CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

April 21, 2017

Donald Duneman
Wilson & Company
4900 Lang Ave, NE
Albuquerque, NM 8709

RE: **APS Montgomery Complex**
3315 Louisiana Blvd NE
Drainage Report and Grading Plan
Engineer's Stamp Date: 4/19/17
Hydrology File: G18D048

Dear Mr. Duneman:

Based on the information provided in your submittal received 4/20/17, the Drainage Report and Grading Plan are not approved for Grading or Building Permit. The following comments need to be addressed for approval of the above referenced project:

1. Provide finished floor elevation for the PDC building. Assuming the PDC building footprint is outside the Zone AO on Comanche, state so in the report (section 1.3).

2. Pond 7. Provide inlet protection on the outfall to prevent accidental entry. Also include a water quality feature to prevent sediment from washing into South Hahn.

3. Pond 4. Provide inlet protection on the outfall end section to prevent accidental entry.

4. It is unclear how the storm water quality volume is being retained. The report references use of each ponds' dead storage, however the outlet culverts are all within 0.2ft of pond bottom. Provide dead storage volumes and account for allowable error in construction finished grades (likely +/- 0.2 feet).

5. This work will require a Floodplain Permit to be submitted prior to Grading Permit approval (Rudy Rael, CFM, rrael@cabq.gov).

6. This work will require an updated Erosion and Sediment Control Plan to be submitted before Grading Permit approval (Curtis Cherne, PE, ccherne@cabq.gov).

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Orig: Drainage file

CITY OF ALBUQUERQUE

Richard J. Berry, Mayor

7. The penetration into South Hahn may be performed under SO-19 or mini- work order. State how the work will be performed on the Grading Plan. If using SO-19, include standard SO-19 notes. Prior to beginning work, notify Jason Rodriguez with Municipal Development to coordinate an inspection schedule (jtrodriguez@cabq.gov).

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

Sincerely,

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

PO Box 1293

Albuquerque

New Mexico 87103

www.cabq.gov

Orig: Drainage file

City of Albuquerque

Planning Department

Development & Building Services Division

DRAINAGE AND TRANSPORTATION INFORMATION SHEET (REV 09/2015)

Project Title: APS Professional Development Center - Montgomery Complex Building Permit #: BP-2017-01271 City Drainage #: G18D048

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

Legal Description: Lands of the Board of Education of the Albuquerque Municipal School District No. 12 (Montgomery Elementary School) within Section 1, Township 10N, Range 3E

City Address: 3315 Louisiana Blvd, NE Albuquerque, NM 87110

Engineering Firm: Wilson & Company Engineers and Architects, Inc. Contact: Donald Duneman

Address: 4900 Lang Ave, NE Albuquerque, NM 87109

Phone#: 505-948-5125 Fax#: _____ E-mail: donald.duneman@wilsonco.com

Owner: Albuquerque Public Schools Contact: David Ritchey

Address: 915 Oak Street, SE, Albuquerque, NM 87106

Phone#: 505-977-5829 Fax#: _____ E-mail: ritchey_d@aps.edu

Architect: Studio Collaboration, LLC Contact: Sam Sterling

Address: 924 2nd St. NW, Albuquerque, NM 87102

Phone#: 505-232-2520 Fax#: _____ E-mail: sam@studiocollaboration.com

Other Contact: _____ Contact: _____

Address: _____

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

Check all that Apply:

DEPARTMENT:

X HYDROLOGY/ DRAINAGE

_____ TRAFFIC/ TRANSPORTATION

_____ MS4/ EROSION & SEDIMENT CONTROL

TYPE OF SUBMITTAL:

_____ ENGINEER/ ARCHITECT CERTIFICATION

_____ CONCEPTUAL G & D PLAN

X GRADING PLAN

_____ DRAINAGE MASTER PLAN

X DRAINAGE REPORT

_____ CLOMR/LOMR

_____ TRAFFIC CIRCULATION LAYOUT (TCL)

_____ TRAFFIC IMPACT STUDY (TIS)

_____ EROSION & SEDIMENT CONTROL PLAN (ESC)

_____ OTHER (SPECIFY) _____

CHECK TYPE OF APPROVAL/ACCEPTANCE SOUGHT:

X BUILDING PERMIT APPROVAL

_____ CERTIFICATE OF OCCUPANCY

_____ PRELIMINARY PLAT APPROVAL

_____ SITE PLAN FOR SUB'D APPROVAL

_____ SITE PLAN FOR BLDG. PERMIT APPROVAL

_____ FINAL PLAT APPROVAL

_____ SIA/ RELEASE OF FINANCIAL GUARANTEE

_____ FOUNDATION PERMIT APPROVAL

X GRADING PERMIT APPROVAL

_____ SO-19 APPROVAL

_____ PAVING PERMIT APPROVAL

_____ GRADING/ PAD CERTIFICATION

_____ WORK ORDER APPROVAL

_____ CLOMR/LOMR

_____ PRE-DESIGN MEETING

_____ OTHER (SPECIFY) _____

IS THIS A RESUBMITTAL?: X Yes _____ No

DATE SUBMITTED: April 20, 2017 By: Donald Duneman

COA STAFF: ELECTRONIC SUBMITTAL RECEIVED: ___

ALBUQUERQUE PUBLIC SCHOOLS
MONTGOMERY COMPLEX
DRAINAGE REPORT

By:

4900 Lang Ave NE
Albuquerque, NM 87109

ALBUQUERQUE PUBLIC SCHOOLS
MONTGOMERY COMPLEX
DRAINAGE REPORT

APRIL 2017

I, Donald M. Duneman, P.E., do hereby certify that this report was prepared under my direction and review, and that I am a duly registered Professional Engineer under the laws of the State of New Mexico.

Donald M. Duneman, P.E.
State of New Mexico P.E. No. 17616

04/19/17
Date

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Appendix

1 Introduction

The Albuquerque Public Schools (APS) Montgomery Complex is located at 3315 Louisiana Blvd NE, Albuquerque, NM 87110. The 10.3 acre site is a multi-use educational facility used by APS. The proposed facility will be composed of a professional development center and associated parking lot.

The proposed site calls for a linear park buffer on the west side of the campus between the proposed buildings and surrounding streets (Mossman Place NE and Comanche Road NE).

1.1 Purpose

The purpose of this report is to evaluate existing and proposed on-site drainage conditions and provide recommendations for on-site storm drain facilities that accommodate the development. The proposed site plan is illustrated in Figure 4, page 10. The majority of the site will discharge into the South Hahn Arroyo, while a small basin will drain to Comanche Road.

This Drainage Report serves as the basis for the grading and drainage design of the Montgomery Complex Facility. This report supersedes the "Albuquerque Public Schools Montgomery Complex Drainage Master Plan", dated August 2016 prepared by Wilson & Company (DMP). The DMP presented a two level parking structure located in the middle of the site, with a future early childhood development center proposed on the south side of the site. Since the DMP was completed, the parking structure and early childhood development center have been eliminated from the plans for the site and replaced with an at grade parking lot.

1.2 Existing Reports and Plans

The following reports and plans were employed in the hydrologic and hydraulic analyses.

- "South Hahn Arroyo Channel Design Phase 1" Design Analysis Report, dated December 2010, by Smith Engineering Company. (Report received/copied from AMAFCA files)
- "Candelaria – Hahn Drainage Analysis – Report and Conceptual Storm Drain Design," dated May, 2004, by Smith Engineering Company. Drainage File Number 279.
- "Drainage Report for Comanche Park, Phase 1," dated December, 2003, by Smith Engineering Company. Drainage File Number 511.

The above reports and plans provide information regarding existing offsite drainage patterns and tributary flows to the South Hahn Arroyo Channel, which is located adjacent to the project site.

1.3 Site Location

The APS Montgomery Complex is located on approximately 10.3 acres of land northeast of downtown Albuquerque (see Figure 1, Vicinity Map). The site is bounded on the north by Comanche Road NE, Mossman Place NE to the west, and Louisiana Boulevard NE to the east, and South Hahn Arroyo Channel to the south.

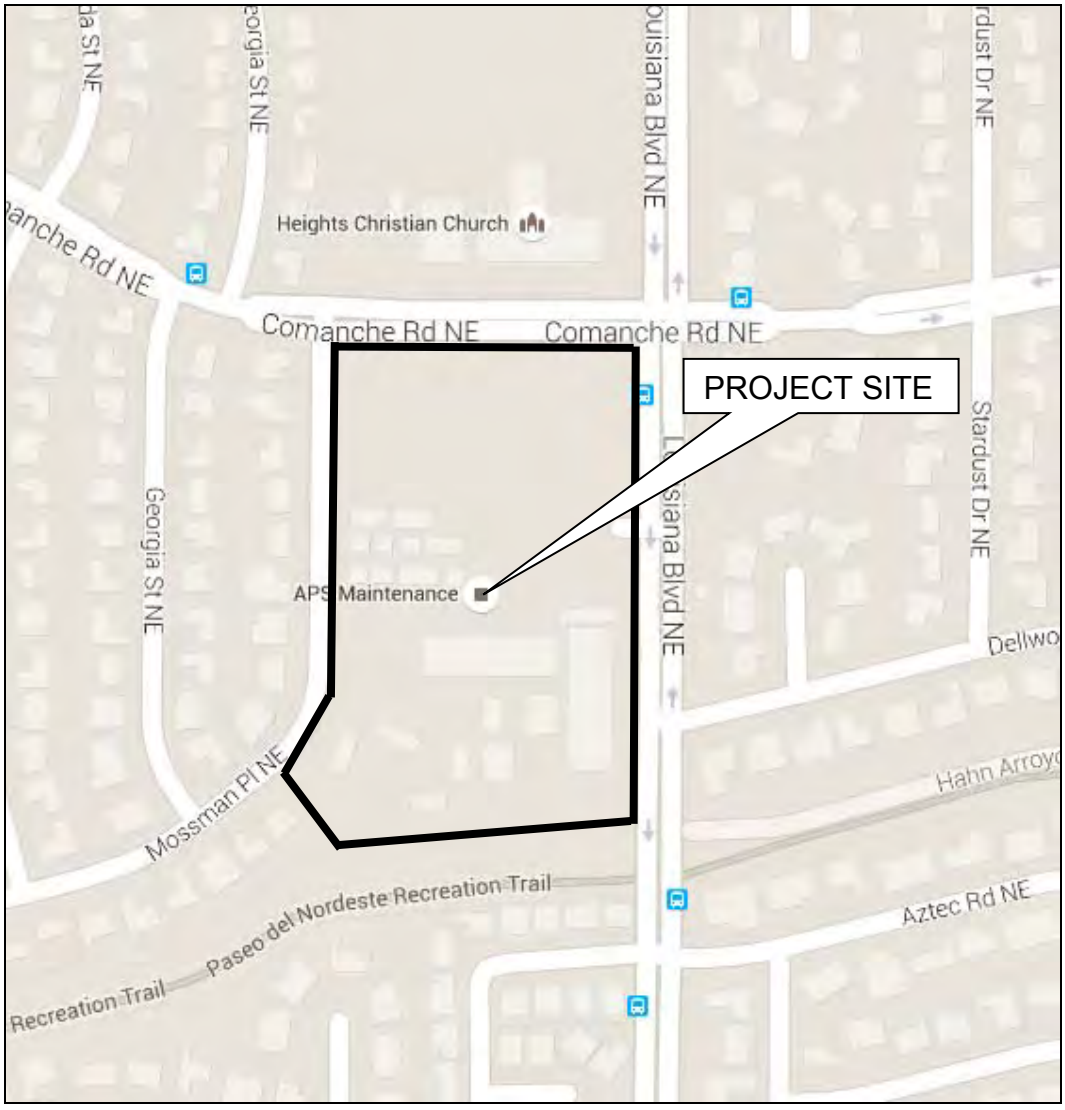

Figure 1: Vicinity Map

Comanche Rd NE serves as a conveyance channel and is within a Federal Emergency Management Agency (FEMA) designated flood hazard zone, Zone AO, with flood

depths of 1 foot. A portion of the north side of the site lies within the FEMA Zone AO. The FEMA Flood Insurance Rate Map (FIRM) Number 35001C0352H also shows the presence of a Zone A floodplain located within the South Hahn Arroyo Channel, which is adjacent to the south side of the project. The majority of the site is outside the FEMA designated flood hazard zone. A copy of the FIRM map is included within Appendix A of this report.

2 Hydrology

The APS Montgomery Complex is located within the watershed boundary lines of the South Hahn Arroyo, which ultimately discharge into the Rio Grande. This area lies within Precipitation Zone 3 as defined in Section 22.2 of the City Of Albuquerque (COA) Development Process Manual (DPM), July 1997. Basin peak flows and volumes for the study area were computed using Arid Lands Hydrological Model (AHYMO-S4).

2.1 Methodology

The AHYMO-S4 Computer Program follows the procedures outlined in Chapter 22 of the COA DPM. The program's input parameters were created by the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) in conjunction with the City of Albuquerque. The storm events analyzed were the 100-year 6-hour and 24-hour events.

2.2 Design Storm Precipitation

Two design storm events were considered for the analysis of the existing and proposed drainage systems. The 100-year, 6-hour event storm was utilized in calculating peak discharge, and the 100-year, 24-hour event storm was utilized in determining volumetric runoff. Zone 3 precipitation depths per Section 22.2 of DPM are as follows: P_{60}=2.14", P_{360}=2.60", and P_{1440}=3.10" for the 100-year Average Recurrence Interval (ARI) respectively.

2.3 Land Treatments

Four land treatments are defined by the DPM. Table A-4 of Section 22.2 of the DPM describes land conditions for each treatment. The following sections describe how the percentages of land treatments were determined for use in the current analysis.

2.3.1 Existing Land Treatment

Existing off-site and on-site land treatments were delineated using aerial photography, existing topography and site visits.

2.3.2 Proposed Land Treatment

The proposed site is comprised of various buildings and a parking facility. The Fully Developed Site Plan (see Figure 4, page 9) illustrates the proposed location and approximate sizes of future buildings, a parking facility, and landscape areas. Land use assumptions for the areas designated as landscape have been divided into two categories, described below.

- Where existing flat surfaces (landscape and grass) are located, 100% B was assumed.

- Where existing concrete sidewalks and buildings are located, 100% 'D' was assumed.

- Where existing bituminous surfaces are located, the land treatment was assumed to be 100% 'D' due to heavy compaction from vehicle and pedestrian use.

- Where proposed steep hillsides have been shown to receive landscape, land use treatments are considered to be treatment 'C'. The use of this treatment anticipates that the steep sloped areas will likely receive desert landscape or gravel.

- Where proposed landscaping correlates with relatively flat slopes, such as those in landscaped medians and large areas adjacent to buildings, a land use ratio of 50% 'B' and 50% 'C' was used to account for the probability of a combination of irrigated areas and desert landscaping mixed with some areas compacted by human activity.

- The proposed asphalt parking lot, as well as development center building, were assumed to be 100% 'D'.

- The base course parking area located on the south side of the property was assumed to be 100% 'C'.

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2.4 Time of Concentration

In accordance with Chapter 22 of the DPM, equation B-9, the time to peak (t_p) is equal to 2/3 of the time of concentration (t_c). The time of concentration for the existing and proposed sub-basins utilized in the on-site hydrologic analysis have been estimated to be 12 minutes or less. Thus, in accordance with the DPM, the minimum time to peak values of 0.1333 hours is utilized in the AHYMO-S4 model.

2.5 Peak Discharge Rates

Peak discharge rates for the existing and proposed conditions were calculated using the AHYMO-S4 computer program as outlined in Chapter 22 of the DMP. Soils report data obtained from the NRCS Web Soil Survey indicate that the primary soils on-site are classified as Hydraulic Soil Group B. These soils are typically well drained and have low runoff potential. Peak discharge rates for the existing and proposed conditions are presented in Tables 1 and 3 of Section 4 in this report.

3 Hydrologic and Hydraulic Analysis

3.1 Existing Site Description

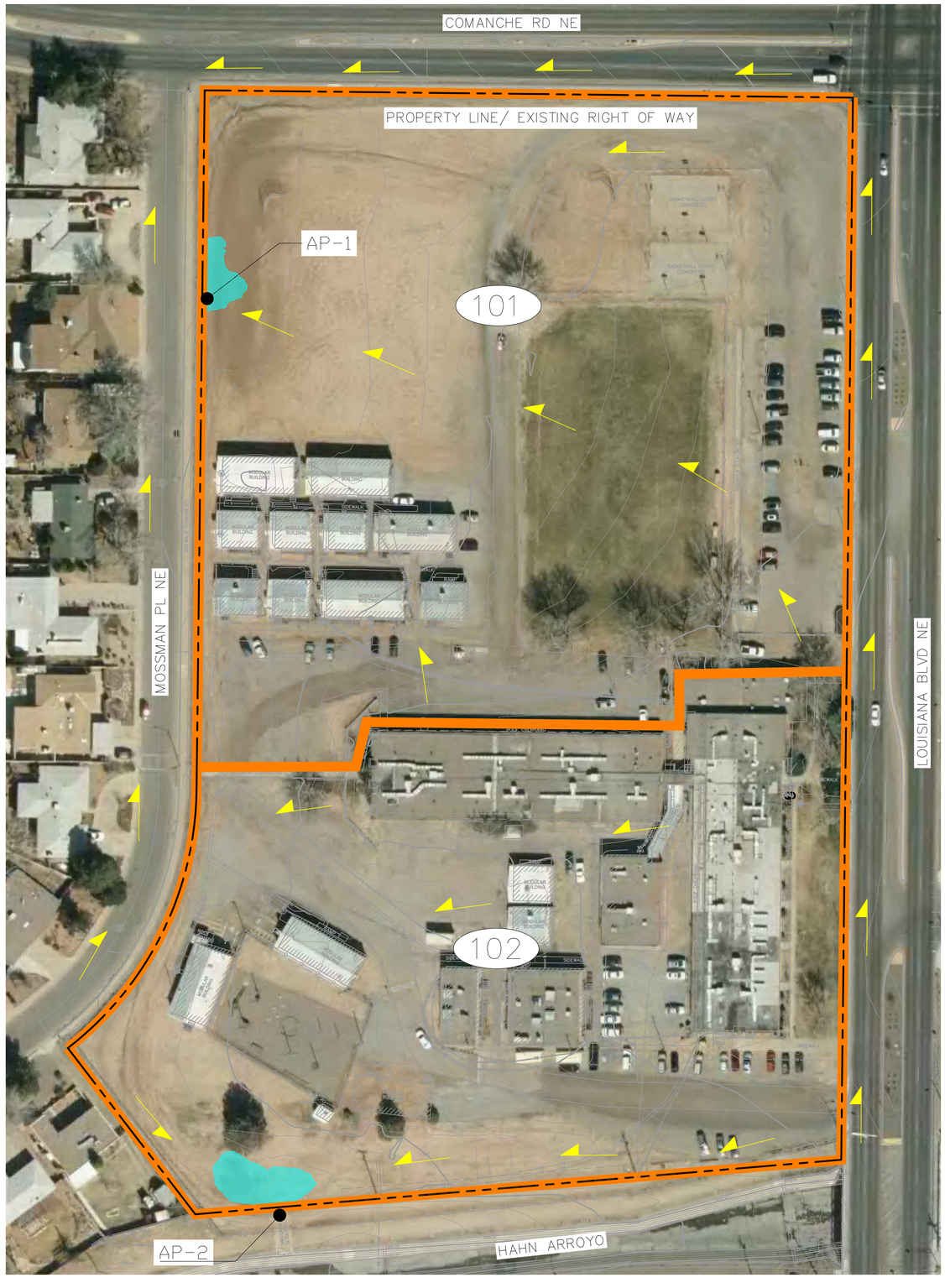
The site is currently vacant and was cleared of all pre-existing facilities in late 2016 after the DMP was completed. For the purposes of this analysis, the pre-existing conditions were modeled in order to determine the allowable discharge from the site. As illustrated in Figure 2, Existing Site Map, with the exception of field and landscaped areas, the pre-existing site was fairly developed. The existing campus was characterized by buildings, sidewalks, bituminous surfaces and landscaping.

Figure 2: Existing Site Map

3.2 Existing Conditions Analysis

The existing conditions hydrology map (Figure 3, Page 6) shows the various parameters utilized to analyze the site, as well as peak rates and volumetric runoff. The general topography of the site drains to two low points, one located at the northwest corner and one at southwest corner of the project site. The area draining to the northwest “low point” ultimately spills over the sidewalk and discharges onto the Mossman Place NE and Comanche Rd. NE Intersection. The area draining to the southwest corner of the site ultimately discharges into a concrete rundown and into a12-inch storm drain pipe, which outfalls into the South Hahn Arroyo Channel.

In reviewing the South Hahn Arroyo Channel Design Phase 1, by Smith Engineering Company, Inc., it was determined that the site is located in Main South Hahn Arroyo, also named the South Hahn Arroyo, Watershed Boundary. This segment of the Hahn Arroyo is owned and maintained by the City of Albuquerque. The north boundary of the site is currently at an elevation in which flows from Comanche Rd. could potentially encroach upon the site as shown on the FEMA FIRM. This report assumes no offsite flows enter the site.



