Final Drainage Report

for

Rolling Hills Ranch Filing 1

at

Meridian Ranch

MERIDIAN RANCH

A GOLF & RECREATIONAL COMMUNITY

EL PASO COUNTY, COLORADO

October 2019

Prepared For:

GTL DEVELOPMENT, INC.
P.O. Box 80036
San Diego, CA 92138

Prepared By:
Tech Contractors
11886 Stapleton Drive
Falcon, CO 80831
719.495.7444

PCD Project No. SF-19-XXX

SF1923

UPDATED

CERTIFICATIONS

Design Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Thomas A. Kerby, P.E. #31429 Date

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____

Raul Guzman, Vice President Date
GTL Development, Inc.
P.O. Box 80036
San Diego, CA 92138

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 & 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Jennifer Irvine, P.E. Date
County Engineer / ECM Administrator

Rolling Hills Ranch at Meridian Ranch PUD
Final Drainage Report Report

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Added appendices for the HEC-RAS and Water Quality with Regional Detention Pond. The HEC-RAS appendix does include responses to comments made within the PDR. Added narrative for HEC-RAS in this report. Included PDR Responses pdf file for reference.

EXECUTIVE SUMMARY

The purpose of the following Final Drainage Report (FDR) is to present the changes to the drainage patterns as a result the Rolling Hills Ranch Filing 1 at Meridian Ranch (RHR Filing 1) development. Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM) (1994 version) and portions of the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version).

This report based on the current version of the Meridian Ranch Sketch Plan amendment as adopted by the El Paso County Board of Commissioners on March 13, 2018. Hydrologic calculations follow method outlined in Chapter 6 of the 2014 version of the City of Colorado Springs Drainage Criteria Manual (COSDCM) as adopted by the El Paso County Board of County Commissioners by Resolution 15-042. Chapter 6 addresses the hydrologic calculation methods and includes an updated hydrograph to be used with storm drainage runoff. The Board adopted by the same resolution, Section 3.2.1 of Chapter 13 of the COSDCM referencing Full Spectrum Detention; the concept "provides better control of the full range of runoff rates that pass through detention facilities than the convention multi-stage concept. This section of the COSDCM identifies the necessity to provide full spectrum detention but does not prescribe a methodology to reach such the detention requirements. This report includes hydrologic models from HEC-HMS for the historic, interim and future conditions for the 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr design storm frequencies. The interim and the future conditions include detention facilities sized and modeled such that *"frequent and infrequent inflows are released at rates approximating undeveloped conditions"*

RHR Filing 1 encompasses 95.2± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

Rolling Hills Ranch is located within Gieck Ranch Drainage Basin. The Gieck Ranch Basin has been studied, but has not received final approval from El Paso County. The developer has agreed to meet the requirements of the studied Gieck Ranch Basin but as yet to be approved Drainage Basin Study.

Based on the aforementioned design parameters the development of the project will not adversely affect downstream properties.

INTRODUCTION

Purpose

The purpose of the following Final Drainage Report Report (FDR) is to present proposed changes to the drainage patterns as a result of the development of RHR Filing 1. The report outlines the proposed drainage mitigation based on calculated developed flows in excess of allowable exiting runoff discharge.

Scope

The scope of this report includes:

- Location and description of the proposed development stating the proposed land use, density, acreage and adjacent features to the site.
- Calculations for design peak flows from all off-site tributary drainage areas.
- Calculations for design peak flows within the proposed project area for all drainage areas.
- Discussion of major drainage facilities required as a result of the development.
- Discussion and analysis of existing and proposed facilities.

Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM) (1994 version) and those portions of the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version) adopted by Resolution 15-042 of the El Paso County Board of County Commissioners.

Background

On November 16, 2000 the El Paso County Board of County Commissioners approved the rezoning of the Meridian Ranch project (PUD-00-010) from A-35 to PUD with several conditions. Condition number seven stated in part that "drainage plans shall release and/or retain at approximately eight percent (80%) of historic rates." At the time of the initial approvals there were no drainage improvements downstream of the Meridian Ranch project and the existing natural channels were shallow and undefined. There are no facilities located downstream of the Rolling Hills Ranch at Meridian Ranch PUD that will be adversely impacted by this development.

No development has occurred downstream of this project except for portions of the Falcon Regional Park providing ballparks and associated parking. The Meridian Ranch MDDP and this report indicate the Eastonville Road culvert crossing located downstream of this project does not provide enough capacity for the historic flow rates. It is anticipated that this culvert will be upgraded at the time of the Eastonville Road construction.

Current calculations show the future design discharge of the proposed Pond G to the Falcon Regional Park to be below historic flow rates at full buildout for the full spectrum of design storms.

Update paragraph to reference the specific project/resolution that removed this condition.

UPDATED

Figure 1: Vicinity Map

EXISTING CONDITIONS

General Location

RHR Filing 1 project encompasses 95.2± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

Land Use

Historically, ranching dominated the area surrounding Meridian Ranch; however, currently urbanization has occurred in the general vicinity. Most notably, urbanization is occurring to the north with Latigo Trails, to the south in the Woodmen Hills Subdivision, to the east in Four Way Ranch, to the west in the Falcon Hills subdivision, and to the northwest in the Paint Brush Hills subdivision.

Climate

Mild summers and winter, light precipitation; high evaporation and moderately high wind velocities characterize the climate of the study area. The average annual monthly temperature is 48.4 F with an average monthly low of 30.3 F in the winter and an average monthly high of 68.1 F in the summer. Two years in ten will have maximum temperature higher than 98 F and a minimum temperature lower than –16 F. Precipitation averages 15.73" annually, with 80% of this occurring during the months of April through September. The average annual Class A pan evaporation is 45 inches. (Soil Survey of El Paso County Area, Colorado).

Topography and Floodplains

The topography of the site is typical of a high desert, short prairie grass with relatively flat slopes generally ranging from 2% to 4%. The project site drains generally from the northwest to southeast and is tributary to the Black Squirrel Creek.

The Flood Insurance Rate Maps (FIRM No. 08041C0575-F dated 3/17/1997) indicates that the project is outside of any designated floodplain. Please see Figure 2: RHR Filing 1 Federal Emergency Management Agency (FEMA) Floodplain Map.

However, a designated floodplain is located within 300 feet of the project within Tract G of Meridian Ranch Filing 11A recorded on October 2, 2014. The designated floodplain is the existing Pond D detention pond and has an approved Base Flood Elevation is 7056. The lowest elevation of embankment nearest the proposed home sites is 7060 with a spillway elevation of 7058.0.

The adjacent existing detention pond and designated floodplain poses no hazard to the proposed development.

Update reference

UPDATED

Figure 2: FEMA Floodplain Map

Geology

The National Resources Conservation Service (NRCS) soil survey records indicate that the service area is predominately covered by soils classified in the Columbine (2 ac.) and Stapleton series (93 ac.). These series are categorized in the Hydrological Soil Groups A & B.

