 x 38	1049	857	719	701	712	676	644	657	699	756	820	891	966	1042	1119
27 x 42	1133	863	680	618	589	588	606	642	690	747	810	881	954	1029	1106
29 x 45	1116	855	676	618	591	592	612	651	701	760	824	897	972	1049	1127
32 x 49	1117	877	701	625	581	584	607	647	698	757	822	895	969	1046	1124
34 x 53	1090	860	688	616	575	579	603	644	696	755	820	893	968	1044	1122
38 x 60	963	879	766	644	595	570	597	640	693	754	819	892	967	1043	1121
43 x 68	889	796	752	663	599	580	592	637	692	753	819	892	966	1043	1120
48 x 76	838	726	691	669	604	591	587	633	689	751	818	891	966	1042	1119
53 x 83	752	660	635	619	588	592	589	633	690	753	820	894	969	1045	1123
58 x 91	676	602	599	588	578	582	599	631	689	753	820	894	969	1046	1123
63 x 98	644	578	592	582	580	575	613	637	695	759	826	900	975	1052	1129
68 x 106	612	585	570	563	572	574	606	647	698	762	830	903	978	1055	1132
72 x 113	591	603	556	551	572	579	605	655	704	768	836	909	984	1061	1138
77 x 121	569	582	540	559	560	566	606	657	714	772	839	913	988	1064	1141

APPENDIX E: ENGINEER'S OPINION OF ESTIMATED CONSTRUCTION COSTS

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CYPRESS DRIVE PHASE II ROAD IMPROVEMENTS
ENGINEER'S ESTIMATE OF PROBABLE CONSTRUCTION COST
JANUARY 2016

COA ITEM #	BID ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENDED COST
004.010	1	CONSTRUCTION STAKING, COMPL.	LS	1	$ 5,310.76	$ 5,310.76
004.020	2	CONSTRUCTION SURVEYING, COMPL.	LS	1	$ 4,969.36	$ 4,969.36
006.010	3	CONSTRUCTION PROJECT SIGN, PER CONTRACT, CIP	EA	2	$ 746.10	$ 1,492.20
006.050/60	4	CONSTRUCTION MOBILIZATION/DEMOBILIZATION, COMPL.	LS	1	$ 19,232.55	$ 19,232.55
019.010	5	CONSTRUCTION TRAFFIC CONTROL & BARRICADING, COMPL.	LS	1	$ 7,966.14	$ 7,966.14
030.010	6	FLOOD PROTECTION, COMPL.	LS	1	$ 1,403.56	$ 1,403.56
030.020	7	NPDES PERMITTING, COMPL.	LS	1	$ 2,389.84	$ 2,389.84
116.030	8	RESIDENTIAL ASPHALT CONCRETE TYPE C, COMPL.	TON	503	$ 81.20	$ 40,844.43
201.010	9	SITE CLEARING AND GRUBBING, COMPL.	AC	0.5	$ 1,501.66	$ 750.83
202.011	10	EXCAVATE & DISPOSE OF EXCESS SOIL, COMPL.	CY	200	$ 10.02	$ 2,003.10
301.010	11	GRADING AREAS NOT TO BE PAVED, WITH LESS THAN 2' EXCAVATION, COMPL.	SY	1,400	$ 3.39	$ 4,739.50
301.020	12	SUBGRADE PREP, 12" AT 95% COMPACTION, CIP.	SY	3,080	$ 2.34	$ 7,215.84
336.120	13	TACK COAT, CATIONIC EMULSIFIED ASPHALT, CIP.	SY	3,080	$ 0.43	$ 1,334.93
336.xxx	14	ASPHALT CONCRETE SPEED HUMP, INCL. TACK COAT, CIP.	EA	1	$ 1,500.00	$ 1,500.00
340.050	15	CURB & GUTTER, STANDARD, PORTLAND CEMENT CONCRETE, INCL. SUBGRADE PREPARATION, CIP. SD 2415	LF	30	$ 23.79	$ 713.74
340.061	16	ROLL TYPE, MOUNTABLE CURB & GUTTER (INCL. STD. TO MOUNT. TRANS.), PORTLAND CEMENT CONCRETE, INCL. SUBGRADE PREP. CIP. SD 2415	LF	2,490	$ 27.39	$ 68,194.62
343.020	17	EXISTING PAVEMENT, ASPHALT CONCTETE, UP TO 4" THICK, SAWCUT, REMOVE & DISPOSE, COMPL.	SY	3,360	$ 7.30	$ 24,520.74
602.030	18	CHANNEL LINING (RUNDOWN), 8" THICK, REINFORCED PC CONCRETE, CIP. SD 2260, INCLUDING 12" THICK SILL	SF	340	$ 19.08	$ 6,487.93
603.010	19	WIRE ENCLOSED RIPRAP, CIP.	CY	55	$ 190.44	$ 10,474.20
603.050	20	FILTER CLOTH, CIP.	SF	1,400	$ 0.13	$ 180.40
701.100	21	TRENCHING, BACKFILLING & COMPACTION, FOR 18" TO 36" SEWER PIPE, UP TO 8' IN DEPTH, PIPE NOT INCL., COMPL., ROUND EQUIVALENT PIPE	LF	1,052	$ 28.14	$ 29,600.22
710.052	22	18" STEEL CARRIER PIPE AND APPURTENANCES, COMPL.	LF	20	$ 144.81	$ 2,896.18
801.007	23	16" WATERLINE PIPE EXCL. FITTINGS, (STD. SPEC. SEC. 801), INCL. TRENCH, & COMPACTED BACKFILL, TO 6' DEPTH,CIP.	LF	40	$ 82.70	$ 3,308.04
801.056	24	EXISTING WATERLINE, 16" TO 36", WITH FITTINGS, REMOVE & DISPOSE, TRENCHING NOT INCL., COMPL.	LF	40	$ 14.33	$ 573.05
801.158	25	JOINT RESTRAINING HARNESS, DI & PVC PUSH-ON BELLS, 14"-24", CIP.	EA	8	$ 1,009.69	$ 8,077.53
801.xxx	26	16" 45 DEGREE BEND, CIP	EA	4	$ 527.13	$ 2,108.53
802.300	27	3/4" SERVICE LINE REPLACEMENT & TRANSFER, INCL. TAPPING SADDLE & TUBING, CIP. SD 2362	EA	16	$ 884.22	$ 14,147.55
905.200	28	RECONNECT EXISTING 4" SEWER SERVICE LINE TO REPLACEMENT MAIN, INCL. FIRST 5' OF NEW SERVICE LINE, CIP. SD 2134	EA	16	$ 1,105.41	$ 17,686.50
910.006	29	18" REINFORCED CONCRETE PIPE, CLASS IV, FURNISH AND PLACE IN OPEN TRENCH, CIP.	LF	78	$ 45.68	$ 3,563.41
910.010x	30	19" X 30" ELLIPTICAL REINFORCED CONCRETE PIPE (24" EQUIVALENT), CLASS IV, FURNISH & PLACE IN OPEN TRENCH, CIP.	LF	103	$ 58.62	$ 6,037.55
910.012x	31	22" X 34" ELLIPTICAL REINFORCED CONCRETE PIPE (27" EQUIVALENT), CLASS IV, FURNISH & PLACE IN OPEN TRENCH, CIP.	LF	190	$ 65.13	$ 12,374.70
910.014x	32	24" X 38" ELLIPTICAL REINFORCED CONCRETE PIPE (30" EQUIVALENT), CLASS IV, FURNISH & PLACE IN OPEN TRENCH, CIP.	LF	411	$ 71.63	$ 29,440.46
910.018x	33	27" X 42" ELLIPTICAL REINFORCED CONCRETE PIPE (33" EQUIVALENT), CLASS IV, FURNISH & PLACE IN OPEN TRENCH, CIP.	LF	208	$ 89.21	$ 18,556.52
910.020x	34	29" X 45" ELLIPTICAL REINFORCED CONCRETE PIPE (36" EQUIVALENT), CLASS IV, FURNISH & PLACE IN OPEN TRENCH, CIP. (IF NOT EXISTING)	LF	62	$ 106.80	$ 6,621.40
915.050	35	CATCH BASIN, TYPE "D", SINGLE GRATE, CIP. SD 2206	EA	2	$ 2,899.49	$ 5,798.98
915.060	36	CATCH BASIN, TYPE "D", DOUBLE GRATE, CIP. SD 2206	EA	4	$ 5,082.44	$ 20,329.74
920.130	37	MANHOLE, 6' DIA., TYPE "C", LESS THAN 6' DEEP, CIP. SD2101	EA	3	$ 4,239.30	$ 12,717.89
920.130x	38	MODIFIED MANHOLE, 6' DIA., TYPE "C", WITH SINGLE TYPE "D" INLET GRATE, LESS THAN 6' DEEP, CIP. SD2101	EA	2	$ 4,875.19	$ 9,750.38
920.130x	39	MANHOLE, 6' DIA., STORMWATER QUALITY, LESS THAN 6' DEEP (IF NOT EXISTING)	EA	1	$ 5,299.12	$ 5,299.12

SUBTOTAL	$ 420,612.38
NMGRT (7.1875% FOR CITY OF ALBUQUERQUE)	$ 30,231.52
GRAND TOTAL	**$ 450,843.90**

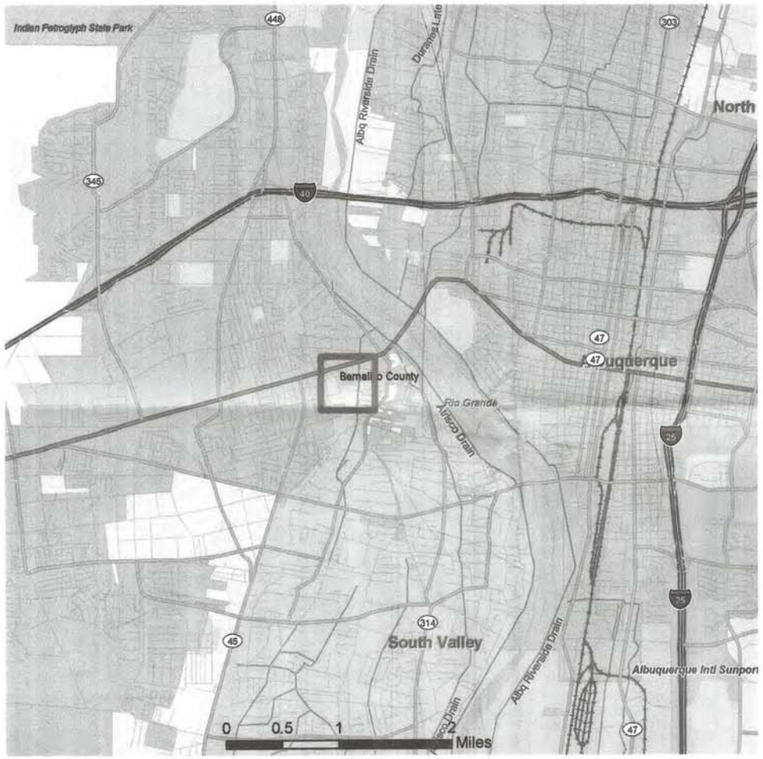
APPENDIX B: CYPRESS DRIVE STORM DRAIN CONSTRUCTION PLANS, PHASE I AS-BUILT RECORD DRAWINGS

CYPRESS DRIVE STORM DRAIN

CONSTRUCTION PLANS
BERNALILLO COUNTY, NEW MEXICO

PHASE I AS-BUILT
RECORD DRAWINGS

ALBUQUERQUE ASPHALT
REDLINES



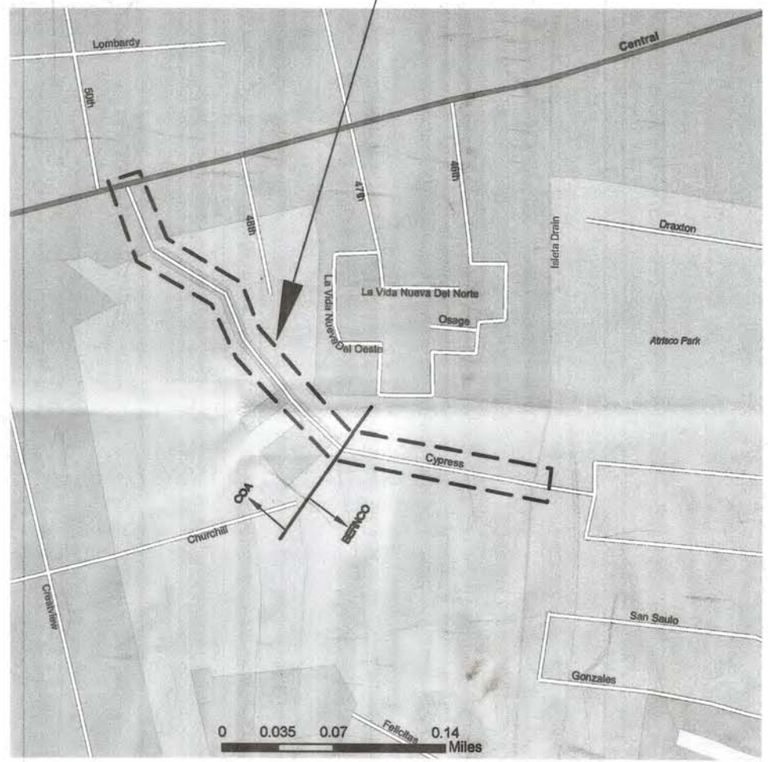
VICINITY MAP

BERNALILLO COUNTY
STATE OF NEW MEXICO

INDEX OF SHEETS

SHEET	TITLE
1	COVER SHEET
2	GENERAL NOTES AND LEGEND
3	SURVEY CONTROL
4	PLAN & PROFILE STA 50+00 TO 54+10
5	PLAN & PROFILE STA 54+10 TO 58+00
6	PLAN & PROFILE STA 58+00 TO 61+90
7	PLAN & PROFILE STA 61+90 TO 65+80
8	PLAN & PROFILE STA 65+80 TO EOP
9	WATER AND SAS SERVICE DETAILS
10	ROADWAY AND CURB DETAILS
11	RUNDOWN AND EROSION PROTECTION DETAILS
12	COUNTY TRAFFIC CONTROL
13	COUNTY TRAFFIC CONTROL NOTES

PROJECT LOCATION



LOCATION MAP ZONE ATLAS K-11/K-12

VERTICAL DATUM IS NAVD 88

REV.	SHEETS	CITY ENGINEER	DATE	USER DEPARTMENT	DATE	USER DEPARTMENT	DATE

BERNALILLO COUNTY PUBLIC WORKS DIV. DATE
PWCO 90020

ENGINEERS STAMP & SIGNATURE

MICHAEL D. SMITH NEW MEXICO 6050 9-16-09 LICENSED PROFESSIONAL ENGINEER

APPROVALS	ENGINEER	DATE
WATER/WASTEWATER		7-22-09
Hydrology		7/27/09

APPROVED FOR CONSTRUCTION

ENGINEER DATE
JUNE 2009

COUNTY PROJECT NO. CITY PROJECT NO.
TS08-04 601791

SHEET 1 OF 13

Resource Technology, Inc.
Civil Engineering
Environmental Sciences
Water Resources
Landscape Architecture
Planning
5501 Jefferson Blvd. NE, Suite 200
Albuquerque, New Mexico 87109
E-mail: rti@rtiabq.com
Telephone: (505) 243-7300
Facsimile: (505) 243-7400

GOVERNING SPECIFICATIONS

1) THE CONTRACTOR SHALL ABIDE BY ALL LOCAL, STATE, AND FEDERAL LAWS, REGULATIONS, AND RULES WHICH APPLY TO THIS PLAN SET

2) ALL WORK DETAILED ON THIS PLAN SET TO BE PERFORMED UNDER CONTRACT SHALL, UNLESS OTHERWISE STATED, BE PERFORMED IN ACCORDANCE WITH THE BERNALILLO COUNTY ORDINANCES AND CITY OF ALBUQUERQUE (COA) STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1986 EDITION (INCLUDING REVISIONS THOUGH UPDATE #7, AND AMENDMENT # 1).

SURVEY/MONUMENTATION INFORMATION

3) INFORMATION PERTAINING TO THE MONUMENTATION FOR THIS PROJECT MAY BE OBTAINED FROM THE CITY OF ALBQ. PUBLIC WORKS DEPT, SURVEY SECTION.

4) THE CONTRACTOR SHALL NOTIFY THE ENGINEER NOT LESS THAN SEVEN (7) DAYS PRIOR TO STARTING WORK IN ORDER THAT THE CITY SURVEYOR MAY TAKE NECESSARY MEASURES TO INSURE THE PRESERVATION OF SURVEY MONUMENTS. CONTRACTOR SHALL NOT DISTURB PERMANENT SURVEY MONUMENTS WITHOUT THE CONSENT OF THE CITY SURVEYOR AND SHALL NOTIFY THE CITY SURVEYOR AND BEAR THE EXPENSE OF REPLACING ANY THAT MAY BE DISTURBED WITHOUT PERMISSION. REPLACEMENT SHALL BE DONE ONLY BY THE CITY SURVEYOR. WHEN A CHANGE IS MADE IN THE FINISHED ELEVATIONS OF THE PAVEMENT OF ANY ROADWAY IN WHICH A PERMANENT SURVEY MONUMENT IS LOCATED, CONTRACTOR SHALL, AT HIS OWN EXPENSE, ADJUST THE MONUMENT TO THE NEW GRADE UNLESS OTHERWISE SPECIFIED, REFER TO SECTION 4.4 OF THE GENERAL CONDITIONS OF THE STANDARD SPECIFICATIONS.

5) CONTRACTOR IS RESPONSIBLE FOR PROTECTING AND MAINTAINING ALL EXISTING MONUMENTATION CONTROLS. IN THE EVENT OF INADVERTANT DESTRUCTION OR ALTERATION THE CONTRACTOR MUST IMMEDIATELY NOTIFY THE CITY SURVEYOR.

6) CONSTRUCTION STAKING SHALL INCLUDE ALL SURVEYING AND CONTROL STAKING NECESSARY TO ESTABLISH PROJECT CENTERLINE, TOE OF SLOPE CATCH POINTS AND OTHER FEATURES AS REQUIRED FOR CONSTRUCTION OF THE PROJECT.

7) THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND RECORDING ALL EXISTING AND FINAL GRADES BY CROSS-SECTIONING OR OTHER MEANS, FOR THE PURPOSE OF DETERMINING EARTHWORK QUANTITIES. THESE RECORDS WILL BE SUBJECT TO REVIEW BY THE CITY AND/OR ENGINEER FOR VERIFICATION OF PAY QUANTITIES.

EARTHWORK

8) AN EXCAVATION/CONSTRUCTION PERMIT WILL BE REQUIRED BEFORE BEGINNING ANY WORK WITHIN THE CITY RIGHT OF WAY.

9) THE EARTHWORK QUANTITIES ARE BASED ON FINAL VOLUMES COMPACTED IN PLACE. ON-SITE EXCAVATION AND BACK FILL QUANTITY IS BASED ON A SHRINKAGE FACTOR OF 20%.

10) UNLESS OTHERWISE STATED WITHIN THIS PLAN SET ALL SIDESLOPES SHALL BE 3H:1V MAXIMUM, KEEPING SLOPES FLATTER WHEREVER POSSIBLE. SLOPES SHALL TRANSITION SMOOTHLY TO EXISTING GRADES AND ADJACENT STRUCTURES IN ALL CASES.

11) NO MATERIAL PITS HAVE BEEN IDENTIFIED FOR THIS PROJECT. THE CONTRACTOR MAY OBTAIN SUITABLE MATERIAL FROM ANY ACCEPTABLE SOURCE, PROVIDED THAT IT MEETS PROJECT SPECIFICATIONS. ALL MATERIAL PIT ACTIONS SHALL BE IN COMPLIANCE WITH SECTION 205 OF THE C.O.A. SPECIFICATIONS. NO ADDITIONAL PAYMENT SHALL BE MADE FOR HAULING OF SUCH MATERIAL.

12) THE DESIGN "R" VALUE FOR THIS PROJECT IS 50. MATERIAL WITH AN "R" VALUE OF LESS THAN 50 SHALL NOT BE PLACED IN, NOR ALLOWED TO REMAIN WITHIN, THE TOP TWO FEET OF FINISHED SUBGRADE.

13) THE CONTRACTOR SHALL WARP SLOPES WHERE NECESSARY TO STAY WITHIN THE RIGHT-OF-WAY OR CONSTRUCTION LIMITS, OR TO MEET EXISTING STRUCTURES.

14) ALL EXCAVATION TRENCHING AND SHORING ACTIVITIES MUST BE CARRIED OUT IN ACCORDANCE WITH OSHA 29, CFR 1926.650, SUBPART P.

15) THE CONTRACTOR SHALL BE RESTRICTED TO THE USE OF A 35 TON NON-VIBRATING ROLLER MAXIMUM TO OBTAIN THE REQUIRED COMPACTION IN EMBANKMENT AND SUB GRADE IN URBAN OR OTHER AREAS WHERE THE USE OF HEAVIER EQUIPMENT COULD DAMAGE UNDERGROUND UTILITIES OR OTHER PERMANENT STRUCTURES.

16) CONTRACTOR SHALL PROMPTLY CLEAN UP ANY MATERIAL EXCAVATED WITHIN THE PUBLIC RIGHT-OF-WAY SO THAT THE EXCAVATED MATERIAL IS NOT SUSCEPTIBLE TO BEING WASHED DOWN THE STREET, INTO STORM DRAIN SYSTEMS, OR DOWN ARROYOS.

17) PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXCAVATE AND VERIFY EXISTING HORIZONTAL AND VERTICAL LOCATIONS OF ALL OBSTRUCTIONS. SHOULD A CONFLICT EXIST, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR SURVEYOR IMMEDIATELY SO THAT THE CONFLICT CAN BE RESOLVED WITH A MINIMUM AMOUNT OF DELAY.

UTILITIES

18) ** WARNING ** - EXISTING UTILITY LINE LOCATIONS ARE SHOWN IN APPROXIMATE MANNER ONLY, AND SUCH LINES MAY EXIST WHERE NONE ARE SHOWN. THE LOCATION OF ANY SUCH EXISTING LINES IS BASED UPON INFORMATION PROVIDED BY THE UTILITY COMPANY, THE OWNER, OR BY OTHERS, AND THE INFORMATION MAY BE INCOMPLETE OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES. THE ENGINEER HAS UNDERTAKEN NO FIELD VERIFICATION OF THE LOCATION, DEPTH, SIZE, OR TYPE OF EXISTING UNDERGROUND UTILITY LINES, MAKES NO REPRESENTATION PERTAINING THERETO, AND ASSUMES NO RESPONSIBILITY OR LIABILITY THEREFOR. THE CONTRACTOR SHALL INFORM ITSELF OF THE LOCATION OF ANY UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY, AND PRESERVE ANY AND ALL EXISTING UTILITIES. THE CONTRACTOR SHALL COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES AND REGULATIONS PERTAINING TO THE LOCATION OF THESE LINES AND FACILITIES, IN PLANNING AND CONDUCTING EXCAVATION, WHETHER BY CALLING OR NOTIFYING THE UTILITIES, COMPLYING WITH "BLUE STAKES" PROCEDURES, OR OTHERWISE.

19) THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES WHEN WORKING NEAR THEIR SYSTEMS. TWO WORKING DAYS PRIOR TO ANY EXCAVATION, THE CONTRACTOR SHALL CALL NEW MEXICO ONE CALL SYSTEM INC. AT 260-1990 OR 811 VIA CELL PHONE REGARDING LOCATION OF EXISTING UTILITIES. CONTRACTOR MAY BE REQUIRED TO RESCHEDULE ITS ACTIVITIES TO ALLOW UTILITY CREWS TO PERFORM THEIR REQUIRED WORK.

20) IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL EXISTING UTILITIES WITH IN THE CONSTRUCTION AREA. ANY DAMAGE RESULTING FROM CONSTRUCTION ACTIVITIES WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE AND SHALL BE APPROVED BY THE ENGINEER.

21) CONTRACTOR SHALL SUPPORT ALL EXISTING UNDERGROUND UTILITY LINES WHICH BECOME EXPOSED DURING CONSTRUCTION. PAYMENT FOR ALL SUPPORTING WORK SHALL BE INCIDENTAL TO CONSTRUCTION COSTS.

22) ALL UTILITY VALVE BOXES, MANHOLES, AND/OR UTILITY POLES WHICH FALL WITHIN CONSTRUCTION ZONE SHALL BE ADJUSTED TO GRADE OR RELOCATED BY THE RESPECTIVE UTILITIES, UNLESS OTHERWISE NOTED ON PLANS. THE CONTRACTOR SHALL COORDINATE SUCH ACTIVITIES IN ORDER TO FACILITATE ADJUSTMENT OR RELOCATION IN A TIMELY MANNER.

23) CONTRACTOR SHALL COORDINATE WITH THE ABCWUA (857-8200) SEVEN (7) WORKING DAYS IN ADVANCE OF ANY WORK THAT MAY AFFECT EXISTING PUBLIC WATER OR SEWER UTILITIES. EXISTING VALVES TO BE OPERATED BY ABCWUA PERSONNEL ONLY. CONTRACTOR SHALL CONTACT THE WATER SYSTEMS DIVISION SEVEN (7) WORKING DAYS PRIOR TO NEEDING VALVES TURNED ON OR OFF.

24) PNM (PUBLIC SERVICE CO. OF NEW MEXICO) WILL PROVIDE AT NO COST TO THE CITY OR TO THE CONTRACTOR THE REQUIRED PERSONNEL FOR INSPECTION OR OBSERVATION DEEMED NECESSARY BY PNM WHILE THE CONTRACTOR IS EXPOSING PNM'S CABLES. HOWEVER, THE CONTRACTOR SHALL BE CHARGED THE TOTAL COST ASSOCIATED WITH REPAIRS TO ANY DAMAGED CABLES OR FOR ANY COST ASSOCIATED WITH SUPPORTING OR RELOCATING THE POLES AND CABLES DURING CONSTRUCTION.

25) RCP SHALL BE INSTALLED SO THAT THE JOINT GAP AT THE HOME POSITION SHALL CONFORM TO THE APPROVED MANUFACTURER'S RECOMMENDATIONS. MANUFACTURER'S RECOMMENDED JOINT GAP TOLERANCES FOR EACH PIPE SIZE AND TYPE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PLACEMENT OF PIPE. RCP JOINTS SHALL NOT BE GROUTED UNLESS DIRECTED BY THE ENGINEER AFTER CITY APPROVAL. RCP SHALL BE RUBBER GASKETED TONGUE AND GROOVE.

26) ALL UTILITIES AND UTILITY SERVICE LINES SHALL BE INSTALLED PRIOR TO PAVING. BACK FILL COMPACTION SHALL BE ACCORDING TO SPECIFIED STREET USE.

GENERAL CONSTRUCTION

27) THE CONTRACTOR IS TO COORDINATE ALL WORK WITH THE ENGINEER.

28) IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO SECURE AND SUPPLY WATER FOR THE PROJECT. THE COST WILL BE INCIDENTAL TO COMPLETION OF THE PROJECT AND NO SEPARATE PAYMENT WILL BE MADE THEREFORE.

29) THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REMOVALS REQUIRED TO COMPLETE THE PROJECT. ADDITIONAL REMOVALS NOT SHOWN ON THE PLANS MAY BE DESIGNATED BY THE MANAGER. ALL REMOVALS, UNLESS OTHERWISE INDICATED WILL BE INCIDENTAL TO SITE CLEARING AND GRUBBING.

30) ANY SALVAGEABLE MATERIALS REMOVED FROM THIS PROJECT SHALL BE HAULED AND STOCK PILED AT A LOCAL LOCATION DETERMINED BY THE ENGINEER. HAUL OF SUCH MATERIALS SHALL BE INCIDENTAL TO SITE CLEARING AND GRUBBING.

31) THE CONTRACTOR SHALL BE REQUIRED TO CONFINE HIS WORK WITHIN THE CONSTRUCTION LIMITS AND/OR RIGHT-OF-WAY LIMITS.

32) THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED BY IT TO EXISTING WALLS, FENCES, SIDEWALKS, TRAIL SURFACES, IRRIGATION LINES, VALVE BOXES, MANHOLES, CURB AND GUTTER, ETC, DURING CONSTRUCTION AND SHALL REPAIR OR REPLACE SAME AT ITS OWN EXPENSE. THE CONTRACTOR IS RESPONSIBLE FOR DOCUMENTATION OF ANY EXISTING DAMAGE PRIOR TO START OF CONSTRUCTION.

33) SEVEN (7) WORKING DAYS PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT TO CONSTRUCTION COORDINATION DIVISION A DETAILED CONSTRUCTION SCHEDULE. TWO (2) WORKING DAYS PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL OBTAIN A BARRICADING PERMIT FROM THE CONSTRUCTION COORDINATION DIVISION. CONTRACTOR SHALL NOTIFY BARRICADE ENGINEER (924-3400) PRIOR TO OCCUPYING AN INTERSECTION. REFER TO SECTION 19 OF THE GENERAL CONDITIONS OF THE COA STANDARD SPECIFICATIONS.

34) THE CONTRACTOR SHALL BE THE RESPONSIBLE PARTY FOR THE IMPLEMENTATION AND MAINTENANCE OF ALL TRAFFIC CONTROL PROCEDURES AND MATERIALS. THE CONTRACTOR SHALL HAVE PERSONNEL AVAILABLE 24 HOURS PER DAY, SEVEN (7) DAYS PER WEEK TO INSPECT AND MAINTAIN TRAFFIC CONTROL DEVICES AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING ALL CONSTRUCTION SIGNING UNTIL PROJECT HAS BEEN ACCEPTED BY THE CITY OF ALBUQUERQUE AND/OR BERNALILLO COUNTY.

35) CONTRACTOR SHALL PRESERVE ALL EXISTING SIGNS. SIGNS REMOVED TO FACILITATE CONSTRUCTION SHALL BE INSTALLED AT THE SAME LOCATION PER COA STD SPECS.