LEGEND

- EXISTING MAJOR CONTOUR (5')
- EXISTING MINOR CONTOUR (1')
- EXISTING ON-SITE DETENTION
- BASIN BOUNDARY
- RIGHT-OF-WAY
- FLOW ARROW
- BASIN IDENTIFIER (102)
- ANALYSIS POINT

EXISTING DESIGN POINT PEAK DISCHARGE AND VOLUMETRIC RUNOFF SUMMARY

Existing Basin Peak Discharge and Volumetric Runoff

Basin	Area (Ac)	Land Treatment Percentage (%)				Q_{100} (cfs)	V_{100} (ac-ft)
		A	B	C	D		
101	5.77	0	15	47	38	24.2	0.90
102	4.57	0	5	46	49	20.2	0.79

N

50 25 0 50 100
SCALE 1" = 100'

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APS ALBUQUERQUE PUBLIC SCHOOLS

SEAL

PROJECT NAME
ALBUQUERQUE PUBLIC SCHOOLS MONTGOMERY COMPLEX DMP

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	1460006901
DESIGNED BY:	EEV
DRAWN BY:	EEV
CHECKED BY:	EEV
DATE:	AUG 2016

SHEET TITLE
EXISTING BASIN MAP FIGURE 3

SHEET NO:
PAGE 6

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3.3 Existing Conditions Hydrologic Analysis Summaries

Table 1: Existing Basin Peak Discharge and Volumetric Runoff

Basin	Area (Ac)	Land Treatment Percentage (%)				Q_{100} (cfs)	V_{100} (ac-ft)
		A	B	C	D		
101	5.77	0	15	47	38	24.2	0.90
102	4.57	0	5	46	49	20.2	0.79

3.4 Proposed Site Description

The proposed site will consist of the following features: a professional development center, a parking lot, and a linear park on the west side of campus. The site will also include a proposed detention system at the southwest corner that will hold all runoff for the site in a 100-year event and gradually release to the South Hahn Arroyo Channel. The Fully Developed Site Plan Map can be found on page 9, Figure 4.

3.5 Proposed Drainage Improvements

Proposed drainage improvements are as follows:

- Storm Drain Culverts
- Swales
- Underground Detention Systems
- South Hahn Arroyo Channel Penetration
- Open Ponds

3.6 Water Quality Treatment

The City of Albuquerque City Ordinance defines that all new development projects shall manage the runoff from precipitation which occurs during 90th percentile storm events. The 90th percentile storm event is defined as 0.44 inches, and also referred to as the "first-flush" event. The first-flush water quality volumetric runoff was calculated utilizing per equation below:

$$\text{First-Flush Volumetric Runoff} = [(P_{90th}) - (I_a)] * A_D$$

Where:
P_{90th}= 90th Percentile Precipitation = 0.44 inches
I_a= Initial Abstraction = 0.1 inches
A_D = Area of Land Treatment 'D' (Acres)

Therefore, per equation above:

First-Flush Volumetric Runoff = (0.34-inches) * (1 ft/12-inches) *(5.1 AC) = 0.14 AC-FT

The 0.14 AC-FT is the total volume of runoff needing to be treated prior to flow leaving the site. The first flush volume will be provided with dead storage retention areas within each of the proposed ponds.

The majority of storm water flows are routed through open detention ponds to attenuate peak flows and allow fines to settle. Flows will ultimately drain into a detention pond located at the southwest corner of the site (Pond 7) prior to discharging into The South Hahn Arroyo Channel. Prior to entering Pond 7 the runoff will pass through a structural treatment (water quality manhole), which will allow for secondary treatment (floatables and solids) and removal of pollutants from urban runoff.

3.7 Proposed Conditions Analysis

The proposed conditions basin map (Figure 5, Page 10) shows the various parameters utilized to analyze the site, as well as peak discharge rates and volumetric runoff. The suggested grading of the site drains runoff generally west towards the landscape where it is collected and conveyed via an underground storm drain and detained onsite with a controlled peak discharge rate into The South Hahn Arroyo Channel.

A flap gate will be installed in the 6-foot diameter manhole located on the storm drain that discharges into the South Hahn Arroyo. The flap gate will prevent water from entering the storm drain system when the South Hahn Arroyo is flowing. The storm drain design is based on the South Hahn Arroyo flowing full. See Section 3.8.

COMANCHE RD NE

MOSSMAN PL NE

LOUISIANA BLVD NE

POND 1

POND 2

POND 3

POND 4

POND 5

POND 6

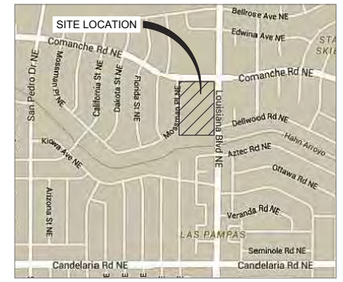
POND 7

PDC BUILDING

RD

HAHN ARROYO

CP-T104



VICINITY MAP
ZONE ATLAS MAP NO G-18

LEGEND

- ASPHALT PAVEMENT
- BASECOURSE SURFACING
- CONCRETE PAVEMENT
- ROW LINE

GRAPHIC SCALE

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ALBUQUERQUE PUBLIC SCHOOLS

SEAL

DONALD M. DUNEMAN NEW MEXICO (17616) PROFESSIONAL ENGINEER

04/12/17

PROJECT NAME
ALBUQUERQUE PUBLIC SCHOOLS MONTGOMERY COMPLEX DMP

REV.	DATE	DESCRIPTION	BY

PROJECT NO:	1460006901
DESIGNED BY:	EEV
DRAWN BY:	EEV
CHECKED BY:	EEV
DATE:	AUG 2016

SHEET TITLE
FULLY DEVELOPED SITE PLAN FIGURE 4

SHEET NO:
PAGE 9

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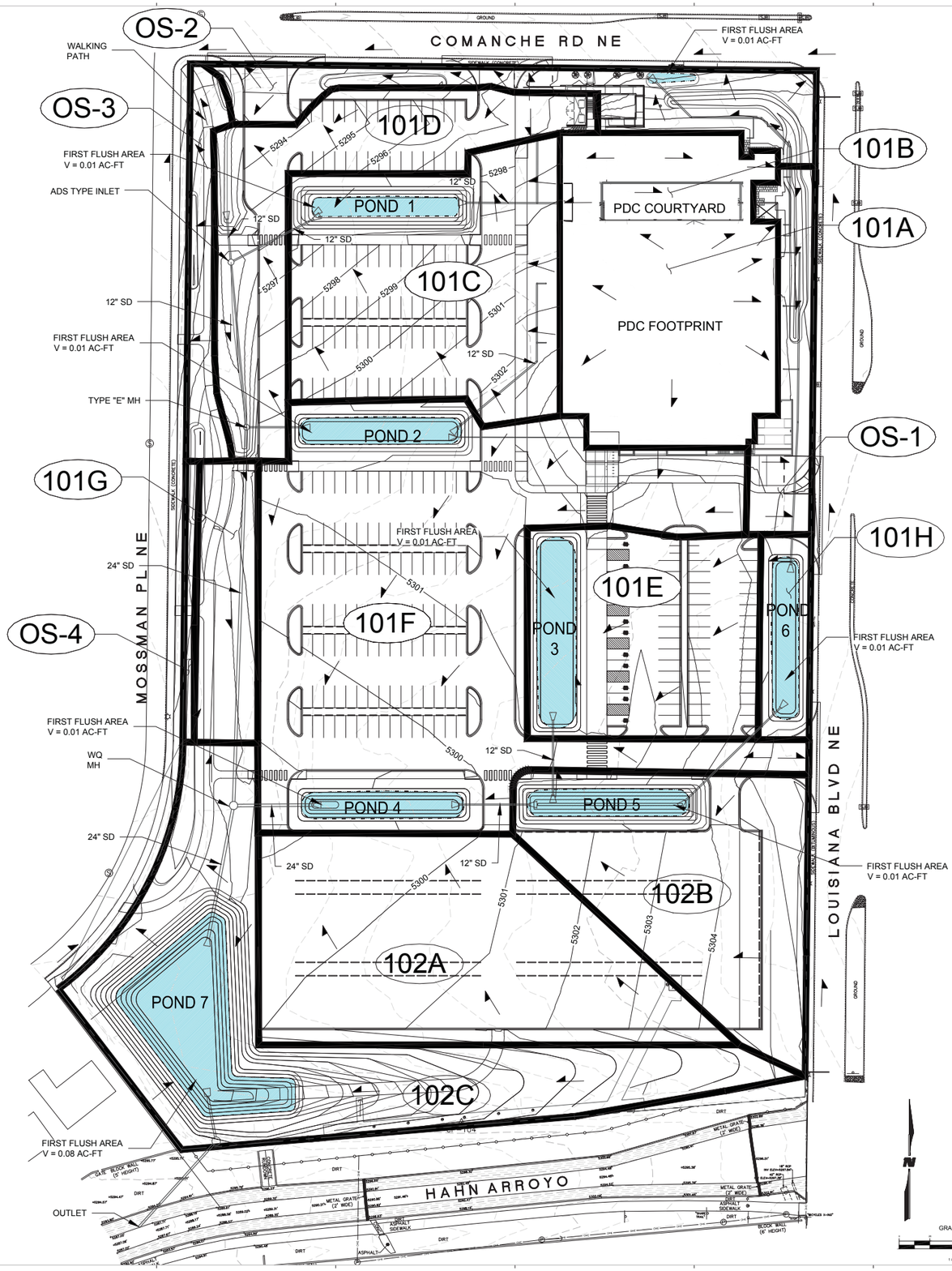

LEGEND

- BASIN BOUNDARY
- PROPOSED STORM DRAIN
- BASIN IDENTIFIER (101)
- ROW
- FLOW ARROWS
- PONDING / FIRST FLUSH AREAS

PROPOSED DESIGN POINT PEAK DISCHARGE AND VOLUMETRIC RUNOFF SUMMARY

Basin	Area (ac)	Land Treatment Percentage A	B	C	D	Q (cfs)	V (ac-ft)
101A	0.925	0	0	0	100	4.17	0.07
101B	0.653	0	0	0	100	2.94	0.05
101C	1.009	0	15	0	85	5.47	0.24
101D	0.652	0	0	47	53	3.05	0.12
101E	0.735	0	15	0	85	2.91	0.11
101F	2.764	0	15	0	85	10.55	0.47
101G	0.265	0	0	70	30	1.12	0.04
101H	0.165	0	0	70	30	0.68	0.02
102A	1.162	0	0	100	0	4.41	0.13
102B	0.870	0	30	60	10	3.19	0.1
102C	1.303	0	0	97	3	5.03	0.15
OS-1	0.265	0	0	70	30	1.13	0.04
OS-2	0.421	0	0	82	18	1.7	0.05
OS-3	0.150	0	0	70	30	0.77	0.05
OS-4	0.050	0	0	90	10	0.21	0.01

POND TABLES

POND	PEAK FLOWS (cfs) IN	OUT	VOLUME (ac-ft) PROVD	REQD	ELEVATION (ft) TOP	BOTTOM	INSF.
1	7.52	0.35	0.736	0.143	5297.0	5294.0	5295
2	1.09	0.13	0.129	0.035	5300.0	5295.0	5294.0
3	2.87	0.01	0.230	0.095	5302.0	5300.0	5300.9
4	14.75	13.20	0.155	0.095	5300.0	5296.5	5295
5	9.15	0.44	0.158	0.098	5300.0	5295.0	5295.1
6	1.25	0.01	0.130	0.042	5303.0	5300.0	5302.8
7	23.09	19.12	1.533	0.230	5298.0	5293.0	5292.1

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PROJECT NO:	1460006901
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DATE:	AUG 2016

SHEET TITLE
PROPOSED CONDITIONS BASIN MAP FIGURE 5

SHEET NO:
PAGE 10

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Table 2: Proposed Basin Peak Discharge and Volumetric Runoff

Basin	Area (Ac)	Land Treatment Percentage (%)				$Q_{100yr-6hr}$ (cfs)	$V_{100yr-24\ hr}$ (ac-ft)
		A	B	C	D		
101A	0.905	0	0	0	100	4.70	0.21
101B	0.083	0	0	0	100	0.44	0.02
101C	1.008	0	15	0	85	5.47	0.24
101D	0.682	0	0	47	53	3.09	0.12
101E	0.733	0	15	0	85	2.91	0.11
101F	2.164	0	15	0	85	10.55	0.47
101G	0.263	0	0	70	30	1.12	0.04
101H	0.155	0	0	70	30	0.66	0.02
102A	1.182	0	0	100	0	4.41	0.13
102B	0.870	0	30	60	10	3.19	0.10
102C	1.333	0	0	97	3	5.03	0.15
OS-1	0.268	0	0	70	30	1.13	0.04
OS-2	0.421	0	0	82	18	1.70	0.57
OS-3	0.180	0	0	70	30	0.77	0.03
OS-4	0.050	0	0	90	10	0.21	0.01

3.8 South Hahn Arroyo Channel

The Hahn Arroyo Channel Design Phase 1 by Smith Engineering was utilized to determine the approximate 100-year Water Surface Elevation (WSEL) at the point of discharge during the peak flow in the Channel. The max channel depth is ~ 3.3 feet. (Hahn Arroyo Channel Design Phase 1, Smith Engineering, 2010). Based on the max channel depth, the starting HGL for the proposed storm drain system is listed in Table 4 below:

Table 3: Proposed Storm Drain System Outflow

100-year WSEL in Channel (ft)	Outflow from Proposed Storm Drain System (cfs)
5291.06	19.1

3.9 Proposed Storm Drain System

The proposed storm drain system (see Appendix C) will take peak flow runoff from the site and ultimately outflow to South Hahn Arroyo Channel. The proposed storm drain system consists of a series of storm drain, ponds and culverts which convey flow to Pond 7 before discharging to the Hahn Arroyo. See Figure 5 – Proposed Conditions Basin Map.

Roof drainage from the west side of the Professional Development Center (PDC) building is conveyed via storm drain and discharges to Ponds 1 and 2. Pond 1 collects runoff from Basin 101B, 101C and a portion of 101A (roof drainage) and discharges to a swale along the west side of the property. The swale also collects runoff from Basin 101D which sheet flows and drains to the swale via a 2' curb opening. Pond 2 collects runoff from a portion of Basin 101A (roof drainage) and discharges to a storm drain system which conveys flows along the west side of the property to Pond 7. This storm drain system also collects runoff from Pond 1 and Basin 101D with an inlet to capture flows from the swale. The storm drain system continues south and collects runoff from Pond 4 before ultimately draining to Pond 7. The total flow from the site to the Hahn Arroyo will not exceed the outflow of 19.1 cfs per Table 4.

Pond 4 collects runoff from Basins 102A, 102B, 101F, 101E, 101H and a portion of Basin 101A (roof drainage). Roof drainage from a portion of Basin 101A is collected by storm drain and conveyed to Pond 6. Pond 6 also collects runoff from Basin 101H and discharges to Pond 5 via a storm drain culvert. Pond 5 collects runoff from Basin 102B and from Pond 3. Pond 3 collects runoff from Basin 101E. Pond 5 then discharges to Pond 4, which discharges to the main storm drain located along the west side of the property and conveys runoff to Pond 7.

There are 4 small drainage basins that drain directly to the adjacent roadways. Basin OS-1, with a 100-year discharge rate of 1.12 cfs drains directly to Louisiana Blvd. Basin OS-2 discharges 1.68 cfs directly to Comanche Rd. Basins OS-3 and OS-4 drain to Mossman Place with a total 100-year discharge rate of 0.97 cfs. A small portion of Basin 101A is captured by a storm drain and conveyed to a first flush pond located at the northeast corner of the property, with a discharge rate of 1.40 cfs. The total flow draining to surrounding roadways is much less than the pre-existing conditions discharge rate of 24.2 cfs.

Culverts throughout the site were sized using CulvertMaster by Bentley. Table 5 shows the Culvert Hydraulic Summary. See Figure 5 – Proposed Conditions Basin Map for the location of all culverts.

Inlet capacities were calculated with FlowMaster. FlowMaster uses the weir equation and the orifice equation to calculate the capacity of inlets. Intercepted flow is calculated at any depth using the lesser of computed intercepted flows using the weir or orifice equation. Inlets are capable of conveying calculated flows with no more than 6" of head. Table 6 shows the Inlet Peak Flows and Inlet Capacities.

Table 4: CulvertMaster Hydraulic Summary

Culvert ID	Downstream	Line Length	Line Size	Line Slope	Flow Rate	Velocity
		(ft)	(in)	(%)	(cfs)	(ft/s)
Pond 1 Outlet	West Swale	75.8	12	3.30	4.72	6.00
Pond 2 Outlet	Main Storm Drain	45.8	12	15.66	3.88	4.94
Pond 3 Outlet	Pond 5	61	12	3.28	3.57	4.55
Pond 4 Outlet	Main Storm Drain	65	24	1.06	21.79	6.94
Pond 5 Outlet	Pond 4	57	12	1.75	3.65	4.64
Pond 6 Outlet	Pond 5	109	12	4.59	2.93	3.74
Pond 7 Outlet	Hahn Arroyo	130	24	0.78	19.12	6.09

Table 5: Inlet Peak Flows and Inlet Capacities

		Intercepted Peak Flow Rate Required	Intercepted Peak Flow Rate Provided
Inlet	Type	$Qp_{100\text{-}6hr}$ (cfs)	Qp (cfs)
A-1	Nyloplast 12" Pedestrian	0.1	1.06*
A-2	Nyloplast 12" Pedestrian	0.1	1.06*
A-3	Nyloplast 12" Pedestrian	0.1	1.06*
A-4	Nyloplast 12" Pedestrian	1.03	1.06*

* Based on 3-inch depth over grate

3.10 Detention System

The AHYMO-S4 Computer Program (Appendix D) was utilized to route the proposed flows through the detention pond system which releases flow to the Hahn Arroyo. The detention pond results are located in Table 7 below.

Table 6: Detention Pond Summary Table

POND	PEAK FLOW (CFS)		VOLUME (AC-FT)		ELEVATION (FT)		
	IN	OUT	PRV'D	REQ'D	TOP	BOTTOM	WSEL
1	7.52	3.35	0.230	0.143	5297.0	5294.0	5296.1
2	1.69	0.13	0.129	0.056	5300.0	5298.0	5299.0
3	2.87	0.01	0.232	0.096	5302.0	5300.0	5300.9
4	14.76	13.22	0.163	0.095	5300.0	5296.5	5299.1
5	3.15	0.44	0.163	0.081	5300.0	5298.0	5299.1
6	1.25	0.01	0.130	0.042	5305.0	5303.0	5303.8
7	23.69	19.12	1.533	0.205	5298.0	5289.0	5292.7

5 Summary and Conclusions

The primary components of the Drainage Report include the following:

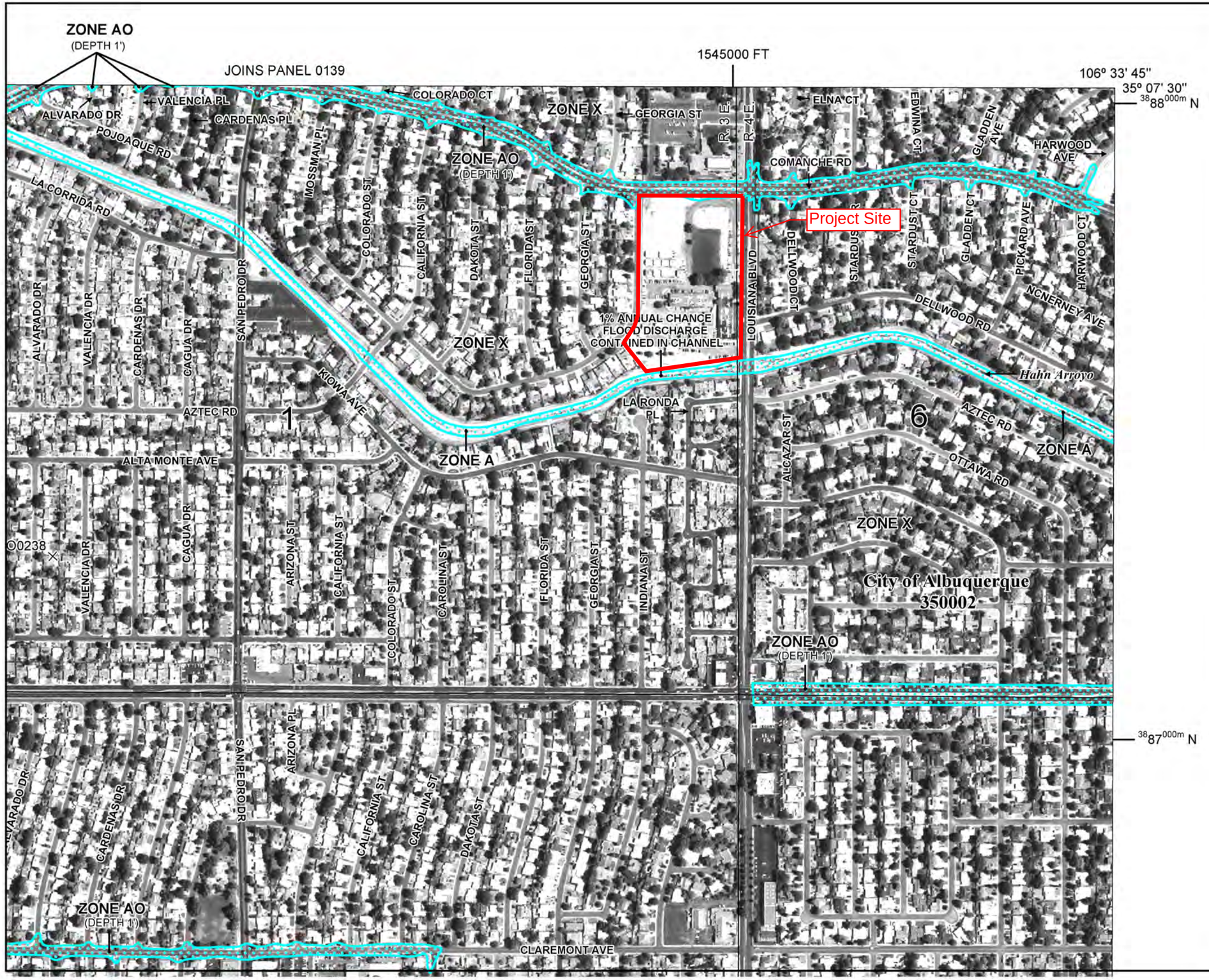
- Increased collection and diversion of runoff to the South Hahn Arroyo at a controlled maximum rate of 19.1 cfs.
- Proposed storm drain facilities are modeled to convey the 100-year, 6-hour storm event.
- The detention system is sized to detain a 100-year, 24-hour volumetric runoff event.
- 7 water quality enhancement/detention ponds
- Drainage swales to facilitate drainage around structures
- Minimize the amount of runoff draining to adjacent roadways

The proposed peak discharge into the South Hahn Arroyo of 19.1 cfs is less than the existing peak discharge of 20.2 cfs. Proposed ponds have been incorporated in the plan including first flush retention to provide treatment of storm water generated throughout the site.