The Columbine (19) gravelly sandy loam is a deep, well-drained to excessively drained soil formed in coarse textured material on alluvial terraces, fans and flood plains. Permeability of this soil is very rapid. Available water capacity is low to moderate, surface runoff is slow, and the hazard of erosion is slight to moderate. The Columbine series is categorized as a Hydrological Soil Group A.

This soil is used mainly for grazing livestock, for wildlife habitat and for home sites. The main limitation of this soil for urban development is a hazard of flooding in some areas.The Stapleton (83) sandy loam is a deep, non-calcareous, well-drained soil formed in alluvium derived from arkosic bedrock on uplands. Permeability of this soil is rapid. Available water capacity is moderate, surface runoff is slow, and the hazard of erosion and soil blowing is moderate. The Stapleton series is categorized as a Hydrological Soil Group B.

This soil is suited to habitat for open land and rangeland wildlife. The main limitation of this soil for urban development is frost-action potential.

Typically, these soils are well-drained, gravelly sandy loams that form on alluvial terraces and fans and exhibit high permeability and low available water capacity with depth to bedrock greater than 6 feet.

Note: (#) indicates Soil Conservation Survey soil classification number. See Figure 3 RHR Filing 1 – Soils Map.

Natural Hazards Analysis

Natural hazards analysis indicates that no unusual surface or subsurface hazards are located near the vicinity. However, because the soils are cohesionless, sloughing of steep banks during drilling and/or excavation could occur. By citing improvements in a manner that provides an opportunity to lay the banks of excavations back at a 1:1 slope during construction, the problems associated with sloughing soils can be minimized.

DRAINAGE BASINS AND SUB-BASINS

The site is near the top of the Gieck Ranch Drainage Basin and accepts flow from areas north of the project site within portions of Meridian Ranch.

Three different scenarios were analyzed for the drainage conditions for the project.

The first scenario analyzes the historic conditions for Meridian Ranch. This condition has all of Meridian Ranch in the pre-development state; where the entirety of Meridian Ranch is modeled in its undeveloped, undisturbed condition, alternatively called the historic condition.

Figure 3: Soils Map

N.T.S.

MERIDIAN RANCH ROLLING HILLS RANCH SOILS MAP	TECH CONTRACTORS 11886 STAPLETON DRIVE FALCON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.2457
FIGURE 3	

The second scenario is the interim conditions scenario and it consists of the current existing conditions for all tributary areas whether developed or undeveloped/historic with the addition of RHR Filing 1 in the proposed developed condition. The current existing conditions assume all approved projects tributary to Rolling Hills Ranch Filing 1 are at full buildout. This condition was analyzed to ensure the full spectrum of historic flow rates exiting the Meridian Ranch development are maintained after the development of RHR Filing 1 is completed.

The interim scenario was analyzed to ensure that the historic flow rates at the outlets of the existing Pond E (Design Points H08 & H09) located along Eastonville Road were maintained. The development flow of Rolling Hills Ranch Filing 1 is located within areas tributary to Ponds D & E.

The final scenario analyzes the future build out conditions for the entirety of Meridian Ranch to ensure the storm drain facilities located at the discharge points of the project are able to properly convey the full spectrum of historic peak flow rates as the storm drainage exits the Meridian Ranch project along Eastonville Road and/or the Falcon Regional Park.

DRAINAGE DESIGN CRITERIA

SCS Hydrograph Procedure

The US Army Corp of Engineers HEC-HMS computer program was used to model the Soil Conservation Service (SCS) Hydrograph procedure to determine final design parameters for the major drainage facilities within the project. Onsite basin areas were calculated using aerial topography of the site and approved final design data. Times of concentration were estimated using the SCS procedures described in the DCM. Based upon the hydrologic soil type, the natural conditions found in the basins and the runoff curve numbers (CN) chart from Table 6-10 of the City of Colorado Springs DCM for Antecedent Runoff Condition II (ARC II), the following CN values were used for the given conditions.

Table 1: SCS Runoff Curve Numbers

Condition	CN*
Residential Lots (5 acre)	63
Residential Lots (2.5 acre)	66
Residential Lots (1 acre)	68
Residential Lots (1/2 acre)	70
Residential Lots (1/3 acre)	72
Residential Lots (1/4 acre)	75
Residential Lots (1/5 acre)	78
Residential Lots (1/6 acre)	80

School	80
Parks/Open Space	62
Commercial	85
Roadways	98
Graded	67
Golf Course	62
Latigo Undeveloped	65
Undeveloped	61

*Curve Numbers were interpolated and based on amount of impervious area per lot. The 24 hour storm precipitation values were selected from the NOAA Atlas 14, Volume 8, Version 2 for the Meridian Ranch location (Latitude 38.9783°, Longitude -104.5842°, Elevation 7054 ft). These numbers along with SCS information were used as input to the U.S. Army Corp of Engineers HEC-HMS computer model to determine design runoffs. See the table for all the design storm events in Appendix A. These numbers along with SCS information were used as input to the U.S. Army Corp of Engineers HEC-HMS computer model to determine design runoffs.

Full Spectrum Design

The City of Colorado Springs adopted a new Drainage Criteria Manual (DCM) in 2014 which incorporated the use of *Full Spectrum Design* for storm drainage analysis for projects located within the city limits. El Paso County adopted portions of the City's 2014 DCM by resolution in January 2015; the County resolution adopted Chapter 6 (Hydrology) and Section 3.2.1 of Chapter 13 (Full Spectrum Detention) for projects outside of the City of Colorado Springs establishing a 1 year review period to analyze the impacts of the Full Spectrum Design on the storm drainage analysis of projects. This report has incorporated the use of full spectrum in the analysis using the SCS Method to determine the size requirements for the detention pond during the interim and future conditions.

Table 2: Detention Pond Summary:

EXISTING POND D				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	52	4.3	4.8	7053.2
5-YEAR STORM	107	12	7.4	7053.9
10-YEAR STORM	168	19	11.1	7054.7
25-YEAR STORM	280	50	15.9	7055.6
50-YEAR STORM	387	91	20.1	7056.3
100-YEAR STORM	509	134	25.5	7057.1
FUTURE CONDITIONS				
2-YEAR STORM	52	4.3	4.8	7053.2
5-YEAR STORM	107	12	7.3	7053.9
10-YEAR STORM	168	19	11.1	7054.7
25-YEAR STORM	280	50	15.9	7055.6
50-YEAR STORM	387	91	20.1	7056.3
100-YEAR STORM	509	134	25.5	7057.1

EXISTING POND E				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	63	6.1	10.9	6970.6
5-YEAR STORM	123	15	18.0	6971.4
10-YEAR STORM	190	28	23.0	6971.9
25-YEAR STORM	308	74	30.0	6972.5
50-YEAR STORM	423	144	36.4	6973.1
100-YEAR STORM	552	233	42.4	6973.6
FUTURE CONDITIONS				
2-YEAR STORM	64	6.6	10.9	6970.6
5-YEAR STORM	126	16	18.0	6971.4
10-YEAR STORM	197	30	23.0	6971.9
25-YEAR STORM	318	80	30.0	6972.5
50-YEAR STORM	432	153	36.4	6973.1
100-YEAR STORM	610	242	42.4	6973.6

The idea behind full spectrum detention is to release the developed runoff flow rates that will approximate those of the pre-developed condition. The design of existing Pond E and the outlet control structure meets or exceeds the intent and spirit of the concept.