36) ALL STREET STRIPING ALTERED OR DESTROYED SHALL BE REPLACED WITH REFLECTORIZED PAVEMENT MARKINGS BY CONTRACTOR TO LOCATION AS EXISTING OR AS INDICATED BY THIS PLAN SET.

37) ALL SIGNS AND CODING WILL BE IN ACCORDANCE WITH THE LATEST EDITION OF MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS - "TRAFFIC CONTROL DEVICES FOR BICYCLE FACILITIES," PUBLISHED BY THE U.S. DEPARTMENT OF TRANSPORTATION. COORDINATE LOCATION FOR NEW SIGNS AND/OR POSTS WITH TRAFFIC OPS. ENGINEER.

38) WHEN ABUTTING NEW CURB AND GUTTER TO EXISTING PAVEMENT, A ONE FOOT (1') WIDE SECTION OF EXISTING PAVEMENT ADJACENT TO THE NEW CURB AND GUTTER SHALL BE SAWCUT, REMOVED, AND REPLACED AS PER THE STANDARD SPECIFICATIONS. REFERENCE COA STANDARD DRAWING #2415. NO DIRECT PAYMENT WILL BE MADE FOR SAW CUTTING.

39) THE FINAL SURFACE OF THE REPLACED PAVEMENT AND GUTTER SHALL CONFORM TO A GRADE LINE SET BY THE CONTRACTOR SUCH THAT THE PAVEMENT AND GUTTER WILL READILY DRAIN AND DOES NOT VARY SIGNIFICANTLY FROM ADJACENT EXISTING GRADES.

40) ALL SAWCUT PAVEMENT SHALL HAVE A UNIFORM EDGE AND BE SPRAYED WITH TACK.

41) WHEN REMOVAL OF EXISTING CURB AND GUTTER OR SIDEWALK IS REQUIRED, REMOVE BACK TO NEAREST SUITABLE JOINT UNLESS OTHERWISE NOTED.

42) EXISTING CURB AND GUTTER NOT CALLED OUT TO BE REMOVED UNDER THE CONTRACT WHICH IS DAMAGED OR DISPLACED BY THE CONTRACTOR SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S OWN EXPENSE PER COA STANDARD DWG. 2415A

43) CONTRACTOR SHALL INDICATE SAS SERVICE LINE LOCATION WITH IMPRINTED "S" ON CURB FOR ALL SAS SERVICE LINES EXPOSED DURING CONSTRUCTION.

44) CONTRACTOR SHALL RECORD DATA ON ALL UTILITY LINES AND ACCESSORIES AS BY THE CITY OF ALBUQUERQUE FOR THE PREPARATION OF "AS CONSTRUCTED" DRAWINGS. CONTRACTOR SHALL NOT COVER UTILITY LINES AND ACCESSORIES UNTIL ALL DATA HAS BEEN RECORDED. THESE SHALL BE KEPT CURRENT AT ALL TIMES AND SHALL BE SUBJECT TO REVIEW BY THE ENGINEER THROUGHOUT THE PROJECT. THE FINAL AS-BUILT PLANS SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO FINAL PAYMENT.

45) QUANTITIES SHOWN HEREIN, FOR THE VARIOUS BID ITEMS, ARE FOR THE CONTRACTOR'S INFORMATION ONLY. PAYMENT SHALL BE BASED ON ACTUAL QUANTITIES AS CONSTRUCTED.

46) OVERNIGHT PARKING OF CONSTRUCTION EQUIPMENT SHALL NOT OBSTRUCT DRIVEWAYS OR DESIGNATED TRAFFIC LANES. THE CONTRACTOR SHALL NOT STORE ANY EQUIPMENT OR MATERIAL WITHIN THE PUBLIC RIGHT-OF-WAY.

47) CONTRACTOR SHALL MAINTAIN A GRAFFITI-FREE WORK SITE. CONTRACTOR SHALL PROMPTLY REMOVE ANY GRAFFITI FROM ALL EQUIPMENT AND STRUCTURES, WHETHER PERMANENT OR TEMPORARY.

WASTE DISPOSAL REQUIREMENTS

48) THE CONTRACTOR SHALL PROPERLY HANDLE AND DISPOSE OF ALL ASPHALT PAVEMENT MATERIAL REMOVED ON THE PROJECT BY BREAKING DOWN TO MAXIMUM 4" SIZE AND PLACING WITHIN NEW ROADWAY PRISM AT LEAST 2 FEET BELOW FINISHED GRADE, RECYCLING, STOCK PILING, AND/OR HAULING TO AN APPROVED LANDFILL IN ACCORDANCE WITH THE REGULATIONS OF THE NEW MEXICO SOLID WASTE ACT.

49) ITEMS DESIGNATED FOR REMOVAL WITHOUT SALVAGE, UNSUITABLE CONSTRUCTION MATERIALS AND DEBRIS FROM CLEARING AND GRUBBING, ARE TO BE PLACED IN AN ENVIRONMENTALLY SUITABLE DISPOSAL SITE DECIDED UPON AND COORDINATED BY THE CONTRACTOR, WITH THE APPROPRIATE REGULATORY AGENCIES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING OF THE DETAILS OF DISPOSAL OPERATIONS. BORROW MATERIAL, ROCK WASTE, VEGETATIVE DEBRIS, ETC. SHALL NOT BE PLACED IN WETLAND AREAS OR AREAS WHICH MAY IMPACT ENDANGERED SPECIES OR ARCHAEOLOGICAL RESOURCES. AN ARCHAEOLOGICAL SURVEY AND ENVIRONMENTAL CLEARANCE SHALL BE GAINED BY THE CONTRACTOR BEFORE DISPOSAL SITES ARE ACCEPTED.

HAZARDOUS SPILLS REQUIREMENTS

50) THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING AND CLEANUP OF SPILLS ASSOCIATED WITH PROJECT CONSTRUCTION AND SHALL REPORT AND RESPOND TO SPILLS OF HAZARDOUS MATERIALS SUCH AS GASOLINE, DIESEL, MOTOR OILS, SOLVENTS, CHEMICALS, TOXIC AND CORROSIVE SUBSTANCES, ETC., WHICH MAY BE A THREAT TO PUBLIC HEALTH OR THE ENVIRONMENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING DISCOVERIES OF PAST SPILLS AND OF CURRENT SPILLS NOT ASSOCIATED WITH CONSTRUCTION. REPORTS SHALL BE MADE IMMEDIATELY TO THE NM ENVIRONMENT DEPARTMENT EMERGENCY RESPONSE AT 827-9329. NON-EMERGENCIES MAY BE REPORTED TO 428-2500.

ENVIRONMENTAL COMPLIANCE

51) THE CONTRACTOR SHALL COMPLY WITH ALL REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY, INCLUDING THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEMS (NPDES) PROGRAM. FOR INFORMATION, CONTACT THE NPDES CONTACT FOR THE STATE OF NEW MEXICO AT (505) 827-2855. THE CONTRACTOR IS RESPONSIBLE FOR SECURING ALL PERMITS REQUIRED BY FEDERAL, STATE, AND CITY REGULATIONS FOR NPDES COMPLIANCE.

52) THE AIR POLLUTION CONTROL REGULATION OF THE ALBUQUERQUE - BERNALILLO COUNTY AIR QUALITY CONTROL BOARD LIMIT EMISSIONS OF PARTICULATE MATTER AND THE USE OF CUT BACK ASPHALT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CLARIFY THESE RESTRICTIONS WITH THE ENVIRONMENTAL HEALTH DEPARTMENT PRIOR TO SUBMITTAL OF BIDS TO AVOID CONFLICT WITH THE REGULATIONS. CALL THE ENVIRONMENTAL HEALTH DEPARTMENT AT 768-2600.

VIBRATION MONITORING AND VIDEO TAPING

53) VIBRATION MONITORING AND VIDEO TAPING DOCUMENTATION SHALL BE PERFORMED IN AND AROUND ALL STRUCTURES AS DEFINED IN THIS GENERAL NOTE AND AS DIRECTED BY THE PROJECT MANAGER. "STRUCTURE" IS DEFINED AS BUILDINGS, RETAINING AND PRIVACY WALLS, END WALLS, DROP INLETS, CATCH BASINS, SEWER AND SERVICE PIPES, DRAINS AND OTHER FEATURES THAT MAY BE ENCOUNTERED DURING CONSTRUCTION. THE CONSTRUCTION AREA AND AREAS ADJACENT TO THE LIMITS OF CONSTRUCTION SHALL ALSO BE VIDEO TAPED.

UTILITY CONTACTS

PNM ELECTRIC	CHRIS BUDD	(505) 401-7432
COMCAST	MORTUS, MIKE	(505) 761-6235
QWEST/US WEST	BEVERLY YOUNG	(505) 245-5934
ABCWUA	ANTHONY MONTOYA	(505) 768-2713
GAS CO. OF NM	JOE DUNLOP	(505) 269-7506
AT&T	MARK EDWARDS	(505) 227-1151

EXISTING LEGEND

- -OHU- = OVERHEAD UTILITY LINE
- = SEWER MANHOLE
- = WATER METER
- = WATER VALVE
- = SEWER CLEANOUT
- = ELECTRIC RISER
- = DRAINAGE MANHOLE
- = TELEPHONE RISER
- = POWER POLE
- = FIRE HYDRANT

SANITARY MANHOLE & LINE

FENCE

UNDERGROUND TELEPHONE LINE

CABLE TELEVISION

FIBER OPTIC LINE

WATER LINE

GAS LINE

PROPOSED LEGEND

MOUNTABLE CURB & GUTTER

STORM DRAIN MANHOLE & LINE

DOUBLE D INLET

SINGLE D INLET

WATER LINE

ABBREVIATIONS

- BOP BEGINNING OF PROJECT
- EOP END OF PROJECT
- LF LINEAR FEET
- R/W RIGHT-OF-WAY
- MH MANHOLE
- GR GRATE

AS-BUILT INFORMATION

CONTRACTOR	DATE
WORK STAKED BY	DATE
INSPECTOR'S ACCEPTANCE BY	DATE
FIELD VERIFICATION BY	DATE
DRAWINGS CORRECTED BY	DATE

MICRO-FILM INFORMATION

RECORDED BY	DATE
NO.	

BENCH MARKS

BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

SURVEY INFORMATION

FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

MICHAEL D. SMITH, NEW MEXICO, 16050, LICENSED PROFESSIONAL ENGINEER, 9-16-09

No.	Date	REMARKS	By

REVISIONS

DESIGN

Designed By: MDS DATE: JUNE 2009

Drawn By: CP,RAO,PMW DATE: JUNE 2009

Checked By: EVD DATE: JUNE 2009

Resource Technology, Inc.

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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
GENERAL NOTES AND LEGEND

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

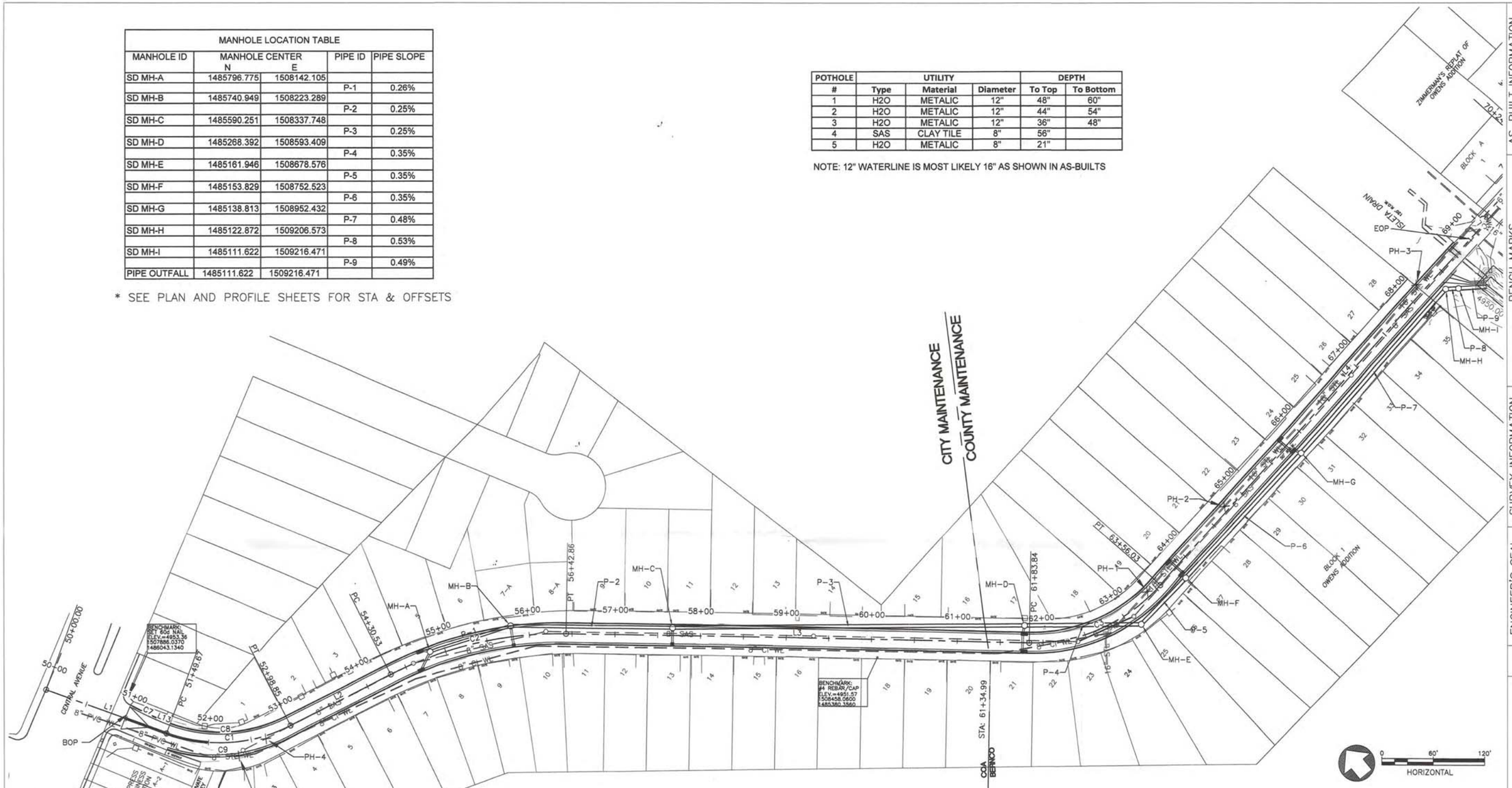
County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	2	13

MANHOLE LOCATION TABLE				
MANHOLE ID	MANHOLE CENTER N	MANHOLE CENTER E	PIPE ID	PIPE SLOPE
SD MH-A	1485796.775	1508142.105		
			P-1	0.26%
SD MH-B	1485740.949	1508223.289		
			P-2	0.25%
SD MH-C	1485590.251	1508337.748		
			P-3	0.25%
SD MH-D	1485268.392	1508593.409		
			P-4	0.35%
SD MH-E	1485161.946	1508678.576		
			P-5	0.35%
SD MH-F	1485153.829	1508752.523		
			P-6	0.35%
SD MH-G	1485138.813	1508952.432		
			P-7	0.48%
SD MH-H	1485122.872	1509206.573		
			P-8	0.53%
SD MH-I	1485111.622	1509216.471		
			P-9	0.49%
PIPE OUTFALL	1485111.622	1509216.471		

* SEE PLAN AND PROFILE SHEETS FOR STA & OFFSETS

POTHOLE	UTILITY			DEPTH	
#	Type	Material	Diameter	To Top	To Bottom
1	H2O	METALIC	12"	48"	60"
2	H2O	METALIC	12"	44"	54"
3	H2O	METALIC	12"	36"	48"
4	SAS	CLAY TILE	8"	56"	
5	H2O	METALIC	8"	21"	

NOTE: 12" WATERLINE IS MOST LIKELY 16" AS SHOWN IN AS-BUILTS



CENTERLINE

Line Table: Alignments		
Line #	Length	Direction
L1	149.67	S17° 40' 00.67"E
L2	131.69	S65° 08' 59.03"E
L3	540.98	S36° 54' 58.58"E
L4	668.16	S86° 14' 37.60"E

CENTERLINE

Curve Table: Alignments				
Curve #	Delta	Radius	Tangent	Length
C1	S41° 24' 30"E	180.00	79.17	149.17
C2	S51° 01' 59"E	430.88	108.36	212.32
C3	S61° 34' 48"E	200.00	91.84	172.19

Point Table			
Point #	Northing	Easting	Description
1	1486123.23	1507831.92	CL – 50+00.00 – BOA
3	1485980.40	1507877.41	CL – 51+49.91 – PC
4	1485872.01	1507972.99	CL – 52+98.64 – PT
6	1485816.57	1508092.70	CL – 54+30.56 – PC
7	1485684.39	1508256.12	CL – 56+42.89 – PT
9	1485251.87	1508581.06	CL – 61+83.87 – PC
10	1485172.43	1508727.86	CL – 63+56.05 – PT
11	1485128.66	1509394.58	CL – 70+24.21 – EOA
12	1485905.18	1507901.37	CL – 52+28.84 – CPI
13	1485771.03	1508191.03	CL – 55+38.93 – CPI

LEFT AND RIGHT MOUNTABLE CURB ALIGNMENT FROM BOP TO STA: 52+98.55 CURB/ASPHALT INTERFACE

Line Table: Alignments		
Line #	Length	Direction
L13	2.93	S15° 00' 14.64"E

Curve Table: Alignments				
Curve #	Delta	Radius	Tangent	Length
C7	S11° 50' 34"E	357.09	19.72	39.40
C8	S40° 04' 37"E	169.37	79.24	148.23
C9	S40° 51' 02"E	180.00	81.76	153.48

AS-BUILT INFORMATION
CONTRACTOR DATE
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BENCH MARKS
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MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE

ENGINEER'S SEAL
MICHAEL D. SMITH NEW MEXICO 16050 REGISTERED PROFESSIONAL ENGINEER
9/16/09

No.	Date	By	REMARKS
			REVISIONS
			DESIGN
			DATE: JUNE 2009
			Designed By: MDS
			DATE: JUNE 2009
			Drawn By: CP, RAO, PMW
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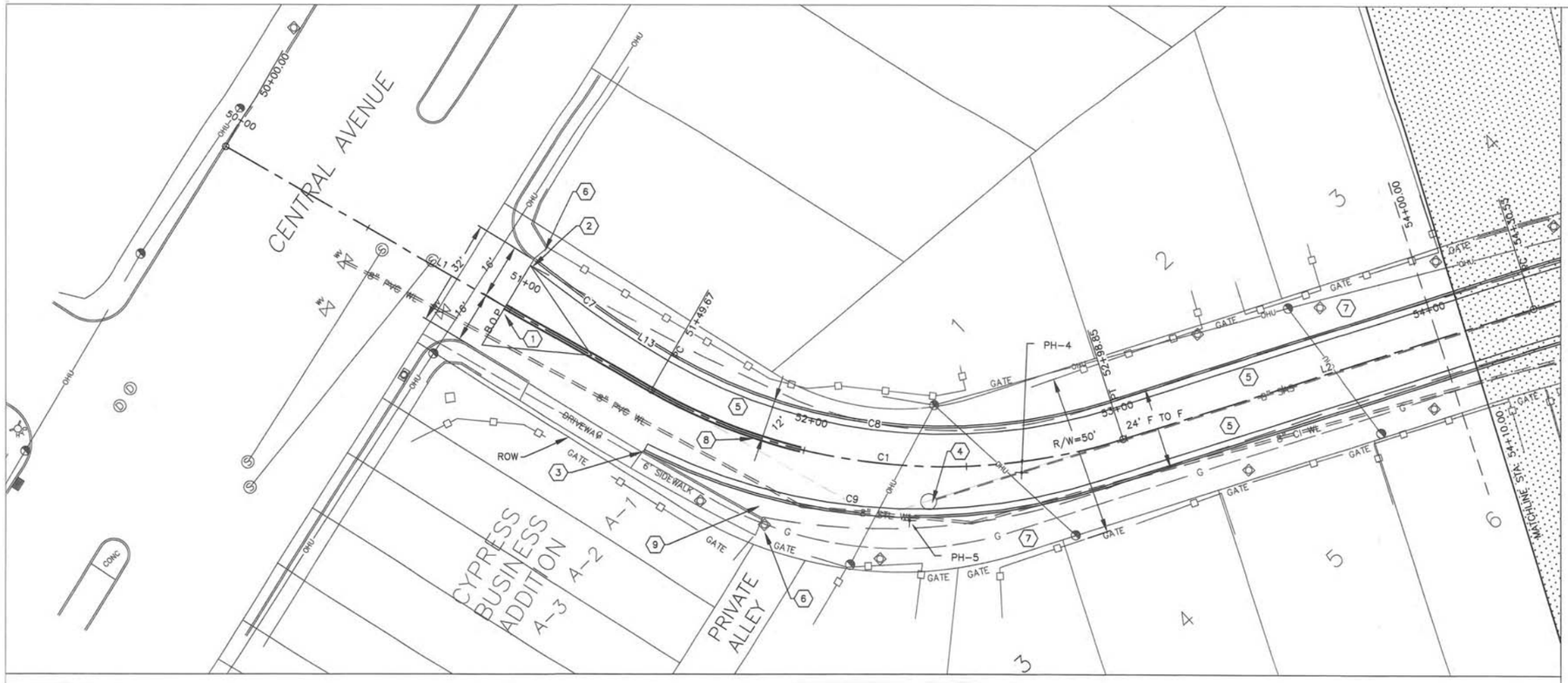
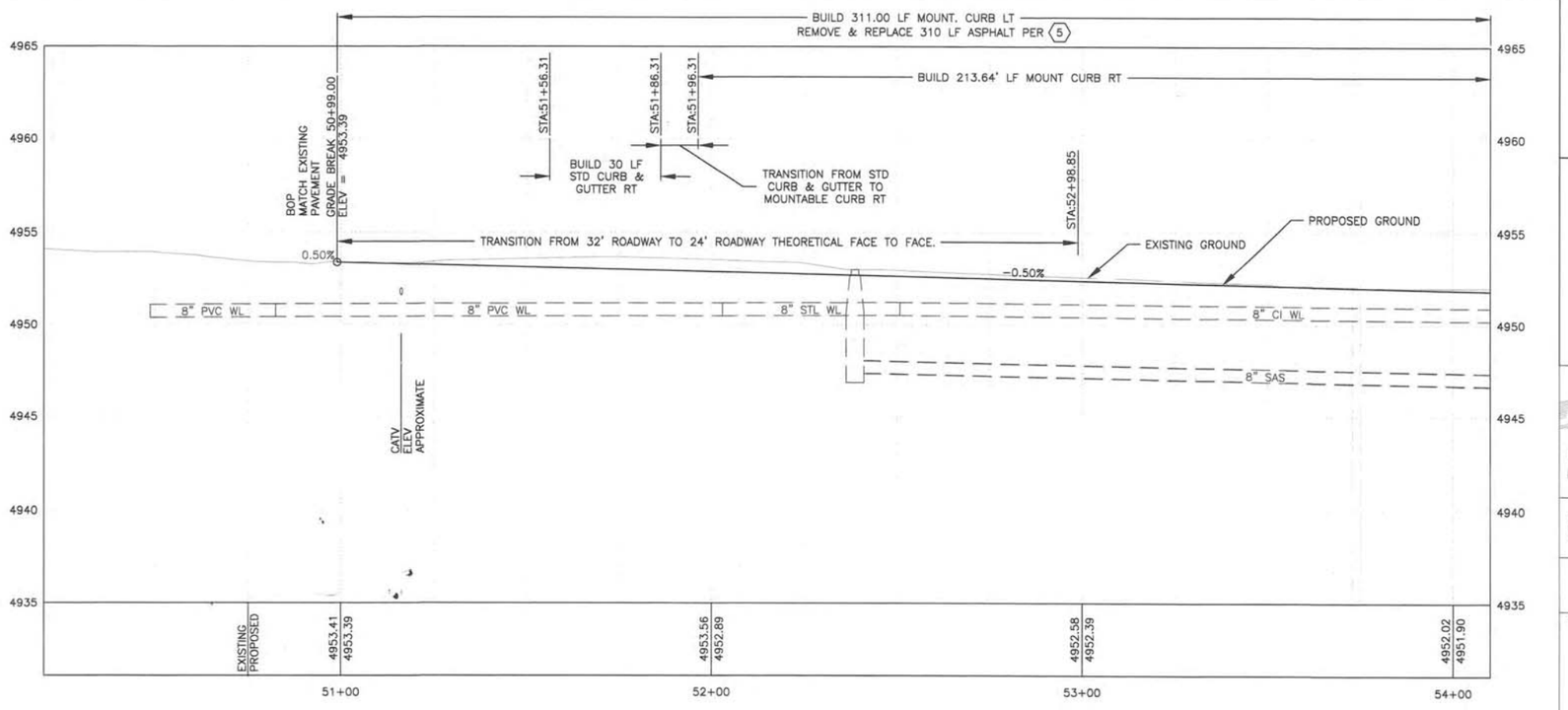
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN SURVEY CONTROL

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	3	13





GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
2. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.
3. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.
4. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. DO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
5. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLES.

KEYED NOTES

1. SAWCUT PAVEMENT STA: 50+99.00 BEGIN TRANSITION FROM NO CROWN AT STA: 50+99.00 TO 1% CROWN AT STA: 51+24.00
2. 10' TRANSITION FROM MOUNTABLE CURB TO EXISTING HANDICAP RAMP WITH STANDARD C & G INTERFACE.
3. REMOVE 1 SECTION CURB AND GUTTER FROM JOINT WITH EXISTING DRIVEWAY (DO NOT DISTURB DRIVEPAD). CONSTRUCT 30 LF. STANDARD CURB AND GUTTER AND TRANSITION OVER 10' TO MOUNTABLE CURB.
4. ADJUST MANHOLE ELEV. TO NEW GRADE. INCLUDE CONCRETE PAD PER COA STD DWG 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENT.
5. REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.
6. PROVIDE 6H:IV MINIMUM TIE-IN GRADES TO EXISTING ELEV.
7. GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).
8. 4" DOUBLE THERMOPLASTIC YELLOW STRIP PER STANDARD.
9. BACKFILL BETWEEN CURB AND GUTTER. GRADE TO DRAIN TO NEW ROADWAY.