Appendices

Appendix A – Referenced Material

FEMA FIRM MAP



MAP SCALE 1" = 500'

NFIP

PANEL 0352H

FIRM

FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO
AND INCORPORATED AREAS

PANEL 352 OF 825

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALBUQUERQUE, CITY OF	350002	0352	H

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

NATIONAL FLOOD INSURANCE PROGRAM

MAP NUMBER
35001C0352H

MAP REVISED
AUGUST 16, 2012

Federal Emergency Management Agency

NOAA POINT PRECIPITATION FREQUENCY ESTIMATES

NOAA Atlas 14, Volume 1, Version 5
Location name: Albuquerque, New Mexico, US*
Latitude: 35.1223°, Longitude: -106.5699°
Elevation: 5299 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.176 (0.149-0.209)	0.228 (0.191-0.271)	0.307 (0.256-0.364)	0.367 (0.306-0.435)	0.449 (0.373-0.532)	0.515 (0.426-0.609)	0.583 (0.479-0.689)	0.654 (0.535-0.774)	0.751 (0.609-0.890)	0.830 (0.669-0.981)
10-min	0.268 (0.226-0.318)	0.347 (0.290-0.412)	0.466 (0.390-0.554)	0.558 (0.466-0.662)	0.684 (0.568-0.810)	0.783 (0.649-0.927)	0.887 (0.728-1.05)	0.996 (0.815-1.18)	1.14 (0.926-1.35)	1.26 (1.02-1.49)
15-min	0.332 (0.280-0.395)	0.429 (0.360-0.510)	0.578 (0.484-0.686)	0.692 (0.577-0.820)	0.848 (0.704-1.00)	0.970 (0.804-1.15)	1.10 (0.903-1.30)	1.24 (1.01-1.46)	1.42 (1.15-1.68)	1.57 (1.26-1.85)
30-min	0.447 (0.377-0.532)	0.578 (0.485-0.687)	0.778 (0.651-0.924)	0.932 (0.777-1.11)	1.14 (0.948-1.35)	1.31 (1.08-1.55)	1.48 (1.22-1.75)	1.66 (1.36-1.97)	1.91 (1.55-2.26)	2.11 (1.70-2.49)
60-min	0.553 (0.467-0.658)	0.716 (0.600-0.851)	0.963 (0.806-1.14)	1.15 (0.962-1.37)	1.41 (1.17-1.67)	1.62 (1.34-1.92)	1.83 (1.51-2.17)	2.06 (1.68-2.43)	2.36 (1.91-2.80)	2.61 (2.10-3.08)
2-hr	0.656 (0.542-0.803)	0.842 (0.698-1.03)	1.12 (0.921-1.36)	1.33 (1.10-1.62)	1.64 (1.34-1.99)	1.89 (1.53-2.28)	2.14 (1.73-2.60)	2.42 (1.94-2.91)	2.80 (2.22-3.38)	3.11 (2.45-3.76)
3-hr	0.700 (0.584-0.851)	0.891 (0.740-1.08)	1.17 (0.971-1.42)	1.39 (1.15-1.68)	1.70 (1.40-2.05)	1.95 (1.59-2.34)	2.21 (1.80-2.66)	2.49 (2.01-3.00)	2.88 (2.30-3.46)	3.20 (2.54-3.85)
6-hr	0.817 (0.685-0.988)	1.03 (0.865-1.25)	1.33 (1.12-1.60)	1.57 (1.31-1.88)	1.89 (1.57-2.27)	2.14 (1.77-2.57)	2.42 (1.99-2.89)	2.69 (2.20-3.22)	3.08 (2.50-3.68)	3.39 (2.73-4.05)
12-hr	0.901 (0.764-1.06)	1.14 (0.963-1.34)	1.45 (1.22-1.70)	1.69 (1.42-1.98)	2.02 (1.69-2.36)	2.27 (1.90-2.66)	2.54 (2.11-2.96)	2.81 (2.32-3.28)	3.18 (2.61-3.72)	3.49 (2.83-4.08)
24-hr	1.03 (0.885-1.20)	1.29 (1.11-1.50)	1.62 (1.39-1.88)	1.88 (1.62-2.19)	2.24 (1.92-2.61)	2.52 (2.14-2.92)	2.81 (2.38-3.25)	3.11 (2.62-3.59)	3.50 (2.93-4.05)	3.82 (3.18-4.43)
2-day	1.07 (0.925-1.24)	1.35 (1.17-1.56)	1.70 (1.47-1.97)	1.98 (1.70-2.29)	2.36 (2.01-2.73)	2.65 (2.25-3.06)	2.95 (2.50-3.41)	3.26 (2.75-3.78)	3.68 (3.08-4.28)	4.01 (3.35-4.67)
3-day	1.18 (1.05-1.33)	1.47 (1.31-1.66)	1.83 (1.63-2.06)	2.12 (1.87-2.37)	2.50 (2.20-2.81)	2.79 (2.45-3.14)	3.09 (2.71-3.47)	3.39 (2.96-3.82)	3.80 (3.30-4.29)	4.12 (3.56-4.70)
4-day	1.29 (1.17-1.41)	1.60 (1.46-1.75)	1.96 (1.78-2.15)	2.25 (2.05-2.46)	2.64 (2.39-2.88)	2.93 (2.66-3.21)	3.23 (2.91-3.53)	3.53 (3.17-3.86)	3.92 (3.52-4.31)	4.22 (3.77-4.72)
7-day	1.47 (1.34-1.60)	1.82 (1.67-1.99)	2.22 (2.03-2.42)	2.53 (2.31-2.76)	2.94 (2.68-3.20)	3.25 (2.96-3.53)	3.56 (3.23-3.86)	3.85 (3.49-4.19)	4.24 (3.83-4.61)	4.52 (4.08-4.93)
10-day	1.63 (1.50-1.77)	2.02 (1.85-2.20)	2.48 (2.27-2.69)	2.83 (2.60-3.07)	3.31 (3.03-3.58)	3.66 (3.35-3.96)	4.02 (3.66-4.35)	4.37 (3.97-4.74)	4.83 (4.37-5.24)	5.17 (4.66-5.62)
20-day	2.05 (1.87-2.24)	2.55 (2.33-2.78)	3.09 (2.83-3.37)	3.51 (3.21-3.82)	4.04 (3.69-4.39)	4.42 (4.03-4.80)	4.79 (4.36-5.20)	5.14 (4.67-5.58)	5.58 (5.06-6.07)	5.90 (5.33-6.42)
30-day	2.46 (2.25-2.67)	3.05 (2.80-3.31)	3.68 (3.37-3.99)	4.14 (3.79-4.48)	4.72 (4.32-5.10)	5.14 (4.69-5.55)	5.53 (5.04-5.97)	5.90 (5.37-6.37)	6.34 (5.76-6.86)	6.66 (6.04-7.21)
45-day	3.02 (2.77-3.27)	3.74 (3.44-4.05)	4.46 (4.10-4.83)	4.97 (4.57-5.38)	5.60 (5.14-6.06)	6.03 (5.54-6.53)	6.42 (5.90-6.95)	6.77 (6.21-7.33)	7.17 (6.58-7.77)	7.42 (6.82-8.04)
60-day	3.47 (3.20-3.77)	4.30 (3.96-4.66)	5.13 (4.73-5.56)	5.72 (5.27-6.20)	6.44 (5.93-6.97)	6.93 (6.38-7.50)	7.38 (6.80-8.00)	7.78 (7.17-8.45)	8.25 (7.60-8.96)	8.55 (7.88-9.28)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Appendix B – Hydrologic Analyses

EXISTING CONDITIONS
100 YEAR-6 HOUR
HYDROLOGY MODEL

```
* ALBUQUERQUE PUBLIC SCHOOLS
* MASTER DRAINAGE PLAN
* EXISTING CONDITIONS MODEL
* 100 YR 6 HR STORM EVENT

START
RAINFALL            TYPE=1   RAIN QUARTER=0.0 IN  RAIN ONE=2.14 IN
                    RAIN SIX=2.60 IN   RAIN DAY=3.10 IN  DT=0.01 HRS
COMPUTE NM HYD      ID=1  HYD NO=101  DA= 0.00903 SQ MI
                    A=0 AC B=0.87 AC C=2.72 AC D=2.18 AC
                    TP=0.1333 HR MASS RAIN=-1
PRINT HYD           ID=1  CODE=1
PLOT HYD            ID=1
COMPUTE NM HYD      ID=2  HYD NO=102  DA= 0.00714 SQ MI
                    A=0 AC B=0.24 AC C=2.09 AC D=2.24 AC
                    TP=0.1333 HR MASS RAIN=-1
PRINT HYD           ID=2  CODE=1
PLOT HYD            ID=2
FINISH
```

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver. S4.01a, Rel: 01a RUN DATE (MON/DAY/YR) =05/12/2016

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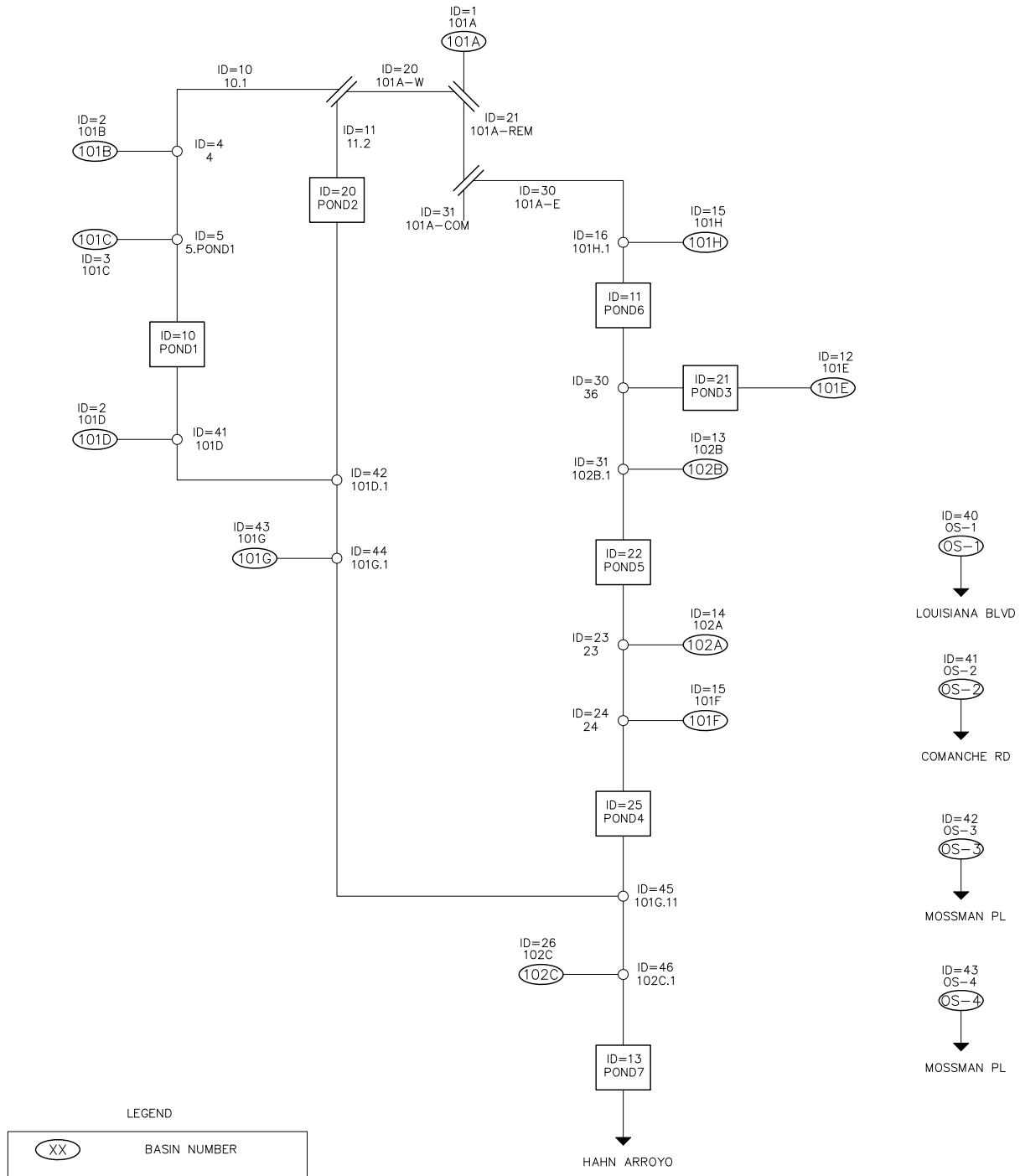
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= 0.00
RAINFALL TYPE= 1 NOAA 14										RAIN6= 2.600
COMPUTE NM HYD	101.00	-	1	0.00903	24.19	0.809	1.67933	1.530	4.186	PER IMP= 37.78
COMPUTE NM HYD	102.00	-	2	0.00714	20.23	0.693	1.82056	1.530	4.427	PER IMP= 49.02
FINISH										

PROPOSED CONDITIONS
100 YEAR-6 HOUR
HYDROLOGY MODEL



MONTGOMERY COMPLEX
AHYMO FLOW CHART

M:\MSD\14–600–070–01\2_Disciplines\Drainage\Calculations\AHYMO\Mont. Complex–FlowChart.dwg

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver. S4.01a, Rel: 01a RUN DATE (MON/DAY/YR) =04/19/2017

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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
*S**********										
*S										
*S	100 YEAR 24 HOUR STORM - PROPOSED RUNOFF ANALYSIS									
*S	RAINFALL DATA FROM DPM Chapter 22 - ZONE 3									
*S										
*S**********										
START										TIME= 0.00
RAINFALL TYPE= 1 NOAA 14										RAIN6= 2.600
COMPUTE NM HYD	101A	-	1	0.00141	4.70	0.177	2.34898	1.518	5.206	PER IMP= 100.00
DIVIDE HYD	101A-W	1	20	0.00103	3.43	0.129	2.34877	1.518	5.206	
	101A-Rem	and	21	0.00038	1.27	0.048	2.34877	1.518	5.206	
DIVIDE HYD	101A-E	21	30	0.00018	0.61	0.023	2.34817	1.518	5.206	
	101A-COM	and	31	0.00020	0.66	0.025	2.34817	1.518	5.206	
DIVIDE HYD	11.20	20	11	0.00051	1.71	0.064	2.34868	1.518	5.206	
	10.10	and	10	0.00051	1.71	0.064	2.34868	1.518	5.206	
*S POND 2										
ROUTE RESERVOIR	POND2	11	20	0.00051	0.13	0.057	2.06249	2.178	0.406	AC-FT= 0.056
COMPUTE NM HYD	101B	-	2	0.00013	0.44	0.016	2.34898	1.518	5.308	PER IMP= 100.00
COMPUTE NM HYD	101C	-	3	0.00175	5.47	0.201	2.15800	1.518	4.883	PER IMP= 85.00
ADD HYD	4.00	10& 2	4	0.00064	2.16	0.081	2.34826	1.518	5.227	
ADD HYD	5.POND1	4& 3	5	0.00239	7.63	0.282	2.20911	1.518	4.976	
*S POND 1										
ROUTE RESERVOIR	POND1	5	10	0.00239	3.35	0.274	2.14362	1.716	2.185	AC-FT= 0.143
COMPUTE NM HYD	101H	-	15	0.00024	0.66	0.021	1.64544	1.518	4.300	PER IMP= 30.00
ADD HYD	101H.1	30&15	16	0.00042	1.27	0.044	1.94864	1.518	4.691	
*S POND 6										
ROUTE RESERVOIR	POND6	16	11	0.00042	0.01	0.038	1.67357	2.838	0.028	AC-FT= 0.042
COMPUTE NM HYD	101E	-	12	0.00115	2.91	0.099	1.61688	1.518	3.954	PER IMP= 42.50
*S POND 3										
ROUTE RESERVOIR	101E.1	12	21	0.00115	0.01	0.064	1.04829	3.201	0.013	AC-FT= 0.096
ADD HYD	36.00	21&11	30	0.00157	0.02	0.102	1.21636	3.036	0.017	
COMPUTE NM HYD	102B	-	13	0.00136	3.19	0.098	1.35464	1.518	3.664	PER IMP= 10.00
ADD HYD	102B.1	30&13	31	0.00293	3.20	0.200	1.28043	1.518	1.703	
*S POND 5										
ROUTE RESERVOIR	POND5	31	22	0.00293	0.45	0.145	0.92863	1.914	0.238	AC-FT= 0.081
COMPUTE NM HYD	102A	-	14	0.00185	4.41	0.132	1.34392	1.518	3.731	PER IMP= 0.00
ADD HYD	23.00	22&14	23	0.00478	4.42	0.278	1.08909	1.518	1.443	
COMPUTE NM HYD	101F	-	15	0.00338	10.55	0.389	2.15799	1.518	4.875	PER IMP= 85.00
ADD HYD	24.00	23&15	24	0.00816	14.96	0.667	1.53191	1.518	2.865	
*S POND 4										
ROUTE RESERVOIR	POND4	24	25	0.00816	13.31	0.662	1.52069	1.584	2.548	AC-FT= 0.096
COMPUTE NM HYD	101D	-	2	0.00107	3.09	0.107	1.87660	1.518	4.535	PER IMP= 53.00
ADD HYD	101D.1	10& 2	41	0.00346	5.65	0.380	2.06129	1.584	2.550	
ADD HYD	101D.11	41&20	42	0.00398	5.65	0.437	2.06144	1.584	2.223	
COMPUTE NM HYD	101G	-	43	0.00041	1.12	0.036	1.64544	1.518	4.248	PER IMP= 30.00
ADD HYD	101G.1	43&42	44	0.00439	6.63	0.473	2.02242	1.584	2.361	
ADD HYD	101G.11	44&25	45	0.01255	19.94	1.135	1.69609	1.584	2.483	
COMPUTE NM HYD	102C	-	26	0.00208	5.03	0.152	1.37407	1.518	3.781	PER IMP= 3.00
ADD HYD	102C.1	45&26	46	0.01463	24.64	1.287	1.65029	1.551	2.632	
*S POND 7										

HYDROGRAPH	FROM ID	TO ID	AREA	PEAK DISCHARGE	RUNOFF VOLUME	RUNOFF	TIME TO PEAK	CFS PER	PAGE = 2

AHYMO.SUM

COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION	
ROUTE RESERVOIR	13.00	46	13	0.01463	19.80	1.226	1.57195	1.683	2.115	AC-FT=	0.215
COMPUTE NM HYD	OS-1	-	40	0.00042	1.13	0.037	1.64544	1.518	4.238	PER IMP=	30.00
COMPUTE NM HYD	OS-2	-	41	0.00066	1.70	0.054	1.52483	1.518	4.036	PER IMP=	18.00
COMPUTE NM HYD	OS-3	-	42	0.00028	0.77	0.025	1.64544	1.518	4.277	PER IMP=	30.00
COMPUTE NM HYD	OS-4	-	43	0.00008	0.21	0.006	1.44442	1.518	4.141	PER IMP=	10.00