DRAINAGE CALCULATIONS

SCS General Overview

The project is located within the Gieck Ranch Drainage Basin; storm water runoff will be conveyed across the site overland across the site along the proposed streets via curb and gutter, channels, and within existing and proposed storm drain networks to the existing detention Ponds D and E. Those portions of the site tributary the existing Detention Pond D will be discharged directly into the pond via proposed storm drain networks. For those portions of the site tributary the existing Detention Pond E; runoff will be directed along the proposed streets via curb and gutter, channels, and within the proposed storm drain network to the existing northern terminus of Lambert Road, the collected flow is then conveyed via an existing storm drain system to the pond.

The detention facilities have been adequately sized such that the developed flows detained and released will approximate the historic flow rates for the various design storm events as outlined in the El Paso County DCM and those sections of the City of Colorado Springs DCM-1 adopted by the El Paso County Board of County Commissioners. Existing facilities located downstream of the proposed development have been designed and/or constructed to accept the given release flow rates from Meridian Ranch. Those existing facilities have been reviewed sufficiently to verify the capacity to convey the storm flow rates from Meridian Ranch. See approved Meridian Ranch MDDP, dated January 2018.

The analysis shows the portion of the site tributary to existing Pond E releasing the developed peak flows below the historic flow rates for the full spectrum of design storms using the newly adopted unit hydrograph from the City DCM-1.

Figure 5: Meridian Ranch SCS Calculations – Historic Conditions Map, Figure 6: Meridian Ranch SCS Calculations – Interim Conditions Map and Figure 7: Meridian Ranch SCS Calculations – Future Conditions Map depict the historic, interim and future general drainage patterns for RHR Filing 1.

The purpose of this report is to show that the development of RHR Filing 1 will not adversely impact the existing drainage facilities adjacent to and downstream of the developed area and the existing Ponds D & E are properly sized for the anticipated future development of Rolling Hills Ranch.

SCS Calculations

Historic Drainage - SCS Calculation Method

Following is a tabulation of the surface drainage characteristics under Existing Conditions using the SCS calculation method. Please refer to Figure 5 - Meridian Ranch SCS Calculations - Historic Basin Map.

Table 3: Historic Drainage Basins – SCS

HISTORIC MDDP (Full Spectrum)							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	81	53	31	12	3.9	0.5
OS06-G02	0.1313	79	52	31	12	3.8	0.5
OS05	0.0578	40	26	16	5.9	1.8	0.2
OS05-G01	0.0578	38	26	16	5.7	1.8	0.2
HG01	0.0547	33	21	13	4.8	1.6	0.2
G01	0.1125	71	47	28	10	3.3	0.5
G01-G02	0.1125	70	47	27	10	3.3	0.5
HG02	0.0906	46	30	18	6.9	2.4	0.4
G02	0.3344	194	129	76	28	9.4	1.4
G02-G03	0.3344	192	127	75	28	9.3	1.4
HG03	0.1828	79	51	31	12	4.4	0.8
OS07	0.0328	25	17	11	4.6	1.7	0.3
OS07-G03	0.0328	24	17	9.9	4.4	1.7	0.3
G03	0.55	295	195	115	44	15	2.4
G03-G04	0.55	286	192	113	43	15	2.4
OS09	0.1547	92	64	41	19	8.5	2.0
OS09-G04	0.1547	91	63	41	19	8.5	2.0
HG04	0.0891	40	27	16	6.1	2.2	0.4
HG05	0.1125	50	33	19	7.6	2.7	0.5
OS08	0.0406	36	25	17	7.9	3.5	0.8
OS08-G04	0.0406	34	24	15	7.6	3.5	0.8
G04	0.9469	502	336	200	78	28	4.9
G04-G05	0.9469	496	322	193	78	28	4.9
HG06A	0.1375	50	33	20	7.8	2.9	0.5
G05	1.0844	544	355	212	86	31	5.4
G05-G06	1.0844	530	353	211	86	31	5.4
HG06B	0.1031	34	22	13	5.4	2.1	0.4
G06	1.1875	561	375	225	91	33	5.8
HG07	0.0984	47	31	18	7.1	2.4	0.4
HG07-G11	0.0984	47	31	18	7.0	2.4	0.4
HG08	0.1328	73	48	28	11	3.6	0.5
G11	0.2312	115	75	44	17	5.7	0.9
G11-G12	0.2312	114	75	44	17	5.6	0.9
HG09	0.1781	73	48	29	11	4.1	0.7
G12	0.4093	187	122	72	28	9.7	1.6
G12-H08	0.4093	183	121	71	28	9.7	1.6
HG10	0.1375	39	26	16	6.5	2.6	0.5
H08	0.5468	216	142	85	34	12	2.1
HG14	0.2297	81	53	32	13	4.8	0.9
HG13	0.0844	55	37	23	9.8	3.9	0.7
G07	0.0844	55	37	23	9.8	3.9	0.7
G07-G08	0.0844	54	37	23	9.7	3.8	0.7
G08	0.3141	119	78	48	20	7.6	1.5
HG15	0.2563	70	46	28	12	4.7	0.9
H13	0.2563	70	46	28	12	4.7	0.9
HG11	0.2047	77	51	30	12	4.5	0.8
H09	0.2047	77	51	30	12	4.5	0.8
HG12	0.1297	57	38	22	8.7	3.1	0.5
H10	0.1297	57	38	22	8.7	3.1	0.5

See approved Meridian Ranch MDDP (EPC File SKP171) dated January 2018 for complete hydrologic calculations and maps.

Interim Drainage - SCS Calculation Method

Following is a tabulation of the surface drainage characteristics for the interim conditions using the SCS calculation method. Please refer to Figure 5 - Meridian Ranch SCS Calculations – Interim Basins Map