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

AS-BUILT INFORMATION
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ENGINEER'S SEAL
MICHAEL D. SMITH NEW MEXICO 16050 REGISTERED PROFESSIONAL ENGINEER
9-9-09

No.	Date	By	REMARKS
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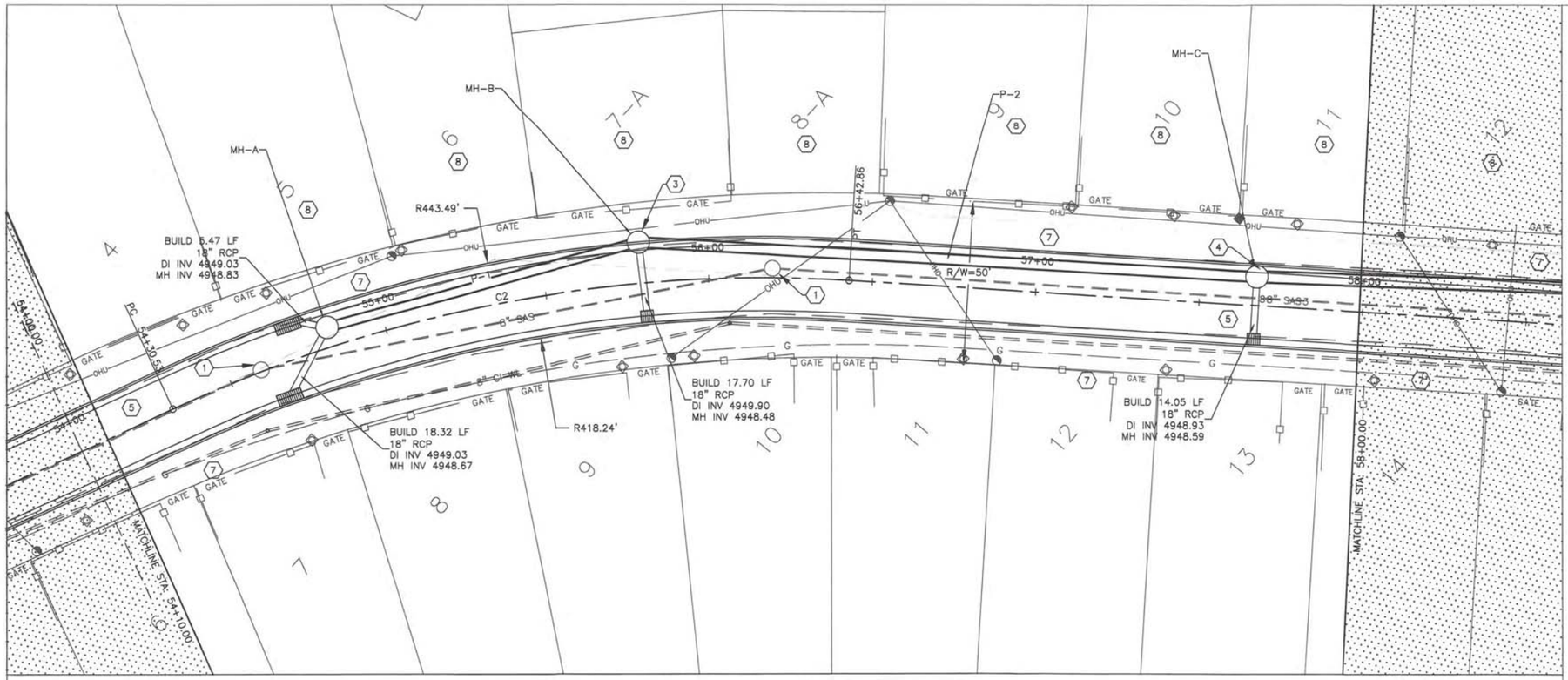
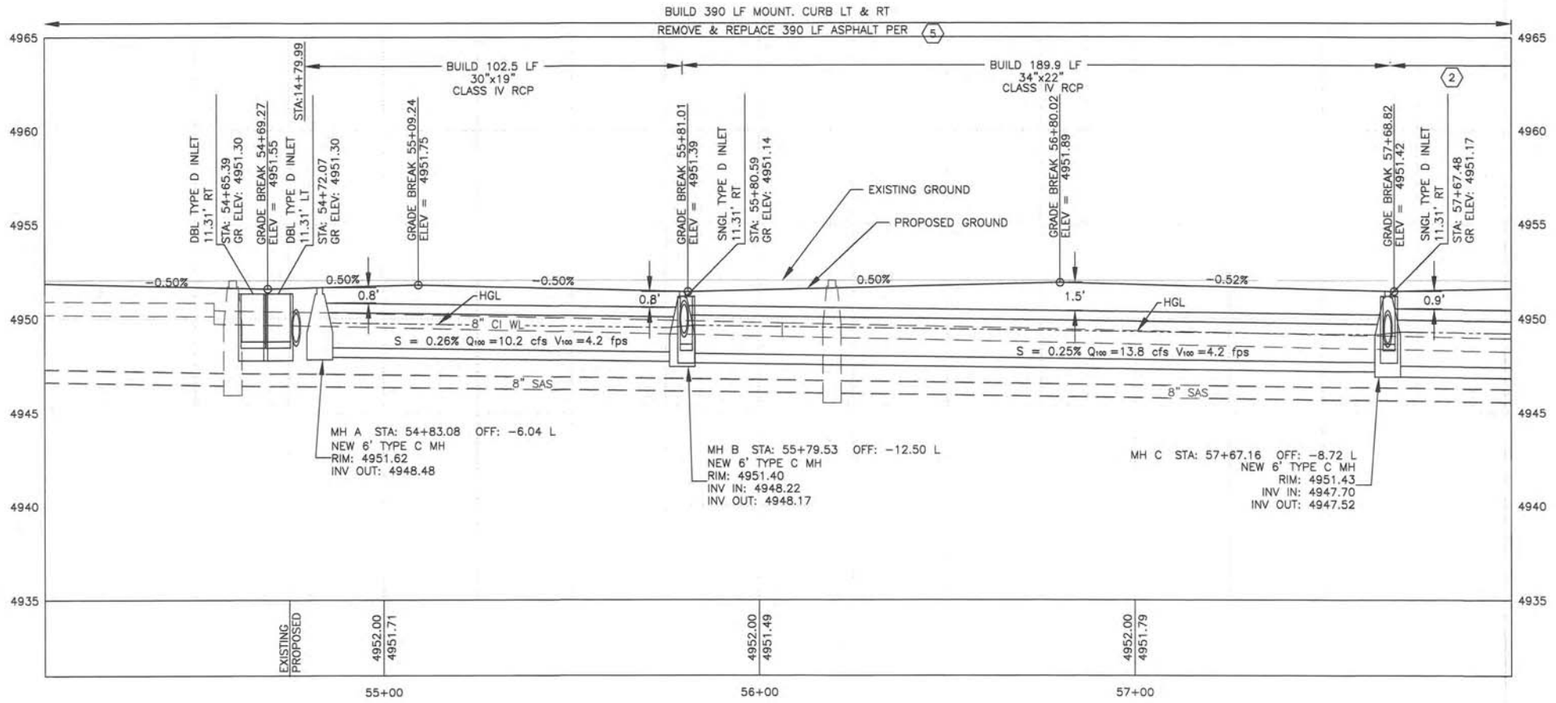
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 50+00 TO 54+10

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	4	13





GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
2. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.
3. INLET OFFSET AND ELEV. REFERS TO BACK OF GRATE. ALL DROP INLETS CONSTRUCTED PER COA STD DWGS 2206 & 2220.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.
5. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

⬡ KEYED NOTES

1 ADJUST MANHOLE ELEV TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 6. RCP LENGTH AND TYPE.

3 MANHOLE OPENING CENTERED ON SOUTH-WEST, WITH NEENAH FRAME AND R-1792-FG GRATE OR APPROVED EQUIVALENT. SEE SHEET 10 FOR CURB MODIFICATION

4 MANHOLE OPENING CENTERED ON NORTH-EAST, WITH NEENAH FRAME AND R-1792-FG GRATE OR APPROVED EQUIVALENT. SEE SHEET 10 FOR CURB MODIFICATION.

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND . DETAIL 4 FOR WATER SERVICE MODIFICATION

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY DATE
ACCEPTANCE BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE

BENCH MARKS
BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE

ENGINEER'S SEAL
MICHAEL D. SMITH
NEW MEXICO
16050
REGISTERED PROFESSIONAL ENGINEER
9-18-09

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

No.	Date	REMARKS
		REVISIONS
		DESIGN
		Designed By: MDS DATE:JUNE 2009
		Drawn By: CP,RAO,PMW DATE:JUNE 2009
		Checked By: EVD DATE:JUNE 2009

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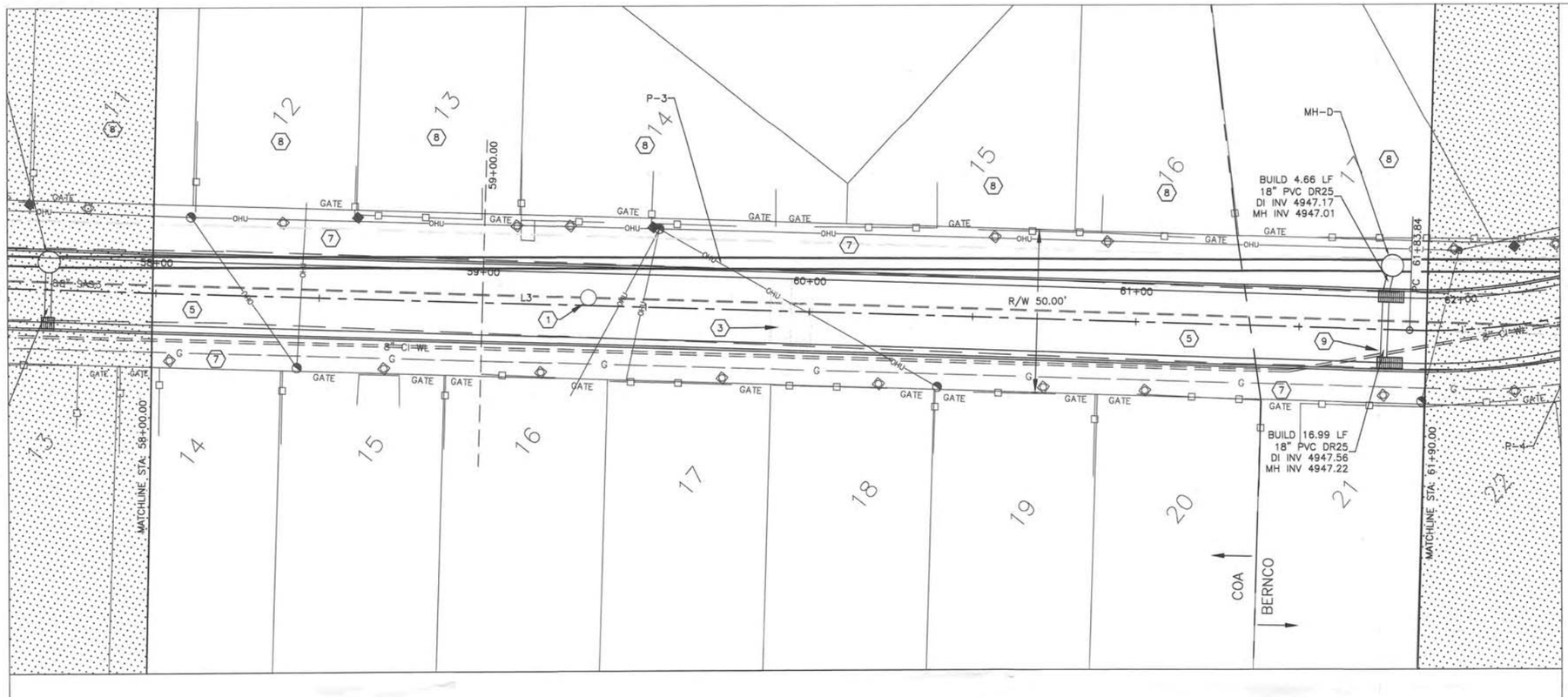
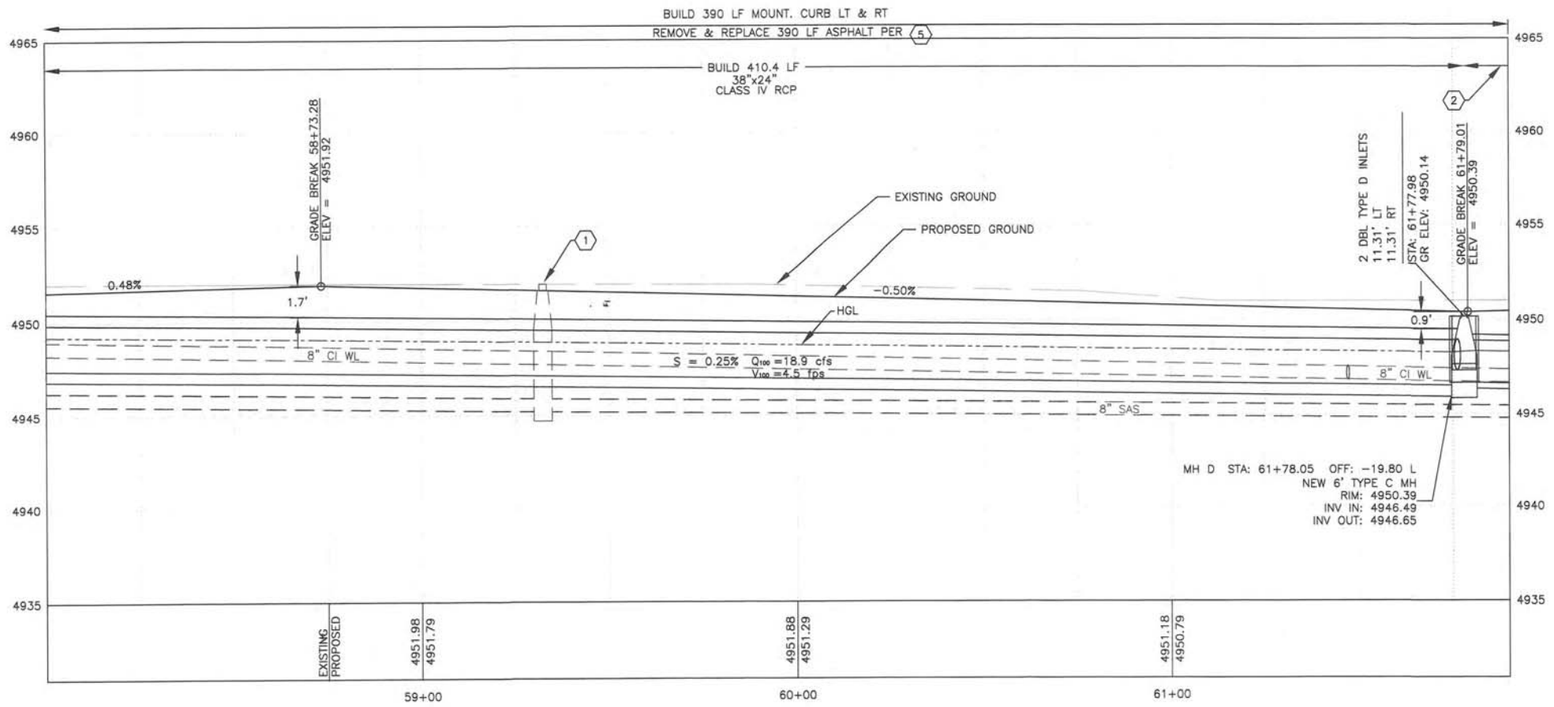
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 54+10 TO 58+00

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	5	13





GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
2. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.
3. INLET OFFSET AND ELEV REFERS TO BACK OF GRATE.
4. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.
5. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV. TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 7. FOR RCP LENGTH AND TYPE.

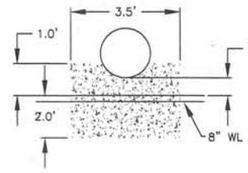
3 REPLACE SPEED HUMP PER SHEET 10.

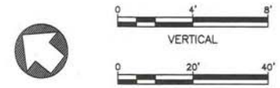
5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND DETAIL 4 FOR WATER SERVICE MODIFICATION.

9 PER COA STD SPEC 207, 3.0 FT LEAN FILL CENTERED ON 18" RCP.





AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY DATE
CONSTRUCTION ACCEPTANCE BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
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SURVEY INFORMATION
FIELD NOTES
NO. BY DATE

ENGINEER'S SEAL
MICHAEL D. SMITH NEW MEXICO 16050 REGISTERED PROFESSIONAL ENGINEER
9-16-09

No.	Date	By	REMARKS
			REVISIONS
			DESIGN
			DATE:JUNE 2009
		MDS	Designed By:
		CP,RAO,PMW	Drawn By: DATE:JUNE 2009
		EVD	Checked By: DATE:JUNE 2009

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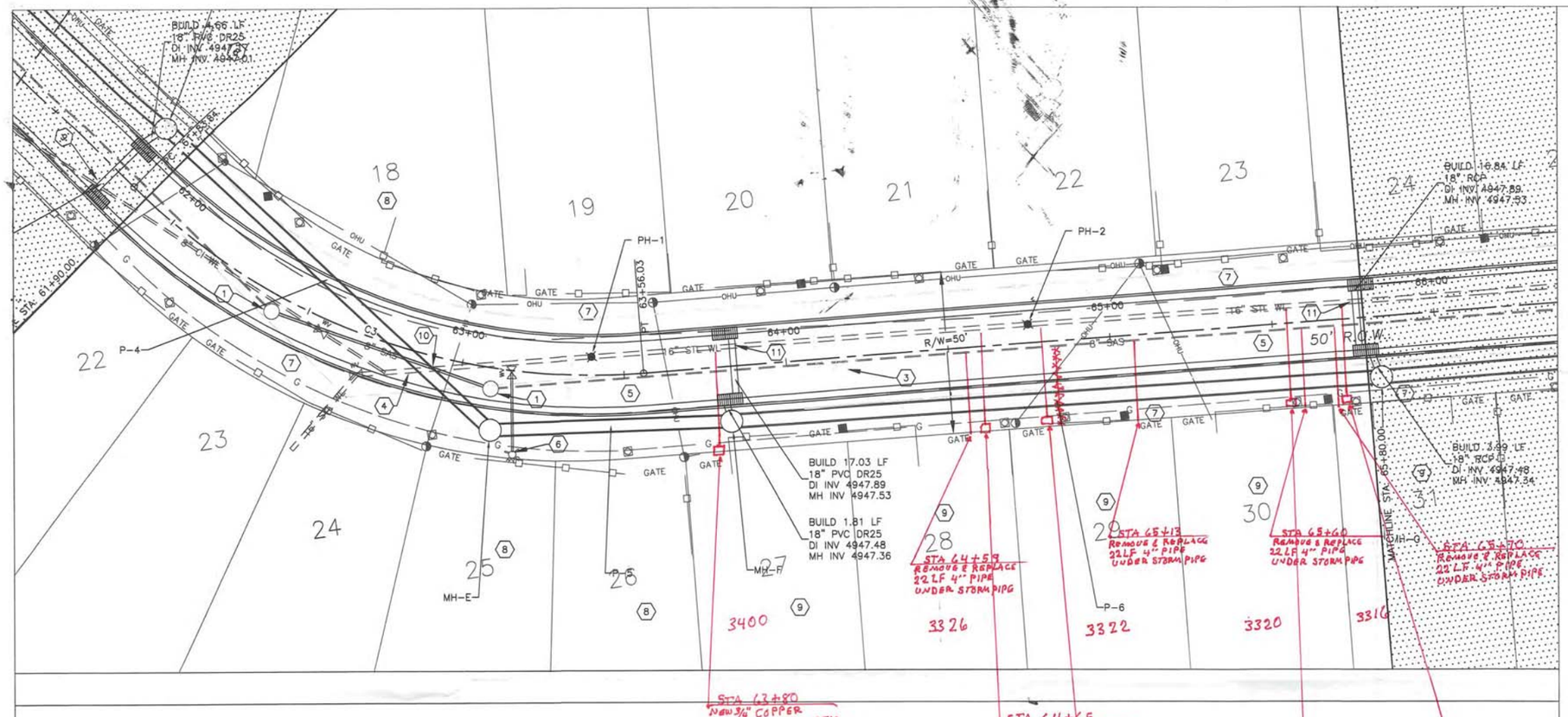
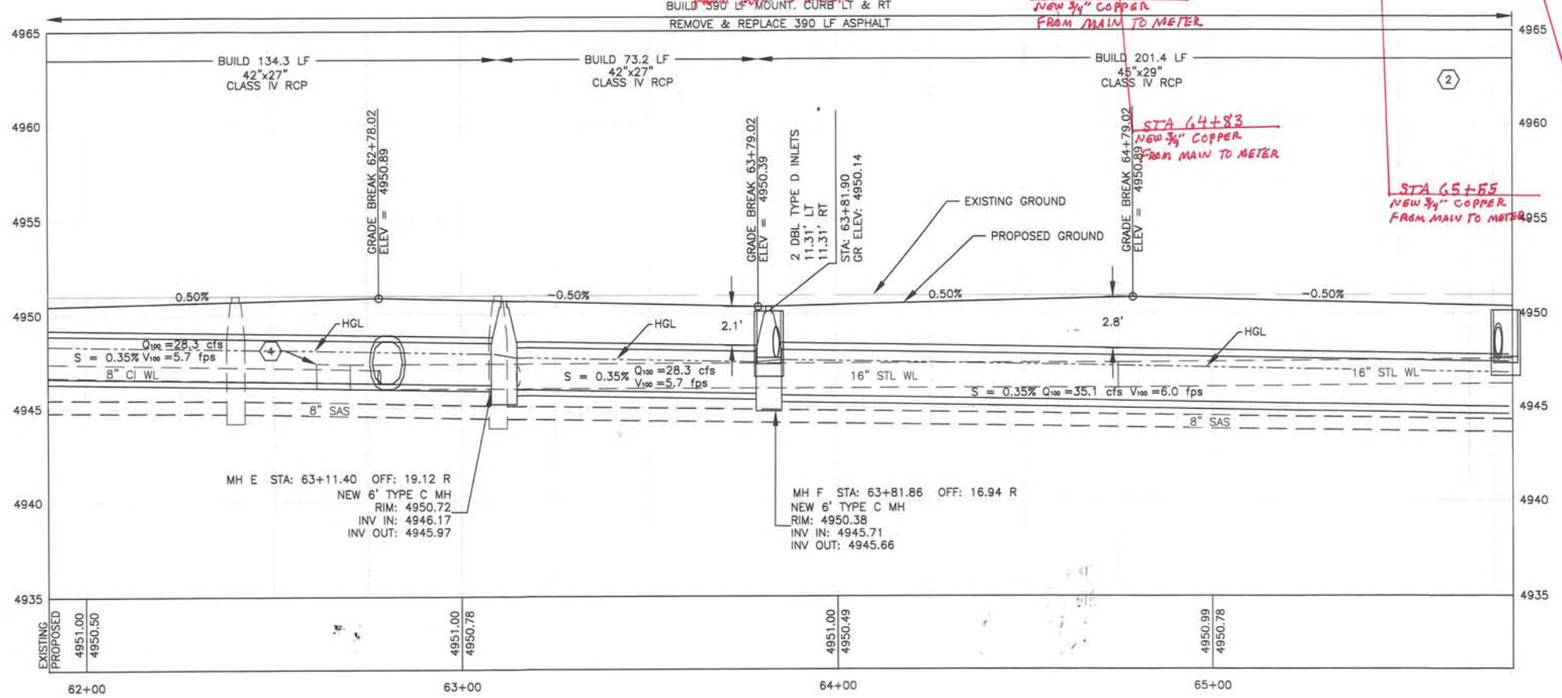
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 58+00 TO 61+90

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	6	13





GENERAL NOTES

1. SEE SHEET 10 FOR PAVEMENT DETAILS
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5. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.
5. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLE.
6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV. TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 8 FOR RCP END STATION.

3 REPLACE SPEED HUMP PER SHEET 10.

4 SEE SHEET 9 FOR WATERLINE MODIFICATION.

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

6 NOTIFY FIRE MARSHAL SEVEN (7) DAYS PRIOR TO WATERLINE SHUTOFF THAT THE HYDRANT WILL BE TEMPORARILY OUT OF SERVICE. COVER IN BLACK PLASTIC WHILE OUT OF SERVICE.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND DETAIL 4 FOR WATER SERVICE MODIFICATION.

9 SEE SHEET 9 DETAIL 1 FOR SAS SERVICE MODIFICATION.

10 SEE SHEET 9 DETAIL 3 FOR RCP CROSSING OF SAS MAIN.

11 SEE SHEET 9 DETAIL 5 FOR LEAN FILL DETAIL.

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

AS-BUILT INFORMATION
CONTRACTOR
DATE
WORK STAKED BY
DATE
ACCEPTANCE BY
DATE
FIELD VERIFICATION BY
DATE
DRAWINGS CORRECTED BY
DATE

BENCH MARKS
MICRO-FILM INFORMATION
RECORDED BY
DATE
NO.

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE
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ENGINEER'S SEAL
MICHAEL D. SMITH
NEW MEXICO
16050
REGISTERED PROFESSIONAL ENGINEER
6-9-09

No.	Date	REMARKS	By
		REVISIONS	
		DESIGN	

Designed By: MDS DATE:JUNE 2009
Drawn By: CP,RAO,PMW DATE:JUNE 2009
Checked By: EVD DATE:JUNE 2009

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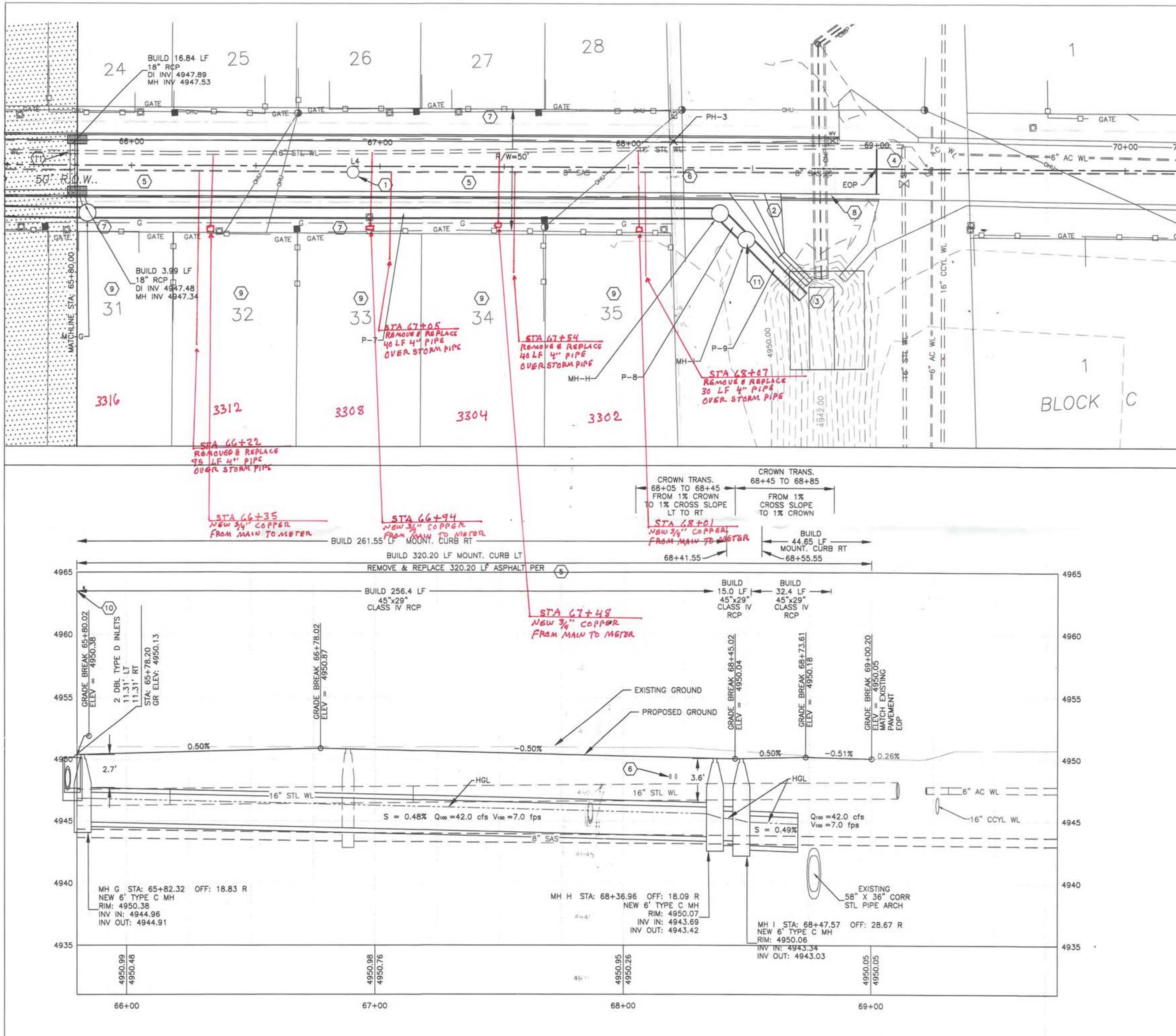
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 61+90 TO 65+80

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	7	13



GENERAL NOTES

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6. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.
7. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1. ADJUST MANHOLE ELEV TO NEW GRADE, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.
2. SEE SHEET 11 FOR RUNDOWN DETAILS
3. SEE SHEET 11 FOR EROSION PROTECTION DETAILS
4. SAWCUT PAVEMENT STA: 69+00.09
5. REMOVE AND DISPOSE OF EXISTING ASPHALT.
6. FIBER OPTIC LINE AND TELEPHONE LINE ELEVATIONS ARE APPROXIMATE. BOTH LINES SHALL BE SUPPORTED AND PROTECTED DURING CONSTRUCTION. CONTACT AT&T REP FOR STANDBY THREE DAYS PRIOR TO CONSTRUCTION NEAR FIBER OPTIC LINE.
7. GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS)
8. REPLACE SPEED HUMP PER SHEET 10.
9. SEE SHEET 9 DETAIL 2 FOR SAS SERVICE MODIFICATION AND DETAIL 4 FOR WATER SERVICE MODIFICATION.
10. SEE SHEET 7 FOR RCP LENGTH AND TYPE
11. WATER QUALITY MH STC900 PRECAST CONCRETE STORMCEPTOR OR APPROVED EQUIVALENT.

VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

AS-BUILT INFORMATION: CONTRACTOR / DATE; WORK STAKED BY / DATE; INSPECTOR'S ACCEPTANCE BY / DATE; FIELD VERIFICATION BY / DATE; DRAWINGS CORRECTED BY / DATE

MICRO-FILM INFORMATION: RECORDED BY / DATE; NO.

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SURVEY INFORMATION: FIELD NOTES — NO. / BY / DATE

ENGINEER'S SEAL: MICHAEL D. SMITH, NEW MEXICO, 16050, LICENSED PROFESSIONAL ENGINEER — 9-16-09

No.	Date	REMARKS	By
		REVISIONS	
		DESIGN	

Designed By: MDS — DATE: JUNE 2009
Drawn By: CP,RAO,PMW — DATE: JUNE 2009
Checked By: EVD — DATE: JUNE 2009

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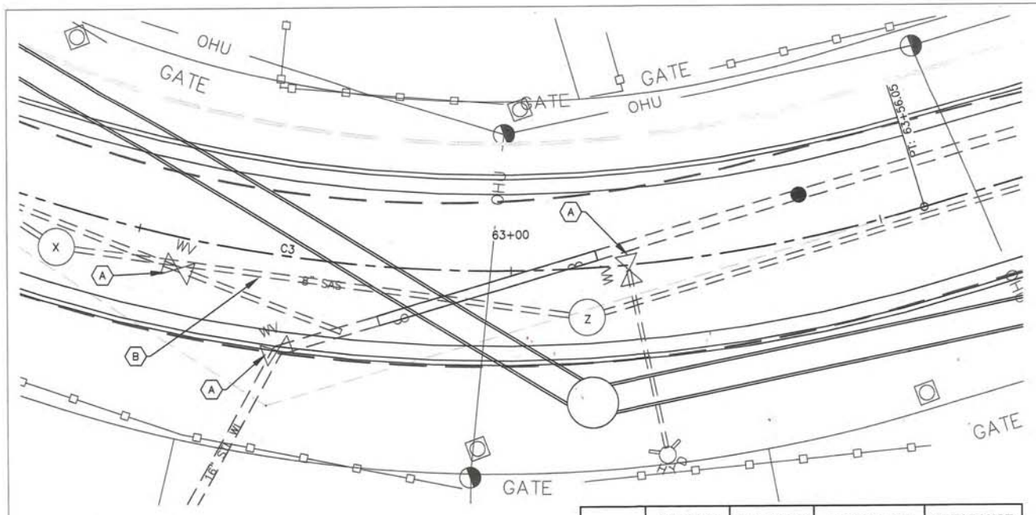
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 65+80 TO EOP

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	8	13



0 2' 4'
VERTICAL

0 10' 20'
HORIZONTAL

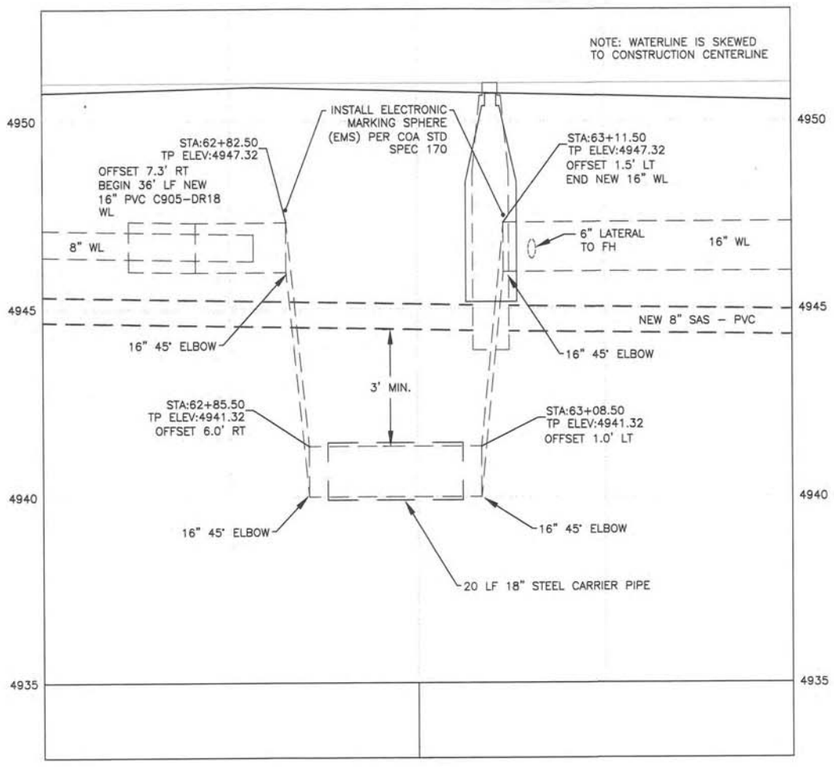
STA:	RESTRAINED LENGTH*
62+82.50	55
62+85.50	8
63+08.50	8
63+11.50	55
RESTRAIN FULL LENGTH WITHIN CARRIER PIPE	
*RESTRAINED EACH SIDE OF FITTING	

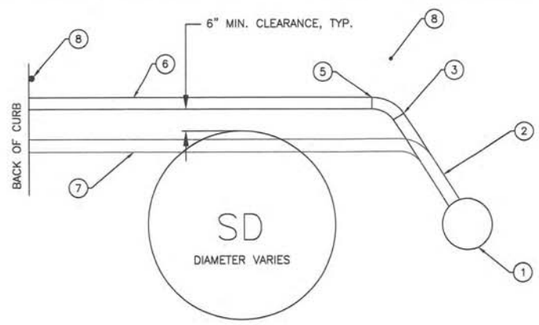
(A) ADJUST WV COLLAR TO NEW GRADE PER COA STD DWG 2326. CONCRETE COLLOR INCIDENTAL TO WV ADJUSTMENT.