FINISH

```
* ALBUQUERQUE PUBLIC SCHOOLS
* MONTGOMERY COMPLEX DRAINAGE MASTER PLAN
* PROPOSED CONDITIONS MODEL
* 100 YR 6 HR STORM EVENT
* DATE: APRIL 2017

*S**************************************************************************
*S
*S      100 YEAR 24 HOUR STORM - PROPOSED RUNOFF ANALYSIS
*S      RAINFALL DATA FROM DPM Chapter 22 - ZONE 3
*S
*S**************************************************************************

START               0.0 HOURS
RAINFALL            TYPE=1   RAIN QUARTER=0.0 IN  RAIN ONE=2.14 IN
                    RAIN SIX=2.60 IN   RAIN DAY=3.10 IN  DT=0.033 HRS

*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101A
**************************************************************************
*

COMPUTE NM HYD      ID=1  HYD NO=101A  DA= 0.00141 SQ MI
                    PER A=0 PER B=0 PER C=0 PER D=100
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=1  CODE=1
*
**************************************************************************
*       DIVIDE HYD FOR BASIN 101A 73% TO WEST 13% TO EAST SD & 14% to Comanche
**************************************************************************
*

DIVIDE HYD          ID=1  PER=-0.73  ID=20  HYD NO=101A-W
                    ID=21  HYD NO=101A-Rem

DIVIDE HYD          ID=21 PER=-0.48  ID=30  HYD NO=101A-E
                    ID=31  HYD NO=101A-COM

PRINT HYD           ID=20  CODE=1
PRINT HYD           ID=30  CODE=1
PRINT HYD           ID=31  CODE=1
*
**************************************************************************
*       DIVIDE HYD FOR BASIN 101A WEST BETWEEN PONDS 1 AND 2
**************************************************************************
*
DIVIDE HYD          ID=20  PER=-0.50  ID=11  HYD NO=11.2
                    ID=10  HYD NO=10.1

PRINT HYD           ID=10  CODE=1
PRINT HYD           ID=11  CODE=1
*

**************************************************************************
*S POND 2
*
****Route 101A-E THROUGH POND 2
*
ROUTE RESERVOIR     ID=20  HYD NO=POND2 INFLOW ID=11  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.0                   0.000                   5298.0
                       0.01                  0.054                   5299.0
                       3.83                  0.129                   5300.0

PRINT HYD           ID=20   CODE=5
*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101B
**************************************************************************
*

COMPUTE NM HYD      ID=2  HYD NO=101B  DA= 0.00013 SQ MI
                    PER A=0 PER B=0 PER C=0 PER D=100
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=2  CODE=1
```

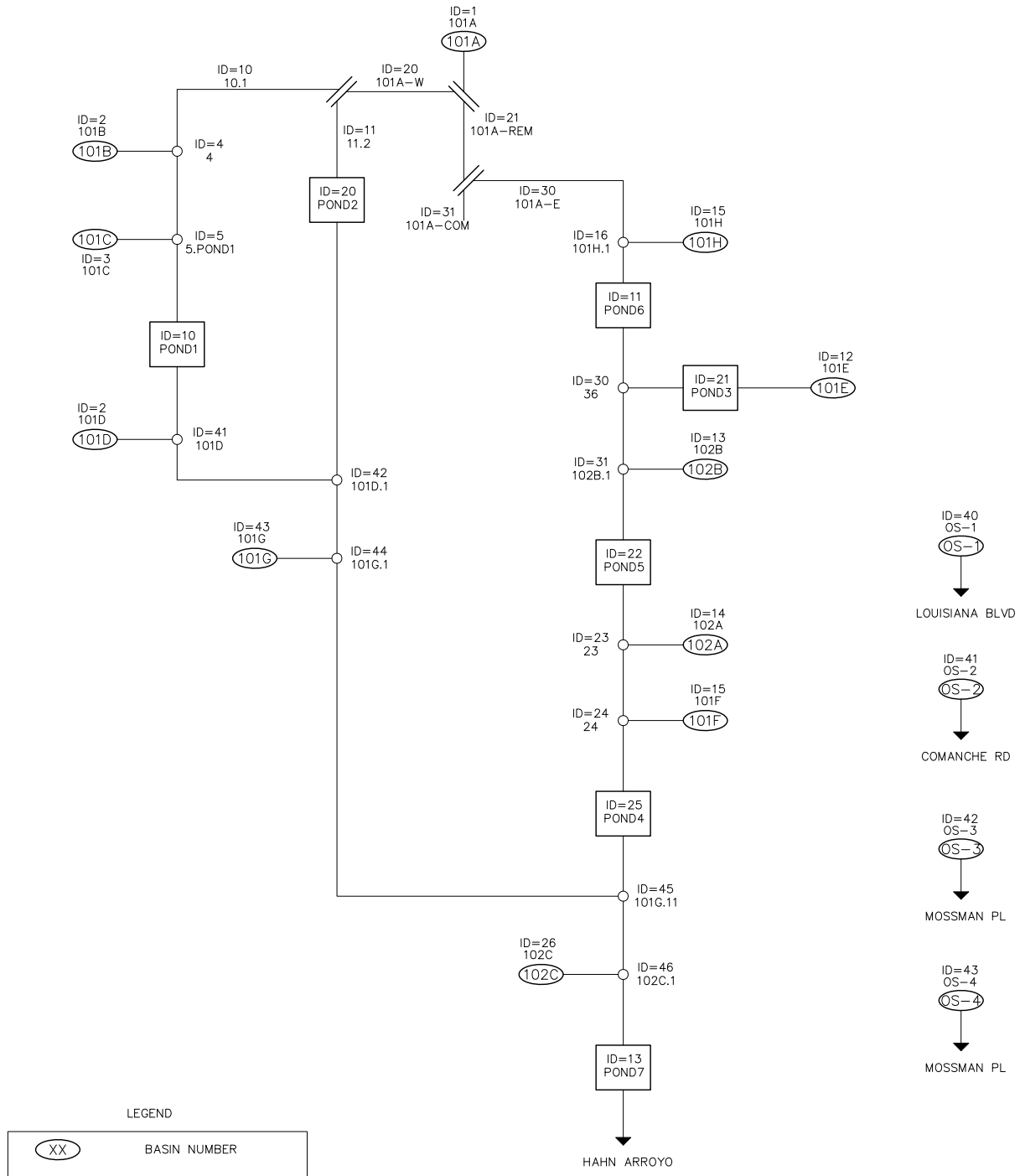
```
*
*************************************************************************
*       COMPUTE HYD FOR BASIN 101C
*************************************************************************
*

COMPUTE NM HYD      ID=3  HYD NO=101C  DA= 0.00175 SQ MI
                    PER A=0 PER B=15 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=3  CODE=1
*************************************************************************
**** ADD HYD HALF 101A-W TO 101B TO GET 101B.1
ADD HYD              ID=4 HYD NO=4  INFLOW IDS= 10 AND 2
PRINT HYD           ID=4   CODE=5

**** ADD HYD 101B.1 TO 101C TO GET 101C.1
ADD HYD             ID=5 HYD NO=5.POND1  INFLOW IDS= 4 AND 3
PRINT HYD           ID=5   CODE=5
*
*************************************************************************
*S POND 1
*
****Route 101C.1 THROUGH POND 1
*
ROUTE RESERVOIR     ID=10  HYD NO=POND1 INFLOW ID=5  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.0                   0.000                   5294.0
                       0.01                  0.055                   5295.0
                       3.19                  0.131                   5296.0
                       4.52                  0.230                   5297.0

PRINT HYD           ID=10   CODE=5

*
*************************************************************************
*       COMPUTE HYD FOR BASIN 101H
*************************************************************************
*

COMPUTE NM HYD      ID=15  HYD NO=101H  DA= 0.00024 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=15  CODE=1

*
*ADD ROOF DRAIN FROM EAST HALF TO BASIN 101H

ADD HYD              ID=16 HYD NO=101H.1  INFLOW IDS= 30 AND 15
PRINT HYD           ID=16   CODE=5
*
*************************************************************************
*S POND 6
*
****Route THROUGH POND 6
*
ROUTE RESERVOIR     ID=11  HYD NO=POND6 INFLOW ID=16  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                  0.000                    5303
                       0.01                  0.055                    5304
                       2.93                  0.130                    5305

PRINT HYD           ID=11   CODE=5
*
*************************************************************************
*       COMPUTE HYD FOR BASIN 101E
*************************************************************************
*
COMPUTE NM HYD      ID=12  HYD NO=101E  DA= 0.00115 SQ MI
                    PER A=0 PER B=115 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=12  CODE=1

*
*************************************************************************
*S POND 3
```

```
*
*ROUTE BASIN 101E THROUGH POND 3

ROUTE RESERVOIR     ID=21  HYD NO=101E.1 INFLOW ID=12  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                   0.000                  5300
                       0.01                   0.103                  5301
                       3.57                   0.232                  5302

PRINT HYD           ID=21   CODE=5
*

*ADD OUTFLOW FROM PONDS 3 AND 6

ADD HYD              ID=30 HYD NO=36  INFLOW IDS= 21 AND 11
PRINT HYD           ID=30   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 102B
*********************************************************************
*
COMPUTE NM HYD      ID=13  HYD NO=102B  DA= 0.00136 SQ MI
                    PER A=0 PER B=30 PER C=60 PER D=10
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=13  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM PONDS 3 AND 6 TO BASIN 102B

ADD HYD              ID=31 HYD NO=102B.1  INFLOW IDS= 30 AND 13
PRINT HYD           ID=31   CODE=5
*
*********************************************************************
*S POND 5
*
*ROUTE THROUGH POND 5

ROUTE RESERVOIR     ID=22  HYD NO=POND5 INFLOW ID=31  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                   0.000                  5298
                       0.01                   0.070                  5299
                       3.65                   0.163                  5300

PRINT HYD           ID=22   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 102A
*********************************************************************
*
COMPUTE NM HYD      ID=14  HYD NO=102A  DA= 0.001847 SQ MI
                    PER A=0 PER B=0 PER C=100 PER D=0
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=14  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM POND 5 AND BASIN 102A

ADD HYD              ID=23 HYD NO=23  INFLOW IDS= 22 AND 14
PRINT HYD           ID=23   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 101F
*********************************************************************
*

COMPUTE NM HYD      ID=15  HYD NO=101F  DA= 0.003381 SQ MI
                    PER A=0 PER B=15 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=15  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM POND 5 AND BASIN 102A
```

```
ADD HYD              ID=24 HYD NO=24  INFLOW IDS= 23 AND 15
PRINT HYD            ID=24   CODE=5
*
**********************************************************************
*S POND 4
*
*ROUTE THROUGH POND 4

ROUTE RESERVOIR      ID=25  HYD NO=POND4 INFLOW ID=24  CODE=5
                     OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                        0.0                   0.0000                 5296.5
                        0.01                  0.0057                 5297
                        0.02                  0.0381                 5298
                        12.6                  0.0901                 5299
                        21.8                  0.1634                 5300

PRINT HYD            ID=25   CODE=5
*
**********************************************************************
*       COMPUTE HYD FOR BASIN 101D
**********************************************************************
*

COMPUTE NM HYD       ID=2  HYD NO=101D  DA= 0.001066 SQ MI
                     PER A=0 PER B=0 PER C=47 PER D=53
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=2  CODE=1

*
**********************************************************************
* ADD BASIN 101D TO OUTFLOW FROM POND 1

ADD HYD              ID=41 HYD NO=101D.1  INFLOW IDS= 10 AND 2
PRINT HYD            ID=41   CODE=5
*
**********************************************************************
* ADD BASIN 101D TO OUTFLOW FROM POND 2

ADD HYD              ID=42 HYD NO=101D.11  INFLOW IDS= 41 AND 20
PRINT HYD            ID=42   CODE=5
*

**********************************************************************
*       COMPUTE HYD FOR BASIN 101G
**********************************************************************
*

COMPUTE NM HYD       ID=43  HYD NO=101G  DA= 0.000411 SQ MI
                     PER A=0 PER B=0 PER C=70 PER D=30
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=43  CODE=1

*
**********************************************************************
* ADD BASIN 101G TO 101D.11

ADD HYD              ID=44 HYD NO=101G.1  INFLOW IDS= 43 AND 42
PRINT HYD            ID=44   CODE=5
*
**********************************************************************
* ADD BASIN 101G.1 TO OUTFLOW FROM POND 4

ADD HYD              ID=45 HYD NO=101G.11  INFLOW IDS= 44 AND 25
PRINT HYD            ID=45   CODE=5
*

**********************************************************************
*       COMPUTE HYD FOR BASIN 102C
**********************************************************************
*

COMPUTE NM HYD       ID=26  HYD NO=102C  DA= 0.00208 SQ MI
                     PER A=0 PER B=0 PER C=97 PER D=3
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=26  CODE=1
*
```

```
**************************************************************************

**** ADD HYD 102C TO 101D.11
ADD HYD              ID=46 HYD NO=102C.1  INFLOW IDS= 45 AND 26
PRINT HYD           ID=46   CODE=5
*

**************************************************************************
*S POND 7
*
****Route 101.D3 THROUGH 18" outlet IN POND 7
*
ROUTE RESERVOIR     ID=13  HYD NO=13 INFLOW ID=46  CODE=5
                    OUTFLOW (CFS)       STORAGE (AC FT)         ELEV (FT)

                      0.00                  0.000                   5289.00
                      0.01                  0.028                   5290.00
                      0.02                  0.076                   5291.00
                      14.6                  0.143                   5292.00
                      20.9                  0.230                   5293.00
                      25.8                  0.341                   5294.00
                      29.8                  0.476                   5295.00
                      33.4                  0.717                   5296.00
                      36.6                  1.097                   5297.00
                      39.6                  1.533                   5298.00

PRINT HYD           ID=13   CODE=5
*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-1
**************************************************************************
*

COMPUTE NM HYD      ID=40  HYD NO=OS-1  DA= 0.000418 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=40  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-2
**************************************************************************
*

COMPUTE NM HYD      ID=41  HYD NO=OS-2  DA= 0.000658 SQ MI
                    PER A=0 PER B=0 PER C=82 PER D=18
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=41  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-3
**************************************************************************
*

COMPUTE NM HYD      ID=42  HYD NO=OS-3  DA= 0.000281 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=42  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-4
**************************************************************************
*

COMPUTE NM HYD      ID=43  HYD NO=OS-4  DA= 0.00008 SQ MI
                    PER A=0 PER B=0 PER C=90 PER D=10
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=43  CODE=1
FINISH
```

PROPOSED CONDITIONS
100 YEAR-24 HOUR
HYDROLOGY MODEL



MONTGOMERY COMPLEX
AHYMO FLOW CHART

M:\MSD\14–600–070–01\2_Disciplines\Drainage\Calculations\AHYMO\Mont. Complex–FlowChart.dwg

AHYMO PROGRAM SUMMARY TABLE (AHYMO-S4) - Ver. S4.01a, Rel: 01a RUN DATE (MON/DAY/YR) =04/19/2017

INPUT FILE = SD\14-600-070-01\2_Disciplines\Drainage\Calculations\AHYMO\PROP 100-24.DAT USER NO.= AHYMO_Temp_User:20122010

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
*S**********										
*S										
*S	100 YEAR 24 HOUR STORM - PROPOSED RUNOFF ANALYSIS									
*S	RAINFALL DATA FROM DPM Chapter 22 - ZONE 3									
*S										
*S**********										
START										TIME= 0.00
RAINFALL TYPE= 2 NOAA 14										RAIN24= 3.100
COMPUTE NM HYD	101A	-	1	0.00141	4.64	0.214	2.84981	1.500	5.137	PER IMP= 100.00
DIVIDE HYD	101A-W	1	20	0.00103	3.38	0.156	2.84959	1.500	5.137	
	101A-Rem	and	21	0.00038	1.25	0.058	2.84959	1.500	5.137	
DIVIDE HYD	101A-E	21	30	0.00018	0.60	0.028	2.84904	1.500	5.137	
	101A-COM	and	31	0.00020	0.65	0.030	2.84904	1.500	5.137	
DIVIDE HYD	11.20	20	11	0.00051	1.69	0.078	2.84953	1.500	5.137	
	10.10	and	10	0.00051	1.69	0.078	2.84953	1.500	5.137	
*S POND 2										
ROUTE RESERVOIR	POND2	11	20	0.00051	0.13	0.075	2.71935	2.150	0.406	AC-FT= 0.056
COMPUTE NM HYD	101B	-	2	0.00013	0.44	0.020	2.84981	1.500	5.229	PER IMP= 100.00
COMPUTE NM HYD	101C	-	3	0.00175	5.40	0.241	2.58387	1.500	4.818	PER IMP= 85.00
ADD HYD	4.00	10& 2	4	0.00064	2.13	0.098	2.84909	1.500	5.156	
ADD HYD	5.POND1	4& 3	5	0.00239	7.52	0.339	2.65513	1.500	4.909	
*S POND 1										
ROUTE RESERVOIR	POND1	5	10	0.00239	3.35	0.335	2.62431	1.700	2.183	AC-FT= 0.143
COMPUTE NM HYD	101H	-	15	0.00024	0.65	0.023	1.79580	1.500	4.233	PER IMP= 30.00
ADD HYD	101H.1	30&15	16	0.00042	1.25	0.051	2.24761	1.500	4.624	
*S POND 6										
ROUTE RESERVOIR	POND6	16	11	0.00042	0.01	0.048	2.13020	2.850	0.028	AC-FT= 0.042
COMPUTE NM HYD	101E	-	12	0.00115	2.87	0.112	1.83038	1.500	3.900	PER IMP= 42.50
*S POND 3										
ROUTE RESERVOIR	101E.1	12	21	0.00115	0.01	0.089	1.45262	12.800	0.013	AC-FT= 0.096
ADD HYD	36.00	21&11	30	0.00157	0.02	0.134	1.60075	3.050	0.017	
COMPUTE NM HYD	102B	-	13	0.00136	3.14	0.102	1.40354	1.500	3.612	PER IMP= 10.00
ADD HYD	102B.1	30&13	31	0.00293	3.15	0.236	1.50924	1.500	1.678	
*S POND 5										
ROUTE RESERVOIR	POND5	31	22	0.00293	0.44	0.198	1.26319	1.900	0.236	AC-FT= 0.081
COMPUTE NM HYD	102A	-	14	0.00185	4.35	0.132	1.34408	1.500	3.678	PER IMP= 0.00
ADD HYD	23.00	22&14	23	0.00478	4.35	0.330	1.29443	1.500	1.423	
COMPUTE NM HYD	101F	-	15	0.00338	10.41	0.466	2.58387	1.500	4.809	PER IMP= 85.00
ADD HYD	24.00	23&15	24	0.00816	14.76	0.796	1.82861	1.500	2.826	
*S POND 4										
ROUTE RESERVOIR	POND4	24	25	0.00816	13.22	0.793	1.82105	1.550	2.531	AC-FT= 0.095
COMPUTE NM HYD	101D	-	2	0.00107	3.05	0.122	2.14211	1.500	4.470	PER IMP= 53.00
ADD HYD	101D.1	10& 2	41	0.00346	5.62	0.455	2.46722	1.600	2.536	
ADD HYD	101D.11	41&20	42	0.00398	5.62	0.528	2.49120	1.600	2.210	
COMPUTE NM HYD	101G	-	43	0.00041	1.10	0.039	1.79580	1.500	4.178	PER IMP= 30.00
ADD HYD	101G.1	43&42	44	0.00439	6.60	0.568	2.42600	1.550	2.352	
ADD HYD	101G.11	44&25	45	0.01255	19.82	1.360	2.03253	1.550	2.469	
COMPUTE NM HYD	102C	-	26	0.00208	4.96	0.154	1.38925	1.500	3.726	PER IMP= 3.00
ADD HYD	102C.1	45&26	46	0.01463	24.67	1.514	1.94056	1.550	2.635	
*S POND 7										

AHYMO.SUM

COMMAND	IDENTIFICATION	NO.	NO.	(SQ MI)	(CFS)	(AC-FT)	(INCHES)	(HOURS)	ACRE	NOTATION	
ROUTE RESERVOIR	13.00	46	13	0.01463	19.72	1.479	1.89542	1.650	2.107	AC-FT=	0.214
COMPUTE NM HYD	OS-1	-	40	0.00042	1.12	0.040	1.79580	1.500	4.178	PER IMP=	30.00
COMPUTE NM HYD	OS-2	-	41	0.00066	1.68	0.057	1.61511	1.500	3.980	PER IMP=	18.00
COMPUTE NM HYD	OS-3	-	42	0.00028	0.76	0.027	1.79580	1.500	4.211	PER IMP=	30.00
COMPUTE NM HYD	OS-4	-	43	0.00008	0.21	0.006	1.49465	1.500	4.084	PER IMP=	10.00