Table 4: Interim Drainage Basins-SCS

INTERIM MDDP (Full Spectrum)							
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
FG10A	0.0806	111	83	59	34	20.2	8.3
FG08A	0.0750	116	90	66	41	26.8	13.4
FG08A-G05	0.0750	110	86	64	41	26.5	13.1
FG08B	0.0630	86	67	49	30.9	20.1	10.1
FG08B-G05	0.0630	84	65	48	29.5	19.5	10.0
FG11	0.0625	75	59	44	28.1	18.6	9.8
FG09	0.0484	48	36	25	14.3	8.3	3.2
FG09-G05	0.0484	48	36	25	14	8.0	3.2
FG10B	0.0416	42	31	22	12	7.0	2.7
G05	0.3711	451	345	251	151.6	94.5	45.1
FG13	0.0534	34	24	15	7	4	0.9
FG12	0.0328	50	40	30	20	14	7.8
POND D IN	0.4573	527	402	292	176.2	110.1	52.4
POND D	0.4573	134	90	50	18.4	11.7	4.3
POND D-G17	0.4573	134	90	50	18	12	4.3
FG15	0.0103	15	12	9	6	4	2.1
FG15-G17A	0.0103	15	12	9	5.8	3.9	2.1
G17	0.5676	159	109.8	74.0	41.0	24.1	9.6
G17-G18	0.5676	159	109	74	41	24	9.2
FG16	0.0791	133	104	78	50	33.9	18.3
G18	0.6467	277	207	147	88	55.2	26.6
G18-POND E	0.6467	272	202	144	87	55.0	26.2
FG31	0.0922	116	92	69.5	45.4	31.0	17.2
FG30	0.0389	30	20.0	11.5	4.3	1.3	0.2
FG30-PONDHS	0.0389	28	19.0	11.3	4.2	1.2	0.2
POND HS	0.1311	112	63	40	28	19	10.0
FG17a	0.0694	101	78	57	35	23	11.7
FG17a-POND E	0.0694	99	76	56	35	22.9	11.6
FG18	0.0644	56	42	30	18	10.6	4.7
FG18-POND E	0.0644	56	42	30	17	10.6	4.6
FG19	0.0527	84	66	50	33.0	22.9	13.1
FG17c	0.0313	31	22	14	6.5	2.8	0.5
FG17b	0.0214	39	31	24	16	11	6.1
POND E IN	1.0170	590	449	326	199	128	64.1
POND E	1.0170	224	138	69.9	26.9	13.9	5.9
H08	1.0170	193	125	62	21	10	3.6
FG20	0.0109	28	23	19	15	12	8.5
H08A	1.0279	195.1	126.1	62.9	21.6	13.0	8.8
H09	0.0000	31	13	8	6	4	2.3

See approved Meridian Ranch MDDP (EPC File SKP171) dated January 2018 for complete hydrologic calculations and maps.

Future Drainage - SCS Calculation Method

Following is a tabulation of the surface drainage characteristics for the future conditions using the SCS calculation method. Please refer to Figure 6 - Meridian Ranch SCS Calculations – Future Basins Map

Table 5: Future Drainage Basins-SCS

FUTURE MDDP (Full Spectrum)							
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	30	12	3.8	0.5
G1a	0.1313	80	52	30	12	3.8	0.5
G1a-G2	0.1313	79	52	30	11	3.6	0.5
OS05	0.0578	39	26	15	5.6	1.8	0.2
OS05-G1	0.0578	39	25	15	5.5	1.7	0.2
FG01	0.0538	31	22	14	7.0	3.4	0.9
FG01-G1	0.0538	31	22	14	6.9	3.4	0.9
G1	0.1116	61	41	25	11	4.9	1.1
G1-G2	0.1116	61	41	25	11	4.8	1.1
FG02	0.0391	32	22	14	6.4	2.7	0.5
G2	0.2820	167	112	67	27	10	1.9
G2-G3	0.2820	163	109	66	27	10	1.9
FG03	0.0203	24	17	12	5.9	0.8	0.8
FG04	0.0172	22	16	11	5.8	3.1	0.9
G3	0.3195	185	123	74	31	11	2.4
G3-POND F	0.3195	183	121	74	31	11	2.4
FG06	0.0608	49	34	22	10	4.6	0.9
FG05	0.0580	45	33	23	12	6.7	2.4
OS07a	0.0170	14	9.2	5.7	2.5	0.9	0.1
OS07a-POND F	0.0170	13	9.0	5.7	2.4	0.9	0.1
POND F IN	0.4553	286	194	120	52	22	4.7
POND F	0.4553	177	121	61	17	8.1	2.3
POND F-G7	0.4553	177	120	60	17	8.1	2.3
FG21b	0.0170	25	20	15	9.6	6.5	3.5
FG21a	0.0072	7.2	5.0	3.2	1.4	0.5	0.1
FG21a-G7	0.0072	6.8	4.9	2.7	1.4	0.5	0.1
G7	0.4795	186	126	64	18	8.8	3.6
G7-G8	0.4795	185	126	64	18	8.8	3.5
FG22	0.1380	102	73	47	24	12	3.3
OS08	0.0406	35	25	16	7.7	3.4	0.7
OS08-G8	0.0406	34	24	15	7.5	3.4	0.7
FG23a	0.0216	21	15	10	5.2	2.7	0.8
OS07b	0.0156	15	10	6.2	2.6	1.0	0.1
OS07b-G7	0.0156	14	9.7	6.0	2.4	0.9	0.1
G8	0.6953	291	186	95	47	24	7.4
G8-G10	0.6953	288	186	94	46	24	7.4
OS09	0.1527	90	62	39	18	8.2	1.9
OS09-G10	0.1527	88	62	39	18	8.2	1.9
FG24	0.1373	105	76	50	26	13	4.0
G9	0.2900	180	125	81	38	17	4.4
G9-G10	0.2900	178	125	79	37	17	4.4
FG23b	0.0286	23	16	10	4.6	2.0	0.4
G10	1.0139	478	307	174	80	39	12
G10-G11	1.0139	474	305	173	80	38	12
FG23c	0.0122	12	8.7	5.7	3.0	1.5	0.4
G11	1.0261	479	308	176	81	39	12
FG25	0.1086	85	64	46	27	17	7.5
FG26	0.0863	78	58	40	22	12	4.6
FG26-POND G	0.0863	77	57	39	22	12	4.5
FG27	0.0500	52	40	29	17	11	5.0
FG28	0.0245	18	13	8.5	4.1	2.0	0.5