(B) REPLACE 8" VCP WITH 8" PVC BETWEEN MANHOLE X AND Z.

LOT#	CYPRESS ADDRESS	CLEANOUT DEPTH (FT)	SAS SERVICE SLOPE	CLEARANCE OVER PIPE
35	3302	1.1	2.08%	18.8"
34	3304			
33	3308			
32	3312	1.4	2.08%	7.3"
31	3316	2.0	1.36%	1.0"
30	3320	1.5	2.08%	12.8"
29	3322	1.0	2.08%	7.5"
28	3326			
27	3400			

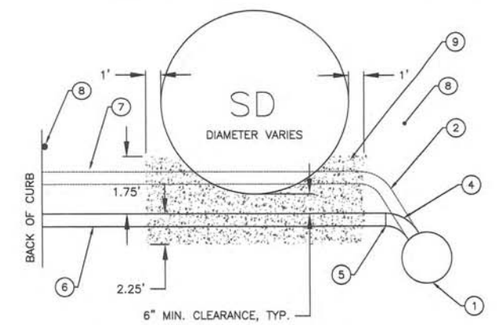
LOT#S REFER TO SOUTH SIDE OF CYPRESS. BLANKS INDICATE HOME OWNERS DID NOT RESPOND TO ACCESS PERMISSION LETTER AND WERE NOT AVAILABLE ON TWO SUBSEQUENT SITE VISITS.





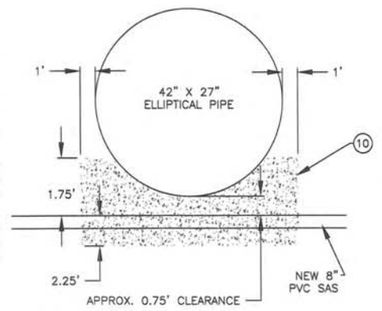
1 EXISTING SAS SERVICE ADJUSTMENT REROUTE OVER STORM DRAIN

9 SERVICES FROM STA: 63+10 TO 68+20

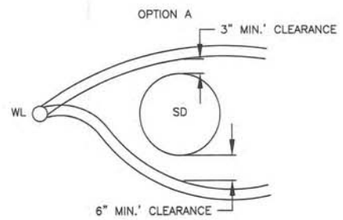


2 EXISTING SAS SERVICE ADJUSTMENT REROUTE UNDER STORM DRAIN

16 SERVICES FROM STA: 54+80 TO 62+75

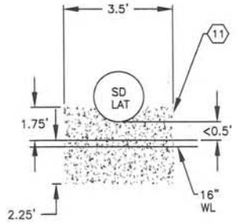


3 STORM DRAIN CROSSING OF SAS



REPLACE SERVICE LINE WITH COPPER SERVICE LINE FROM MAIN TO METER – NO SPLICING AND NO KINKING OF LINE. CONTRACTOR HAS OPTION OF PLACING NEW SERVICE LINE UNDER STORM DRAIN WITH 6" MIN. CLEARANCE.

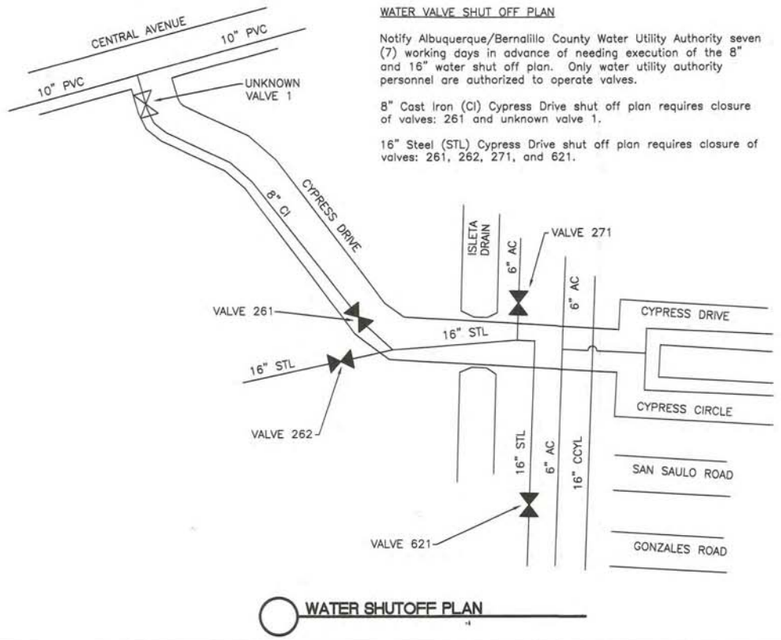
4 EXISTING WATER SERVICE REPLACEMENT



5 16" WL LEAN FILL DETAIL

KEYED NOTES

1. EXISTING 8" VITRIFIED CLAY PIPE SAS
2. EXISTING 4" VITRIFIED CLAY PIPE RISER
3. EXTEND 4" VITRIFIED CLAY PIPE RISER
4. SHORTEN 4" VITRIFIED CLAY PIPE RISER
5. TRANSISTION 4" VITRIFIED CLAY PIPE TO 4" PVC
6. PVC WITH UNIFORM SLOPE FROM JUNCTION TO SERVICE AT PROPERTY LINE. MINIMUM SLOPE 2.08%
7. REMOVE AND DISPOSE OF 4" SAS PIPE
8. INSTALL ELECTRONIC MARKING SPHERE (EMS) AT BACK OF CURB AND BEND PER COA STD SPEC 170.
9. PER COA STD SPEC 207, 4.25 FT. LEAN FILL CENTERED ON SAS SERVICE. LEAN FILL VOLUME IS 4 FT. X 4.25 FT X (SD DIA. + 2 FT.).
10. PER COA STD SPEC 207,12 FT. LEAN FILL CENTERED ON SAS MAIN. LEAN FILL VOLUME IS 4 FT. X 12 FT. X 5.5 FT.
11. PER COA STD. SPEC. 207, 5 FT. LEAN FILL CENTERED ON 16" WL.



WATER VALVE SHUT OFF PLAN

Notify Albuquerque/Bernalillo County Water Utility Authority seven (7) working days in advance of needing execution of the 8" and 16" water shut off plan. Only water utility authority personnel are authorized to operate valves.

8" Cast Iron (CI) Cypress Drive shut off plan requires closure of valves: 261 and unknown valve 1.

16" Steel (STL) Cypress Drive shut off plan requires closure of valves: 261, 262, 271, and 621.

WATER SHUTOFF PLAN

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE

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MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL
MICHAEL D. SMITH NEW MEXICO 16050 PROFESSIONAL ENGINEER

No.	Date	By	REMARKS
			REVISIONS
			DESIGN

Designed By: MDS — DATE:JUNE 2009
Drawn By: CP,RAO,PMW — DATE:JUNE 2009
Checked By: EVD — DATE:JUNE 2009

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BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN WATER AND SAS SERVICE DETAILS

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
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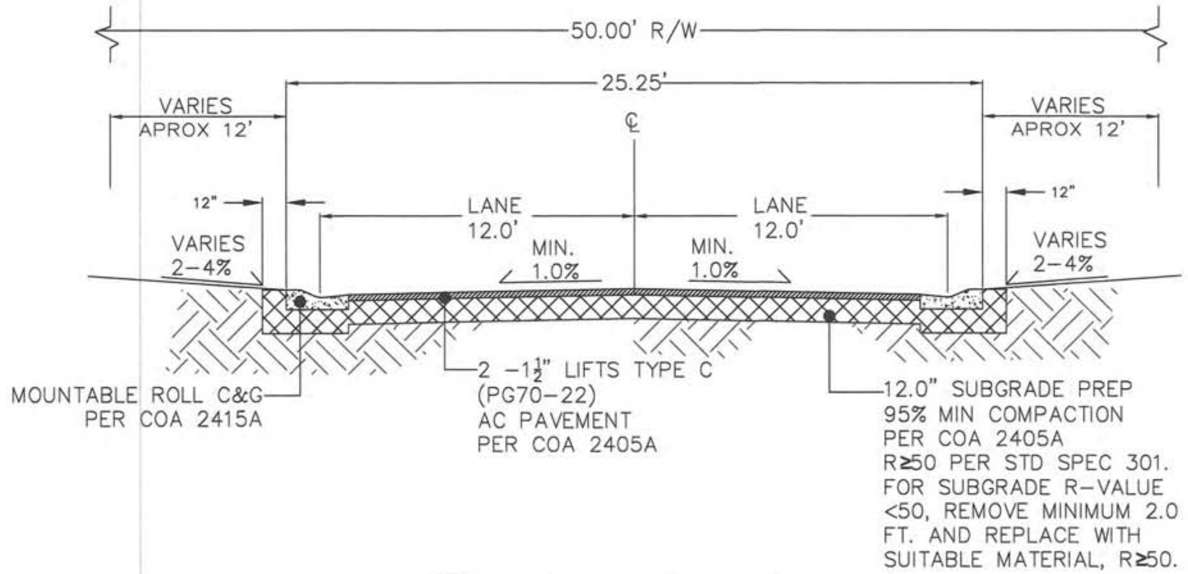
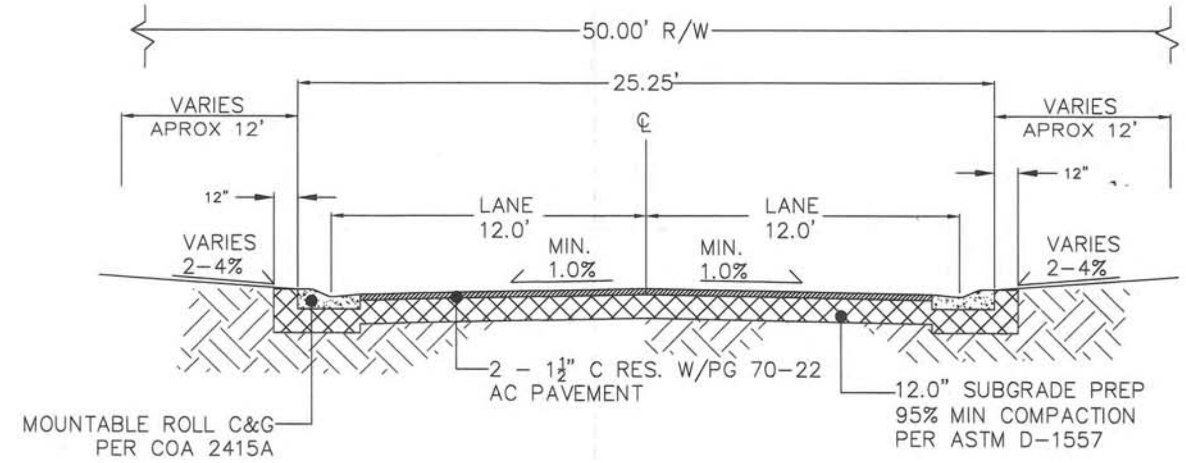
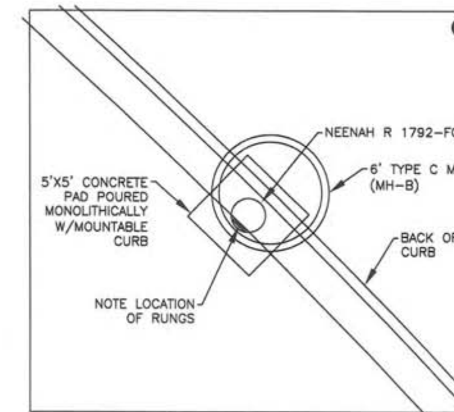


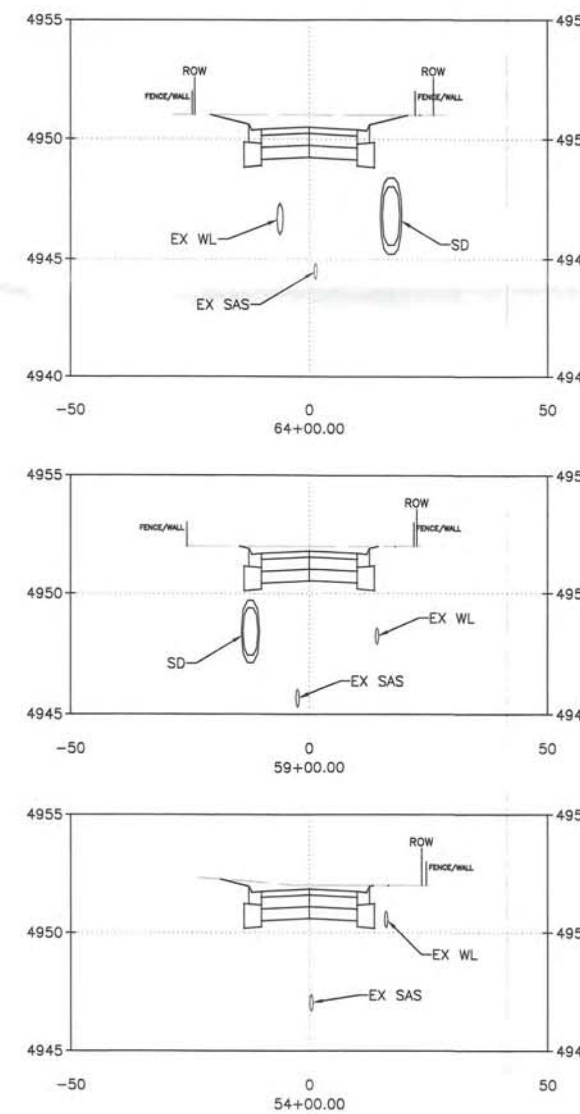
COA TYPICAL ROAD SECTION
STA: 52+50 TO TBD

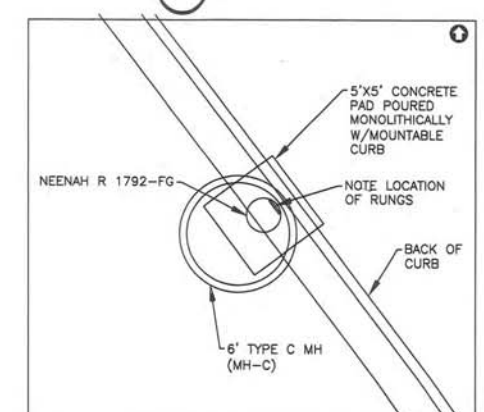


COUNTY TYPICAL ROAD SECTION
STA: TBD TO 69+00.09

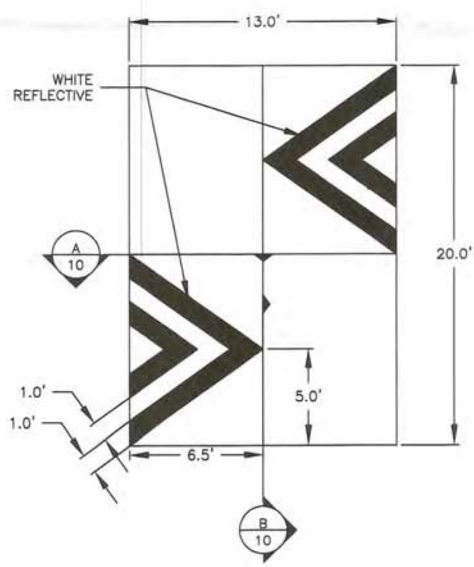


MH-B CURB DETAIL

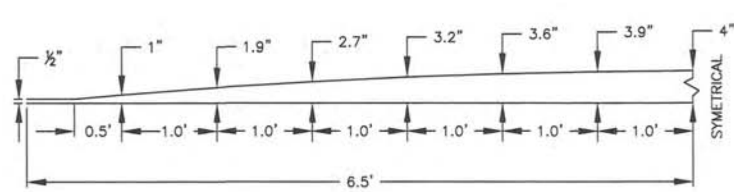




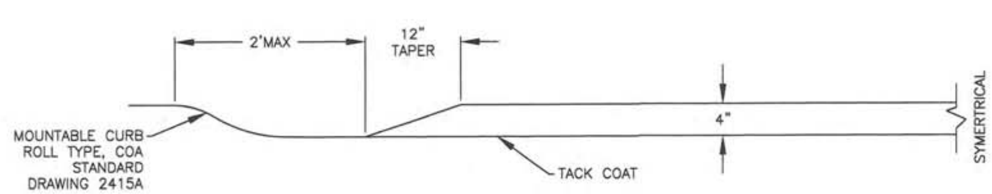
MH-C CURB DETAIL



SPEED HUMP
NTS



SECTION A
NTS



SECTION B
NTS

SECTION VIEWS

AS-BUILT INFORMATION
CONTRACTOR — DATE
WORK STAKED BY — DATE
INSPECTOR'S ACCEPTANCE BY — DATE
FIELD VERIFICATION BY — DATE
DRAWINGS CORRECTED BY — DATE
MICRO-FILM INFORMATION
RECORDED BY — DATE
NO.

BENCH MARKS
BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL

REVISIONS
No. | Date | REMARKS | By

DESIGN
Designed By: MDS — DATE: JUNE 2009
Drawn By: CP,RAO,PMW — DATE: JUNE 2009
Checked By: EVD — DATE: JUNE 2009

Resource Technology, Inc.
Civil Engineering
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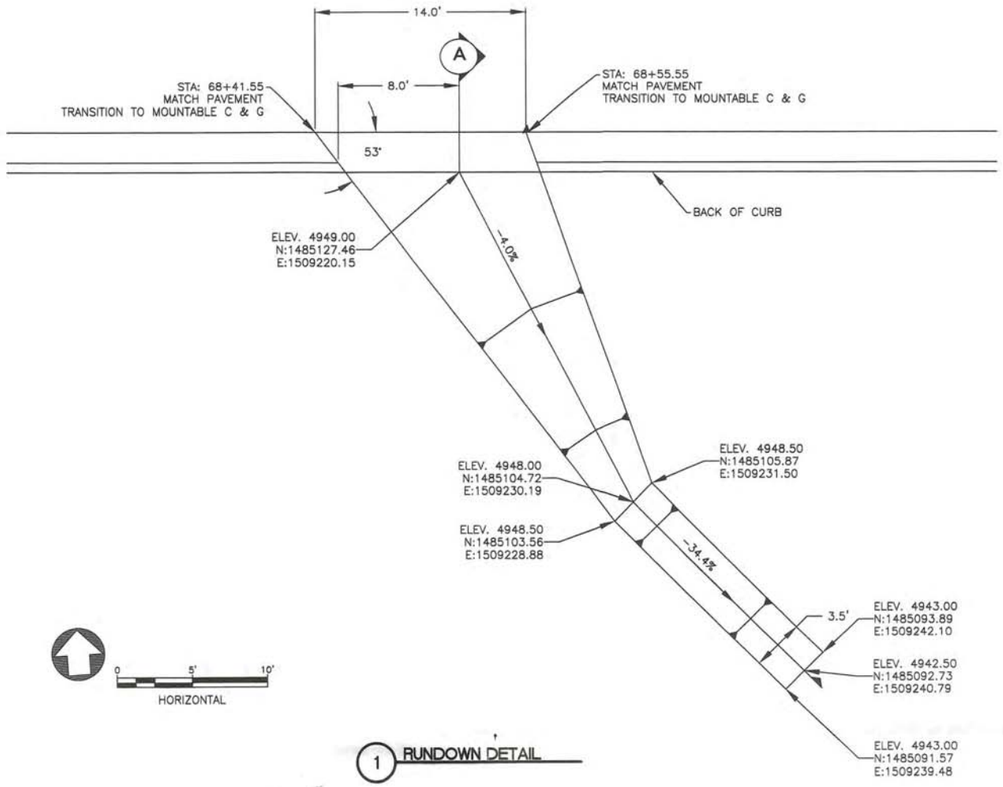
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN ROADWAY AND CURB DETAILS

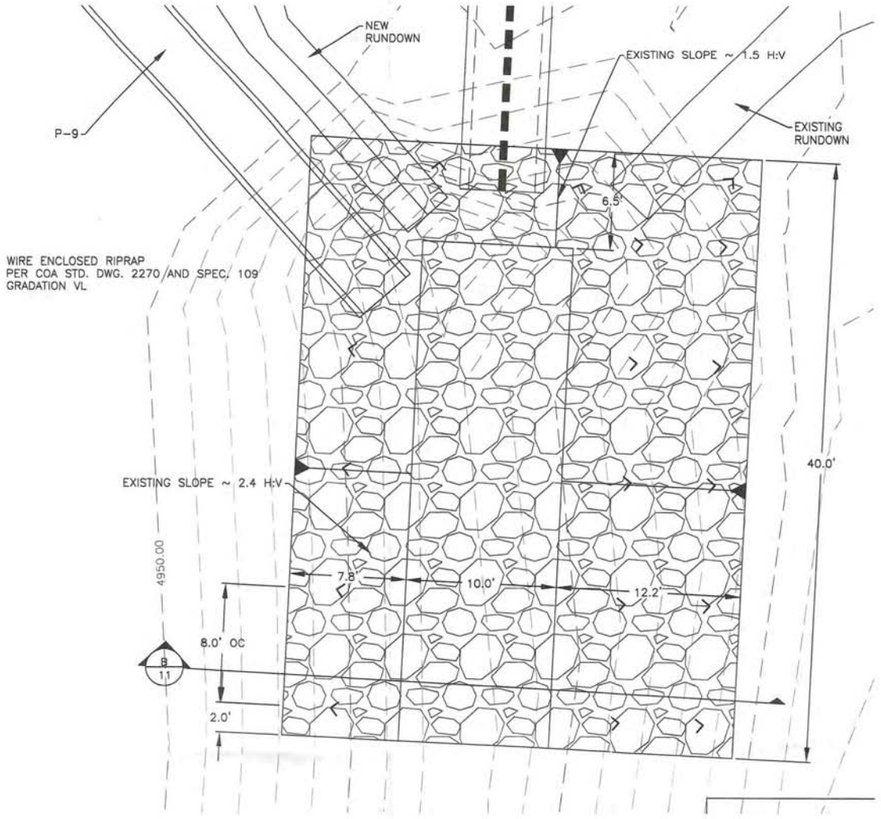
Design Review Committee	City Engineer Approval	Mo./Day/Yr.	Mo./Day/Yr.

Last Design Update

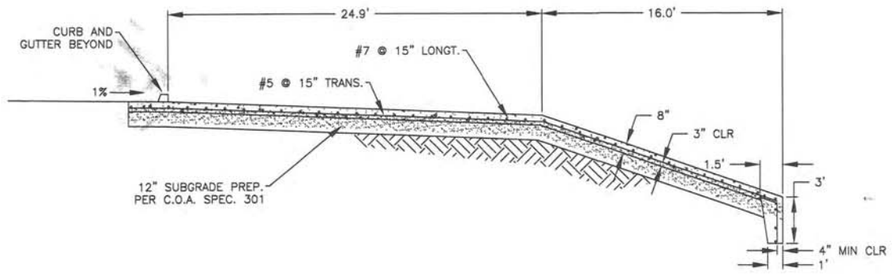
County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	10	13



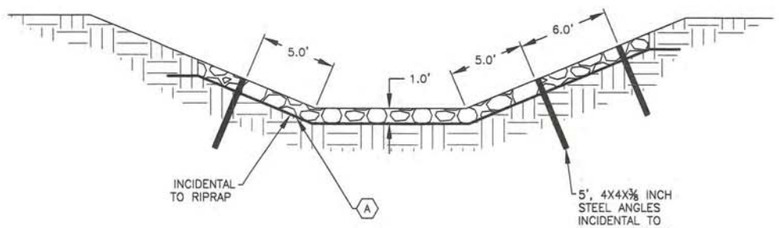
1 RUNDOWN DETAIL



2 RIPRAP DETAIL



A SECTION



B SECTION

A. PLACE CLASS 1 NON-WOVEN GEOTEXTILE (FILTER FABRIC). FABRIC SHALL BE IN ACCORDANCE WITH SECTION 604, SOIL AND DRAINAGE GEOTEXTILES NMDOT STD SPECS FOR HIGHWAY AND BRIDGE CONSTRUCTION, 2007 EDITION.

AS-BUILT INFORMATION

CONTRACTOR DATE

WORK STAKED BY DATE

ACCEPTANCE BY DATE

FIELD VERIFICATION BY DATE

DRAWING CORRECTED BY DATE

MICRO-FILM INFORMATION

RECORDED BY DATE

NO.

BENCH MARKS

BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE

ENGINEER'S SEAL

MICHAEL D. SMITH
NEW MEXICO
16050
LICENSED PROFESSIONAL ENGINEER
9-16-09

No.	Date	By	REMARKS
			REVISIONS
			DESIGN

Designed By: MDS DATE:JUNE 2009

Drawn By: CP,RAO,PMW DATE:JUNE 2009

Checked By: EVD DATE:JUNE 2009

Resource Technology, Inc.
Civil Engineering
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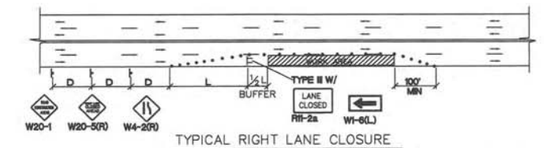
BERNALILLO COUNTY

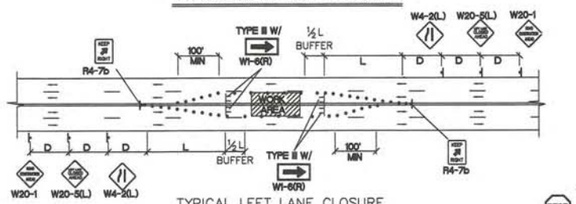
CYPRESS DRIVE STORM DRAIN
RUNDOWN AND EROSION PROTECTION DETAILS

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

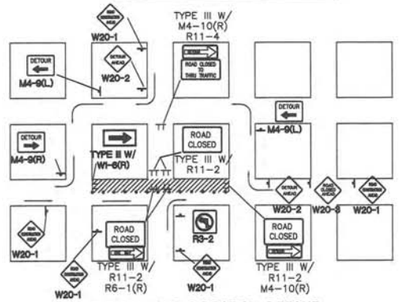
County Project No.	City Project No.	Zone Map No.	Sheet	Of
TS08-04	601791	K-11/12	11	13



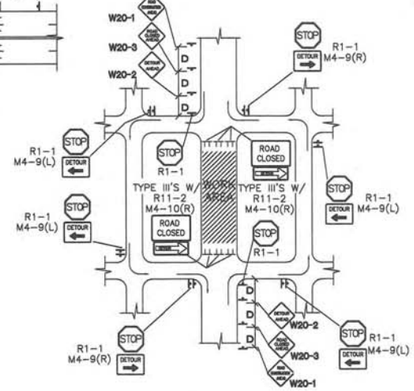
TYPICAL RIGHT LANE CLOSURE



TYPICAL LEFT LANE CLOSURE

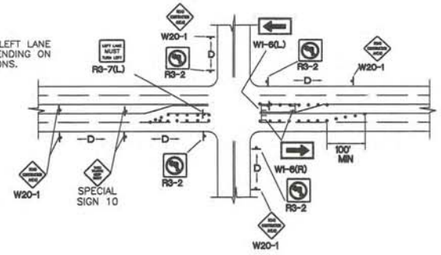


TYPICAL ONE DIRECTION DETOUR



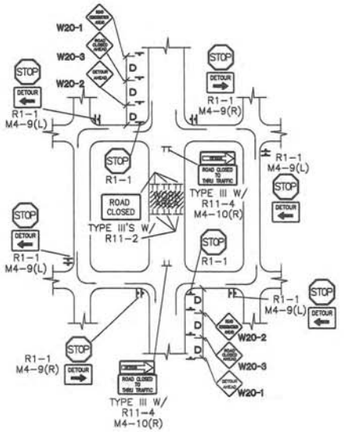
TYPICAL STREET CLOSURE

NOTE: (R1-1) BASED ON FIELD CONDITIONS.