FINISH

```
* ALBUQUERQUE PUBLIC SCHOOLS
* MONTGOMERY COMPLEX DRAINAGE MASTER PLAN
* PROPOSED CONDITIONS MODEL
* 100 YR 24 HR STORM EVENT
* DATE: APRIL 2017

*S**************************************************************************
*S
*S      100 YEAR 24 HOUR STORM - PROPOSED RUNOFF ANALYSIS
*S      RAINFALL DATA FROM DPM Chapter 22 - ZONE 3
*S
*S**************************************************************************

START               0.0 HOURS
RAINFALL            TYPE=2   RAIN QUARTER=0.0 IN  RAIN ONE=2.14 IN
                    RAIN SIX=2.60 IN   RAIN DAY=3.10 IN  DT=0.05 HRS

*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101A
**************************************************************************
*

COMPUTE NM HYD      ID=1  HYD NO=101A  DA= 0.00141 SQ MI
                    PER A=0 PER B=0 PER C=0 PER D=100
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=1  CODE=1
*
**************************************************************************
*       DIVIDE HYD FOR BASIN 101A 73% TO WEST 13% TO EAST SD & 14% to Comanche
**************************************************************************
*

DIVIDE HYD          ID=1  PER=-0.73  ID=20  HYD NO=101A-W
                    ID=21  HYD NO=101A-Rem

DIVIDE HYD          ID=21 PER=-0.48  ID=30  HYD NO=101A-E
                    ID=31  HYD NO=101A-COM

PRINT HYD           ID=20  CODE=1
PRINT HYD           ID=30  CODE=1
PRINT HYD           ID=31  CODE=1
*
**************************************************************************
*       DIVIDE HYD FOR BASIN 101A WEST BETWEEN PONDS 1 AND 2
**************************************************************************
*
DIVIDE HYD          ID=20  PER=-0.50  ID=11  HYD NO=11.2
                    ID=10  HYD NO=10.1

PRINT HYD           ID=10  CODE=1
PRINT HYD           ID=11  CODE=1
*

**************************************************************************
*S POND 2
*
****Route 101A-E THROUGH POND 2
*
ROUTE RESERVOIR     ID=20  HYD NO=POND2 INFLOW ID=11  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.0                   0.000                   5298.0
                       0.01                  0.054                   5299.0
                       3.83                  0.129                   5300.0

PRINT HYD           ID=20   CODE=5

*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101B
**************************************************************************
*

COMPUTE NM HYD      ID=2  HYD NO=101B  DA= 0.00013 SQ MI
                    PER A=0 PER B=0 PER C=0 PER D=100
                    TP=0.1333 HR MASS RAIN=-1
```

```
PRINT HYD           ID=2  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101C
**************************************************************************
*

COMPUTE NM HYD      ID=3  HYD NO=101C  DA= 0.00175 SQ MI
                    PER A=0 PER B=15 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=3  CODE=1
**************************************************************************
**** ADD HYD HALF 101A-W TO 101B TO GET 101B.1
ADD HYD              ID=4 HYD NO=4  INFLOW IDS= 10 AND 2
PRINT HYD           ID=4   CODE=5

**** ADD HYD 101B.1 TO 101C TO GET 101C.1
ADD HYD             ID=5 HYD NO=5.POND1  INFLOW IDS= 4 AND 3
PRINT HYD           ID=5   CODE=5
*
**************************************************************************
*S POND 1
*
****Route 101C.1 THROUGH POND 1
*
ROUTE RESERVOIR     ID=10  HYD NO=POND1 INFLOW ID=5  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.0                   0.000                   5294.0
                       0.01                  0.055                   5295.0
                       3.19                  0.131                   5296.0
                       4.52                  0.230                   5297.0

PRINT HYD           ID=10   CODE=5
*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101H
**************************************************************************
*

COMPUTE NM HYD      ID=15  HYD NO=101H  DA= 0.00024 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=15  CODE=1

*
*ADD ROOF DRAIN FROM EAST HALF TO BASIN 101H

ADD HYD              ID=16 HYD NO=101H.1  INFLOW IDS= 30 AND 15
PRINT HYD           ID=16   CODE=5
*
**************************************************************************
*S POND 6
*
****Route THROUGH POND 6
*
ROUTE RESERVOIR     ID=11  HYD NO=POND6 INFLOW ID=16  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                  0.000                   5303
                       0.01                  0.055                   5304
                       2.93                  0.130                   5305

PRINT HYD           ID=11   CODE=5
*
**************************************************************************
*       COMPUTE HYD FOR BASIN 101E
**************************************************************************
*
COMPUTE NM HYD      ID=12  HYD NO=101E  DA= 0.00115 SQ MI
                    PER A=0 PER B=115 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=12  CODE=1

*
**************************************************************************
*S POND 3
```

```
*
*ROUTE BASIN 101E THROUGH POND 3

ROUTE RESERVOIR     ID=21  HYD NO=101E.1 INFLOW ID=12  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                   0.000                 5300
                       0.01                   0.103                 5301
                       3.57                   0.232                 5302

PRINT HYD           ID=21   CODE=5
*

*ADD OUTFLOW FROM PONDS 3 AND 6

ADD HYD              ID=30 HYD NO=36  INFLOW IDS= 21 AND 11
PRINT HYD           ID=30   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 102B
*********************************************************************
*
COMPUTE NM HYD      ID=13  HYD NO=102B  DA= 0.00136 SQ MI
                    PER A=0 PER B=30 PER C=60 PER D=10
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=13  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM PONDS 3 AND 6 TO BASIN 102B

ADD HYD              ID=31 HYD NO=102B.1  INFLOW IDS= 30 AND 13
PRINT HYD           ID=31   CODE=5
*
*********************************************************************
*S POND 5
*
*ROUTE THROUGH POND 5

ROUTE RESERVOIR     ID=22  HYD NO=POND5 INFLOW ID=31  CODE=5
                    OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                       0.00                   0.000                 5298
                       0.01                   0.070                 5299
                       3.65                   0.163                 5300

PRINT HYD           ID=22   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 102A
*********************************************************************
*
COMPUTE NM HYD      ID=14  HYD NO=102A  DA= 0.001847 SQ MI
                    PER A=0 PER B=0 PER C=100 PER D=0
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=14  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM POND 5 AND BASIN 102A

ADD HYD              ID=23 HYD NO=23  INFLOW IDS= 22 AND 14
PRINT HYD           ID=23   CODE=5
*
*********************************************************************
*       COMPUTE HYD FOR BASIN 101F
*********************************************************************
*

COMPUTE NM HYD      ID=15  HYD NO=101F  DA= 0.003381 SQ MI
                    PER A=0 PER B=15 PER C=0 PER D=85
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=15  CODE=1

*
*********************************************************************
*ADD ADD OUTFLOW FROM POND 5 AND BASIN 102A
```

```
ADD HYD              ID=24 HYD NO=24  INFLOW IDS= 23 AND 15
PRINT HYD            ID=24   CODE=5
*
**********************************************************************
*S POND 4
*
*ROUTE THROUGH POND 4

ROUTE RESERVOIR      ID=25  HYD NO=POND4 INFLOW ID=24  CODE=5
                     OUTFLOW (CFS)        STORAGE (AC FT)         ELEV (FT)
                        0.0                  0.0000                  5296.5
                        0.01                 0.0057                  5297
                        0.02                 0.0381                  5298
                        12.6                 0.0901                  5299
                        21.8                 0.1634                  5300

PRINT HYD            ID=25   CODE=5
*
**********************************************************************
*       COMPUTE HYD FOR BASIN 101D
**********************************************************************
*

COMPUTE NM HYD       ID=2  HYD NO=101D  DA= 0.001066 SQ MI
                     PER A=0 PER B=0 PER C=47 PER D=53
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=2  CODE=1

*
**********************************************************************
* ADD BASIN 101D TO OUTFLOW FROM POND 1

ADD HYD              ID=41 HYD NO=101D.1  INFLOW IDS= 10 AND 2
PRINT HYD            ID=41   CODE=5
*
**********************************************************************
* ADD BASIN 101D TO OUTFLOW FROM POND 2

ADD HYD              ID=42 HYD NO=101D.11  INFLOW IDS= 41 AND 20
PRINT HYD            ID=42   CODE=5
*

**********************************************************************
*       COMPUTE HYD FOR BASIN 101G
**********************************************************************
*

COMPUTE NM HYD       ID=43  HYD NO=101G  DA= 0.000411 SQ MI
                     PER A=0 PER B=0 PER C=70 PER D=30
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=43  CODE=1

*
**********************************************************************
* ADD BASIN 101G TO 101D.11

ADD HYD              ID=44 HYD NO=101G.1  INFLOW IDS= 43 AND 42
PRINT HYD            ID=44   CODE=5
*
**********************************************************************
* ADD BASIN 101G.1 TO OUTFLOW FROM POND 4

ADD HYD              ID=45 HYD NO=101G.11  INFLOW IDS= 44 AND 25
PRINT HYD            ID=45   CODE=5
*

**********************************************************************
*       COMPUTE HYD FOR BASIN 102C
**********************************************************************
*

COMPUTE NM HYD       ID=26  HYD NO=102C  DA= 0.00208 SQ MI
                     PER A=0 PER B=0 PER C=97 PER D=3
                     TP=0.1333 HR MASS RAIN=-1

PRINT HYD            ID=26  CODE=1
*
```

```
**************************************************************************

**** ADD HYD 102C TO 101D.11
ADD HYD              ID=46 HYD NO=102C.1  INFLOW IDS= 45 AND 26
PRINT HYD           ID=46   CODE=5
*

**************************************************************************
*S POND 7
*
****Route 101.D3 THROUGH 18" outlet IN POND 7
*
ROUTE RESERVOIR     ID=13  HYD NO=13 INFLOW ID=46  CODE=5
                    OUTFLOW (CFS)       STORAGE (AC FT)         ELEV (FT)

                      0.00                  0.000                   5289.00
                      0.01                  0.028                   5290.00
                      0.02                  0.076                   5291.00
                      14.6                  0.143                   5292.00
                      20.9                  0.230                   5293.00
                      25.8                  0.341                   5294.00
                      29.8                  0.476                   5295.00
                      33.4                  0.717                   5296.00
                      36.6                  1.097                   5297.00
                      39.6                  1.533                   5298.00

PRINT HYD           ID=13   CODE=5
*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-1
**************************************************************************
*

COMPUTE NM HYD      ID=40  HYD NO=OS-1  DA= 0.000418 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=40  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-2
**************************************************************************
*

COMPUTE NM HYD      ID=41  HYD NO=OS-2  DA= 0.000658 SQ MI
                    PER A=0 PER B=0 PER C=82 PER D=18
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=41  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-3
**************************************************************************
*

COMPUTE NM HYD      ID=42  HYD NO=OS-3  DA= 0.000281 SQ MI
                    PER A=0 PER B=0 PER C=70 PER D=30
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=42  CODE=1

*
**************************************************************************
*       COMPUTE HYD FOR BASIN OS-4
**************************************************************************
*

COMPUTE NM HYD      ID=43  HYD NO=OS-4  DA= 0.00008 SQ MI
                    PER A=0 PER B=0 PER C=90 PER D=10
                    TP=0.1333 HR MASS RAIN=-1

PRINT HYD           ID=43  CODE=1
FINISH
```

Appendix C – Hydraulic Analyses

INLET CAPACITIES

Rating Curve for Type D Single Inlet

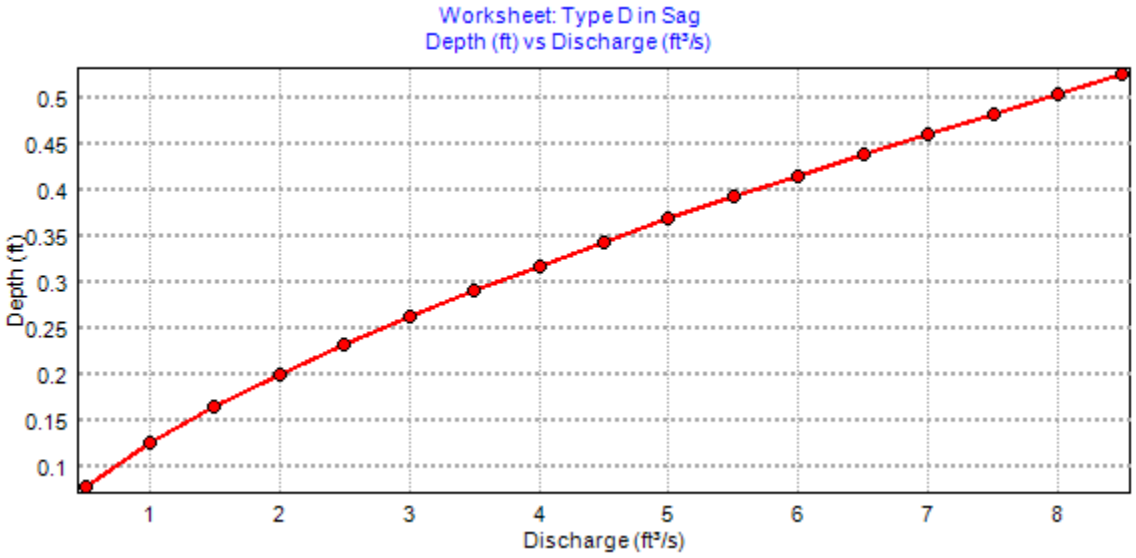
Project Description

Solve For	Spread

Input Data

Discharge		8.00	ft³/s
Left Side Slope		50.00	ft/ft (H:V)
Right Side Slope		50.00	ft/ft (H:V)
Bottom Width		3.20	ft
Grate Width		3.20	ft
Grate Length		2.13	ft
Local Depression		0.00	in
Local Depression Width		0.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

Rating Curve Plot



Rating Curve for 12" Nyloplast Inlet

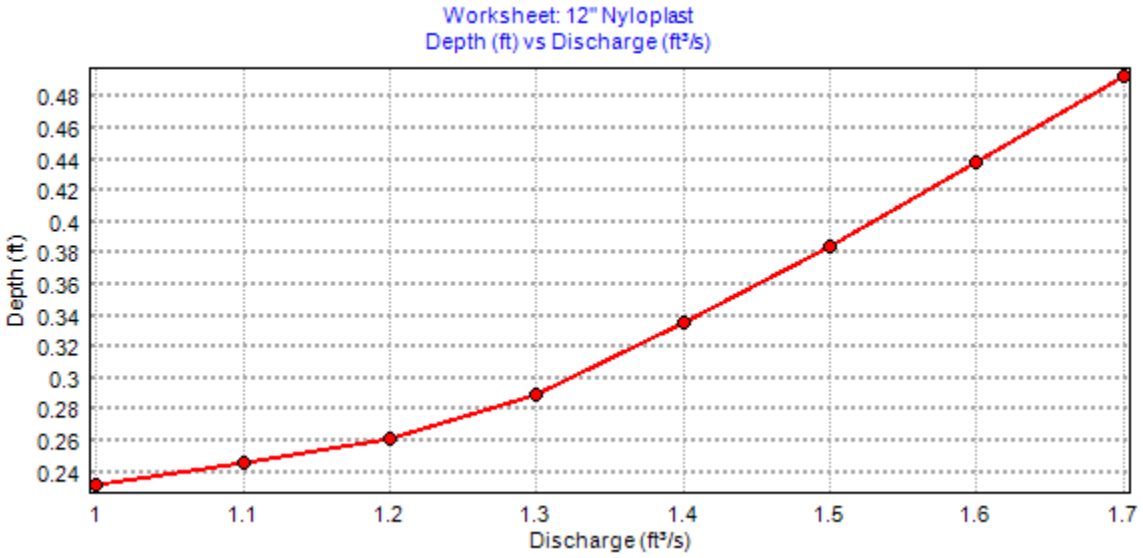
Project Description

Solve For	Spread

Input Data

Discharge		1.70	ft³/s
Left Side Slope		50.00	ft/ft (H:V)
Right Side Slope		50.00	ft/ft (H:V)
Bottom Width		1.00	ft
Grate Width		1.00	ft
Grate Length		1.00	ft
Local Depression		0.00	in
Local Depression Width		0.00	ft
Grate Type	P-50 mm (P-1-7/8")		
Clogging		50.00	%

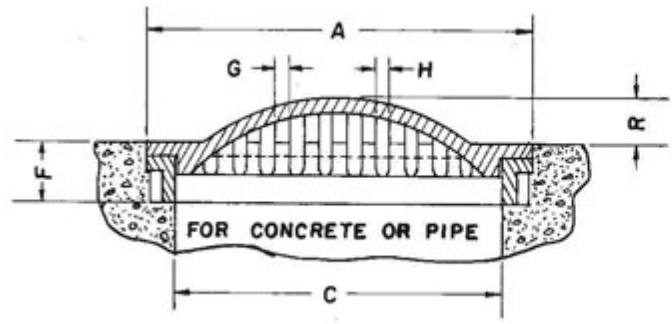
Rating Curve Plot



R-4360 Series

Beehive Grate, Frame

Light Duty



Various kinds and types of pipe are made under many specifications and dimensions may vary. Check the grate size as shown on the drawing to be sure it will fit the pipe you are using.

Catalog Number	Grate Type	Sq. Feet Open	Weir Perimeter Lineal Feet
R-4360-A	Beehive	0.6	4.3
R-4360-B	Beehive	0.8	4.7
R-4360-C	Beehive	1.4	4.5
R-4360-D	Beehive	0.7	6.3

Catalog Number	A	C	F	G	H	R
R-4360-A	18-1/4	16-1/4	2-3/4	1	1/2	1-5/8

Catalog Number	A	C	F	G	H	R
R-4360-B	22	18	2-3/4	1	1/2	1-5/8
R-4360-C	23-1/4	17	3-1/2	2	1-1/2	1-3/4
R-4360-D	28-1/2	24	3-5/8	1	1	3

Instructions:

1. Select a catalog number (will automatically fill in Open Area and Perimeter) or enter your own values
2. Enter head value
3. Click "calculate"

The results will determine automatically if your situation falls into a Weir, Transitional or Orifice flow. Additionally, Neenah grates which fall within the parameters chosen will appear below the calculator.

Catalog Number and Grate Type:

R-4360-C: Beehive

Feet perimeter (P):	Head in feet (h):	Free open area in sq. ft. (A):
4.5	.4	1.4

Calculate

Weir capacity in cfs:	Transitional flow in cfs:	Orifice capacity in cfs:
	3.2	

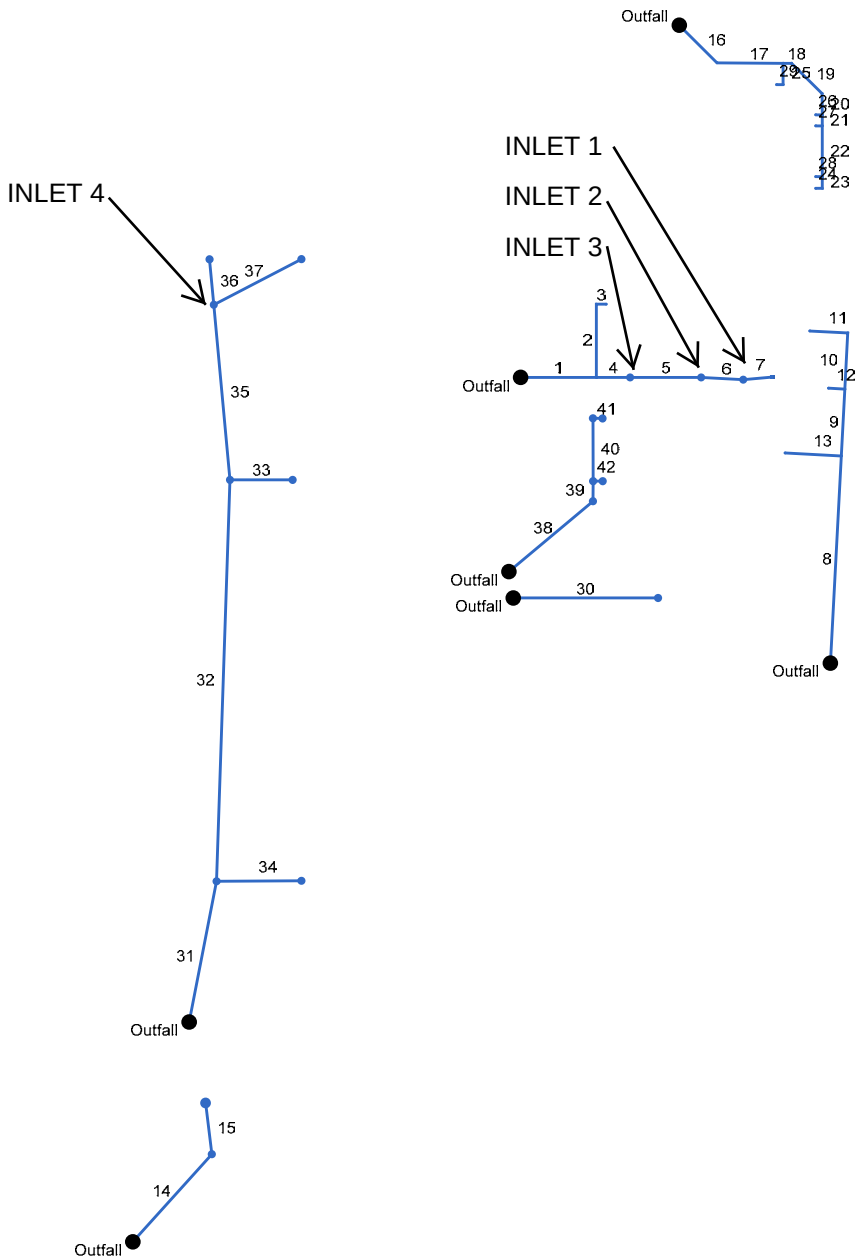
Based on transitional flow, the following grates match the criteria you entered.