FUTURE MDDP (Full Spectrum)							
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
POND G IN	1.2955	684	454	287	145	78	28
POND G	1.2955	478	333	170	56	22	5.1
G12	1.2955	478	333	170	56	22	5.1
G12-G06	1.2955	478	332	170	56	22	5.1
FG29	0.0997	60	39	23	8.7	2.8	0.4
FG32	0.0402	72	57	44	29	20	11
FG32-G06	0.0402	69	54	41	27	18	11
G06	1.4354	506	352	181	61	24	11
FG10A	0.0806	81	61	43	25	15	6.5
FG08A	0.0750	116	90	66	41	27	13
FG08A-G05	0.0750	110	86	64	41	27	13
FG08B	0.0630	86	67	49	31	20	10
FG08B-G05	0.0630	84	65	48	29	19	10
FG11	0.0625	75	59	44	28	19	9.8
FG09	0.0484	48	36	25	14	8.3	3.2
FG09-G05	0.0484	48	36	25	14	8.0	3.2
FG10B	0.0416	42	31	22	12	7.0	2.7
G05	0.3711	433	330	239	145	93	45
FG13	0.0534	34	24	15	7.5	3.6	0.9
FG12	0.0328	50	40	30	20	14	7.8
POND D IN	0.4573	509	387	280	168	107	52
POND D	0.4573	134	91	50	19	12	4.3
POND D-G17	0.4573	134	91	50	19	12	4.3
FG15	0.0103	15	12	9.0	5.8	3.9	2.1
FG15-G17A	0.0103	15	12	8.9	5.8	3.9	2.1
G17A	0.4676	137	93	51	19	12	4.4
FG14	0.1000	98	74	53	32	20	9.2
G17	0.5676	196	132	75	43	25	12
G17-G18	0.5676	196	131	75	43	25	12
FG16	0.0791	133	104	78	50	34	18
G18	0.6467	240	178	128	79	51	26
G18-POND E	0.6467	240	176	126	78	50	25
FG31	0.0922	116	92	69	45	31	17
FG30	0.0389	73	57	44	29	20	11
FG30-PONDHS	0.0389	70	56	42	27	18	11
POND HS	0.1311	153	106	53	36	26	15
FG17a	0.0694	101	78	57	35	23	12
FG17a-POND E	0.0694	99	76	56	35	23	12
FG18	0.0644	56	42	30	18	11	4.7
FG18-POND E	0.0644	56	42	30	17	11	4.6
FG19	0.0527	84	66	50	33	23	13
FG17c	0.0313	31	22	14	6.5	2.8	0.5
FG17b	0.0214	39	31	24	16	11	6.1
POND E IN	1.0170	610	432	318	197	126	64
POND E	1.0170	242	153	80	30	16	6.6
H08	1.0170	205	137	72	24	12	4.1
H09	0.0000	37	16	8.3	5.9	4.1	2.4
FG34	0.0600	34	23	13	5.5	2.0	0.3
G14	0.0600	34	23	13	5.5	2.0	0.3
G14-G15	0.0600	34	22	13	5.4	2.0	0.3
FG35	0.0344	20	13	8.3	3.5	1.5	0.3
G15	0.0944	53	36	21	8.7	3.3	0.6
G15-G08	0.0944	52	35	21	8.7	3.3	0.6
FG37	0.0797	41	27	16	6.0	2.0	0.3
FG36	0.0281	14	9.4	5.5	2.1	0.7	0.1
FG36-G08	0.0281	14	9.3	5.4	2.1	0.7	0.1
G08	0.2022	106	69	41	16	5.8	1.0

See approved Meridian Ranch MDDP (EPC File SKP171) dated January 2018 for complete hydrologic calculations and maps.

Rational Calculations

The Rational Hydrologic Calculation Method was used to estimate the total runoff from the 5-year and the 100-year design storm and thus establish the storm drainage system design. Using the rational calculation methodology outlined in the Hydrology Section (Ch 6) of the COSDCM coupled with the El Paso County EPCDCM an effective storm drainage design for RHR Filing 1 has been designed. The storm drainage facilities have been designed such that the minor storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not overtop the curbs. The storm drainage facility has been designed such that the major storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not exceed the right-of-way widths for residential streets and the hydraulic grade line will be less than one foot below the surface.

The site is located within the Gieck Ranch Drainage Basin; the project will discharge the collected surface flow from the project into existing downstream facilities properly sized to safely convey the storm water flows away from the project without damaging adjacent property.

Rational hydrologic and hydraulic calculations were performed for the project. The storm drain runoff will be collected by a series of inlets and storm drain pipe then conveyed through the project and discharged either into an existing storm drain system located within Lambert Road discharged into the existing Pond E or directly into existing Pond D.

Rational Narrative

The following is a detailed narrative of the storm drainage system located in RHR Filing 1. The description is organized by system beginning on the west in the Bennett Ranch portion of Rolling Hills Ranch and ending on the east side of the project in the Gieck Ranch Basin.

<u>Storm Drain System B</u>

- Basin B01 (2.3 acres, Q_5= 2.2 CFS, Q_{100} = 6.4 CFS) contains lots in Rolling Hills Ranch 1 along east side of Rolling Peaks Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I04. All of the flow is captured by this inlet and conveyed downstream via a 18” RCP to Inlet 05.

- Basin B02 (5.6 acres, Q_5= 5.2 CFS, Q_{100} = 15 CFS) contains lots in Rolling Hills Ranch 1 along west side of Rolling Peaks Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 15' Type R forced sump inlet located at I05. All of the 5-year storm flow is captured by this inlet (Q_5= 5.2 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 14 CFS) with the remaining flow (Q_{100} = 1.8 CFS) continuing downstream to Inlet 14. The captured flow is conveyed downstream via a 24” RCP to Storm Manhole 02 then to Storm Manhole 03.

- The total pipe flow conveyed to Storm Manhole 03 is Q_5= 7.3 CFS, Q_{100} = 20 CFS.

- Basin B03 (4.3 acres, Q_5= 4.2 CFS, Q_{100} = 12 CFS) contains lots along Rolling Mesa Dr, Evening Creek Dr and Monument Vista Ln in Rolling Hills Ranch 1 and 3. The surface runoff will sheet flow off of the residential lots and be conveyed Design Point 1 (DP01) at the intersection of Rolling Mesa Dr and Evening Creek Dr. The crosses the intersection via a crosspan then continues along Rolling Mesa Dr through Basin B04 to inlet I06.

- Basin B04 (3.0 acres, Q_5= 2.9 CFS, Q_{100} = 8.5 CFS) contains lots along the east side of Rolling Mesa Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 20' Type R forced sump inlet located at I06 where it combines with the surface runoff from DP01. All of the 5-year storm flow is captured by this inlet (Q_5= 6.2 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 17 CFS) with the remaining flow (Q_{100} = 1.2 CFS) continuing downstream to Inlet 10. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 03 where it is combined with flow from MH02 then conveyed to Storm Manhole 04.

- The total pipe flow conveyed from MH03 to Storm Manhole 04 via a 30" RCP is Q_5= 13 CFS, Q_{100} = 36 CFS.

- Basin B05 (3.2 acres, Q_5= 3.1 CFS, Q_{100} = 9.1 CFS) contains lots in Rolling Hills Ranch 1 along the west side of Rolling Mesa Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I07. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 04.

- The total pipe flow conveyed from MH04 to Storm Manhole 05 via a 36" RCP is Q_5= 16 CFS, Q_{100} = 44 CFS.

- Basin B06 (3.1 acres, Q_5= 3.3 CFS, Q_{100} = 9.9 CFS) contains lots in Rolling Hills Ranch 1 along the east side of Evening Creek Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I08. Most of the flow is captured by this inlet (Q_5= 3.7 CFS, Q_{100} = 9.2 CFS) with the remaining (Q_5= 0.5 CFS, Q_{100} = 3.4 CFS) continuing downstream to Inlet 12. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 05.

- The total pipe flow conveyed from MH05 to Storm Manhole 06 via a 36" RCP is Q_5= 18 CFS, Q_{100} = 51 CFS.

- Basin B07 (4.8 acres, Q_5= 4.3 CFS, Q_{100} = 13 CFS) contains lots in Rolling Hills Ranch 1 along the west side of Evening Creek Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 20' Type R flow-by inlet located at I09. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 06.

- The total pipe flow conveyed from MH06 to Storm Manhole 07, then to MH10 via a 36" RCP is Q_5= 22 CFS, Q_{100} = 59 CFS.