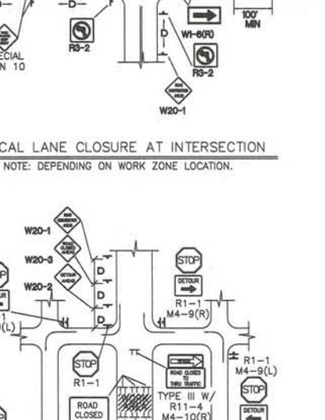
TYPICAL LANE CLOSURE AT INTERSECTION

NOTE: DEPENDING ON WORK ZONE LOCATION.



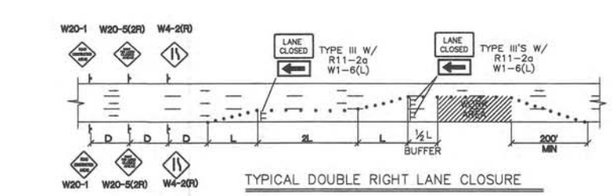
TYPICAL MID-BLOCK CLOSURE

NOTE: (R1-1) BASED ON FIELD CONDITIONS.

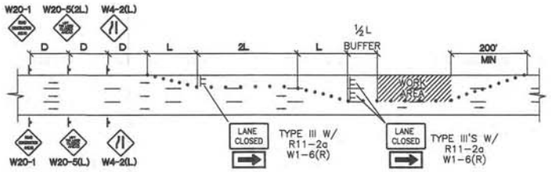


TYPICAL STREET CLOSURE

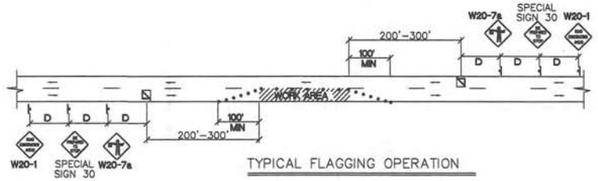
NOTE: (R1-1) BASED ON FIELD CONDITIONS.



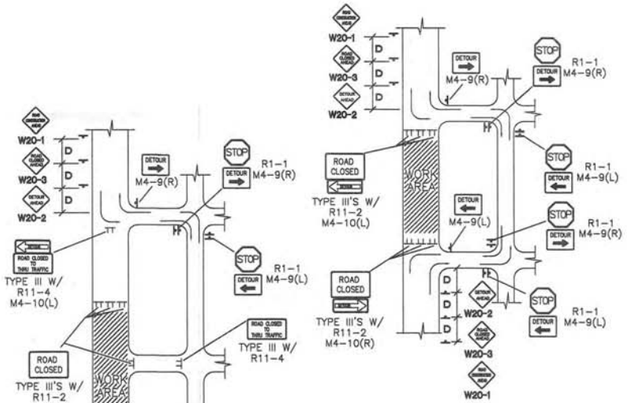
TYPICAL DOUBLE RIGHT LANE CLOSURE



TYPICAL DOUBLE LEFT LANE CLOSURE

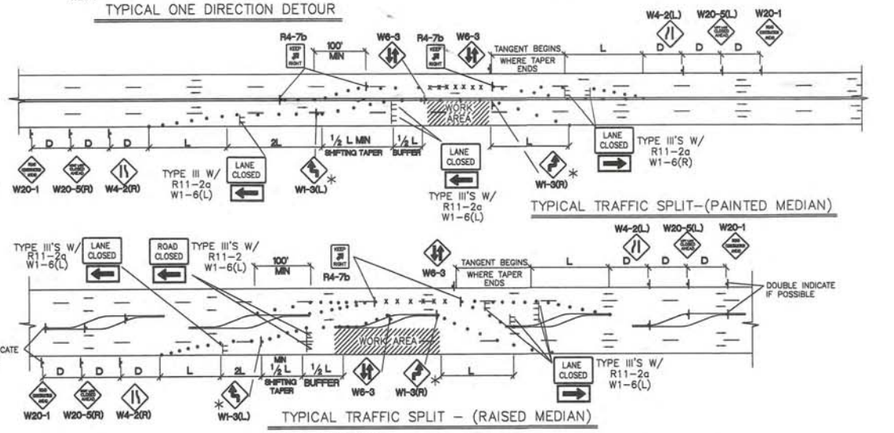


TYPICAL FLAGGING OPERATION



TYPICAL STREET CLOSURE

NOTE: (R1-1) BASED ON FIELD CONDITIONS.

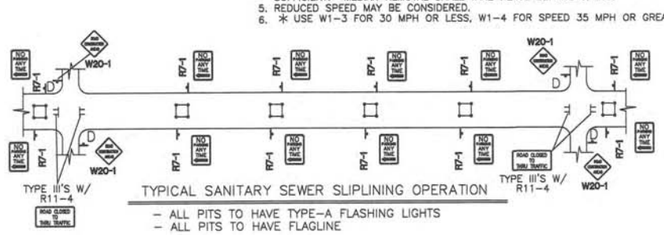


TYPICAL TRAFFIC SPLIT-(PAINTED MEDIAN)

TYPICAL TRAFFIC SPLIT – (RAISED MEDIAN)

TRAFFIC SPLIT NOTES:

1. THE OFFSET DISTANCE MUST BE CALCULATED IN ALL SHIFTING TAPERS. THE OFFSET DISTANCES SHALL INCLUDE LANE WIDTHS PLUS MEDIAN WIDTHS.
2. 1/2 L IS THE MINIMUM DISTANCE FOR SHIFTING TAPERS.
3. REVERSE CURVES MAY BE IMPLEMENTED. ALL CURVE DATA SHALL BE CALCULATED.
4. MEDIAN REMOVAL SHALL BE REQUIRED IF 1/2 L OR REVERSE CURVE IS NOT SUFFICIENT. MEDIAN REMOVAL SHALL TAKE PLACE BEFORE SPLITS.
5. REDUCED SPEED MAY BE CONSIDERED.
6. * USE W1-3 FOR 30 MPH OR LESS, W1-4 FOR SPEED 35 MPH OR GREATER.



TYPICAL SANITARY SEWER SLIPLINING OPERATION

- ALL PITS TO HAVE TYPE-A FLASHING LIGHTS
- ALL PITS TO HAVE FLAGLINE

GENERAL NOTE:

ALL CONSTRUCTION WARNING SIGNS SHALL HAVE A BLACK LEGEND ON A ORANGE BACKGROUND.

⚠ ALL ADVANCE WARNING SIGNS SHALL BE A MINIMUM OF 36" THIRTY SIX INCHES BY 36" THIRTY SIX INCHES IN SIZE AND SHALL HAVE ONE WARNING LIGHT.

FOR INFORMATION ONLY

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE

ENGINEER'S SEAL

BENCH MARKS

AS-BUILT INFORMATION
CONTRACTOR | DATE
WORKED BY | DATE
INSPECTOR'S ACCEPTANCE BY | DATE
FIELD VERIFICATION BY | DATE
AS-BUILTS CORRECTED BY | DATE

MICRO-FILM INFORMATION
RECORDED BY | DATE
NO.

COA STANDARD

NO.	DATE	REMARKS	BY
	8/24/97	REVISED GENERAL NOTE	J.D.L.
		REVISIONS	
		DESIGN	
		DESIGNED BY BOHANNAN HUSTON	DATE 5-97
		DRAWN BY BOHANNAN HUSTON	DATE 5-97
		CHECKED BY BOHANNAN HUSTON	DATE 5-97

COUNTY OF BERNALILLO

TITLE: TYPICAL TRAFFIC CONTROL & SIGNING EXAMPLES (REF MUTCD)

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

CITY PROJECT NO. 601791 /TS08-04 | ZONE MAP NO. | SHEET 12 OF 13

CONSTRUCTION TRAFFIC CONTROL GENERAL NOTES

1. PROJECT IS SUBJECT TO THE REQUIREMENTS OF COUNTY ORDINANCE NO. 95-12 AND COUNTY ORDINANCE NO. 96-3. THE CONTRACTOR IS RESPONSIBLE FOR ACQUIRING ALL PERMITS NECESSARY. CONTRACTOR SHALL CALL 848-1504 FOR MORE INFORMATION.

2. THE CONTRACTOR SHALL SUBMIT A TRAFFIC CONTROL PLAN TO THE COUNTY TRAFFIC CONTROL ADMINISTRATOR AT LEAST 72 HOURS PRIOR TO COMMENCEMENT OF WORK. TRAFFIC CONTROL PLANS SHALL BE PREPARED IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST EDITION AND BY CERTIFIED PERSONNEL AND MUST BE APPROVED PRIOR TO COMMENCEMENT OF WORK ON THE PROJECT. CALL 848-1504 FOR FURTHER INFORMATION.

3. A DAILY TRAFFIC CONTROL LOG SHALL BE MAINTAINED BY THE CONTRACTOR REFLECTING THE TYPES AND LOCATIONS OF ALL TRAFFIC CONTROL DEVICES, SIGNS, BARRICADES, ETC. BEING USED ON THE PROJECT IN COMPLIANCE WITH THE APPROVED TRAFFIC CONTROL PLAN. THIS LOG SHALL BE SUBMITTED TO THE BERNALILLO COUNTY TRAFFIC CONTROL ADMINISTRATOR UPON COMPLETION OF THE PROJECT CONSTRUCTION OR WHEN SO REQUESTED BY THE PROJECT MANAGER OR THE BERNALILLO COUNTY TRAFFIC CONTROL ADMINISTRATOR.

4. CONTRACTOR SHALL PROVIDE A WEEKLY CONSTRUCTION ACTIVITY SCHEDULE TO BERNALILLO COUNTY PUBLIC WORKS DIVISION ATTN: PROJECT MANAGER

5. THE CONTRACTOR SHALL FILE A WEEKLY WRITTEN REPORT TO THE TRAFFIC CONTROL ADMINISTRATOR DESCRIBING THE TRAFFIC CONTROL PLAN THAT WILL BE IN EFFECT FOR THE FOLLOWING WEEK.

6. SUBJECT TO THE APPROVED TRAFFIC CONTROL PLAN, AT LEAST ONE LANE SHALL BE OPEN TO TRAFFIC AT ALL TIMES. CONTRACTOR SHALL PROVIDE PROPER SIGNAGE AND FLAGMAN AND SHALL MAINTAIN THE TRAFFIC LANE IN SUCH A MANNER AS TO ASSURE PROPER SAFETY TO THE TRAVELING PUBLIC AT ALL TIMES, EXCEPT WHEN GRADING, EXCAVATION AND BACKFILL OPERATIONS ARE BEING CONDUCTED IMMEDIATELY IN FRONT OF THE PROPERTY, IN WHICH CASE ACCESS WILL NOT BE DENIED FOR MORE THAN 4 HOURS WITHOUT APPROVAL BY THE COUNTY.

7. TRAFFIC LANES PROVIDED DURING CONSTRUCTION SHALL BE MAINTAINED, IN SUCH A CONDITION UNDER ALL WEATHER CONDITIONS, SO AS TO PERMIT THE REASONABLE PASSAGE OF PASSENGER VEHICLES, AND SHALL BE KEPT GRADED AND SMOOTH, AND WATERED SEVERAL TIMES DAILY TO CONTROL DUST.

8. TYPICAL TRAFFIC CONTROL PLANS DO NOT REFLECT THE EXISTING TOPOGRAPHY SUCH AS DRIVEWAYS, LANE WIDTHS, AND BUSINESS/RESIDENTIAL ACCESSES. EVERY LOCATION THAT REQUIRES CONSTRUCTION TRAFFIC CONTROL SHALL HAVE A DETAILED TRAFFIC CONTROL PLAN SHOWING ALL EXISTING TOPOGRAPHY.

9. CONSTRUCTION SHALL NOT BEGIN UNLESS A TRAFFIC CONTROL PLAN HAS BEEN APPROVED AND VERIFIED BY BERNALILLO COUNTY TRAFFIC ENGINEERING.

10. ALL CONSTRUCTION TRAFFIC CONTROL DEVICES SHALL COMPLY WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST EDITION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL, SERVICE AND MAINTAIN ALL TRAFFIC CONTROL DEVICES. TRAFFIC CONTROL DEVICES SHALL NOT BE REMOVED OR ALTERED IN ANY WAY WITHOUT THE APPROVAL OF THE COUNTY TRAFFIC CONTROL ADMINISTRATOR, PER SECTION 6A-4 OF THE MUTCD, LATEST EDITION.

11. THE CONSTRUCTION TRAFFIC CONTROL INITIAL SET-UP FOR EACH PHASE SHALL BE BY AN AMERICAN TRAFFIC SAFETY SERVICES ASSOCIATION (ATSSA) CERTIFIED WORKSITE TRAFFIC SUPERVISOR. THE MAINTENANCE AND SERVICING SHALL ALSO BE DONE BY AN ATSSA CERTIFIED WORKSITE TRAFFIC SUPERVISOR OR EQUIVALENT.

12. CONTRACTOR IS RESPONSIBLE TO MAINTAIN AND SERVICE ALL TRAFFIC CONTROL DEVICES 24 HOURS A DAY, 7 DAYS A WEEK THROUGHOUT LENGTH OF PROJECT. CONTRACTOR IS RESPONSIBLE THAT ALL TRAFFIC CONTROL DEVICES COMPLY WITH THE MUTCD, LATEST EDITION.

13. ALL ADVANCE WARNING SIGNS SHALL BE DOUBLE INDICATED WHENEVER THERE ARE MULTI-LANE TRAFFIC IN ANY ONE GIVEN DIRECTION AND THERE IS SUFFICIENT MEDIAN SPACE.

14. ALL BARRICADES IN ALL TAPERS AND TANGENTS SHALL BE PLACED APART, A DISTANCE MEASURED IN FEET, EQUAL TO THAT OF THE POSTED SPEED LIMIT. NO EXCEPTIONS UNLESS APPROVED BY BERNALILLO COUNTY TRAFFIC ENGINEERING PER MUTCD SECTION 6A-4.

15. ALL WORK IN ARTERIAL ROADWAYS SHALL BE ON A CONTINUOUS 24 HOUR PER DAY BASIS UNTIL COMPLETED.

16. EQUIPMENT OR MATERIALS SHALL NOT BE STORED WITHIN 15 FEET OF A TRAVELED TRAFFIC LANE DURING NON-WORKING HOURS WITHOUT THE APPROVAL OF BERNALILLO COUNTY TRAFFIC ENGINEERING.

17. CONTRACTOR SHALL PROVIDE AND MAINTAIN A SAFE AND ADEQUATE MEANS OF CHANNELIZING PEDESTRIAN TRAFFIC AROUND AND THROUGH THE CONSTRUCTION AREA.

18. CONTRACTOR IS RESPONSIBLE FOR OBLITERATION OF ANY CONFLICTING STRIPING AND RESPONSIBLE FOR ALL TEMPORARY STRIPING.

19. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL FACILITIES, BUSINESSES AND/OR RESIDENTS AT ALL TIMES.

20. CONTRACTOR SHALL PROVIDE ACCESS SIGNS FOR BUSINESSES LOCATED WITHIN THE CONSTRUCTION AREA UNDER THE SUPERVISION OF BERNALILLO COUNTY TRAFFIC ENGINEERING. EACH ACCESS SIGN SHALL HAVE 5 INCH, WHITE LETTERING ON BLUE BACKGROUND. SHOPPING CENTERS AND MALLS SHALL BE LISTED AS SUCH.

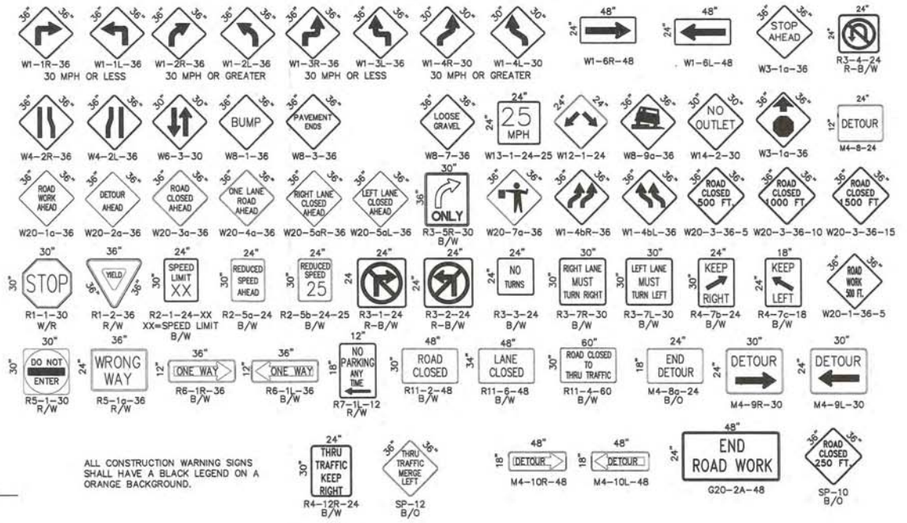
21. 48 HOURS PRIOR TO OCCUPYING OR CLOSING OF A RIGHT-OF-WAY, CONTRACTOR SHALL NOTIFY: POLICE, FIRE DEPARTMENT, SCHOOLS, HOSPITALS, TRANSIT AUTHORITY, BUSINESSES AND/OR RESIDENTS THAT WILL BE AFFECTED BY THE CONSTRUCTION.

22. ANY FIELD ADJUSTMENTS SHALL BE APPROVED BY BERNALILLO COUNTY TRAFFIC ENGINEERING.

23. EXCAVATIONS SHALL BE PLATED, TEMPORARILY PATCHED OR RESURFACED PRIOR TO OPENING OF TRAFFIC. A MINIMUM OF 11 FEET, SHALL BE PROVIDED FOR TRAFFIC IN ANY GIVEN DIRECTION. CONTRACTOR IS RESPONSIBLE FOR ANY WORK INVOLVED IN SATISFYING THESE REQUIREMENTS.

24. THE CONTRACTOR SHALL CONTACT BERNALILLO COUNTY TRAFFIC ENGINEER (848-1575) BEFORE REMOVING AND/OR INSTALLING ANY TRAFFIC SIGNS OR PERMANENT STRIPING AND MARKINGS. ALL STRIPING, PAVEMENT MARKINGS INCLUDING CROSSWALKS, LEGENDS AND SYMBOLS ARE TO BE CONSTRUCTED OF INTERSECTION GRADE COLD PLASTIC AND LINE MARKINGS ARE TO BE CONSTRUCTED OF DURABLE PAINT IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) LATEST EDITION. ANY PAVEMENT MARKINGS AND SIGNS REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED AT EXISTING LOCATIONS. SUCH WORK SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OF THE PROJECT.

SIGN FACE DETAILS



ALL CONSTRUCTION WARNING SIGNS SHALL HAVE A BLACK LEGEND ON A ORANGE BACKGROUND.

TAPER REQUIREMENT

SPEED LIMIT (MPH)	TAPER LENGTH(L) (FEET) 10' LANE	11' LANE	12' LANE	MINIMUM NUMBER OF DEVICES FOR TAPER	MAXIMUM DEVICE SPACING IN FEET ALONG TAPER	AFTER TAPER
20	70	75	80	5	20	20
25	105	115	125	6	25	25
30	150	165	180	7	30	30
35	205	225	245	8	35	35
40	270	295	320	9	40	40
45	450	495	540	13	45	45
50	500	550	600	13	50	50
55	550	605	660	13	55	55

RECOMMENDED SIGN SPACING(D) FOR

ADVANCE WARNING SIGN SERIES

SPEED MILES PER HOUR	MINIMUM DISTANCE IN FEET BETWEEN SIGNS	FROM LAST SIGN TO TAPER
0-20	10 X SPEED LIMIT	10 X SPEED LIMIT
25-30	10 X SPEED LIMIT	10 X SPEED LIMIT
30-35	10 X SPEED LIMIT	10 X SPEED LIMIT
40-45	10 X SPEED LIMIT	10 X SPEED LIMIT
50-60	10 X SPEED LIMIT	10 X SPEED LIMIT

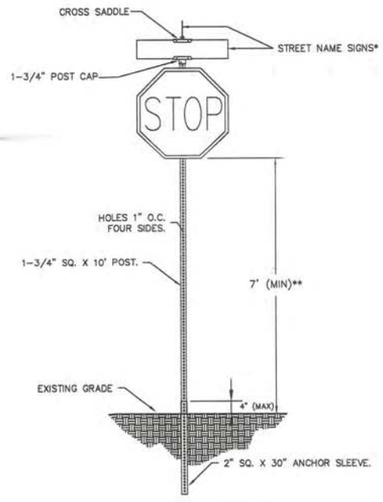
TAPER CRITERIA

TYPE OF TAPER	TAPER LENGTH
UPSTREAM TAPER:	
MERGING TAPER	L MINIMUM
SHIFTING TAPER	1/2 L MINIMUM
SHOULDER TAPER	1/2 L MINIMUM
TWO-WAY TRAFFIC TAPER	100 FEET MAXIMUM
DOWNSTREAM TAPERS	100 FEET PER LANE

TAPER LENGTH COMPUTATION

SPEED LIMIT	
40 MPH OR LESS	$L = \frac{WS^2}{60}$
40 MPH OR GREATER	$L = W \times S$

L = TAPER LENGTH
W = WIDTH OF OFFSET IN FEET
S = POSTED SPEED OR OFF-PEAK 85-PERCENTILE SPEED IN MPH



SIGN POST DETAIL
SCALE: N.T.S

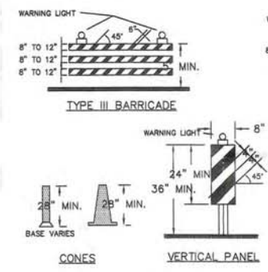
*ALL STREET NAME SIGNS SHALL BE WHITE LETTERS ON GREEN BACKGROUND WITH HI INTENSITY REFLECTIVE SHEETING. ALL LETTERS SHALL BE 4" FOR POSTED SPEEDS OF 25 MPH AND BELOW AND 6" FOR POSTED SPEEDS GREATER THAN 25 MPH.
**SEE MUTCD FOR MINIMUM MOUNTING HEIGHT IN RURAL AREAS

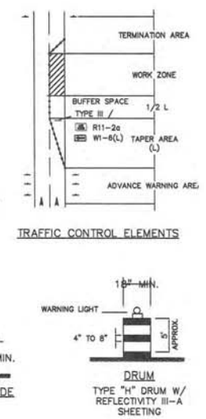
# OF POSTS	MAXIMUM SIGN SQUARE FOOTAGE
1	6
2	12
3	18

LEGEND

- WORK AREA
- BARRICADE - TYPE I, TYPE II, OR TYPE "H" DRUM W/ REFLECTIVITY III-A SHEETING
- BARRICADE - TYPE III
- X VERTICAL PANEL
- WARNING SIGN
- D DISTANCE BETWEEN SIGNS - A DISTANCE MEASURED IN FEET EQUAL TO A VALUE OF TEN TIMES THE SPEED LIMIT OF THE STREET
- FLAGMAN POSITION
- S SPACING BETWEEN BARRICADES- A DISTANCE MEASURED IN FEET EQUAL TO THE SPEED LIMIT OF THE STREET
- L TAPER LENGTH - SEE CHART BELOW

THE TANGENT LENGTH IS EQUAL TO THE TAPER LENGTH FOR A GIVEN STREET.





NO.	DESCRIPTION	BY	DATE

REVISIONS

COUNTY OF BERNALILLO

CYPRESS DRIVE STORM DRAIN SIGNING & CONSTRUCTION TRAFFIC CONTROL STANDARDS

FOR INFORMATION ONLY

PROJECT NO.	DRAWN:	DATE:
601791 / TS08-04	CHECKED:	SCALE:

SHEET 13 OF 13

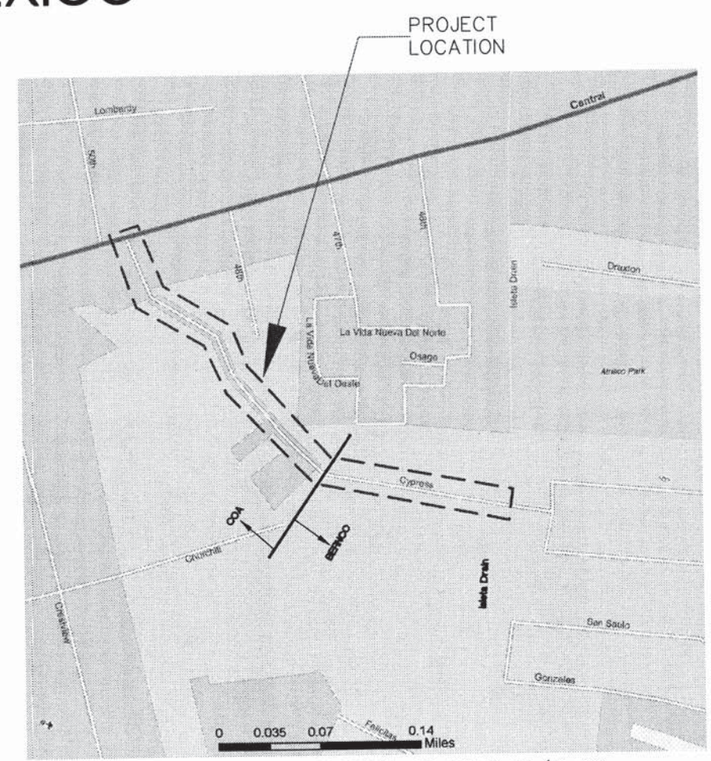
APPENDIX C: CYPRESS DRIVE STORM DRAIN CONSTRUCTION PLANS, PHASE II AS-BUILT RECORD DRAWINGS

CYPRESS DRIVE STORM DRAIN

CONSTRUCTION PLANS
BERNALILLO COUNTY, NEW MEXICO

PHASE II AS-BUILT
RECORD DRAWINGS

VICINITY MAP



LOCATION MAP ZONE ATLAS K-11/K-12

INDEX OF SHEETS

SHEET	TITLE
1	COVER SHEET
2	GENERAL NOTES AND LEGEND
3	SURVEY CONTROL
4	PLAN & PROFILE STA 50+00 TO 54+10
5	PLAN & PROFILE STA 54+10 TO 58+00
6	PLAN & PROFILE STA 58+00 TO 61+90
7	PLAN & PROFILE STA 61+90 TO 65+80
8	PLAN & PROFILE STA 65+80 TO EOP
9	WATER AND SAS SERVICE DETAILS
10	ROADWAY AND CURB DETAILS
11	RUNDOWN AND EROSION PROTECTION DETAILS
12	STANDARD DETAILS
13	COUNTY TRAFFIC CONTROL
14	COUNTY TRAFFIC CONTROL NOTES

SURVEYOR'S CERTIFICATE

I, Andrew S Medina, a duly qualified Licensed Professional Surveyor under the laws of the State of New Mexico, do hereby certify, that the "as-built" information shown on these drawings was obtained from field construction and "as-built" surveys performed by me or under my supervision that the "as built" information shown on these drawings was added by me of under my supervision; and that this "as-built" information is true and correct to the best of my knowledge and belief. I am not responsible for any of the design, concepts, calculations, engineering, or intent of the record drawings.

Andrew S. Medina, NMPS 12649 — Date 10-27-2016

VERTICAL DATUM IS NAVD 88

ANDREW S. MEDINA — NEW MEXICO — 12649 — REGISTERED PROFESSIONAL SURVEYOR

SANDIA LAND SURVEYING, LLC
15 CASA TERRENOS
PLACITAS, NM. 87043
505-259-8130

WESTON SOLUTIONS

REV.	SHEETS	CITY ENGINEER	DATE	USER DEPARTMENT	DATE	USER DEPARTMENT	DATE
ENGINEERS STAMP & SEAL		APPROVALS		ENGINEER	DATE	APPROVED FOR CONSTRUCTION	
		D.R.C. Chair					
		Hydrology					
		Transportation					
		Risk					
		A.B.C.W.U.A.					

DAVID J. COOPER — NEW MEXICO — 21583 — PROFESSIONAL ENGINEER — 3/23/16

ENGINEER	DATE
	MAR 2016

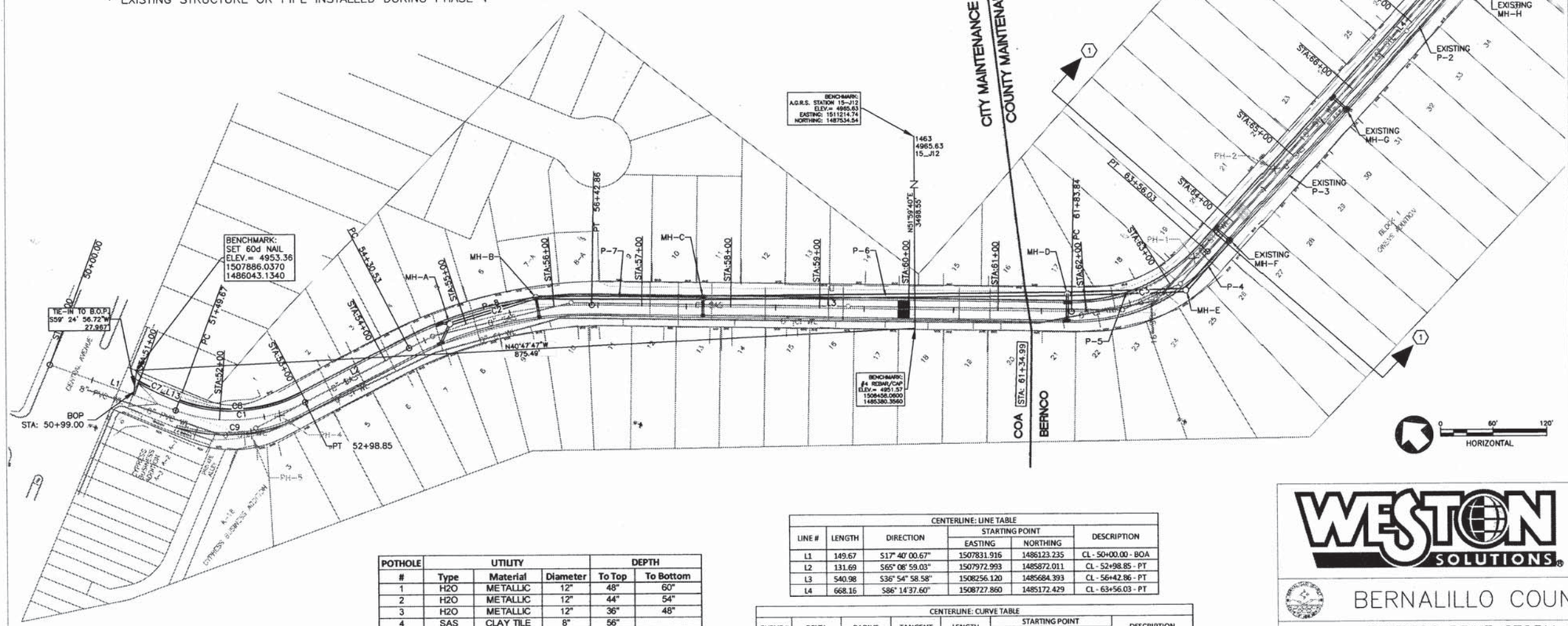
COUNTY PROJECT NO.	CITY PROJECT NO.	SHEET	OF
20160006	601791	1	14

MANHOLE LOCATION TABLE				
MANHOLE ID	MANHOLE CENTER N	MANHOLE CENTER E	PIPE ID	PIPE SLOPE
SD MH-A	1485796.776	1508142.105		
			P-8	0.26%
SD MH-B	1485739.513	1508224.172		
			P-7	0.25%
SD MH-C	1485589.692	1508339.773		
			P-6	0.25%
SD MH-D	1485267.685	1508593.944		
			P-5	0.36%
SD MH-E	1485165.322	1508678.576		
			P-4	0.35%
*SD MH-F	1485160.540	1508753.012		
			*P-3	0.16%
*SD MH-G	1485147.895	1508948.915		
			*P-2	0.39%
*SD MH-H	1485133.810	1509197.533		
			P-1	2.09%
SD MH-I	1485111.795	1509216.670		
			P-0	2.10%
PIPE OUTFALL	1485087.338	1509237.931		

NOTE: SEE PLAN AND PROFILE SHEETS FOR STA & OFFSETS
* EXISTING STRUCTURE OR PIPE INSTALLED DURING PHASE 1

KEYED NOTES:
1. CYPRESS DRIVE STATIONS 63+80.0 TO 68+27.2 BUILT PER PHASE I EXCEPT OUTFALL TO DRAIN.