Catalog Number	Grate Type
R-3165	A
R-4360-C	Beehive

For additional information regarding Neenah Inlet Grate Capacities, please contact Ryan Bonell P.E., at (920) 729.3463 or email at ryan.bonell@neenahenterprises.com, or Joe Falle P.E., at (920)729.3653 or email at joseph.falle@neenahenterprises.com.

HYDRAFLOW CALCULATIONS

Montgomery Complex



Project File: Montgomery Complex.stm	Number of lines: 42	Date: 4/14/2017

MyReport

Line No.	Line ID	Line Size (in)	Line Length (ft)	Line Slope (%)	Flow Rate (cfs)	Invert Dn (ft)	Invert Up (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	HGL Dn (ft)	HGL Up (ft)	Cover Dn (ft)	Cover Up (ft)	J-Loss Coeff	Vel Ave (ft/s)
1	A	12	58.0	2.00	1.75	5295.00	5296.16	5297.00	5301.05	5296.10	5296.72 j	1.00	3.89	1.00 z	3.04
2	A	12	56.3	2.01	0.29	5296.16	5297.29	5301.05	5302.00	5296.72	5297.51 j	3.89	3.71	1.00 z	1.44
3	A	12	7.5	0.40	0.29	5297.29	5297.32	5302.00	5302.00	5297.52	5297.55	3.71	3.68	1.00	2.08
4	A	12	25.9	2.01	1.46	5296.16	5296.68	5301.05	5304.00	5296.72	5297.19 j	3.89	6.32	0.15 z	3.41
5	A	12	54.4	8.33	1.46	5296.68	5301.21	5304.00	5304.00	5297.19	5301.72	6.32	1.79	0.50 z	3.61
6	A	12	32.2	0.50	0.88	5301.21	5301.37	5304.00	5304.00	5301.72	5301.76 j	1.79	1.63	0.50 z	2.63
7	A	12	22.0	0.50	0.44	5301.37	5301.48	5304.00	5304.17	5301.76	5301.75 j	1.63	1.69	1.00 z	2.03
8	B	12	159.2	0.39	0.64	5303.00	5303.62	5304.80	5305.86	5303.80	5303.99	0.80	1.24	1.00	1.67
9	B	12	51.4	0.41	0.46	5303.62	5303.83	5305.86	5306.32	5304.08	5304.14	1.24	1.49	1.00	1.78
10	B	12	43.1	0.39	0.12	5303.83	5304.00	5306.32	5306.00	5304.22	5304.22	1.49	1.00	1.00	0.67
11	B	4	29.1	1.48	0.12	5304.00	5304.43	5306.00	5306.00	5304.24	5304.62 j	1.67	1.24	1.00 z	2.04
12	B	4	12.5	2.00	0.34	5303.83	5304.08	5306.32	5306.00	5304.22	5304.56	2.16	1.59	1.00	3.90
13	B	4	43.1	0.70	0.18	5303.62	5303.92	5305.86	5306.00	5304.08	5304.41	1.91	1.75	1.00	2.06
14	OUT	24	90.5	0.81	19.12	5287.48	5288.21	5289.10	5296.16	5291.06	5291.71	-0.38	5.95	0.79	6.09
15		24	39.5	0.73	19.12	5288.21	5288.50	5296.16	5298.09	5292.16	5292.45	5.95	7.59	1.00	6.09
16	D	12	40.8	2.40	1.40	5299.51	5300.49	5301.00	5304.90	5300.40	5300.99 j	0.49	3.41	0.75 z	2.73
17	D	12	50.6	2.39	1.40	5300.49	5301.70	5304.90	5305.00	5300.99	5302.20	3.41	2.30	1.00 z	3.56
18	D	12	6.6	2.42	1.01	5301.70	5301.86	5305.00	5304.95	5302.20	5302.28 j	2.30	2.09	0.74 z	2.89
19	D	12	32.9	2.40	1.01	5301.86	5302.65	5304.95	5307.00	5302.28	5303.07	2.09	3.35	0.75 z	3.21
20	D	12	16.3	2.45	1.01	5302.65	5303.05	5307.00	5307.30	5303.07	5303.47	3.35	3.25	1.00 z	3.21
21	D	12	8.5	2.36	0.30	5303.05	5303.25	5307.30	5307.35	5303.47	5303.48 j	3.25	3.10	1.00 z	1.61
22	D	12	38.9	1.00	0.26	5303.25	5303.64	5307.35	5305.80	5303.48	5303.85 j	3.10	1.16	1.00 z	2.07
23	D	12	8.9	1.01	0.05	5303.64	5303.73	5305.80	5305.85	5303.85	5303.82	1.16	1.12	1.00 z	0.91

Montgomery Complex | Number of lines: 42 | Date: 4/14/2017

NOTES: ** Critical depth

MyReport

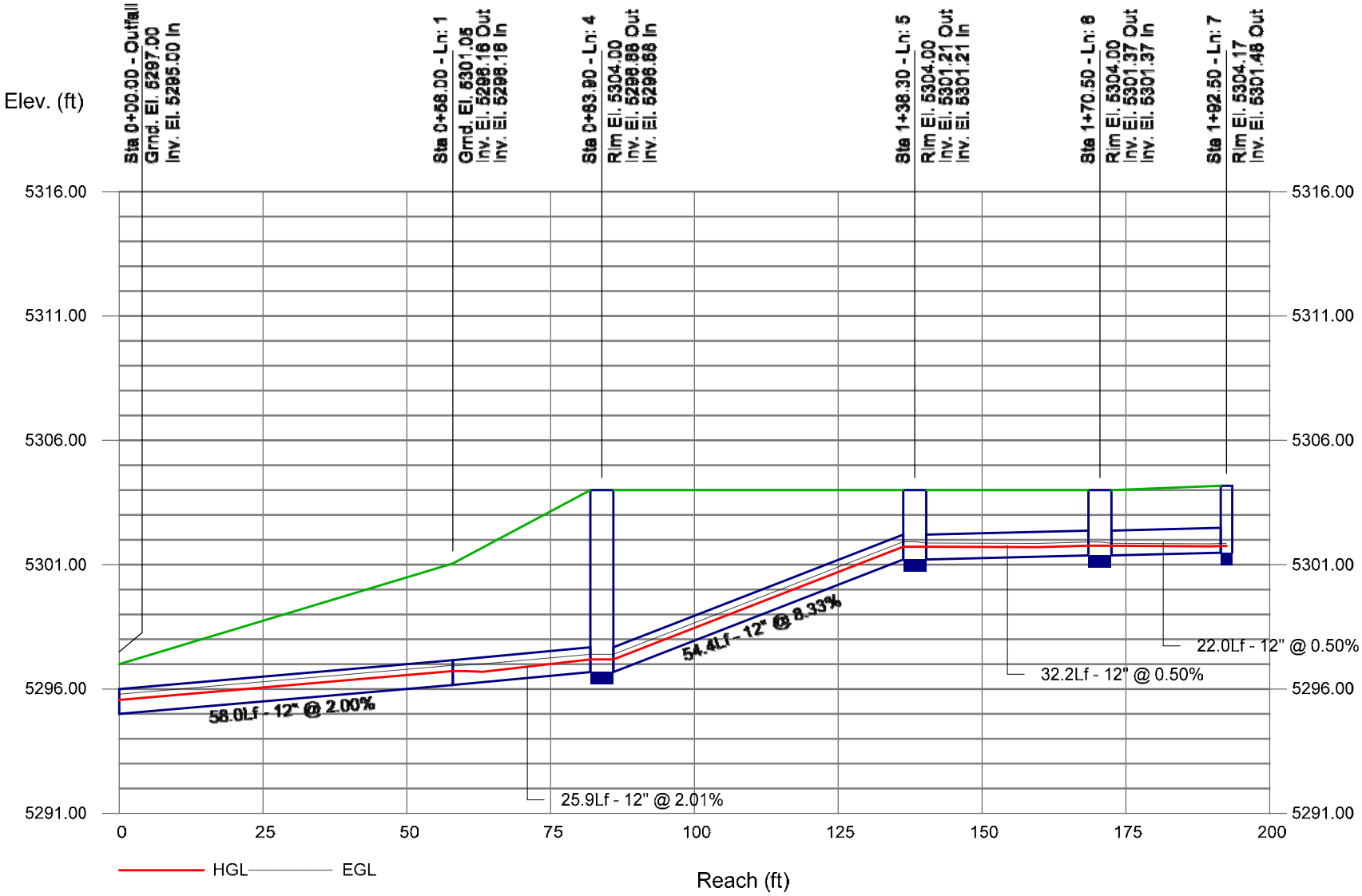
Line No.	Line ID	Line Size (in)	Line Length (ft)	Line Slope (%)	Flow Rate (cfs)	Invert Dn (ft)	Invert Up (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	HGL Dn (ft)	HGL Up (ft)	Cover Dn (ft)	Cover Up (ft)	J-Loss Coeff	Vel Ave (ft/s)
24	D	4	5.0	5.40	0.05	5303.73	5304.00	5305.85	5306.00	5303.82	5304.12	1.79	1.67	1.00 z	2.15
25	D	4	16.4	5.00	0.39	5301.70	5302.52	5305.00	5306.42	5302.20	5302.84 j	2.97	3.57	1.00 z	4.50
26	D	4	5.0	5.00	0.71	5303.05	5303.30	5307.30	5306.00	5303.47	5304.07	3.92	2.37	1.00	8.14
27	D	4	5.0	5.00	0.04	5303.25	5303.50	5307.35	5306.05	5303.48	5303.61 j	3.77	2.22	1.00 z	1.12
28	D	4	5.0	5.00	0.21	5303.64	5303.89	5305.80	5306.00	5303.85	5304.15	1.83	1.78	1.00 z	3.27
29	D	4	5.0	5.00	0.39	5302.52	5302.77	5306.42	5306.50	5302.84	5303.09	3.57	3.40	1.00 z	4.54
30	A	12	110.9	2.00	1.32	5298.00	5300.22	5300.00	5305.00	5298.49	5300.71 j	1.00	3.78	1.00 z	3.47
31		24	110.0	0.50	19.75	5288.74	5289.29	5293.00	5298.30	5292.76	5293.48	2.26	7.01	0.98	6.29
32		24	308.2	0.50	6.53	5289.29	5290.83	5298.30	5298.60	5294.08	5294.30	7.01	5.77	1.00	2.08
33		12	48.0	14.94	0.13	5290.83	5298.00	5298.60	5300.00	5294.36	5298.15 j	6.77	1.00	1.00 z	0.99
34		24	65.0	11.09	13.22	5289.29	5296.50	5298.30	5300.00	5294.08	5297.81 j	7.01	1.50	1.00 z	5.14
35		12	134.9	0.50	6.40	5290.83	5291.50	5298.60	5304.00	5294.36	5298.08	6.77	11.50	0.94	8.15
36		12	35.0	1.43	3.05	5291.50	5292.00	5304.00	5304.00	5299.05	5299.27	11.50	11.00	1.00	3.88
37		12	75.7	3.30	3.35	5291.50	5294.00	5304.00	5304.00	5299.05	5299.62	11.50	9.00	1.00	4.27
38		12	84.0	0.49	1.03	5298.00	5298.41	5300.00	5302.00	5298.43	5298.84	1.00	2.59	0.80	3.20
39		12	15.4	0.52	1.03	5298.41	5298.49	5302.00	5303.60	5298.97	5298.92	2.59	4.11	1.00 z	2.76
40		12	48.3	2.59	0.49	5298.49	5299.74	5303.60	5302.50	5298.92	5300.03 j	4.11	1.76	1.00 z	2.06
41		6	7.4	0.54	0.49	5299.74	5299.78	5302.50	5303.60	5300.24	5300.28	2.26	3.32	1.00	2.50
42		6	7.4	0.54	0.54	5298.49	5298.53	5303.60	5304.00	5298.99	5299.03	4.61	4.97	1.00	2.75

Montgomery Complex | Number of lines: 42 | Date: 4/14/2017

NOTES: ** Critical depth

Storm Sewer Profile

Proj. file: Montgomery Complex.stm



Storm Sewer Profile

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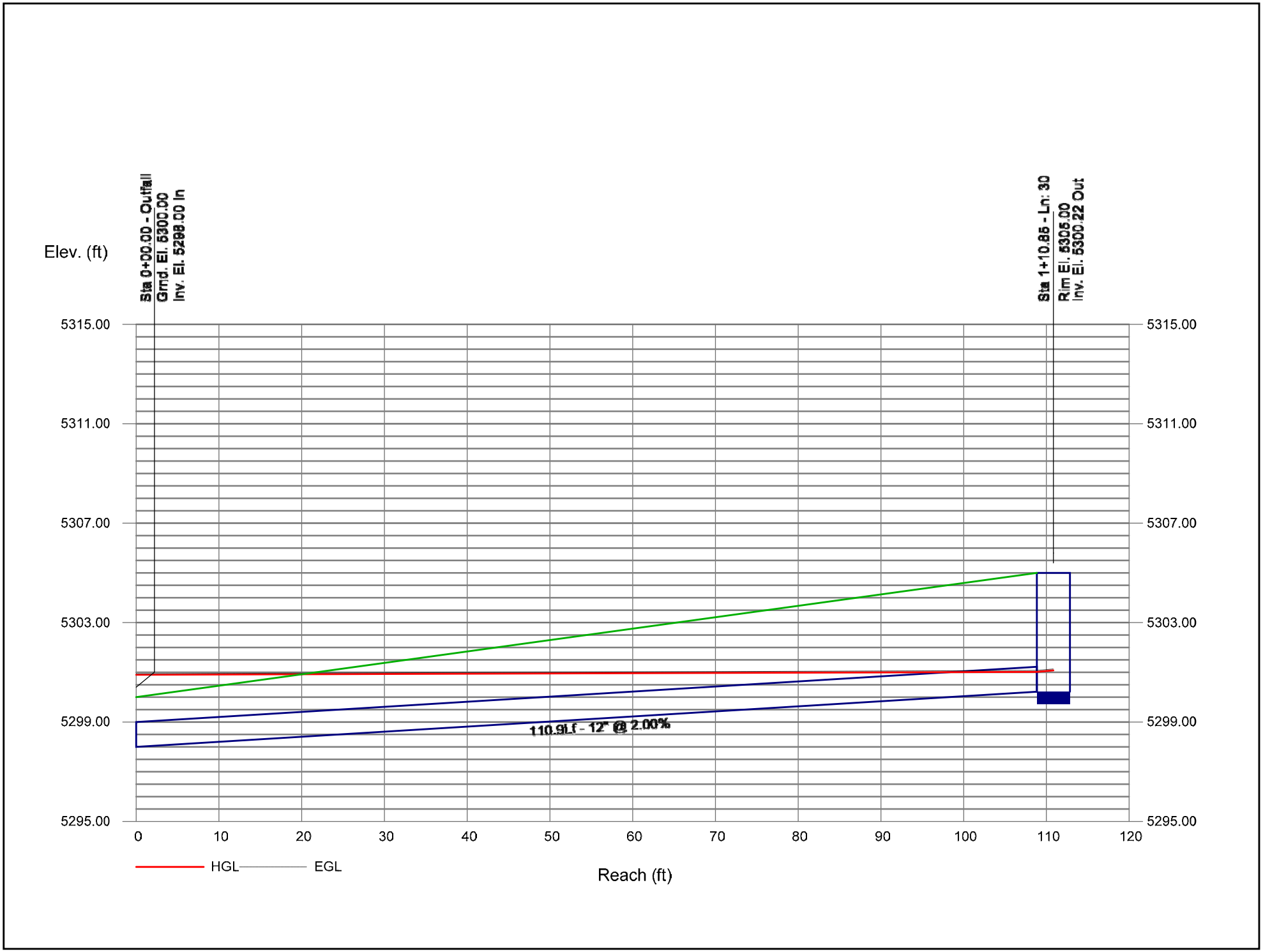

Storm Sewer Profile

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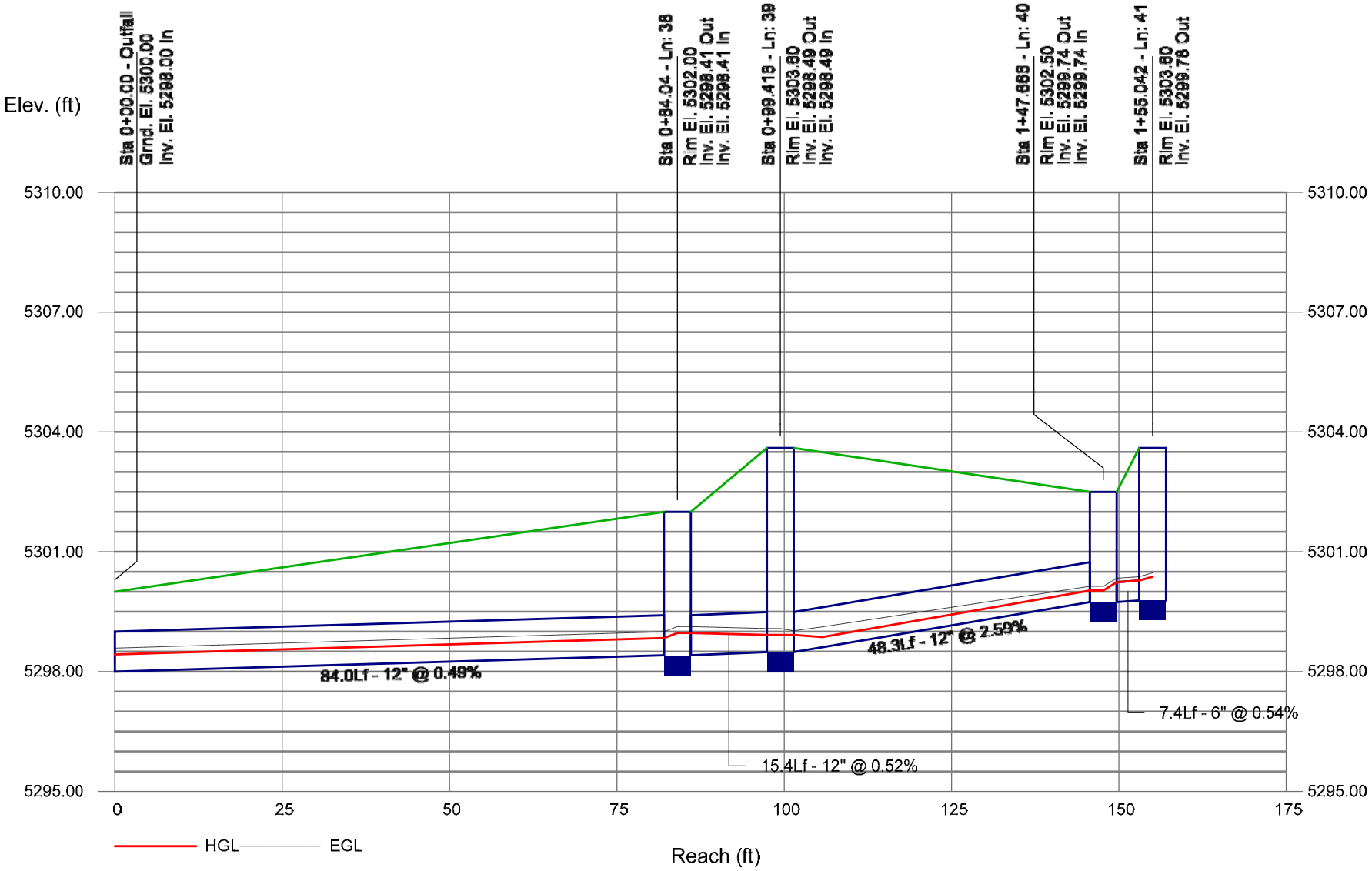