- Basin B08 (2.5 acres, Q_5= 2.5 CFS, Q_{100} = 7.3 CFS) contains lots in Rolling Hills Ranch 1 along east side of Rolling Mesa Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I10. 100-year flow-by from inlet I06 contributes minor flows to inlet I10 for a total 100-year flow of 7.6 CFS. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manholes 08 & 09.

- Basin B09 (2.7 acres, Q_5= 2.6 CFS, Q_{100} = 7.7 CFS) contains lots in Rolling Hills Ranch 1 along south side of Parkland Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R sump inlet located at I11. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 09.

- Basin B10 (3.3 acres, Q_5= 3.1 CFS, Q_{100} = 9.2 CFS) contains lots in Rolling Hills Ranch 1 along west side of Rolling Mesa Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 20' Type R sump inlet located at I12 where it is combined with the surface flow from Basin B11. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 09.

- Basin B11 (3.1 acres, Q_5= 2.9 CFS, Q_{100} = 8.6 CFS) contains lots in Rolling Hills Ranch 1 along east side of Evening Creek Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 20' Type R sump inlet located at I12 where it is combined with the surface flow from Basin B10 and flow-by from B07. All of the flow (Q_5= 5.4 CFS, Q_{100} = 18 CFS) is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 09.

- The total pipe flow conveyed to Storm Manhole 09 is Q_5= 10 CFS, Q_{100} = 31 CFS and is conveyed to Manhole 10 via a 24" RCP. At manhole 10, the flow will combine with the flow from Storm Manhole 07 for a total flow of 30 CFS for the 5-year event and 85 CFS for the 100-year event. The pipe will discharge via a 42" RCP to the existing Pond D constructed in 2012.

reference the specific filing Pond D was constructed with.

updated

Storm Drain System C

- Basin C01 (3.2 acres, Q_5= 3.1 CFS, Q_{100} = 9.0 CFS) contains lots in Rolling Hills Ranch 1 along east side of Rolling Peaks Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I13. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 11.

- Basin C02 (3.5 acres, Q_5= 3.4 CFS, Q_{100} = 10 CFS) contains lots in Rolling Hills Ranch 1 along west side of Rolling Peaks Dr. The surface runoff will sheet flow off

of the residential lots and directed to the street then to a 15' Type R forced sump inlet located at I14. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 11.

- The total pipe flow conveyed from MH11 to Storm Manhole 12 via a 24" RCP is Q_5= 6.0 CFS, Q_{100} = 18 CFS.

- Basin C03 (1.3 acres, Q_5= 1.4 CFS, Q_{100} = 4.0 CFS) contains lots along Rolling Peaks Dr, Parkland Dr and Crooked Hill Dr in Rolling Hills Ranch 1 and 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 5'Type R forced sump inlet located at I15. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 12.

- Basin C04 (3.1 acres, Q_5= 3.2 CFS, Q_{100} = 9.4 CFS) contains lots along Rolling Peaks Dr, Parkland Dr and Crooked Hill Dr in Rolling Hills Ranch 1. The surface runoff will sheet flow off of the residential lots and be conveyed to a 5'Type R forced sump inlet located at I16. All of the 5-year storm flow is captured by this inlet (Q_5= 3.2 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 6.3 CFS) with the remaining flow (Q_{100} = 3.1 CFS) continuing downstream to Inlet 18. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 12.

- The total pipe flow conveyed from MH12 to Storm Manhole 13 via a 30" RCP is Q_5= 9.5 CFS, Q_{100} = 26 CFS.

- Basin C05 (0.6 acres, Q_5= 0.6 CFS, Q_{100} = 1.8 CFS) contains lots along Rolling Peaks Dr and Crooked Hill Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 5'Type R sump inlet located at I17. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 13.

- Basin C06 (1.0 acres, Q_5= 1.0 CFS, Q_{100} = 3.1 CFS) contains lots along Rolling Peaks Dr Crooked Hill Dr in Rolling Hills Ranch 1. The surface runoff will sheet flow off of the residential lots, combine with flow-by (Q_{100} = 3.1 CFS) from inlet I16 and be conveyed to a 5'Type R sump inlet located at I18. All of the flow (Q_5= 1.0 CFS, Q_{100} = 6.0 CFS) is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 13.

- The total pipe flow conveyed from MH13 to Storm Manhole 14 via a 36" RCP is Q_5= 11 CFS, Q_{100} = 32 CFS.

- Basin C07 (0.9 acres, Q_5= 0.9 CFS, Q_{100} = 2.5 CFS) contains runoff from an open space tract in Rolling Hills Ranch 3. The surface runoff will sheet flow off of the adjacent residential lots and be conveyed to a Type C grated inlet located at CB1. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 14.

- The total pipe flow conveyed to Storm Manhole 14 is Q_5= 11 CFS, Q_{100} = 34 CFS and is conveyed to Pond D via a 31" RCP.

Storm Drain System E

- Basin E01 (16 acres, Q_5= 9.9 CFS, Q_{100} = 33 CFS) contains an area within the future Rolling Hills Ranch 2 that has been overlot graded with the PUD approval. The surface runoff will sheet flow off of the future residential lots and be conveyed along the rough cut future streets to a 20' Type R sump inlet located at I37. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 30.

- Basin E03 (9.0 acres, Q_5= 6.0 CFS, Q_{100} = 20 CFS) contains an area within the future Rolling Hills Ranch 2 that has been overlot graded with the PUD approval. The surface runoff will sheet flow off of the future residential lots and be conveyed along the rough cut future streets to a 15' Type R sump inlet located at I37. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 30.

- The total pipe flow conveyed from MH30 to Storm Manhole 31 and Storm Manhole 36 via a 36" RCP is Q_5= 15 CFS, Q_{100} = 51 CFS.

- Basin E06 (1.3 acres, Q_5= 1.4 CFS, Q_{100} = 4.2 CFS) contains lots along Valley Peak Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 5' Type R forced sump inlet located at I38. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 32 then to Storm Manhole 33.

- Basin E07 (2.1 acres, Q_5= 2.5 CFS, Q_{100} = 6.7 CFS) contains lots along Rolling Peaks Dr and Valley Peak Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 15' Type R flow-by inlet located at I39. Most of the flow is captured by this inlet (Q_5= 2.0 CFS, Q_{100} = 4.5 CFS) with the remaining (Q_5= 0.5 CFS, Q_{100} = 2.2 CFS) continuing downstream to Inlet I41. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 33.

- The total pipe flow conveyed from MH33 to Storm Manhole 34 via an 18" RCP is Q_5= 3.5 CFS, Q_{100} = 8.5 CFS.

- Basin E08 (4.2 acres, Q_5= 4.8 CFS, Q_{100} = 13 CFS) contains lots surrounded by Rolling Peaks Dr, Valley Peak Dr, Summer Ridge Dr and Bridge Way in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 10' Type R forced sump inlet located at I40. All of the 5-year storm flow is captured by this inlet (Q_5=4.8 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 10 CFS) with the remaining flow (Q_{100} = 2.8 CFS) continuing downstream to an existing inlet located at the intersection of Park Gate Dr. with

Lambert Rd. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 34.