NOTES:
A. BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS.
B. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET.
C. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". STATION ELEVATION: 4965.627, STATION EASTING: 1511214.74 STATION NORTHING: 1487534.54 (NAD-83/NAVD-88 DATUM).



POTHOLE	UTILITY			DEPTH	
#	Type	Material	Diameter	To Top	To Bottom
1	H2O	METALLIC	12"	48"	60"
2	H2O	METALLIC	12"	44"	54"
3	H2O	METALLIC	12"	36"	48"
4	SAS	CLAY TILE	8"	56"	
5	H2O	METALLIC	8"	21"	

NOTE: 12" WATERLINE MIGHT BE 16" AS SHOWN IN HISTORIC AS-BUILTS

CENTERLINE: LINE TABLE					
LINE #	LENGTH	DIRECTION	STARTING POINT EASTING	STARTING POINT NORTHING	DESCRIPTION
L1	149.67	S17° 40' 00.67"	1507831.916	1486123.235	CL - 50+00.00 - BOA
L2	131.69	S65° 08' 59.03"	1507972.993	1485872.011	CL - 52+98.85 - PT
L3	540.98	S36° 54' 58.58"	1508256.120	1485684.393	CL - 56+42.86 - PT
L4	668.16	S86° 14'37.60"	1508727.860	1485172.429	CL - 63+56.03 - PT

CENTERLINE: CURVE TABLE							
CURVE #	DELTA	RADIUS	TANGENT	LENGTH	STARTING POINT EASTING	STARTING POINT NORTHING	DESCRIPTION
C1	S41° 24' 30"E	180	79.17	149.17	1507877.410	1485980.398	CL - 51+49.67 - PC
C2	S51v 01' 59"E	430.88	108.36	212.32	1508092.701	1485816.571	CL - 54+30.53 - PC
C3	S61° 34' 48"E	200	91.84	172.19	1508581.059	1485251.870	CL - 61+83.84 - PC

SURVEY INFORMATION
FIELD NOTES
NO. | BY | DATE
SLS 10-24

BENCH MARKS
BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION: 4965.627, STATION EASTING: 1511214.74; STATION NORTHING: 1487534.54 (NAD-83/NAVD-88 DATUM).

AS-BUILT INFORMATION
CONTRACTOR | DATE
STAKED BY | DATE
HORIZONTAL & VERTICAL CONTROL BY | DATE
FIELD VERIFICATION BY | DATE
DRAWINGS CORRECTED BY | DATE
MICRO-FILM INFORMATION
RECORDED BY | DATE
NO.

ENGINEER'S SEAL
DAVID J. COOPER NEW MEXICO 21683 REGISTERED PROFESSIONAL ENGINEER

No.	Date	By
REVISIONS		
REMARKS		
DESIGN	DATE: MAR 2016	
Designed By: MDS	DATE: MAR 2016	
Drawn By: CP, RW	DATE: MAR 2016	
Checked By: LBS		

WESTON SOLUTIONS

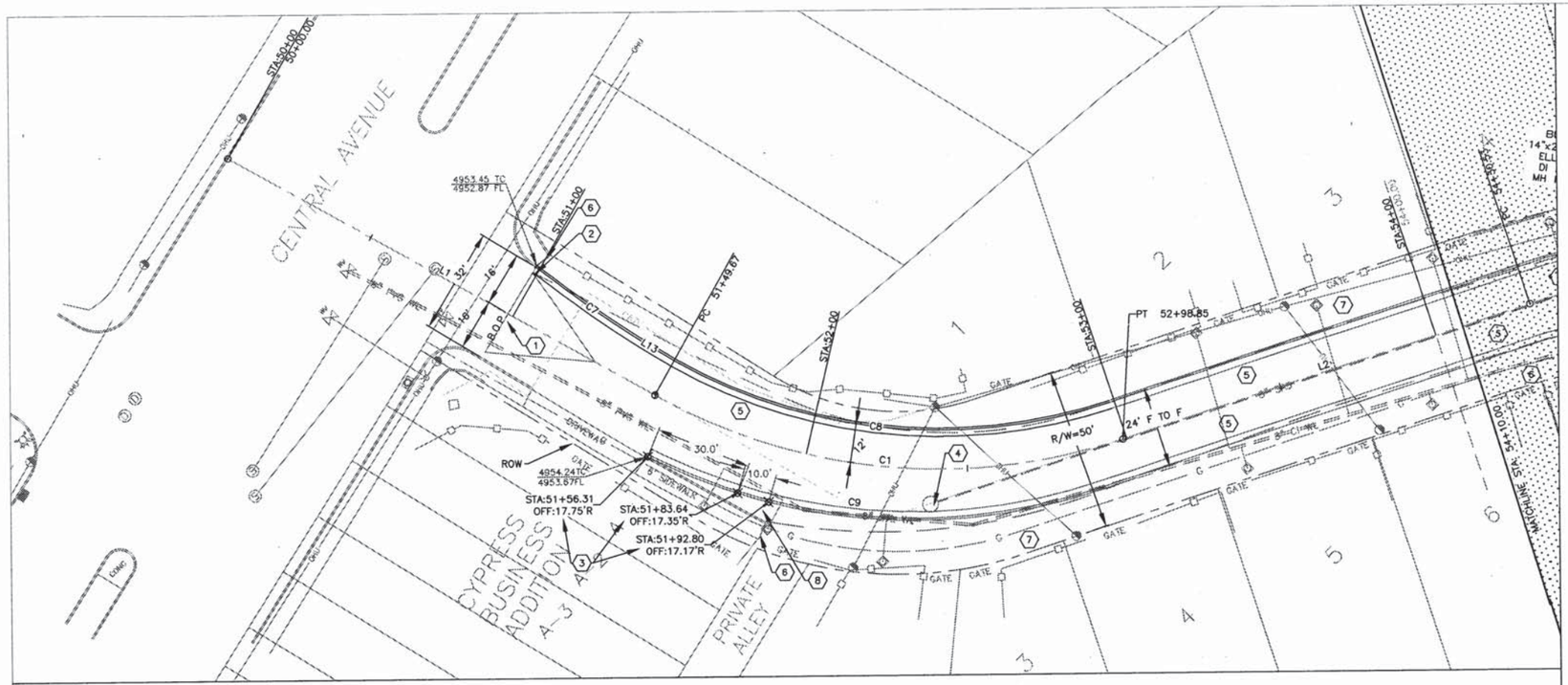
BERNALILLO COUNTY

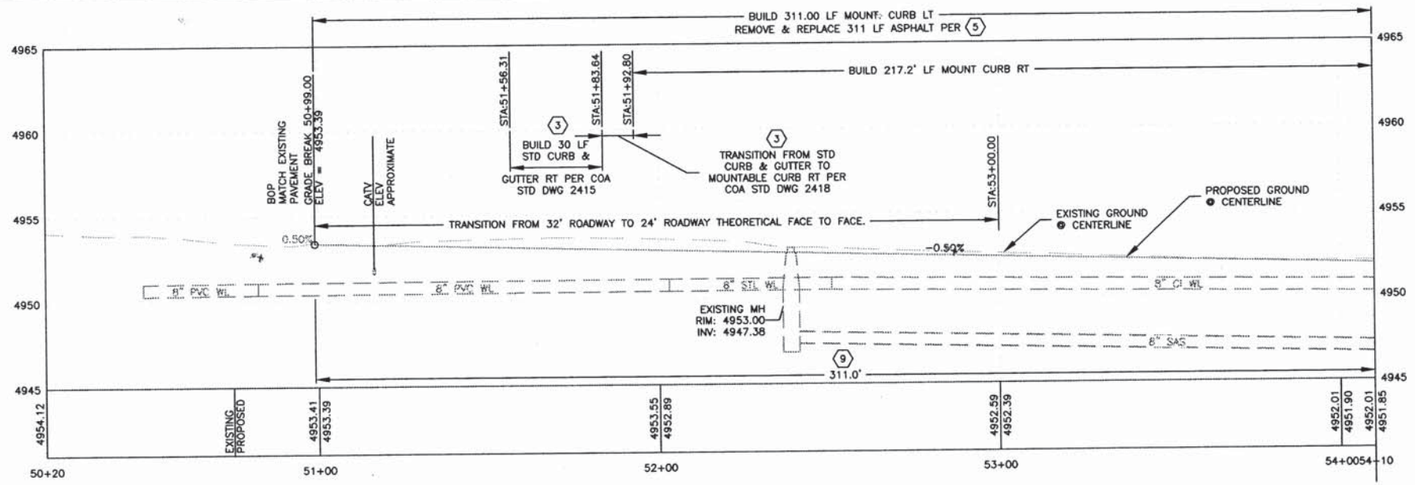
CYPRESS DRIVE STORM DRAIN
SURVEY CONTROL

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	3	14

I:\Projects\Bernalillo County\Cypress Drive Ph II\8.0 CAD\2015\SURVEY .dwg watersr Plotted: March 22, 2016 - 1:04pm Layout: 3





LEFT AND RIGHT MOUNTABLE CURB ALIGNMENT FROM BOP TO STA: 52+98.55 CURB/ASPHALT INTERFACE

Line Table: Alignments		
Line #	Length	Direction
L13	2.93	S15° 00' 14.64"E

Curve Table: Alignments				
Curve #	Delta	Radius	Tangent	Length
C7	511° 50' 34"E	357.09	19.72	39.40
C8	540° 04' 37"E	169.37	79.24	148.23
C9	540° 51' 02"E	180.00	81.78	153.48

GENERAL NOTES

A. SEE SHEET 10 FOR PAVEMENT DETAILS

B. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.

C. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.

D. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. DO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.

E. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLES. SEE SHEET 9 FOR WATER/SEWER DETAILS.

KEYED NOTES

1 SAWCUT PAVEMENT STA: 50+99.00 BEGIN TRANSITION FROM NO CROWN AT STA: 50+99.00 TO MIN. 1% CROWN AT STA: 51+24.00

2 10' TRANSITION FROM MOUNTABLE CURB TO EXISTING HANDICAP RAMP WITH STANDARD C & G INTERFACE.

3 STA: 51+56.0 RT: REMOVE 1 SECTION OF EXISTING CURB AND GUTTER FROM JOINT (DO NOT DISTURB DRIVEPAD). CONSTRUCT 30 LF. STANDARD CURB AND GUTTER AND TRANSITION OVER 10' TO MOUNTABLE CURB.

4 ADJUST MANHOLE ELEV. TO NEW GRADE. INCLUDE CONCRETE PAD PER COA STD DWG 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENT.

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

6 EXISTING SIDEWALK SHALL REMAIN IN PLACE. AT END OF EXISTING SIDEWALK, PROVIDE 6H:1V MINIMUM TIE-IN GRADES TO EXISTING ELEVATION.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 BACKFILL BETWEEN EXISTING AND NEW CURB AND GUTTER. GRADE TO DRAIN TO NEW ROADWAY.

9 STA 50+99 TO STA 58+73.28 REMOVE AND REPLACE EXISTING WATERLINE WITH 8" PVC WATERLINE WITH MINIMUM OF 3' OF COVER. MATCH EXISTING AT STA. 58+73.28.

VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

WESTON SOLUTIONS®

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE
SLS 10-24-16

BENCH MARKS
BEARINGS ARE BASED ON GEODETIC NORTH FROM OPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY SLS DATE 10-24-16
WORK ACCEPTANCE BY DATE
CERTIFICATION BY DATE
DRAWINGS BY DATE

MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

ENGINEER'S SEAL
DAVID J. COOPER NEW MEXICO 21683 PROFESSIONAL ENGINEER

No.	Date	By	REVISIONS / REMARKS / DESIGN
			DATE: MAR 2016
			DATE: MAR 2016
			DATE: MAR 2016

Designed By: MDS
Drawn By: CP, RW
Checked By: LBS

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 50+00 TO 54+10

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	4	14

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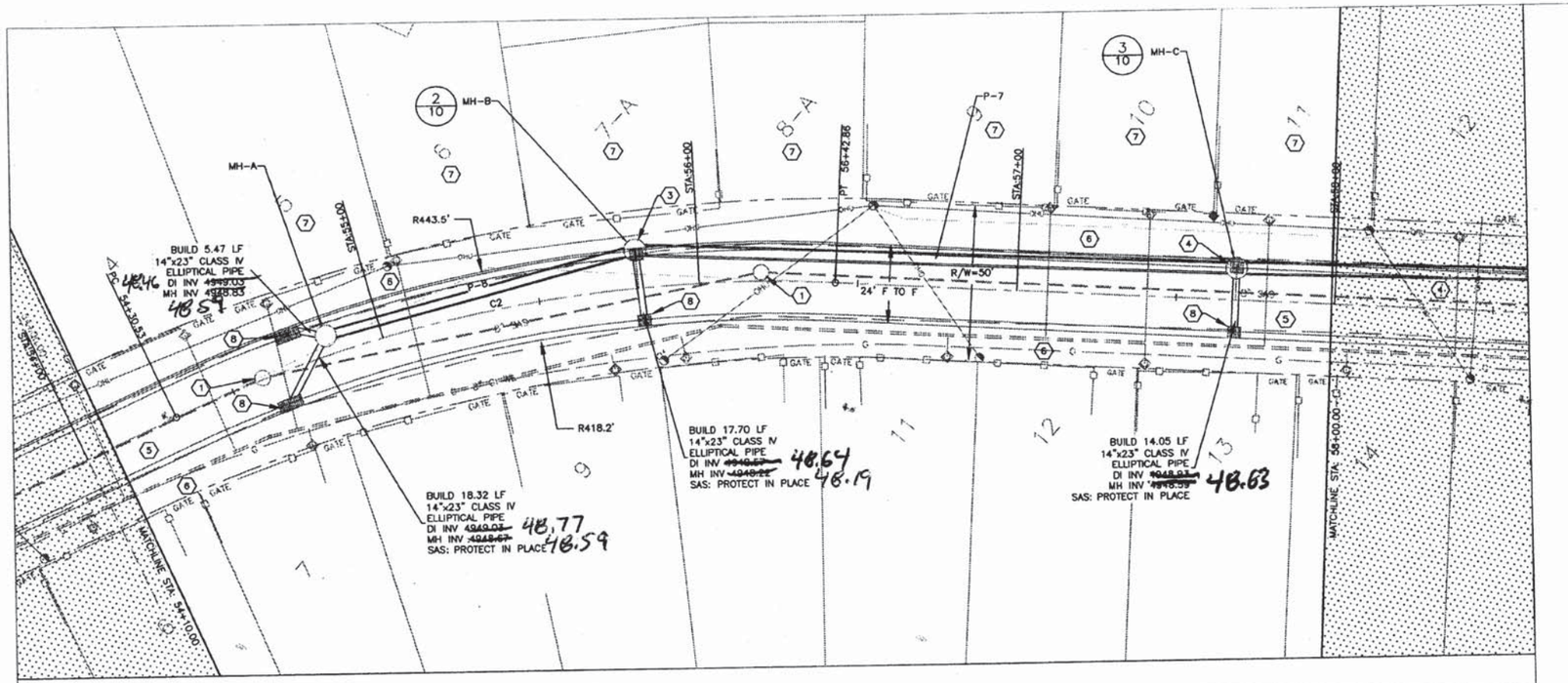

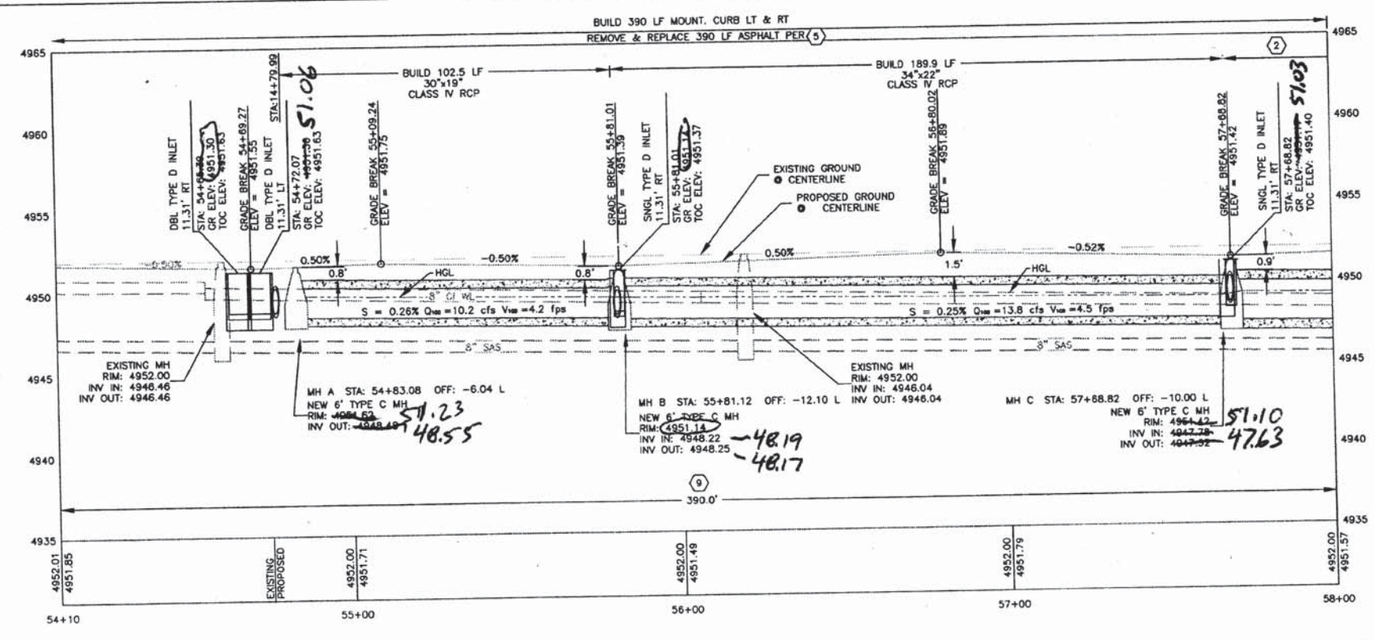

GENERAL NOTES

A. SEE SHEET 10 FOR PAVEMENT DETAILS.

B. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.

C. INLET OFFSET AND ELEV. REFERS TO BACK OF GRATE. ALL DROP INLETS CONSTRUCTED PER COA STD DWGS 2206 & 2220-MODIFIED, SEE SHEET 11.

D. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.

E. CONSTRUCTION LIMITS/EASEMENTS ARE FROM FENCE LINE TO FENCE LINE. SO NOT DISTURB FENCE AND/OR WALL. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF FENCE AND/OR WALL DAMAGED IN THE COURSE OF CONSTRUCTION.

F. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.

G. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2208, 2212 AND 2210 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV TO NEW GRADE PER COA STD SPEC 920, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 6. RCP LENGTH AND TYPE.

3 MANHOLE OPENING CENTERED ON SOUTH-WEST, WITH SINGLE TYPE D INLET OR APPROVED EQUIVALENT. SEE SHEET 10 FOR CURB MODIFICATION.

4 MANHOLE OPENING CENTERED ON NORTH-EAST, WITH SINGLE TYPE D INLET OR APPROVED EQUIVALENT. SEE SHEET 10 FOR CURB MODIFICATION.

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

6 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

7 SEE SHEET 9 DETAIL 1 FOR SAS SERVICE MODIFICATION AND DETAIL 3 FOR WATER SERVICE MODIFICATION.

8 INSTALL DROP INLET GRATE PER MODIFIED COA STANDARD DRAWING 2220. SEE (1/12)

9 STA 50+99 TO STA 58+73.28 REMOVE AND REPLACE EXISTING WATERLINE WITH 8" PVC WATERLINE WITH MINIMUM OF 3' OF COVER. MATCH EXISTING AT STA. 58+73.28.

10 ADJUST EXISTING MANHOLE COVER TO FINISHED GRADE PER COA STD SPEC SECTION 920.

VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

WESTON SOLUTIONS

AS-BUILT INFORMATION
CONTRACTOR DATE 10-24-16
STAKED BY SLS DATE
INSPECTED BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

BENCH MARKS
ON A.C.R.S. STATION "15-J12". ELEVATION OF STATION
= 4985.627 (NAVD 1988 DATUM).

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE
SLS 10-24
BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED

ENGINEER'S SEAL
DAVID J. COOPER NEW MEXICO 21683 REGISTERED PROFESSIONAL ENGINEER

No.	Date	By	REVISIONS REMARKS
			DESIGN
			Designed By: MDS DATE: MAR 2016
			Drawn By: CP, RW DATE: MAR 2016
			Checked By: LBS DATE: MAR 2016

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 54+10 TO 58+00

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	5	14

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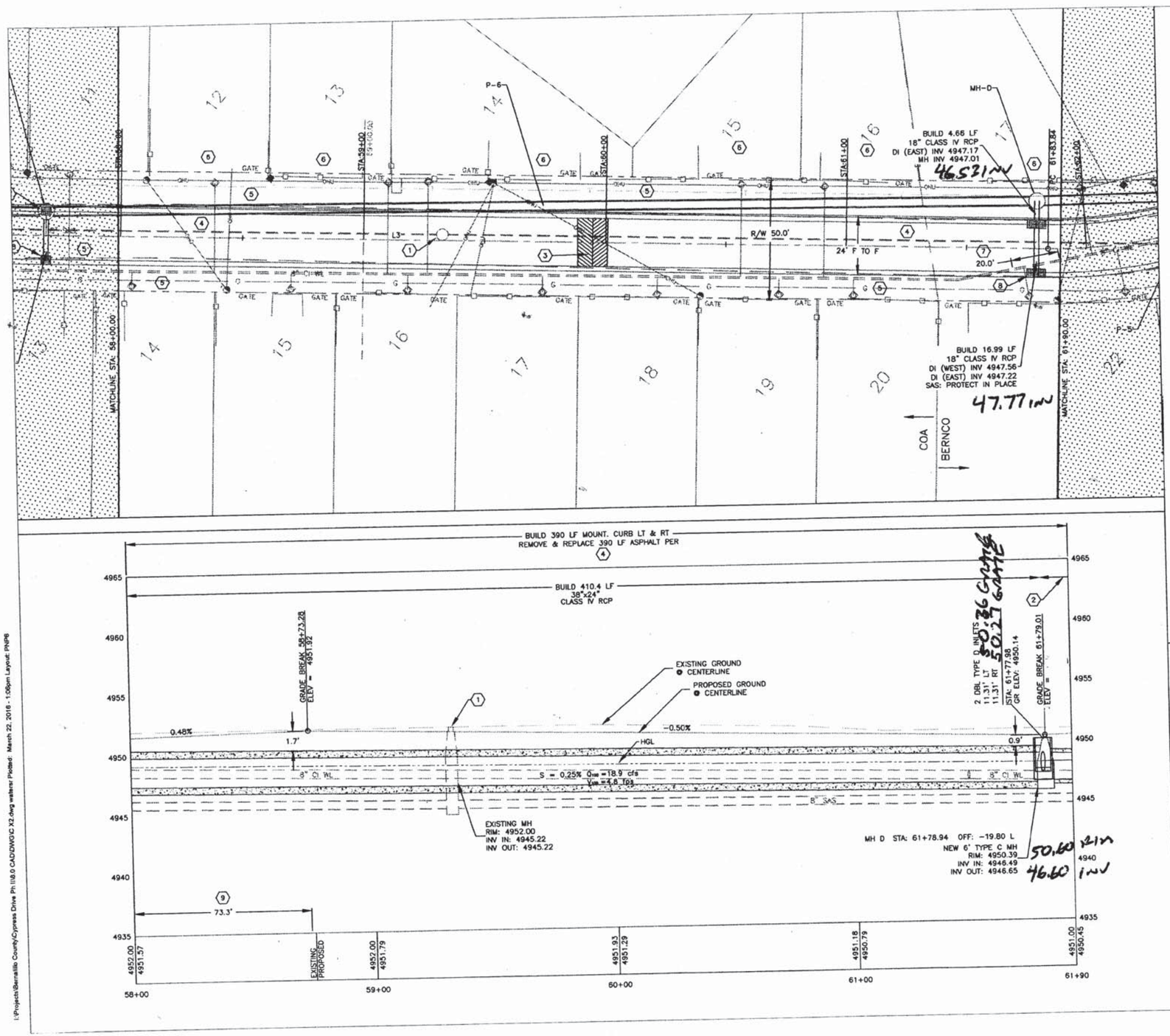

GENERAL NOTES

A. SEE SHEET 10 FOR PAVEMENT DETAILS

B. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.

C. INLET OFFSET AND ELEV REFERS TO BACK OF GRATE.

D. CONTRACTOR IS RESPONSIBLE FOR VERIFYING HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES. UTILITY LOCATIONS SHOWN IN APPROXIMATE MANNER ONLY. CONTRACTOR IS RESPONSIBLE FOR REPLACEMENT COST OF UTILITY LINES DAMAGED IN THE COURSE OF CONSTRUCTION.

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F. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.

G. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2208, 2212 AND 2210 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV TO NEW GRADE PER COA STD SPEC 920, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 7. FOR RCP LENGTH AND TYPE.

3 REPLACE SPEED HUMP PER SHEET 10.

4 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH.

5 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

6 SEE SHEET 9 DETAIL 1 FOR SAS SERVICE MODIFICATION AND DETAIL 3 FOR WATER SERVICE MODIFICATION.

7 RELOCATE 20.0' WATER LINE PER (3/12)

8 INSTALL DROP INLET GRATE PER MODIFIED COA STANDARD DRAWING 2220. SEE (1/12)

9 STA 50+99 TO STA 58+73.28 REMOVE AND REPLACE EXISTING WATERLINE WITH 8" PVC WATERLINE WITH MINIMUM OF 3' OF COVER. MATCH EXISTING AT STA. 58+73.28.