Storm Sewer Profile

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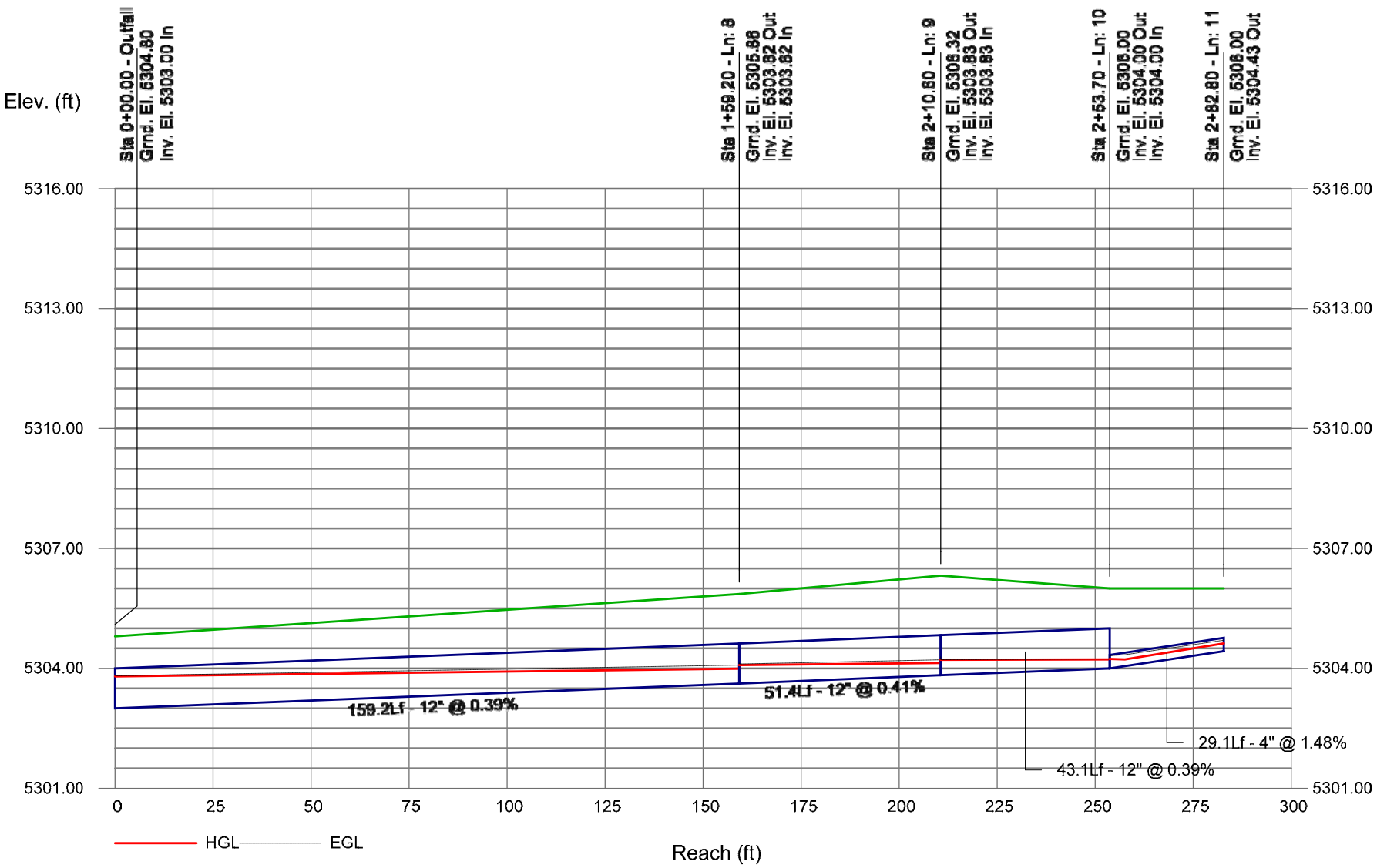

Storm Sewer Profile

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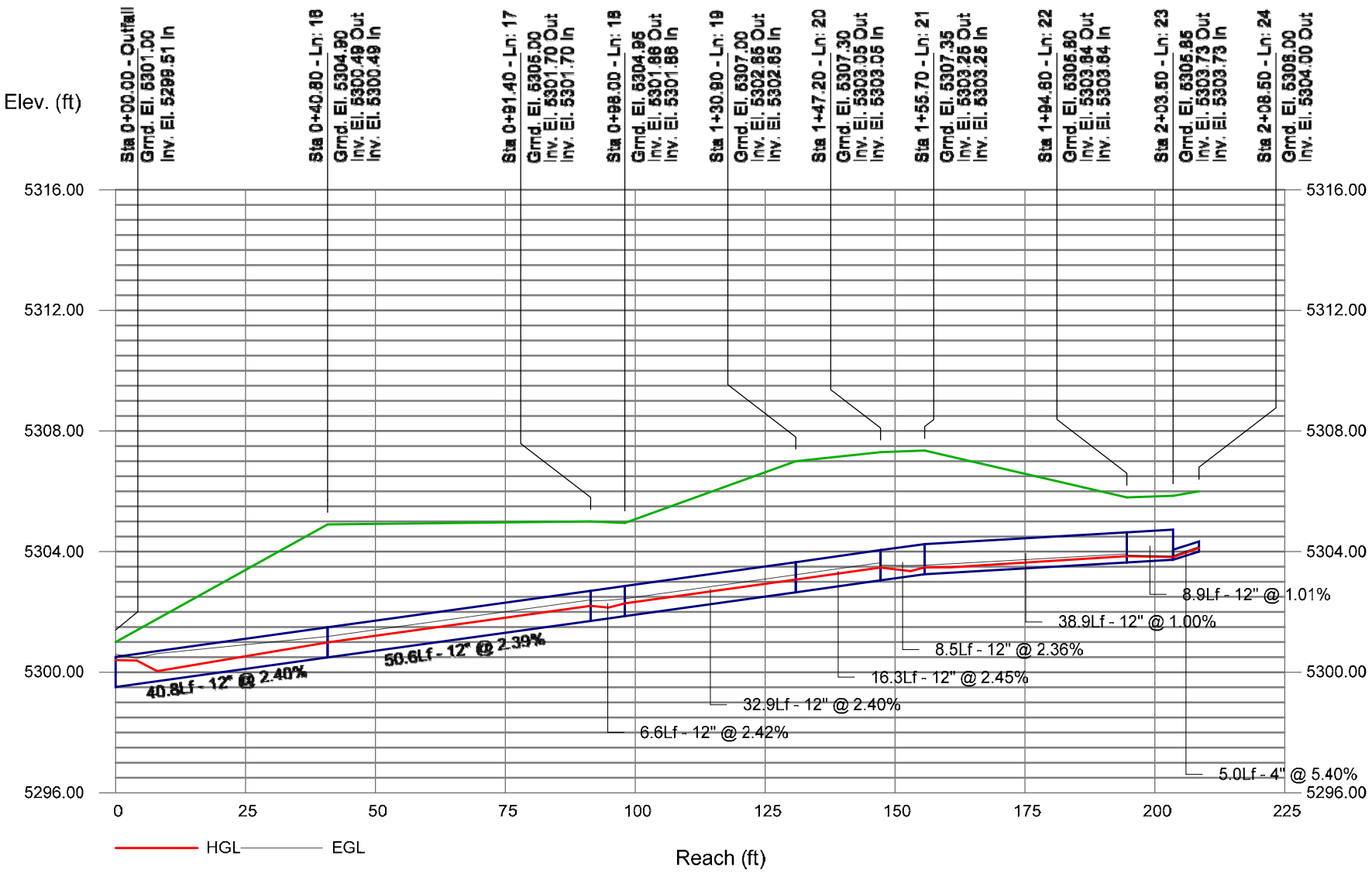

Storm Sewer Profile

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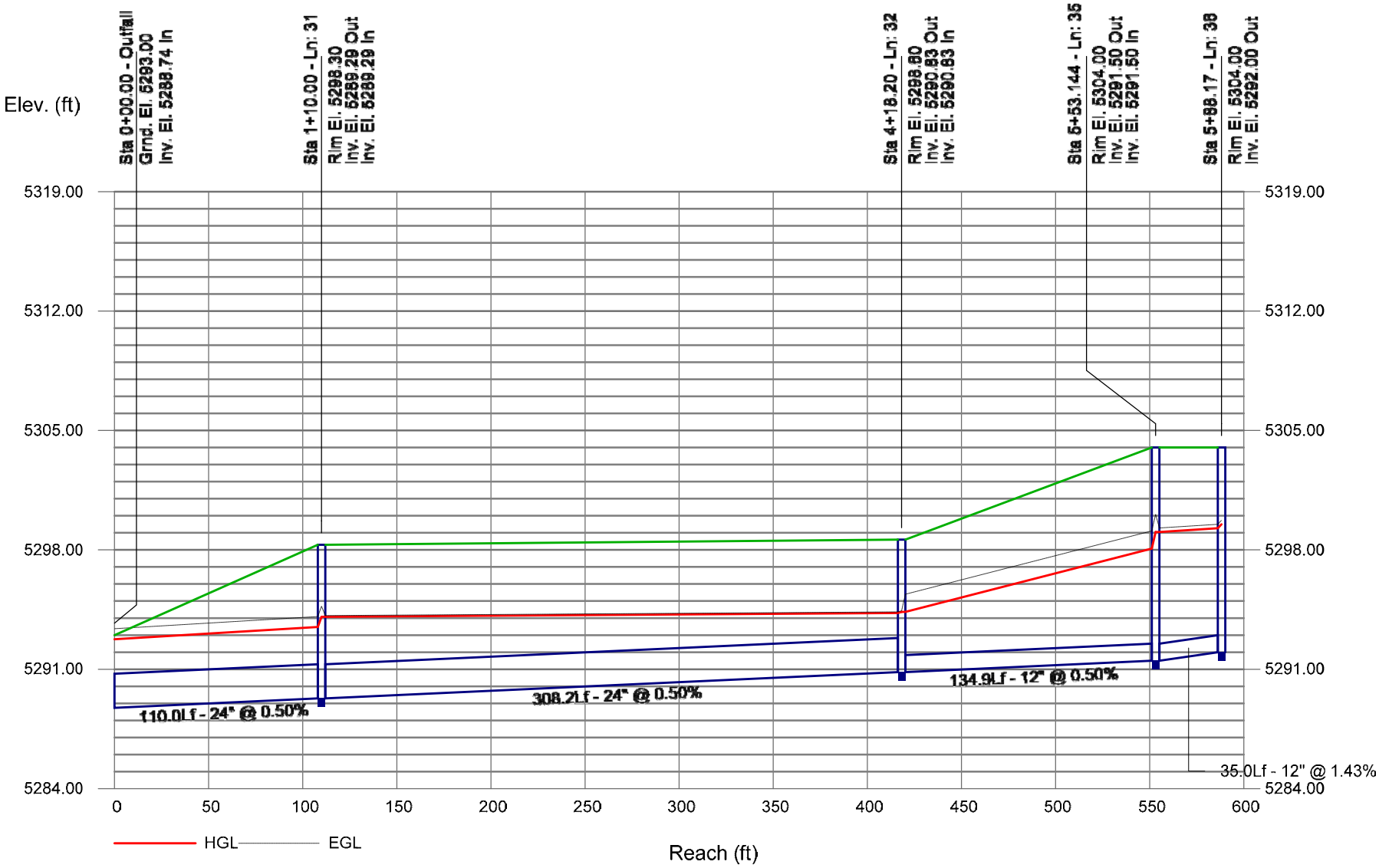

Storm Sewer Profile

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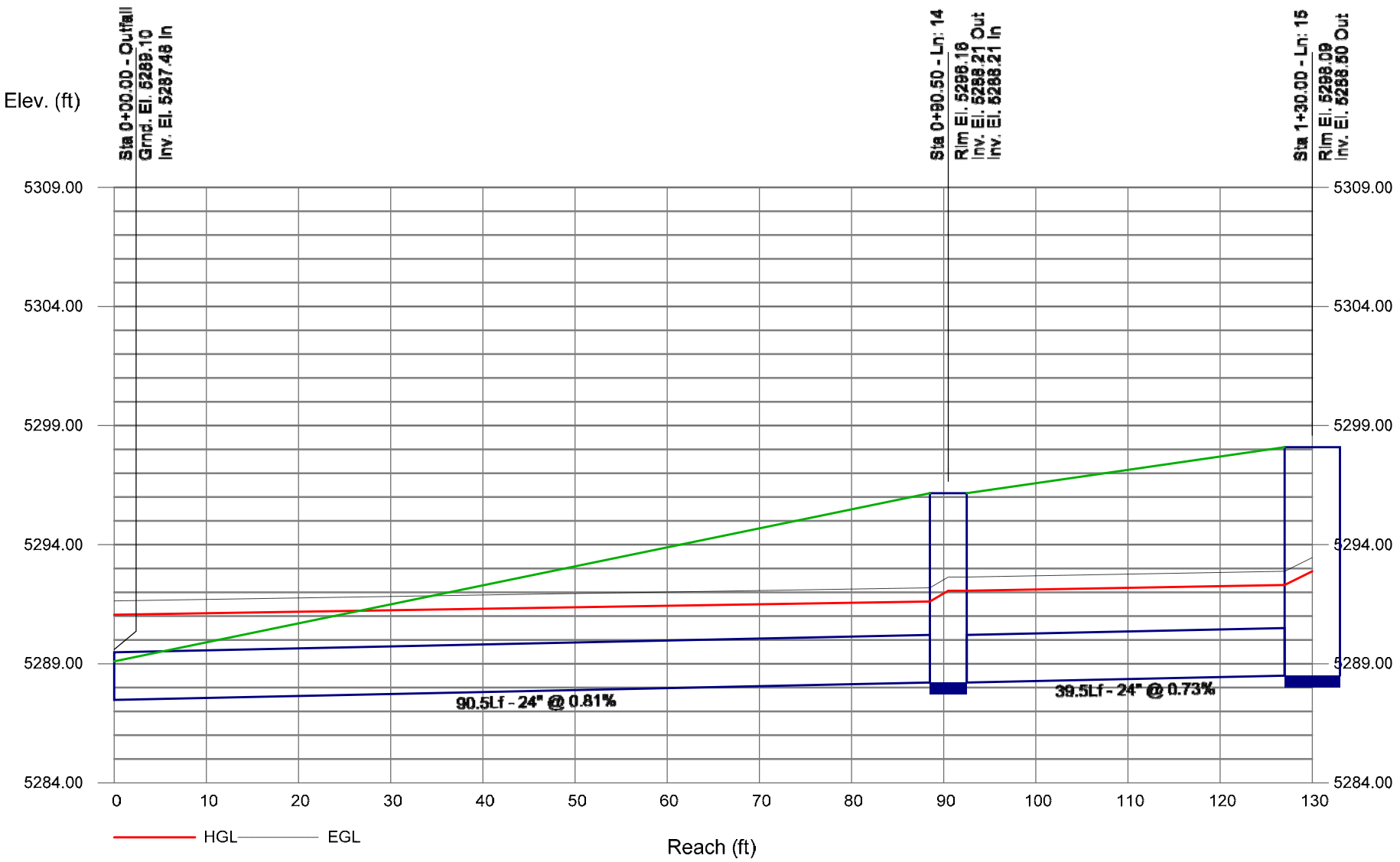


CULVERTMASTER CALCULATIONS

Culvert Calculator Report
Pond 1 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,297.00	ft	Headwater Depth/Height	3.00	
Computed Headwater Eleva	5,297.00	ft	Discharge	4.52	cfs
Inlet Control HW Elev.	5,295.62	ft	Tailwater Elevation	5,295.00	ft
Outlet Control HW Elev.	5,297.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,294.00	ft	Downstream Invert	5,291.29	ft
Length	86.00	ft	Constructed Slope	0.031512	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.71	ft
Slope Type	N/A		Normal Depth	0.62	ft
Flow Regime	N/A		Critical Depth	0.89	ft
Velocity Downstream	5.75	ft/s	Critical Slope	0.014331	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.00	ft
Section Size	12 inch		Rise	1.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,297.00	ft	Upstream Velocity Head	0.51	ft
Ke	0.20		Entrance Loss	0.10	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,295.62	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 2 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,300.00	ft	Headwater Depth/Height	2.00	
Computed Headwater Eleva	5,300.00	ft	Discharge	3.88	cfs
Inlet Control HW Elev.	5,299.35	ft	Tailwater Elevation	5,299.00	ft
Outlet Control HW Elev.	5,300.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,298.00	ft	Downstream Invert	5,290.83	ft
Length	45.80	ft	Constructed Slope	0.156550	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	8.17	ft
Slope Type	N/A		Normal Depth	0.36	ft
Flow Regime	N/A		Critical Depth	0.84	ft
Velocity Downstream	4.94	ft/s	Critical Slope	0.011459	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.00	ft
Section Size	12 inch		Rise	1.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,300.00	ft	Upstream Velocity Head	0.38	ft
Ke	0.20		Entrance Loss	0.08	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,299.35	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 3 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,302.00	ft	Headwater Depth/Height	2.00	
Computed Headwater Eleva	5,302.00	ft	Discharge	3.57	cfs
Inlet Control HW Elev.	5,301.32	ft	Tailwater Elevation	5,301.00	ft
Outlet Control HW Elev.	5,302.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,300.00	ft	Downstream Invert	5,298.00	ft
Length	61.00	ft	Constructed Slope	0.032787	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.00	ft
Slope Type	N/A		Normal Depth	0.53	ft
Flow Regime	N/A		Critical Depth	0.81	ft
Velocity Downstream	4.55	ft/s	Critical Slope	0.010354	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.00	ft
Section Size	12 inch		Rise	1.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,302.00	ft	Upstream Velocity Head	0.32	ft
Ke	0.20		Entrance Loss	0.06	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,301.32	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 4 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,300.00	ft	Headwater Depth/Height	1.75	
Computed Headwater Eleva	5,300.00	ft	Discharge	21.79	cfs
Inlet Control HW Elev.	5,299.22	ft	Tailwater Elevation	5,298.50	ft
Outlet Control HW Elev.	5,300.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,296.50	ft	Downstream Invert	5,289.60	ft
Length	65.00	ft	Constructed Slope	0.106154	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	8.90	ft
Slope Type	N/A		Normal Depth	0.75	ft
Flow Regime	N/A		Critical Depth	1.67	ft
Velocity Downstream	6.94	ft/s	Critical Slope	0.008999	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,300.00	ft	Upstream Velocity Head	0.75	ft
Ke	0.20		Entrance Loss	0.15	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,299.22	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	3.1	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 5 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,300.00	ft	Headwater Depth/Height	2.00	
Computed Headwater Eleva	5,300.00	ft	Discharge	3.65	cfs
Inlet Control HW Elev.	5,299.35	ft	Tailwater Elevation	5,299.00	ft
Outlet Control HW Elev.	5,300.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,298.00	ft	Downstream Invert	5,297.00	ft
Length	57.00	ft	Constructed Slope	0.017544	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	2.00	ft
Slope Type	N/A		Normal Depth	0.66	ft
Flow Regime	N/A		Critical Depth	0.81	ft
Velocity Downstream	4.64	ft/s	Critical Slope	0.010603	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.00	ft
Section Size	12 inch		Rise	1.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,300.00	ft	Upstream Velocity Head	0.34	ft
Ke	0.20		Entrance Loss	0.07	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,299.35	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 6 Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	5,305.00	ft	Headwater Depth/Height	2.00	
Computed Headwater Eleva	5,305.00	ft	Discharge	2.93	cfs
Inlet Control HW Elev.	5,304.12	ft	Tailwater Elevation	5,304.00	ft
Outlet Control HW Elev.	5,305.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,303.00	ft	Downstream Invert	5,298.00	ft
Length	109.00	ft	Constructed Slope	0.045872	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	6.00	ft
Slope Type	N/A		Normal Depth	0.43	ft
Flow Regime	N/A		Critical Depth	0.73	ft
Velocity Downstream	3.74	ft/s	Critical Slope	0.008569	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.00	ft
Section Size	12 inch		Rise	1.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	5,305.00	ft	Upstream Velocity Head	0.22	ft
Ke	0.20		Entrance Loss	0.04	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,304.12	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	0.8	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

Culvert Calculator Report
Pond 7 Outlet

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	5,298.00	ft	Headwater Depth/Height	2.09	
Computed Headwater Eleva	5,292.68	ft	Discharge	19.12	cfs
Inlet Control HW Elev.	5,291.06	ft	Tailwater Elevation	5,291.06	ft
Outlet Control HW Elev.	5,292.68	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	5,288.50	ft	Downstream Invert	5,287.48	ft
Length	130.00	ft	Constructed Slope	0.007846	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.58	ft
Slope Type	N/A		Normal Depth	1.56	ft
Flow Regime	N/A		Critical Depth	1.57	ft
Velocity Downstream	6.09	ft/s	Critical Slope	0.007737	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

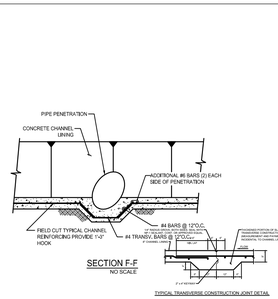
Outlet Control Properties					
Outlet Control HW Elev.	5,292.68	ft	Upstream Velocity Head	0.58	ft
Ke	0.20		Entrance Loss	0.12	ft

Inlet Control Properties					
Inlet Control HW Elev.	5,291.06	ft	Flow Control	Submerged	
Inlet Type	Beveled ring, 33.7° bevels		Area Full	3.1	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	B	
C	0.02430		Equation Form	1	
Y	0.83000				

GENERAL NOTES:

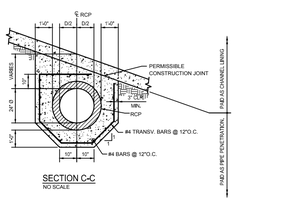
1. THE PIPE PENETRATION DETAILED HEREIN SHALL BE PAID FOR LUMP SUM AND SHALL BE COMPENSATION FOR THE PENETRATION COMPLETE AND IN PLACE, INCLUDED IN THIS WORK (BUT NOT LIMITED TO) IS GRADING, SUBGRADE PREPARATION, REINFORCED CONCRETE, CONSTRUCTION JOINTS, CONCRETE PLACEMENT AND FINISHING. NOTE THE MEASUREMENT FOR 8" CHANNEL LINING IS CONTINUOUS AND UNINTERRUPTED AT THE PENETRATION LOCATION.
2. ALL CULVERT PIPE PLACED UNDER THE CHANNEL LINING OR WITHIN AMAFCA RIGHT-OF-WAY SHALL BE RCP CLASS III MIN.
3. FOR PIPE PENETRATIONS INTO EXISTING CHANNELS, USE CHANNEL REMOVAL DETAILS FROM AMAFCA STANDARD DRAWING 102.