- The total pipe flow conveyed from MH34 to Storm Manhole 35 then to Storm Manhole 36 via a 24" RCP is Q_5= 8.0 CFS, Q_{100} = 18 CFS.

- Basin E09 (5.4 acres, Q_5= 6.2 CFS, Q_{100} = 17 CFS) contains lots along Rolling Peaks Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 15' Type R sump inlet located at I41. All of the 5-year storm flow is captured by this inlet (Q_5=6.2 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 14 CFS) with the remaining flow (Q_{100} = 3.9 CFS) continuing downstream to Inlet I43. The captured flow is conveyed downstream via a 24" RCP to Storm Manhole 36.

- The total combined pipe flow from MH30, MH34 and I41 is conveyed to Storm Manhole 37 via a 42" RCP is Q_5= 35 CFS, Q_{100} = 86 CFS.

- Basin E10 (7.0 acres, Q_5= 7.0 CFS, Q_{100} = 10 CFS) contains lots along Summer Ridge Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 20' Type R sump inlet located at I42. All of the flow is captured by this inlet and conveyed downstream via a 24" RCP to Storm Manhole 37.

- The total combined pipe flow from MH37 is conveyed to Storm Manhole 38 via a 48" RCP is Q_5= 41 CFS, Q_{100} = 102 CFS.

- Basin E11 (13 acres, Q_5= 6.3 CFS, Q_{100} = 18 CFS) contains runoff from an open space tract in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a Type C grated inlet located at CB3. All of the flow is captured by this inlet and conveyed downstream via a 24" RCP to Storm Manhole 37.

- Basin E12 (1.6 acres, Q_5= 3.6 CFS, Q_{100} = 7.5 CFS) contains runoff from Rolling Peaks Dr and Lambert Rd in Rolling Hills Ranch 2. The surface runoff will collected in the curb and gutter then conveyed to a 20' Type R flow-by inlet located at I43. Most of the flow is captured by this inlet (Q_5= 3.2 CFS, Q_{100} = 7.1 CFS) with the remaining (Q_5= 0.4 CFS, Q_{100} = 2.1 CFS) continuing downstream to Inlet I41. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 38.

- The total combined pipe flow from MH38, I43 and CB3 is conveyed to an existing Storm Manhole EJ02 via a 54" RCP is Q_5= 52 CFS, Q_{100} = 131 CFS.

- Basin E13 (6.0 acres, Q_5= 8.2 CFS, Q_{100} = 19 CFS) contains runoff from Park Gate Rd, Lambert Rd. found in Meridian Ranch Filing 11A and Rolling Peaks Dr in Rolling Hills Ranch 2 The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 15' Type R forced sump inlet constructed with the

improvements associated with Meridian Ranch Filing 11A located at EI1. All of the 5-year storm flow is captured by this inlet (Q_5=6.0 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 13 CFS) with the remaining flow (Q_{100} = 6.5 CFS) continuing downstream to an existing inlet located along the west side of Lambert Rd. The captured flow is conveyed downstream via an 18" RCP to existing manhole EJ01.

- The existing storm drain system at existing manhole EJ01 conveys storm flow from other parts of Meridian Ranch Filing 11A and the discharge from Pond D. The flow rates upstream of EJ01 as from the SCS model are 12 CFS for the 5-year storm and 136 CFS for the 100-year storm. The coefficient-area (CA) figure from the approved Final Drainage Report for Meridian Ranch Filing 11A and the time of concentration was adjusted to match the flow rate from the SCS Model to replicate the flow rate in the storm drain. The total flow from Meridian Ranch Filing 11A from MH EJ01 to EJ02 is 22 CFS for the 5-year storm and 140 CFS for the 100-year storm.

- The total combined storm flow at MH EJ02 from Rolling Hills, Meridian Ranch Filing 11A and the discharge from Pond D is 39 CFS for the 5-year storm and 182 CFS for the 100-year storm. The existing storm drain located within Lambert Rd was installed with the construction of the Falcon High School in 2007. The anticipated 10-year flow rate at 128 CFS and the 100-year flow rate for the storm drain was 245 CFS per the approved 2007 Londonderry-Lambert Final Drainage Report. The approved Final Drainage Report for Meridian Ranch Filing 11A shows the 5-year flow rate at 63 CFS and 212 CFS for the 100-year storm. These calculations result buildout flow rates (Q_5= 39 CFS, Q_{100} = 182 CFS) below the previously approved drainage reports, therefore this development will not have any adverse impacts on the existing storm drain located in Lambert Road.

DETENTION PONDS

Existing Pond D Detention Storage Criteria

The existing Detention Pond D is located east of Rainbow Bridge Dr., northeast of Meridian Ranch Filing 3, and was constructed as a part of the Meridian Ranch Filing 3 Improvements; the pond is owned and maintained by the Meridian Service Metropolitan District (MSMD). It has been in operation since 2012 with no reported issues. A maintenance agreement between the Meridian Service Metropolitan District and El Paso County has been recorded as a part of the Meridian Ranch Filing 3 Final Plat process.

The SCS calculation method was used to determine inflow and outflow from the detention pond to ensure the developed runoff does not overcharge the pond and the discharges do not adversely impact drainage patterns downstream. Pond D and existing Pond E work in series such that the peak flow rates from the Meridian Ranch development do not adversely affect the drainage patterns downstream of Eastonville Road. Storm drainage runoff will enter the pond from upstream development via existing pipe networks and overland from existing rear lots adjacent to the pond. The ultimate future build-out design of the tributary areas was

analyzed to insure the sizing of the pond would be adequate after development of Meridian Ranch is complete. This SCS calculation can be found in the appendix.

An analysis of the SCS calculations show the development of Rolling Hills Ranch and the discharge flow rates from Pond D do not adversely impact the downstream drainage patterns. No additional improvements or modifications are necessary to this pond as a result of the full buildout of RHR Filing 1. Table 6 provides summary data for the various design storms for the completed development for all areas tributary to Pond D including RHR Filing 1. Rolling Hills Ranch completes the development of all areas tributary to Pond E.

A water quality capture volume (WQCV) was added to the required storage volume for the final build out condition. The purpose of the WQCV is to allow particulates to settle out and accumulate over time to improve water quality and to maintain full volume for detention during the life of the facility for a major storm event. The WQCV of 1.0 ac-ft. was added to the detention of the minor storm and half (0.5 ac-ft.) was added to the detention volume of the major storm. This was accomplished with respect to the HEC-HMS computer run by providing a starting detention volume of 1.0 ft. for the 5-year storm and 0.5 ft. for the 100-year storm. The resulting storage elevations remain well below the emergency spillway elevation. See Appendix B for more information.

The WQCV was calculated by using the equations found in Volume 2, of the Drainage Criteria Manual (DCM). The release rate from the WQCV is generally very small, which helps minimize downstream impacts. Detaining the WQCV also serves to cleanse the "first flush" of runoff from the higher initial concentration of sediment and pollutants by allowing for settlement to occur. This greatly improves the quality of runoff, leaving the facility and reduces the potential for erosion. The positive impact on water quality is expected to be significant, particularly during the construction phase of the development.