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

WESTON SOLUTIONS

AS-BUILT INFORMATION
CONTRACTOR STAKED BY: SLS DATE: 10-24-16
INSPECTOR'S SIGNATURE DATE
VERIFICATION BY DATE
DRAWINGS BY DATE
ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

SURVEY INFORMAL
BENCH MARKS
FIELD NOTES
NO. DATE BY
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ENGINEER'S SEAL
SANDRA J. COOPER NEW MEXICO 21683 REGISTERED PROFESSIONAL ENGINEER

No.	Date	REVISIONS / REMARKS / DESIGN	By
		DESIGN	DATE: MAR 2016
		Designed By: MDS	DATE: MAR 2016
		Drawn By: CP, RW	DATE: MAR 2016
		Checked By: LBS	

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 58+00 TO 61+90

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	6	14

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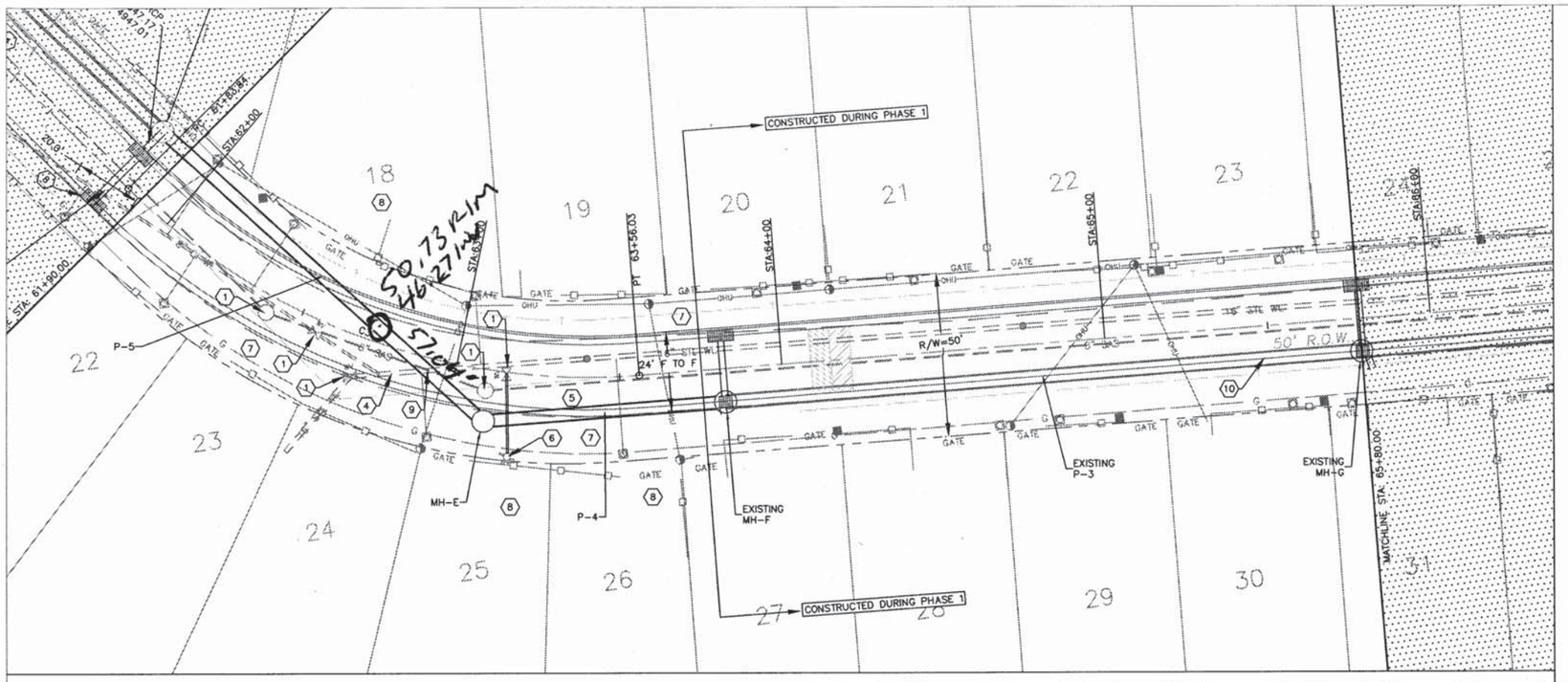

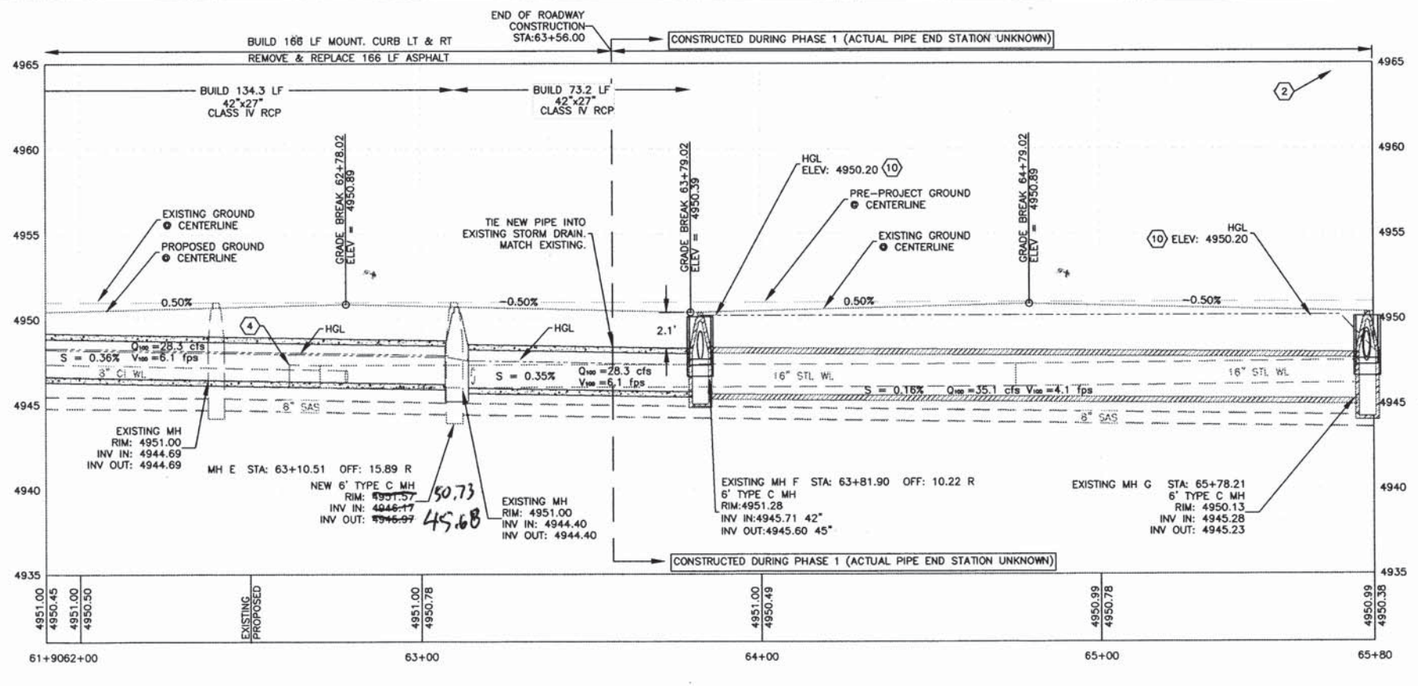

GENERAL NOTES

A. SEE SHEET 10 FOR PAVEMENT DETAILS

B. WATERLINE IS IN FOREGROUND; HOWEVER IT IS SHOWN IN PROFILE FOR INFORMATIONAL PURPOSES.

C. INLET OFFSET AND ELEV REFERS TO BACK OF GRATE.

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F. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLE.

G. RCP STORM DRAIN AND LATERALS SHALL BE GASKETED TONGUE AND GROOVE.

H. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

1 ADJUST MANHOLE ELEV TO NEW GRADE PER COA STD SPEC 920, INCLUDE CONCRETE PAD PER COA STD DWG. 2101. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS. ADJUST WATER VALVE COVER TO NEW GRADE PER COA STD SPEC 801. CONCRETE PAD INCIDENTAL TO ADJUSTMENTS.

2 SEE SHEET 8 FOR RCP END STATION.

4 RELOCATE WATER LINE PER (3/12)

5 REMOVE AND DISPOSE OF EXISTING ASPHALT FOR FULL STREET WIDTH TO APPROX. STA. 63+51 (BOP OF PHASE I PAVING).

6 NOTIFY FIRE MARSHAL SEVEN (7) DAYS PRIOR TO WATERLINE SHUTOFF THAT THE HYDRANT WILL BE TEMPORARILY OUT OF SERVICE. COVER IN BLACK PLASTIC WHILE OUT OF SERVICE.

7 GRADE TO DRAIN FROM FENCE LINE TO MOUNTABLE CURB. DO NOT DISTURB EXISTING UTILITY POLES OR SERVICES (INCLUDING WATER METERS).

8 SEE SHEET 9 DETAIL 1 FOR SAS SERVICE MODIFICATION AND DETAIL 3 FOR WATER SERVICE MODIFICATION.

9 SEE SHEET 9 DETAIL 2 FOR RCP CROSSING OF SAS MAIN.

10 STORM DRAIN PIPE BETWEEN MH F AND MH G IS SURCHARGED. WATER WILL OVERFLOW MH F.

VERTICAL 0 4' 8'

HORIZONTAL 0 20' 40'

WESTON SOLUTIONS

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FIELD NOTES
NO. BY DATE
SLS 10-24

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY SLS DATE 6-24-24
ACCEPTANCE BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE

MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

ENGINEER'S SEAL
DAVID J. COOPER NEW MEXICO 21683 REGISTERED PROFESSIONAL ENGINEER

No.	Date	REVISIONS REMARKS DESIGN	By	DATE: MAR 2016
		Designed By:	MDS	DATE: MAR 2016
		Drawn By:	CP, RW	DATE: MAR 2016
		Checked By:	LBS	

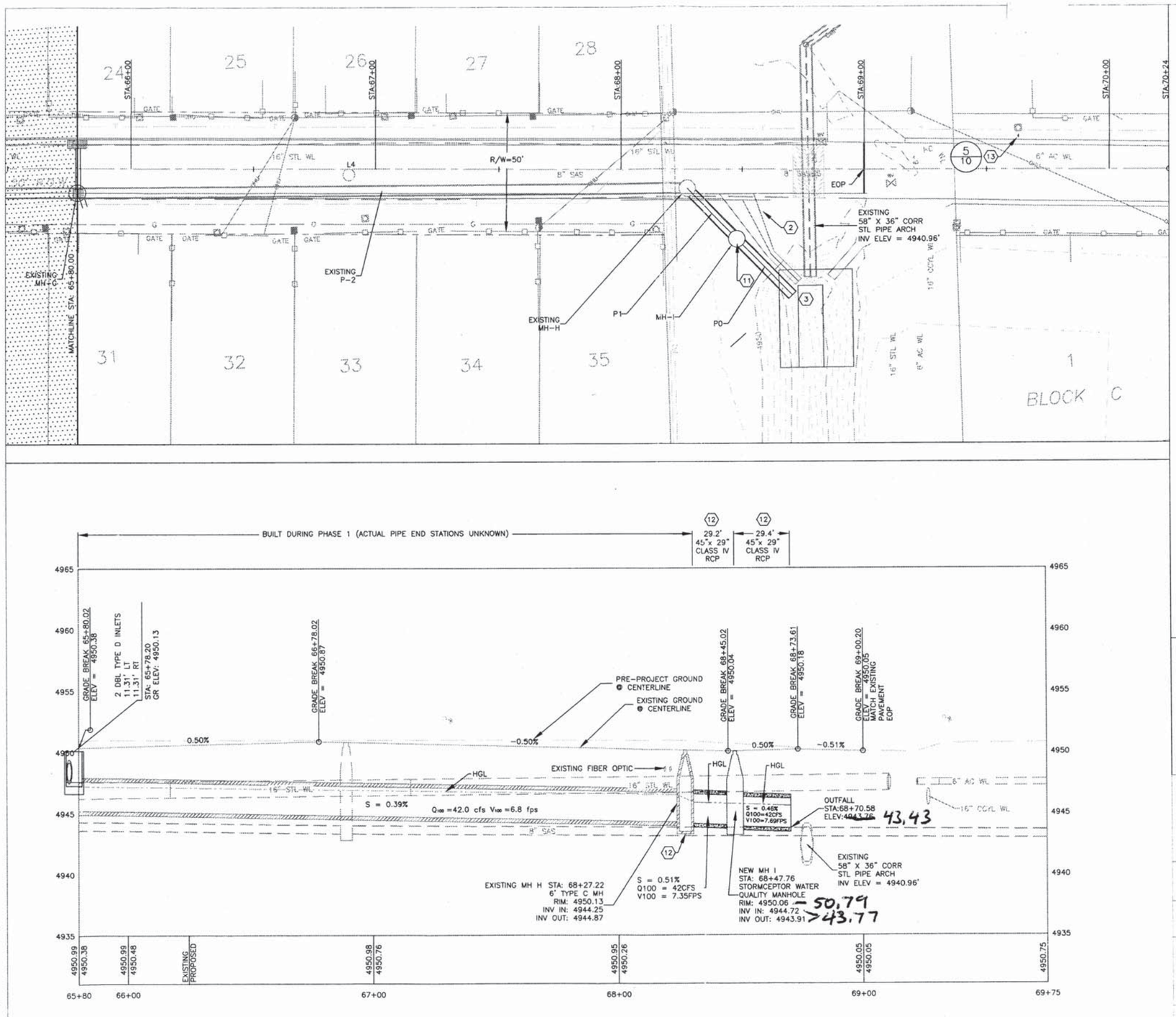
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 61+90 TO 65+80

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	7	14

I:\Projects\Bernalillo County\Cypress Drive Ph II\8.0 CAD\DWG\C X2.dwg waterw Plotted: March 22, 2016 - 1:07pm Layout: PNP7



GENERAL NOTES

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D. SEE SHEET 3 FOR POTHOLE TABLE AND LINE AND CURB TABLE.

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F. TYPE C MANHOLES CONSTRUCTED PER COA STD DWGS 2101, 2107 AND 2110 UNLESS OTHERWISE NOTED.

KEYED NOTES

2 SEE SHEET 11 FOR RUNDOWN DETAILS

3 SEE SHEET 11 FOR EROSION PROTECTION DETAILS

11 WATER QUALITY MH STC900 PRECAST CONCRETE STORMCEPTOR OR APPROVED EQUIVALENT. SHALL BE MAINTAINED BY BERNALILLO COUNTY.

12 IT IS NOT KNOWN WHAT WAS CONSTRUCTED DOWNSTREAM OF MH H DURING PHASE 1. CONTRACTOR SHALL VERIFY WHICH DESIGN FEATURES WERE BUILT AND WHICH REMAIN TO BE BUILT.

13 INSTALL SPEED HUMP WARNING SIGNAGE AT STATION 69+62.85, 13.62' LT PER COA STANDARD SPECIFICATIONS SECTION 450 AND THE MUTCD.

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN U.S. FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).
SLS 10-24-16

BENCH MARKS

AS-BUILT INFORMATION
CONTRACTOR DATE
STAKED BY SLS DATE 10-24-16
INSPECTOR'S FIELD NOTES BY DATE
FIELD VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE
MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

ENGINEER'S SEAL
DAVID J. COOPER NEW MEXICO 21683 PROFESSIONAL ENGINEER

SC

CURRENT CONDITION: 3

No.	Date	By	REVISIONS / REMARKS
1	11/15	SC	DESIGN

Designed By: MDS DATE: MAR 2016
Drawn By: CP, RW DATE: MAR 2016
Checked By: LBS DATE: MAR 2016

0 4' 8'
VERTICAL
0 20' 40'
HORIZONTAL

WESTON SOLUTIONS

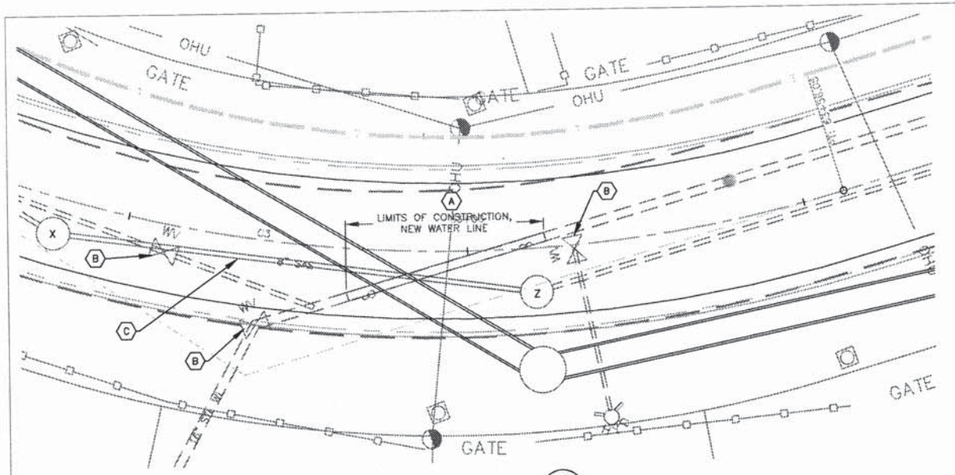
BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
PLAN & PROFILE STA 65+80 TO EOP

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	8	14

I:\Projects\Bernalillo County\Cypress Drive Ph II\8.0 CAD\DWG\C X2.dwg watersi Plotted: March 22, 2016 - 1:07pm Layout: PNP8



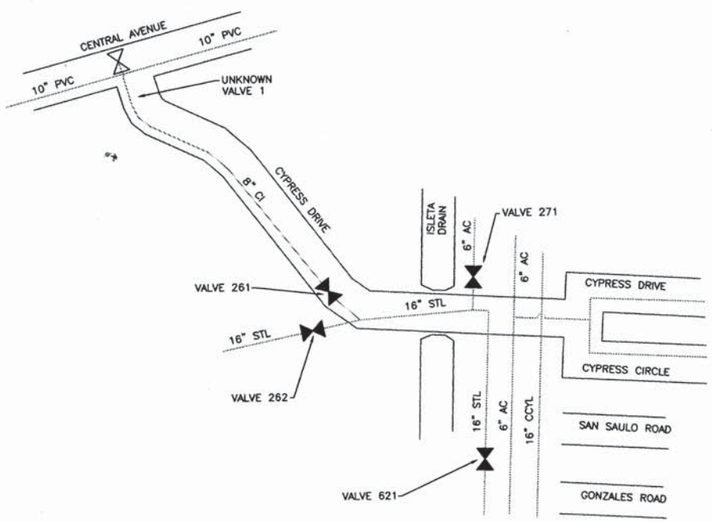
(A) RELOCATE EXISTING 16" WATER LINE PER 3/12

(B) ADJUST WV COLLAR TO NEW GRADE PER COA STD DWG 2326. CONCRETE COLLAR INCIDENTAL TO WV ADJUSTMENT.

(C) REPLACE 8" VCP WITH 8" PVC PRESSURE PIPE BETWEEN MANHOLES X AND Z.

STA:	RESTRAINED LENGTH*	FITTINGS
62+82.50	55	16" 45° ELBOW
62+85.50	8	16" 45° ELBOW
63+08.50	8	16" 45° ELBOW
63+11.50	55	16" 45° ELBOW

*RESTRAINED EACH SIDE OF FITTING



WATER SHUTOFF PLAN

WATER VALVE SHUT OFF PLAN

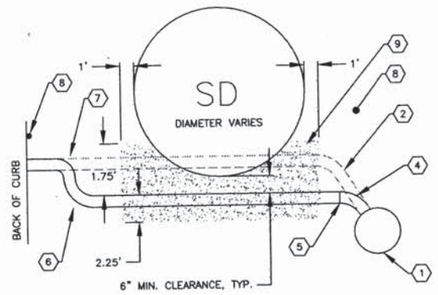
Notify Albuquerque/Bernalillo County Water Utility Authority seven (7) working days in advance of needing execution of the 8" water shut off plan.

Notify Albuquerque/Bernalillo County Water Utility Authority fourteen (14) working days in advance of needing execution of the 16" water shut off plan.

Only water utility authority personnel are authorized to operate valves.

8" Cast Iron (CI) Cypress Drive shut off plan requires closure of valves: 261 and unknown valve 1.

16" Steel (STL) Cypress Drive shut off plan requires closure of valves: 261, 262, 271, and 621.

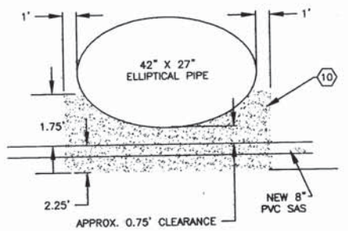


1 EXISTING SAS SERVICE ADJUSTMENT REROUTE UNDER STORM DRAIN

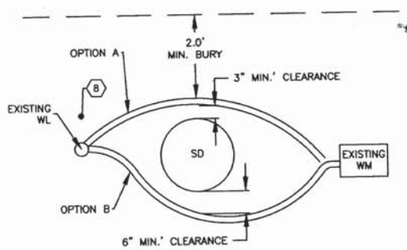
16 SERVICES FROM STA: 54+80 TO 62+75

KEYED NOTES

1. EXISTING 8" VITRIFIED CLAY PIPE SAS
2. EXISTING 4" VITRIFIED CLAY PIPE RISER
3. EXTEND 4" VITRIFIED CLAY PIPE RISER
4. SHORTEN 4" VITRIFIED CLAY PIPE RISER
5. TRANSISTION 4" VITRIFIED CLAY PIPE TO 4" PVC
6. PVC WITH UNIFORM SLOPE FROM JUNCTION TO SERVICE AT PROPERTY LINE. MINIMUM SLOPE 2.08%
7. REMOVE AND DISPOSE OF 4" SAS PIPE
8. INSTALL ELECTRONIC MARKING SPHERE (EMS) AT BACK OF CURB AND BEND PER COA STD SPEC 170.
9. PER COA STD SPEC 207, 4.25 FT. LEAN FILL CENTERED ON SAS SERVICE. LEAN FILL VOLUME IS 4 FT. X 4.25 FT X (SD DIA. + 2 FT.).
10. PER COA STD SPEC 207,12 FT. LEAN FILL CENTERED ON SAS MAIN. LEAN FILL VOLUME IS 4 FT. X 12 FT. X 5.5 FT.
11. PER COA STD. SPEC. 207, 5 FT. LEAN FILL CENTERED ON 16" WL.



2 STORM DRAIN CROSSING OF SAS



REPLACE SERVICE LINE WITH COPPER SERVICE LINE FROM MAIN TO METER – NO SPLICING AND NO KINKING OF LINE. CONTRACTOR HAS OPTION OF PLACING NEW SERVICE LINE UNDER STORM DRAIN WITH 6" MIN. CLEARANCE.

3 EXISTING WATER SERVICE REPLACEMENT

37 SERVICES FROM STA: 52+02.93 TO 63+81.90

SURVEY INFORMATION
FIELD NOTES

NO.	BY	DATE
	SLS	10-21

BENCH MARKS

BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

AS-BUILT INFORMATION

CONTRACTOR — DATE
WORK STAKED BY: SLS — DATE 10-24
INSPECTED BY — ACCEPTANCE BY — DATE
FIELD LOCATION BY — DATE
DRAWINGS CORRECTED BY — DATE

MICRO-FILM INFORMATION

RECORDED BY — DATE
NO.

ENGINEER'S SEAL

DAVID J. COOPER NEW MEXICO 21683 PROFESSIONAL ENGINEER 3/23/16

No.	Date	By	REVISIONS / REMARKS / DESIGN
			DATE: MAR 2016
			DATE: MAR 2016
			DATE: MAR 2016

Designed By: MDS
Drawn By: CP, RW
Checked By: LBS

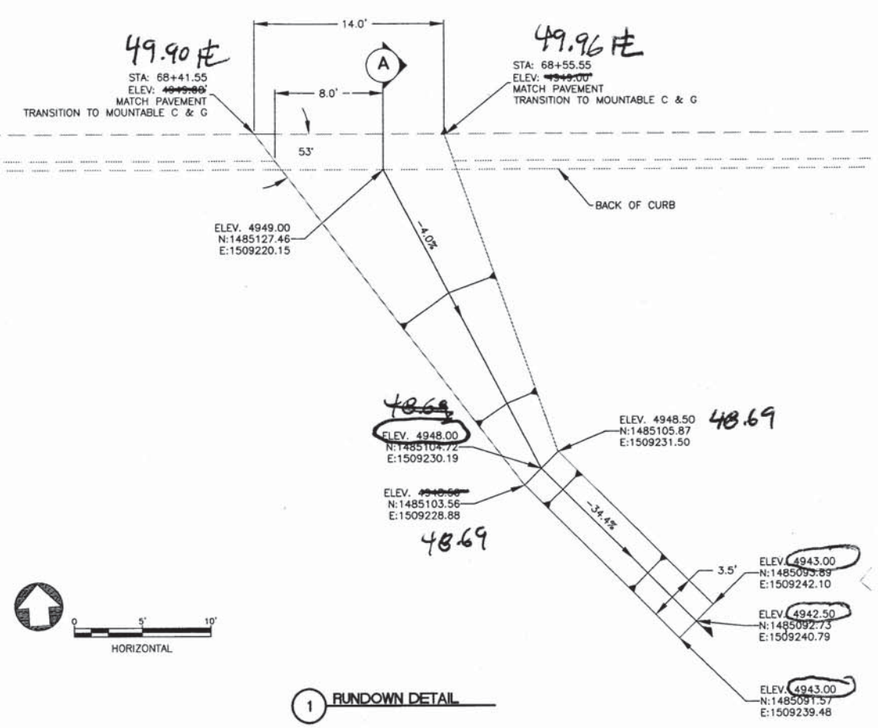
WESTON SOLUTIONS®

BERNALILLO COUNTY

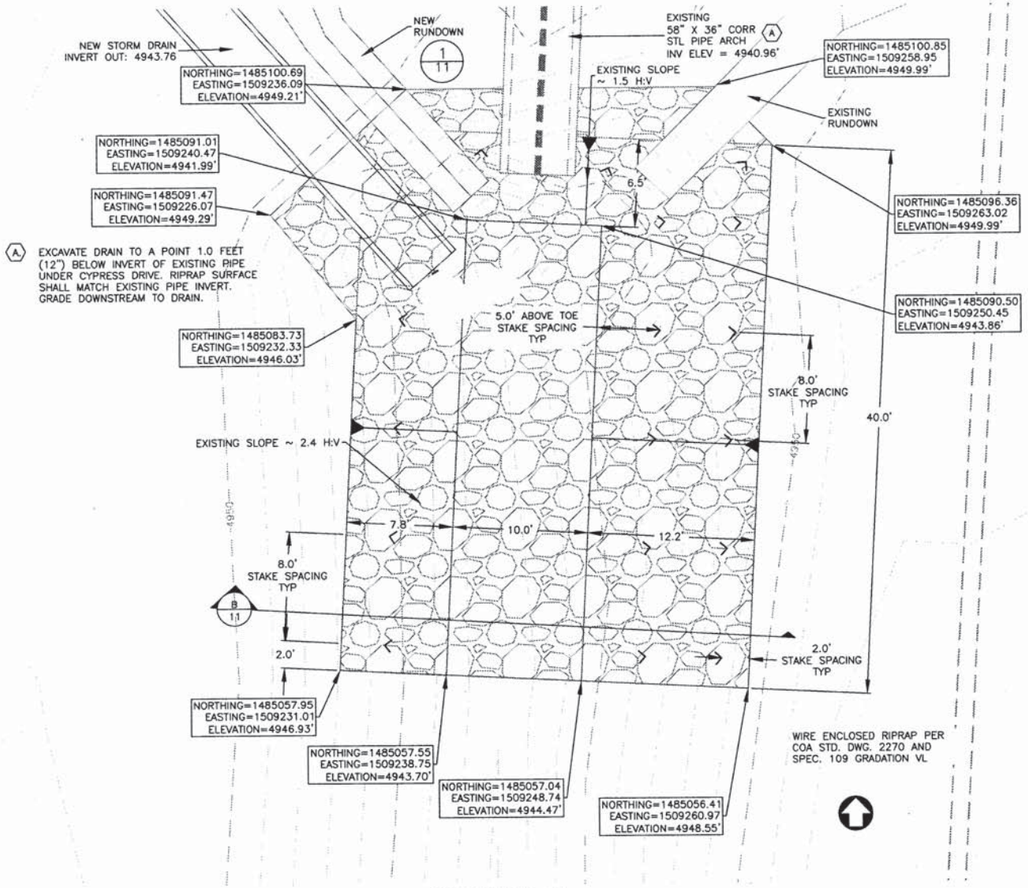
CYPRESS DRIVE STORM DRAIN WATER AND SAS SERVICE DETAILS

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

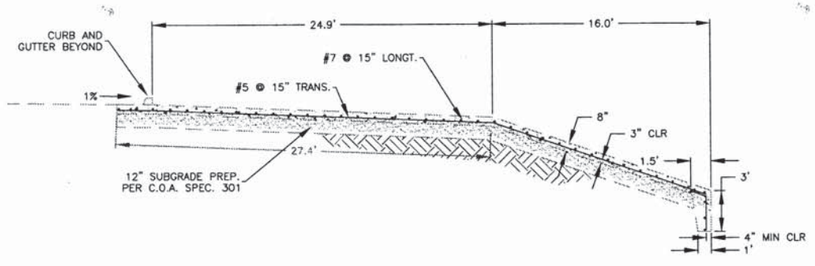
County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	9	14



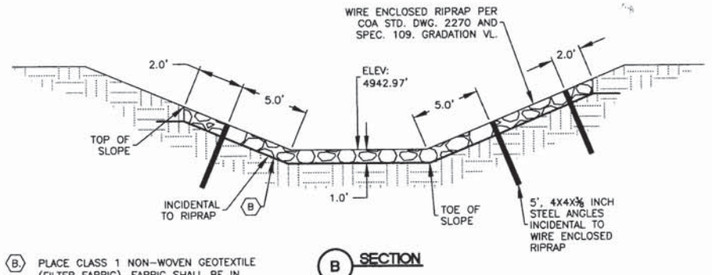
1 RUNDOWN DETAIL



2 RIPRAP DETAIL



A SECTION



B. PLACE CLASS 1 NON-WOVEN GEOTEXTILE (FILTER FABRIC). FABRIC SHALL BE IN ACCORDANCE WITH SECTION 604, SOIL AND DRAINAGE GEOTEXTILES NMDOT STD SPECS FOR HIGHWAY AND BRIDGE CONSTRUCTION, 2007 EDITION.

B SECTION

SURVEY INFORMATION
FIELD NOTES
NO. BY DATE
SLS 10-24

BENCH MARKS
BEARINGS ARE BASED ON GEODETIC NORTH FROM GPS OBSERVATIONS. DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS IN US FEET. ELEVATIONS ARE BASED ON A.G.R.S. STATION "15-J12". ELEVATION OF STATION = 4965.627 (NAVD 1988 DATUM).

AS-BUILT INFORMATION
CONTRACTOR DATE
WORK STAKED BY: SLS DATE 10-24-16
WORK ACCEPTANCE BY DATE
VERIFICATION BY DATE
DRAWINGS CORRECTED BY DATE

MICRO-FILM INFORMATION
RECORDED BY DATE
NO.