SECTION B-B
NO SCALE

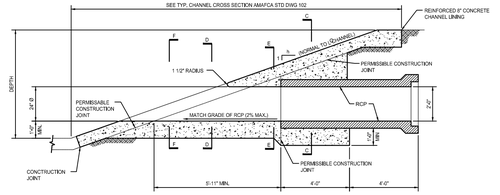


SECTION F-F
NO SCALE

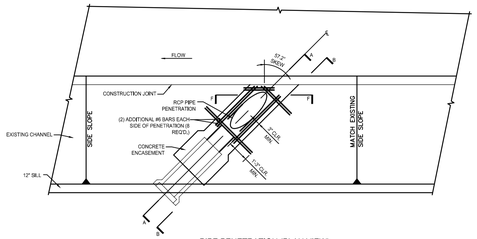
TYPICAL TRANSVERSE CONSTRUCTION JOINT DETAIL



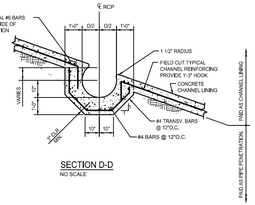
SECTION C-C
NO SCALE



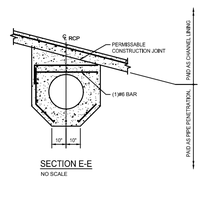
SECTION A-A
NO SCALE



PIPE PENETRATION (PLAN VIEW)
NO SCALE



SECTION D-D
NO SCALE



SECTION E-E
NO SCALE

B1 PIPE PENETRATION DETAIL DETAIL

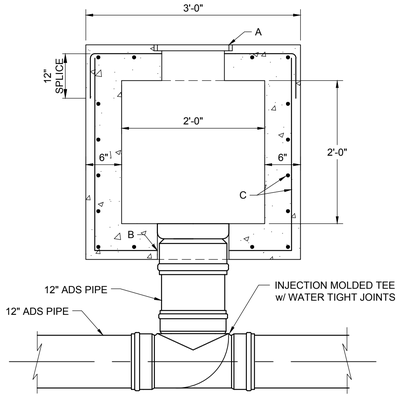
SCALE: NTS

NOTES FOR CHANNEL CONSTRUCTION

1. CAST-IN-PLACE CONCRETE: CONCRETE SHALL BE IN ACCORDANCE WITH PROJECT SPECIFICATIONS. (f'c = 3000 psi MINIMUM). 3/4" CHAMFER ON ALL EXPOSED FORMED EDGES UNLESS NOTED OTHERWISE.
2. REINFORCING STEEL: STEEL REINFORCEMENT AND PLACEMENT SHALL BE IN ACCORDANCE WITH PROJECT SPECIFICATIONS AND SHALL CONFORM TO ASTM A615, GRADE 60. ALL LAP SPLICES SHALL BE CLASS "B" UNLESS NOTED OTHERWISE. REINFORCING STEEL SHALL BE INCIDENTAL TO CONCRETE BID ITEMS.
3. ALL EXPOSED CHANNEL SURFACES SHALL BE GIVEN A CLASS 3 FLOAT & TINE FINISH. TINE SHALL BE TRANSVERSE TO FLOW.
4. ALL EXPOSED CONCRETE SHALL BE TINTED WITH SAN DIEGO BUFF (DAVIS COLOR 5237) AT THE REDUCED DOSAGE OF 1 lb PER SACK OF CEMENT, OR APPROVED EQUAL. TINT SHALL BE INCIDENTAL TO THE COST OF THE RESPECTIVE CONCRETE.
5. NEW TO EXISTING CHANNEL CONSTRUCTION: EUCO ARC LITHIUM NITRATE TREATMENT IS REQUIRED FOR ANY EXISTING CONCRETE CHANNELS. SEE DETAILS FOR INSTALLATION REQUIREMENTS, THIS SHEET.
6. MINIMUM REBAR LAP LENGTH (CLASS B LAPS):
   #5 = 22"
   #7 = 43"
   #9 = 54"
7. THE EARTH SIDE OF SILL WALLS SHALL BE WATERPROOFED AT IRRIGATED AREAS AND DAMP PROOFED AT ALL OTHER AREAS. WATERPROOFING SHALL BE CONWRAP BARRIER CS-212 AS MANUFACTURED BY CONCRETE SEALANTS, INC. (MEMBRANE THICKNESS 0.100 INCHES MINIMUM) OR ENGINEER APPROVED EQUAL. DAMP PROOFING SHALL BE HYDROCIDE 7006 OR ENGINEER APPROVED EQUAL.
8. ALL EXPOSED SURFACES OF THE CHANNEL SILL WALLS SHALL RECEIVE A "TNORCOAT" CLASS 4 FINISH. THE COLOR SHALL BE SIMILAR TO THE TINTED CHANNEL LINING AND SHALL BE APPROVED BY AMAFCA. "THORCOAT" SHALL BE APPLIED TO THE BACK OF WALLS 6 INCHES BELOW GRADE.

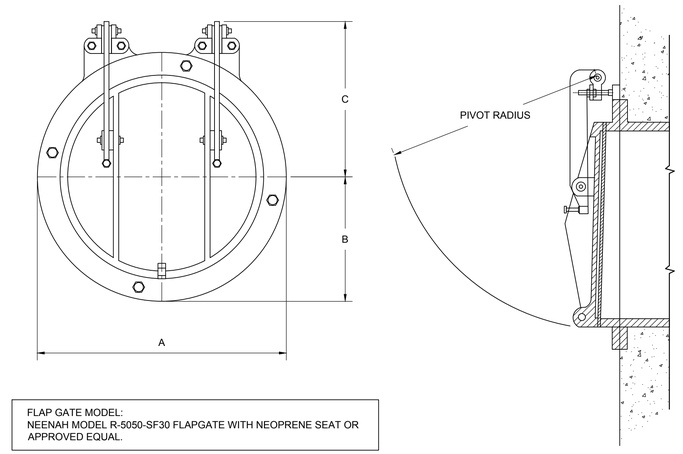
KEYED NOTES

1. NATIVE RE-VEGETATION: SEE CITY OF ALBUQUERQUE SPECIFICATION SECTION 1012. GRAVEL MULCH IS REQUIRED FOR SLOPES GREATER THAN 3H:1V.
2. EUCO ARC LITHIUM NITRATE COATING OR APPROVED EQUAL APPLIED TO VERTICAL SURFACE AND 12" OF TOP SURFACE OF EXISTING CONCRETE TO REMAIN.
3. REMOVAL OF CONCRETE ADJACENT TO THE 2" SAWCUT WILL BE WITH A 30 LB., MAX. PNEUMATIC HAMMER. IN THE EVENT OF DAMAGE TO THE CONCRETE TO REMAIN, THE CONTRACTOR SHALL RE SAW THE 2" JOINT AND REMOVE AND REPLACE THAT CONCRETE AT NO COST TO CITY OF ALBUQUERQUE.



B2 ADS INLET DETAIL

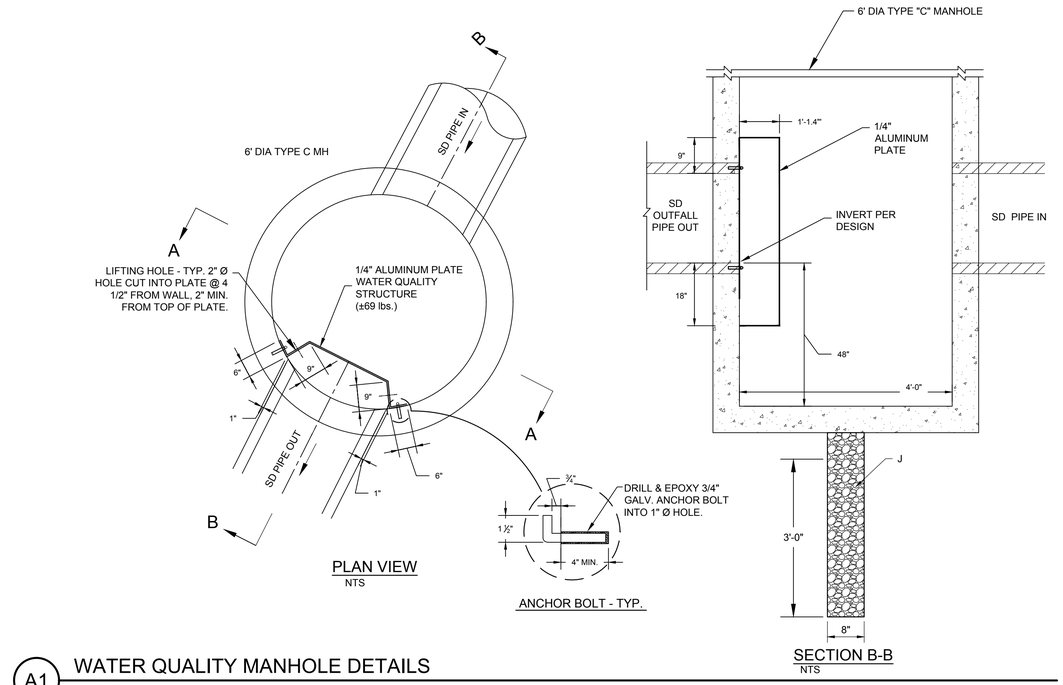
SCALE: NTS



FLAP GATE MODEL:
NEENAH MODEL R-5050-SF30 FLAPGATE WITH NEOPRENE SEAT OR APPROVED EQUAL.

A2 FLAP GATE DETAIL

SCALE: NTS



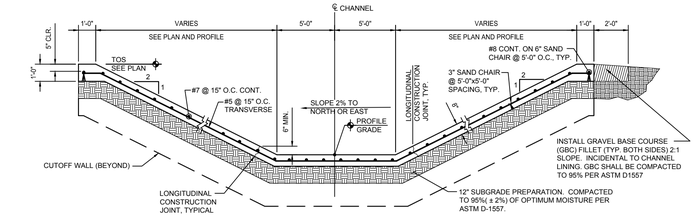
PLAN VIEW
NTS

ANCHOR BOLT - TYP.

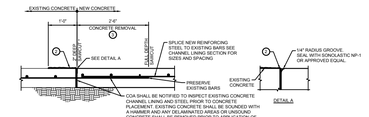
SECTION B-B
NTS

A1 WATER QUALITY MANHOLE DETAILS

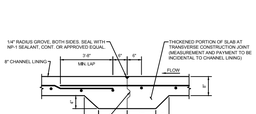
SCALE: NTS



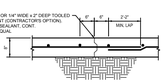
CONCRETE CHANNEL LINING



NEW TO EXISTING CHANNEL LINING CONSTRUCTION JOINT DETAILS



TYPICAL TRANSVERSE CONSTRUCTION JOINT DETAIL



TYPICAL LONGITUDINAL CONSTRUCTION JOINT DETAIL

GENERAL NOTES:

1. OUTLET PIPE SIZE, PER DESIGN REQUIREMENT.

CONSTRUCTION NOTES:

A. FRAME & GRATE, NEENAH #R4441-1-Q OR BEEHIVE #R4360-D; SEE GRADING PLAN

B. CUT HORIZONTAL BAR EW AT PIPE OPENING.

C. NO 4 BARS AT 6" OC EW

D. INVERT PER DESIGN

ARCHITECT

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125 Jefferson St NE Albuquerque, NM 87108 505.255.4033

CONSULTANT

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FAX: 505-348-4055 FIRST FLOOR
FAX: 505-348-4155 SECOND FLOOR
www.wilsonco.com

KEY PLAN

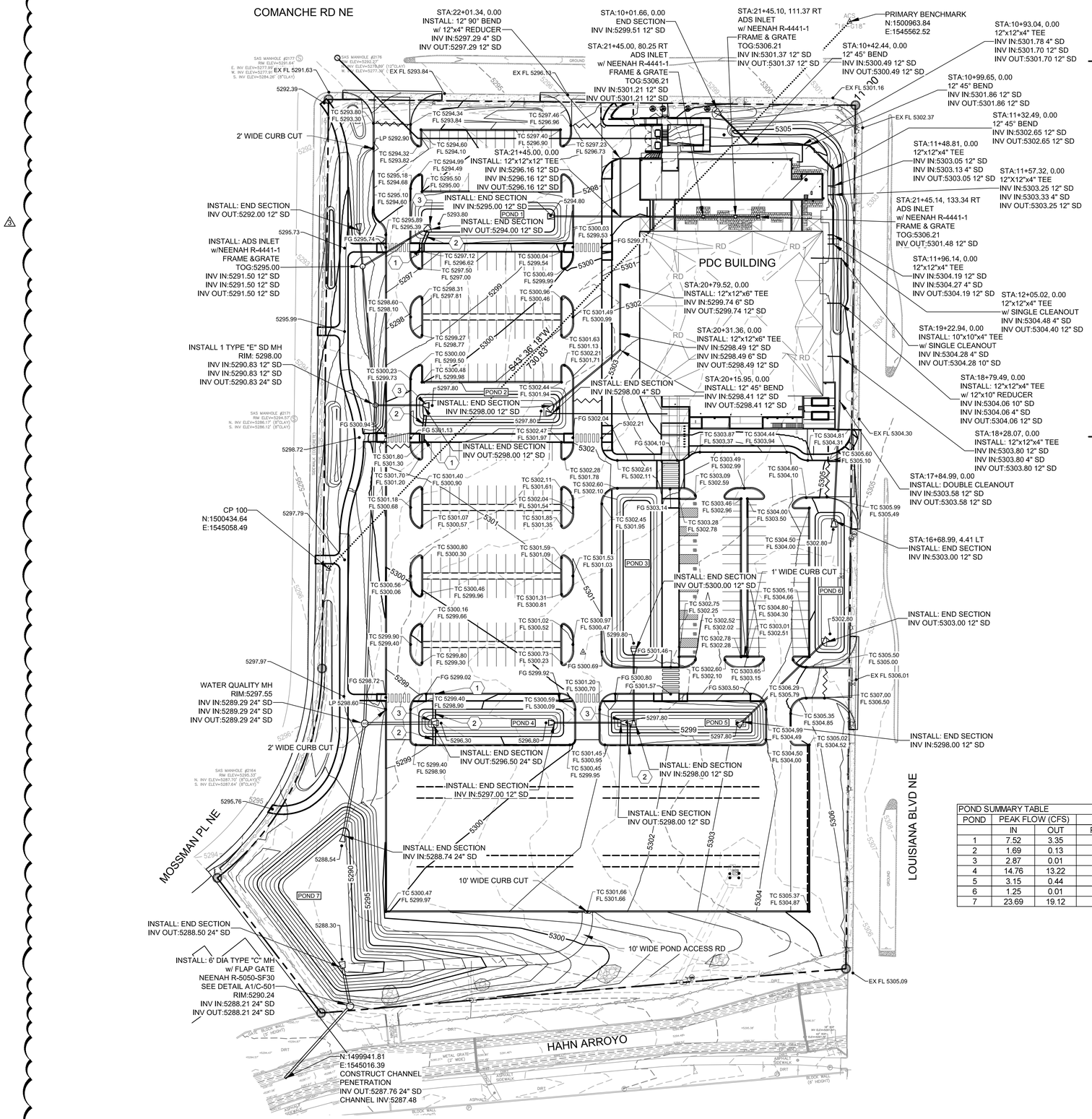
ALBUQUERQUE PUBLIC SCHOOLS
PROFESSIONAL DEVELOPMENT CENTER
3315 LOUISIANA BOULEVARD
Albuquerque, NM 87110

REV:

PHASE: **100% Construction Documents**
DATE: 1 December 2016
DRAWN BY: JEM
CHECKED BY: DMD

C501

MISCELLANEOUS DETAILS



A1 OVERALL GRADING & DRAINAGE PLAN

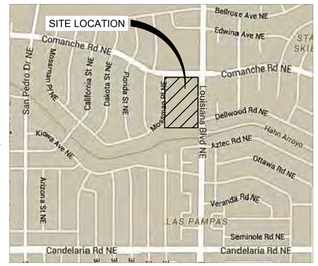
SCALE: 1" = 50'

GENERAL SHEET NOTES

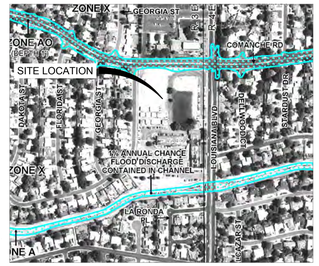
1. ALL ADS TEES AND BENDS SHALL HAVE CAST-IN-PLACE THRUST BLOCK. SEE DETAIL C5/C504.
2. SEE SHEET C505 FOR MANHOLE DETAILS.
3. STORM DRAIN SHALL BE ADS PIPE OR APPROVED EQUAL. EXCEPTION: STORM DRAIN BENEATH PARKING DECK SHALL BE CONCRETE OR APPROVED EQUAL.
4. GRADES SHOWN ARE TO FINISHED GRADE ELEVATIONS. LANDSCAPE SURFACING TREATMENT IS 4 INCHES THICK TO SUGRADE (TYP), EXCEPT FOR AREAS WITH PAVERS AND THE DRAINAGE SWALE SIDE SLOPES WHICH ARE 8 INCHES THICK TO SUBGRADE. CONTRACTOR SHALL COORDINATE WITH LANDSCAPE ARCHITECT.
5. SEE SHEET C502 FOR ADS INLET DETAIL.
6. SEE SHEET C502 FOR DROP INLET DETAIL.
7. SEE SHEET C504 FOR WATER QUALITY INLET DETAIL.
8. SEE SHEET C504 FOR WATER QUALITY MH DETAIL.
9. SEE SHEET C505 FOR TYPE "C" AND "E" MH DETAILS.
10. SEE SHEET C505 FOR TYPE "D" INLET DETAIL.
11. TIE-IN TO HAHN ARROYO AND ALL WORK WITHIN PUBLIC RIGHT-OF-WAY SHALL BE CONSTRUCTED PER CITY WORK ORDER PLANS.

KEYNOTES

1. CONSTRUCT 24" WIDE SIDEWALK CULVERT.
2. CONSTRUCT 24" WIDE CONCRETE RUNDOWN.
3. CONSTRUCT 5'x5' MIN RIPRAP.



LOCATION
ZONE ATLAS MAP NO G-18



FLOOD INSURANCE RATE MAP
REFERENCE: FLOOD INSURANCE STUDY
PANEL 352 #35001C0352H

SOILS MAP
REFERENCE: HTTP://WEBSOILSURVEY.NRCS.USDA.GOV

POND SUMMARY TABLE							
POND	PEAK FLOW (CFS)		VOLUME (AC-FT)		ELEVATION (FT)		
	IN	OUT	PRV'D	REQ'D	TOP	BOTTOM	WSEL
1	7.52	3.35	0.230	0.143	5297.0	5294.0	5296.1
2	1.69	0.13	0.129	0.056	5300.0	5298.0	5299.0
3	2.87	0.01	0.232	0.096	5302.0	5300.0	5300.9
4	14.76	13.22	0.163	0.095	5300.0	5296.5	5299.1
5	3.15	0.44	0.163	0.081	5300.0	5298.0	5299.1
6	1.25	0.01	0.130	0.042	5305.0	5303.0	5303.8
7	23.69	19.12	1.533	0.205	5298.0	5289.0	5292.7

LEGEND

GRADE BREAK

FOUND PROPERTY CORNER

PRIMARY BENCHMARK

1. FIELD SURVEY PERFORMED ON JANUARY 2009.
2. HORIZONTAL DATUM:
   COORDINATES ARE MODIFIED GROUND COORDINATES
   BASED ON NAD83, NEW MEXICO CENTRAL ZONE.
3. VERTICAL DATUM:
   NAVD 88

A CITY OF ALBUQUERQUE 1-3/4" ALUMINUM DISK, STAMPED "ACS BM, 16-G18", EPOXIED ON TOP OF THE CONCRETE CURB BASE OF TRAFFIC LIGHT STANCHION, NW QUADRANT OF LOUISIANA BLVD. & COMANCHE RD. NE., ON THE SOUTHWESTERLY CORNER OF SAID CONCRETE BASE.

X=1,545,562.524' ELEV=5302.355' (NAVD 1988)
Y=1,500,963.838' CGGF:1.0003371873

ARCHITECT

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DONALD M. DUNEMAN NEW MEXICO 17616 PROFESSIONAL ENGINEER
04/19/17

KEY PLAN

PROFESSIONAL DEVELOPMENT CENTER
ALBUQUERQUE PUBLIC SCHOOLS
3315 LOUISIANA BOULEVARD
Albuquerque, NM 87110

⚠3 PARKING LOT REVISION 04/19/17
REV:

PHASE: **100% Construction Documents**
DATE: 1 December 2016
DRAWN BY: JEM
CHECKED BY: DMD

C102R

OVERALL GRADING & DRAINAGE PLAN

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