ENGINEER'S SEAL
DAVID J. COOPER
NEW MEXICO
21683
PROFESSIONAL ENGINEER

No.	Date	REVISIONS REMARKS DESIGN	By
		Designed By: MDS	DATE: MAR 2016
		Drawn By: CP, RW	DATE: MAR 2016
		Checked By: LBS	DATE: MAR 2016

WESTON SOLUTIONS

BERNALILLO COUNTY

CYPRESS DRIVE STORM DRAIN
RUNDOWN AND EROSION PROTECTION DETAILS

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

County Project No.	City Project No.	Zone Map No.	Sheet	Of
20160006	601791	K-11/12	11	14

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APPENDIX D: SWMM MODEL RESULTS

APPENDIX D: SWMM MODEL RESULTS

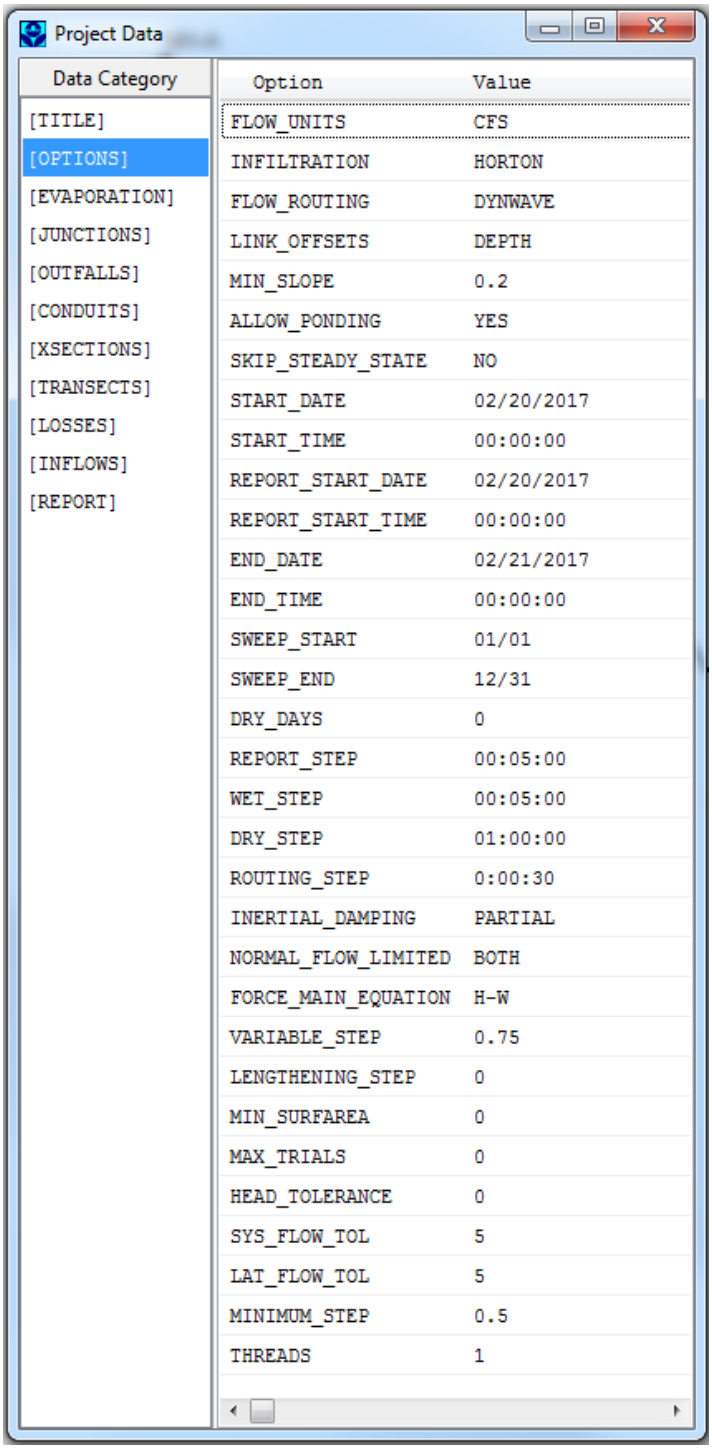


Figure 1: SWMM Model Settings

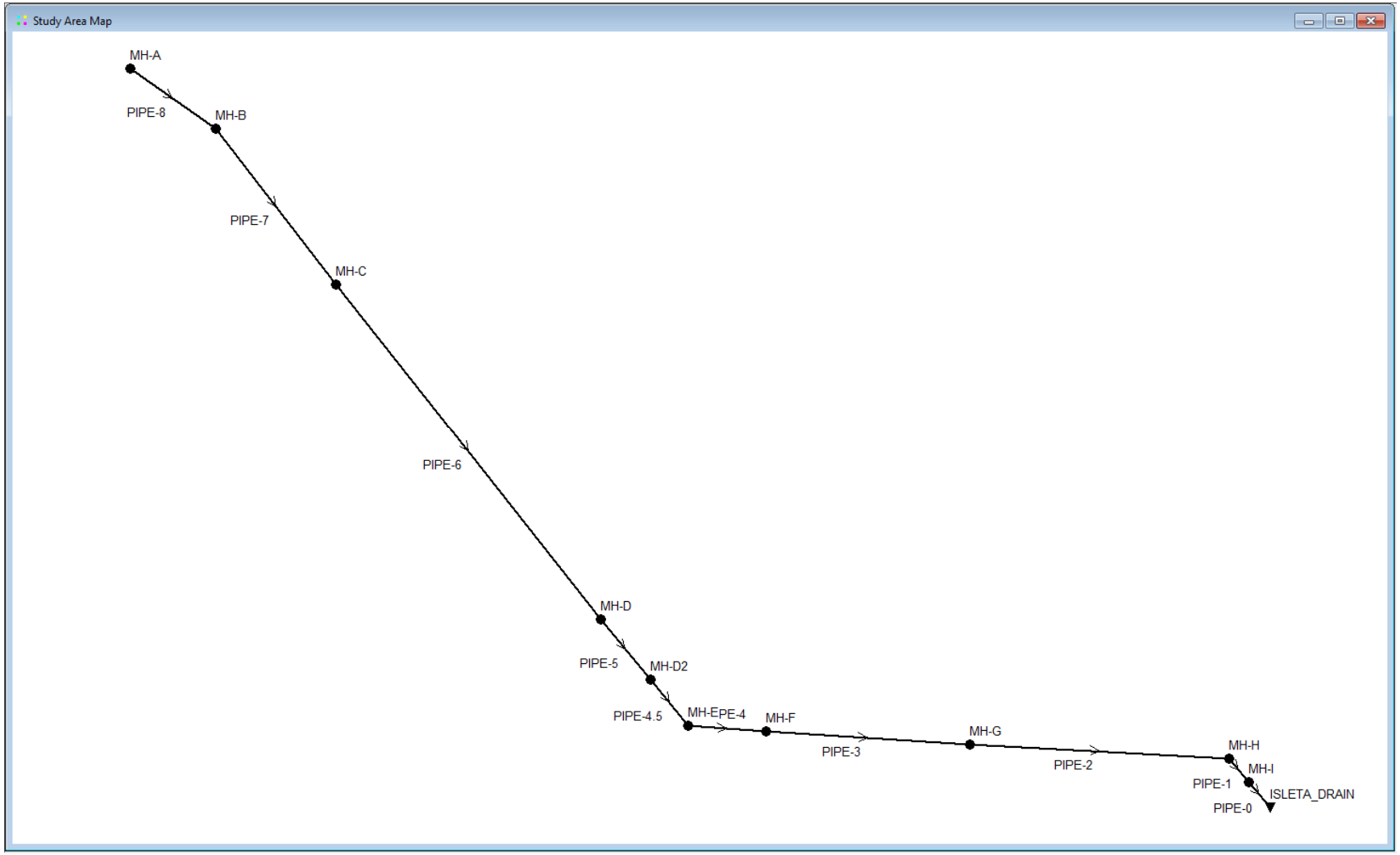


Figure 2: SWMM Model Storm Drain Layout

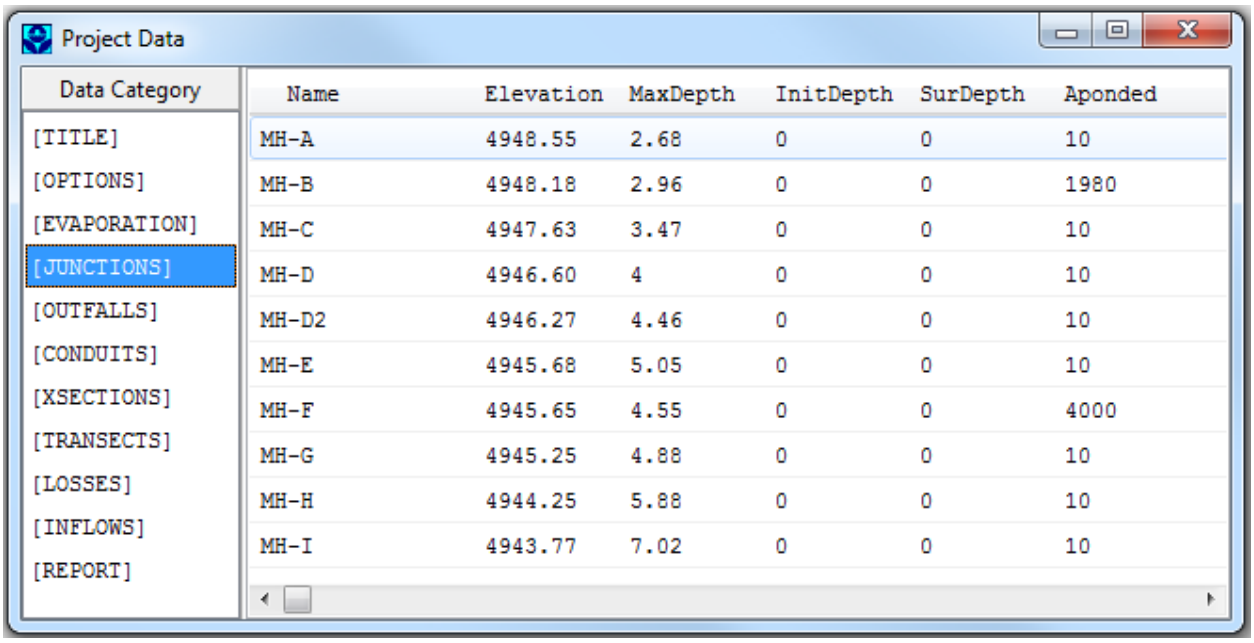


Figure 3: SWMM Model Junction (Node) Inputs

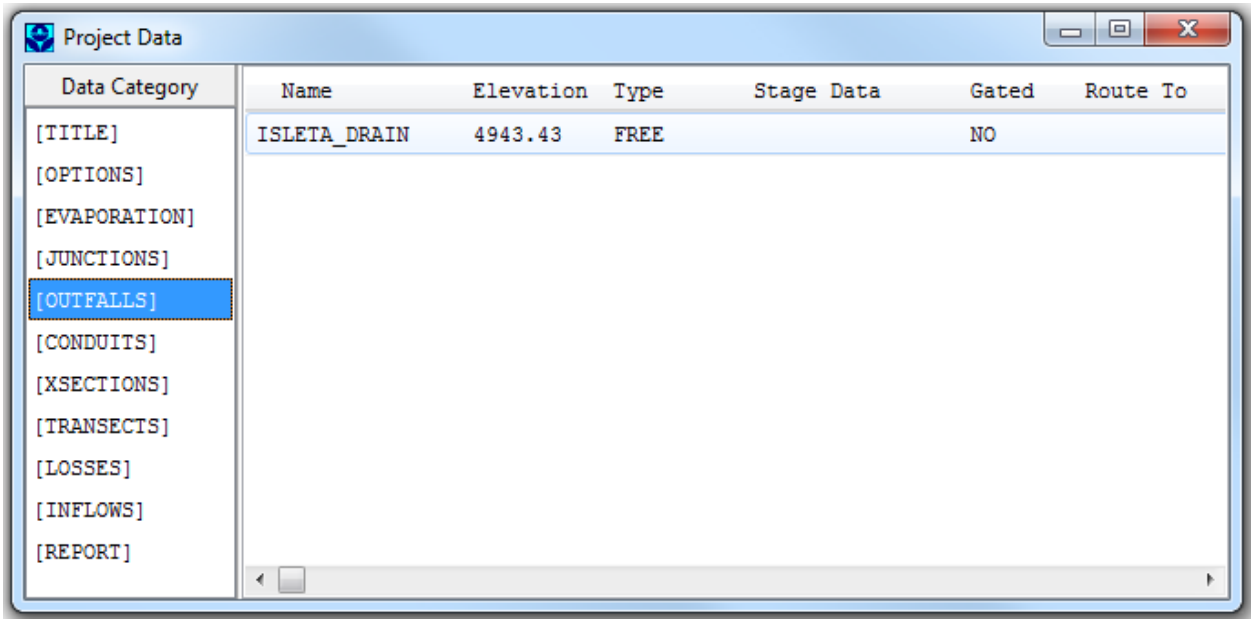
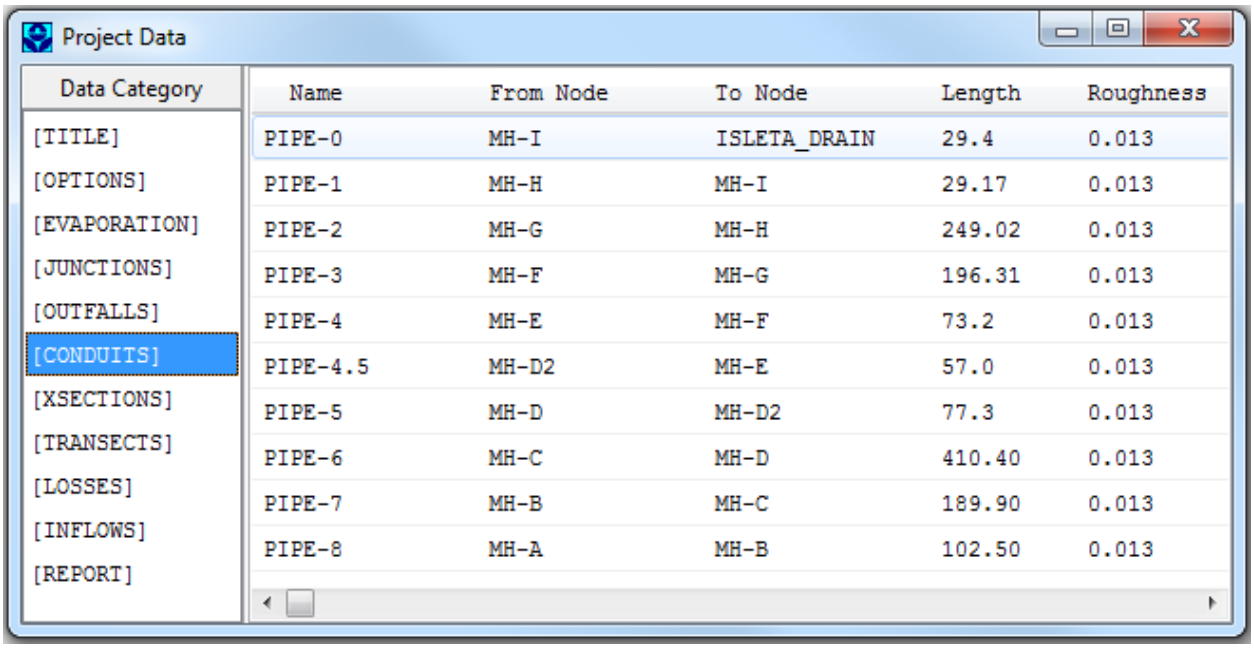
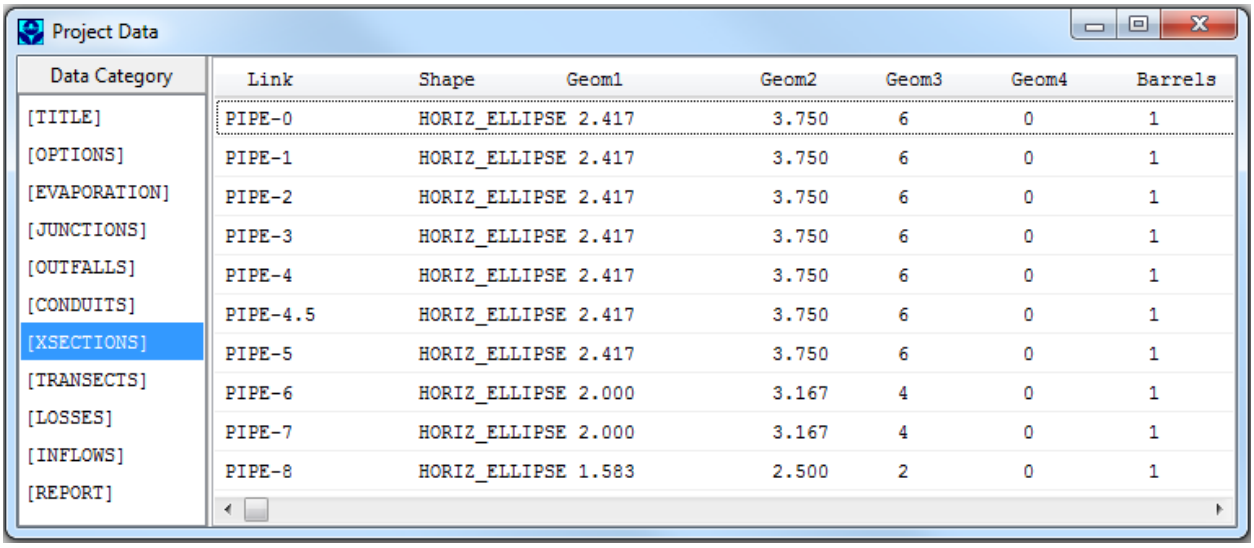


Figure 4: SWMM Model Outfall Node Inputs



Name	From Node	To Node	Length	Roughness
PIPE-0	MH-I	ISLETA_DRAIN	29.4	0.013
PIPE-1	MH-H	MH-I	29.17	0.013
PIPE-2	MH-G	MH-H	249.02	0.013
PIPE-3	MH-F	MH-G	196.31	0.013
PIPE-4	MH-E	MH-F	73.2	0.013
PIPE-4.5	MH-D2	MH-E	57.0	0.013
PIPE-5	MH-D	MH-D2	77.3	0.013
PIPE-6	MH-C	MH-D	410.40	0.013
PIPE-7	MH-B	MH-C	189.90	0.013
PIPE-8	MH-A	MH-B	102.50	0.013

Figure 5: SWMM Model Conduit (Link) Inputs



Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels
PIPE-0	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-1	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-2	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-3	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-4	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-4.5	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-5	HORIZ_ELLIPSE	2.417	3.750	6	0	1
PIPE-6	HORIZ_ELLIPSE	2.000	3.167	4	0	1
PIPE-7	HORIZ_ELLIPSE	2.000	3.167	4	0	1
PIPE-8	HORIZ_ELLIPSE	1.583	2.500	2	0	1

Figure 6: SWMM Model Link Cross Sections (Pipe Cross-Sections)

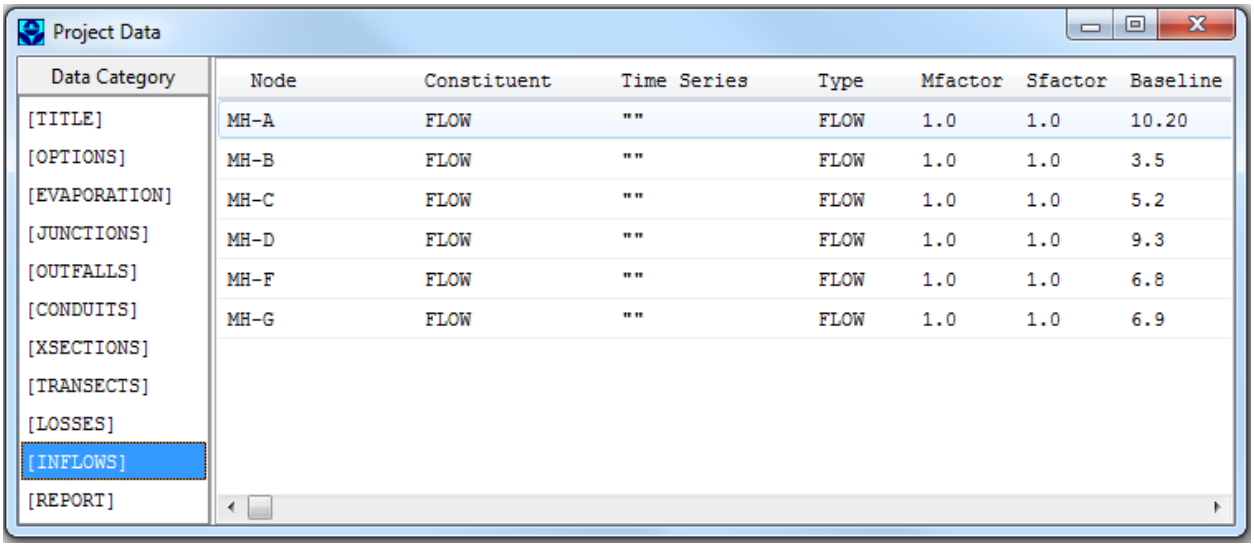
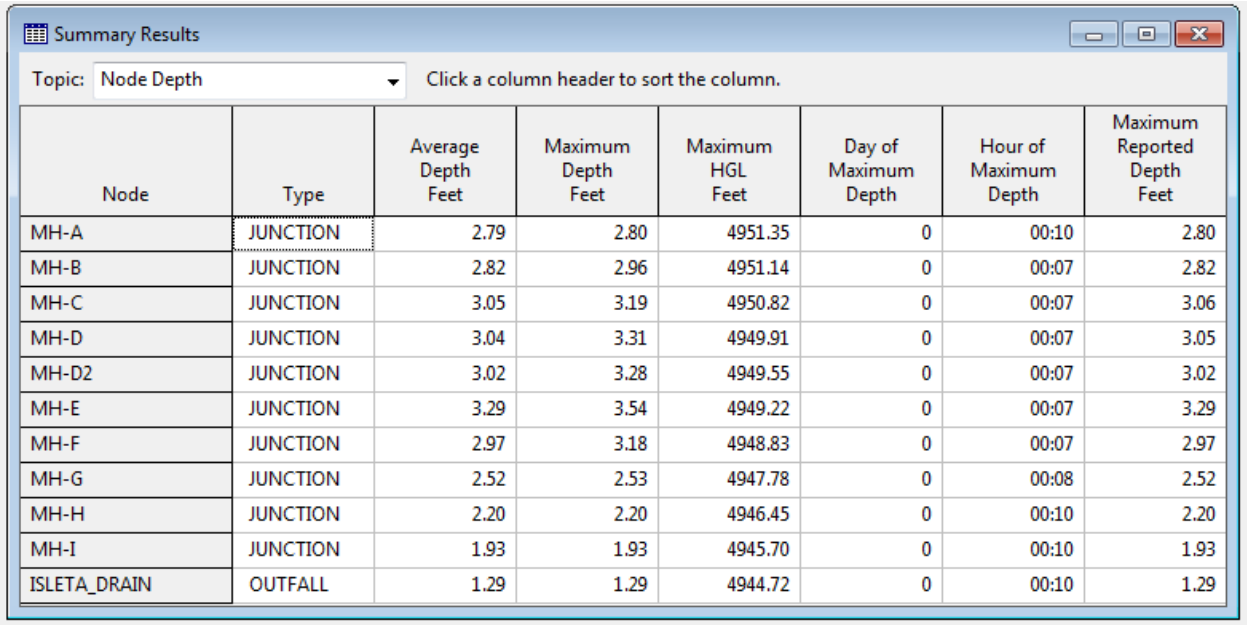


Figure 7: SWMM Model Node Inflow Inputs



Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Day of Maximum Depth	Hour of Maximum Depth	Maximum Reported Depth Feet
MH-A	JUNCTION	2.79	2.80	4951.35	0	00:10	2.80
MH-B	JUNCTION	2.82	2.96	4951.14	0	00:07	2.82
MH-C	JUNCTION	3.05	3.19	4950.82	0	00:07	3.06
MH-D	JUNCTION	3.04	3.31	4949.91	0	00:07	3.05
MH-D2	JUNCTION	3.02	3.28	4949.55	0	00:07	3.02
MH-E	JUNCTION	3.29	3.54	4949.22	0	00:07	3.29
MH-F	JUNCTION	2.97	3.18	4948.83	0	00:07	2.97
MH-G	JUNCTION	2.52	2.53	4947.78	0	00:08	2.52
MH-H	JUNCTION	2.20	2.20	4946.45	0	00:10	2.20
MH-I	JUNCTION	1.93	1.93	4945.70	0	00:10	1.93
ISLETA_DRAIN	OUTFALL	1.29	1.29	4944.72	0	00:10	1.29

Figure 8: SWMM Model Node Results Summary

Summary Results

Topic: Node Inflow Click a column header to sort the column.

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Day of Maximum Inflow	Hour of Maximum Inflow	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
MH-A	JUNCTION	10.20	10.20	0	00:00	6.59	6.59	0.033
MH-B	JUNCTION	3.50	14.11	0	00:07	2.26	8.85	0.051
MH-C	JUNCTION	5.20	19.30	0	00:07	3.36	12.2	0.096
MH-D	JUNCTION	9.30	28.59	0	00:07	6.01	18.2	0.061
MH-D2	JUNCTION	0.00	28.55	0	00:07	0	18.2	0.021
MH-E	JUNCTION	0.00	28.59	0	00:07	0	18.2	0.022
MH-F	JUNCTION	6.80	35.44	0	00:07	4.39	22.6	0.034
MH-G	JUNCTION	6.90	42.46	0	00:07	4.46	27	0.045
MH-H	JUNCTION	0.00	41.98	0	00:08	0	27	0.027
MH-I	JUNCTION	0.00	41.90	0	00:10	0	27	0.006
ISLETA_DRAIN	OUTFALL	0.00	41.90	0	00:10	0	27	0.000

Figure 9: SWMM Model Node Flow Results

Summary Results

Topic: Link Flow Click a column header to sort the column.

Link	Type	Maximum |Flow| CFS	Day of Maximum Flow	Hour of Maximum Flow	Maximum |Velocity| ft/sec	Max / Full Flow	Max / Full Depth
PIPE-0	CONDUIT	41.90	0	00:10	7.71	0.57	0.67
PIPE-1	CONDUIT	41.90	0	00:10	6.18	0.47	0.85
PIPE-2	CONDUIT	41.98	0	00:08	5.80	0.96	0.96
PIPE-3	CONDUIT	35.56	0	00:07	4.86	1.14	1.00
PIPE-4	CONDUIT	28.64	0	00:07	3.87	0.93	1.00
PIPE-4.5	CONDUIT	28.59	0	00:07	3.86	0.41	1.00
PIPE-5	CONDUIT	28.55	0	00:07	4.56	0.63	1.00
PIPE-6	CONDUIT	19.29	0	00:07	3.92	0.92	1.00
PIPE-7	CONDUIT	14.10	0	00:07	4.61	0.62	1.00
PIPE-8	CONDUIT	10.61	0	00:07	3.96	0.76	1.00

Figure 10: SWMM Model Link Flow Results

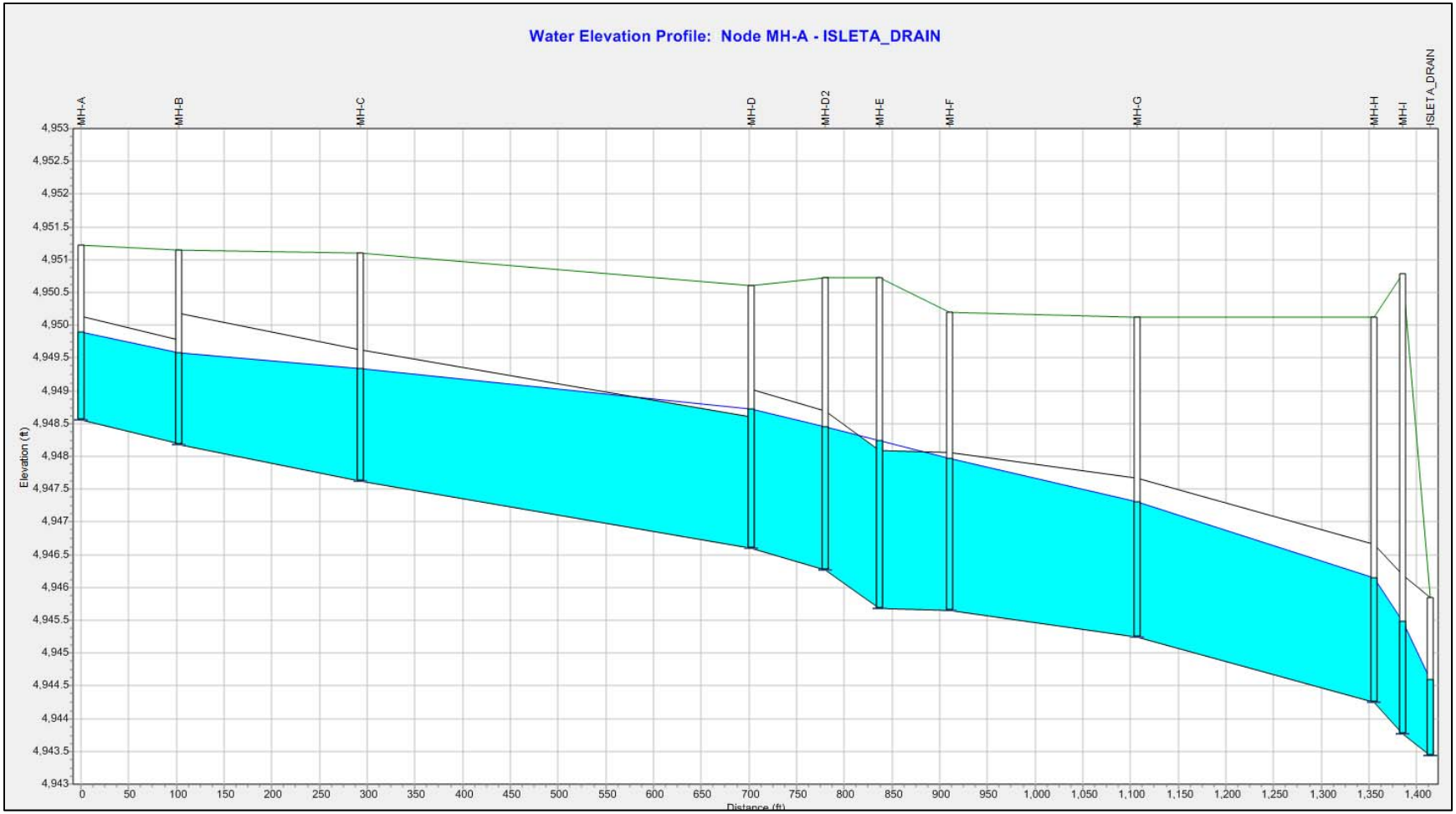


Figure 11: SWMM Model Water Surface Profile Plot