Table 6: Existing Pond D Summary Data

EXISTING POND D				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	52	4.3	4.8	7053.1
5-YEAR STORM	110	12	7.4	7053.9
10-YEAR STORM	176	18	11.0	7054.7
25-YEAR STORM	292	50	15.8	7055.6
50-YEAR STORM	402	90	20.1	7056.3
100-YEAR STORM	527	134	25.4	7057.1
FUTURE CONDITIONS				
2-YEAR STORM	52	4.3	4.8	7053.2
5-YEAR STORM	107	12	7.3	7053.9
10-YEAR STORM	168	19	11.1	7054.7
25-YEAR STORM	280	50	15.9	7055.6
50-YEAR STORM	387	91	20.1	7056.3
100-YEAR STORM	509	134	25.5	7057.1

Existing Pond E Detention Storage Criteria

Existing Detention Pond E is located south of Londonderry and west of Eastonville, and was constructed as a part of the Meridian Ranch Filing 11 Grading, the is owned and maintained by the Meridian Service Metropolitan District (MSMD). It has been in operation since 2013 with no reported issues. A maintenance agreement between the Meridian Service Metropolitan District and El Paso County has been recorded as a part of the Meridian Ranch Filing 11A Final Plat process.

The SCS calculation method was used to determine inflow and outflow from the detention pond to ensure the developed runoff does not overcharge the pond and the discharges do not adversely impact drainage patterns downstream of Eastonville Road. Storm drainage runoff will enter the pond from upstream development via existing pipe networks and overland from existing rear lots adjacent to the pond. The ultimate future build-out design of the tributary areas was analyzed to insure the sizing of the pond would be adequate after development of Meridian Ranch is complete. This SCS calculation can be found in the appendix.

An analysis of the SCS calculations show the development of Rolling Hills Ranch and the discharge flow rates from Pond E approximate those of the historic flow rates at Eastonville Road. No additional improvements or modifications are necessary to this pond as a result of the full buildout of RHR Filing 1. Table 7 provides summary data for the various design storms for the completed development for all areas tributary to Pond E including RHR Filing 1. Rolling Hills Ranch completes the development of all areas tributary to Pond E.

Table 7: Existing Pond E Summary Data

EXISTING POND E				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	64	5.9	10.1	6970.5
5-YEAR STORM	128	14	17.1	6971.3
10-YEAR STORM	199	27	22.1	6971.8
25-YEAR STORM	326	70	29.1	6972.4
50-YEAR STORM	449	138	35.4	6973.0
100-YEAR STORM	590	224	41.0	6973.5
FUTURE CONDITIONS				
2-YEAR STORM	64	6.6	10.9	6970.6
5-YEAR STORM	126	16	18.0	6971.4
10-YEAR STORM	197	30	23.0	6971.9
25-YEAR STORM	318	80	30.0	6972.5
50-YEAR STORM	432	153	36.4	6973.1
100-YEAR STORM	610	242	42.4	6973.6

A water quality capture volume (WQCV) was added to the required storage volume for the final build out condition. The purpose of the WQCV is to allow particulates to settle out and

accumulate over time to improve water quality and to maintain full volume for detention during the life of the facility for a major storm event. The WQCV of 1.5 ac-ft. was added to the detention of the minor storm and half (0.75 ac-ft.) was added to the detention volume of the major storm. This was accomplished with respect to the HEC-HMS computer run by providing a starting detention volume of 1.5 ft. for the 5-year storm and 0.75 ft. for the 100-year storm. The resulting storage elevations remain well below the emergency spillway elevation. See Appendix B for more information.

The WQCV was calculated by using the equations found in Volume 2, of the Drainage Criteria Manual (DCM). The release rate from the WQCV is generally very small, which helps minimize downstream impacts. Detaining the WQCV also serves to cleanse the "first flush" of runoff from the higher initial concentration of sediment and pollutants by allowing for settlement to occur. This greatly improves the quality of runoff, leaving the facility and reduces the potential for erosion. The positive impact on water quality is expected to be significant, particularly during the construction phase of the development.

Downstream Analysis

The outlets (DP H08 & H09) for Pond E located along Eastonville Road upstream of 4-Way Ranch Filing 1 were analyzed in detail with the 2018 MDDP associated with the most recent Meridian Ranch Sketch Plan Amendment. The information can be found in Appendix D of the January 2018 Meridian Ranch MDDP. Below you will find a summary table providing release rates of flow for each Pond E outlet. See the Downstream Channel Analysis Appendix in the WindingWalk Filing 1 Final Drainage Report for a letter to the El Paso County Engineer regarding channel stability and analysis.

Table 8: Key Design Point Comparison - SCS

MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (INTERIM)						
		Q_{100} (CFS)	Q_{50} (CFS)	Q_{25} (CFS)	Q_{10} (CFS)	Q_5 (CFS)
H08 - EASTONVILLE ROAD (POND E NORTH OUTLET)	Historic	216	142	85	34	12
	Interim	193	125	62	21	10
	% of Historic	90%	88%	73%	63%	83%
H09 - EASTONVILLE ROAD (POND E SOUTH OUTLET)	Historic	77	51	30	12	4.5
	Interim	31	13	7.7	5.6	3.8
	% of Historic	40%	27%	25%	46%	85%

MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (FUTURE)						
		Q_{100} (CFS)	Q_{50} (CFS)	Q_{25} (CFS)	Q_{10} (CFS)	Q_5 (CFS)
H08 - EASTONVILLE ROAD (POND E NORTH OUTLET)	Historic	216	142	85	34	12
	Future	205	137	72	24	12
	% of Historic	95%	96%	85%	72%	97%
H09 - EASTONVILLE ROAD (POND E SOUTH OUTLET)	Historic	77	51	30	12	4.5
	Future	37	16	8.3	5.9	4.1
	% of Historic	48%	31%	27%	49%	92%

The developed peak flow rate for the full spectrum of design storms are calculated to be below that of the corresponding historic peak flow rates. See Table 9 for a complete comparative list of the peak flow rates for the key design points impacted by the development of Rolling Hills Ranch Filing 1.

EROSION CONTROL DESIGN

General Concept

Historically, erosion on this property has been held to a minimum by a variety of natural features and agricultural practices including:

- Substantial prairie grass growth
- Construction of drainage arresting berms
- Construction of multiple stock ponds along drainage courses

Existing temporary sediment ponds will also help to minimize erosion by reducing both the volume and velocity of the peak runoff.

During construction, best management practices (BMP) for erosion control will be employed based on El Paso county Criteria. BMP's will be utilized as deemed necessary by the contractor and/or engineer and are not limited to the measures shown on the construction drawing set. The contractor shall minimize the amount of area disturbed during all construction activities.

In general the following shall be applied in developing the sequence of major activities:

- Install down-slope and side-slope perimeter BMP's before the land disturbing activity occurs.
- Do not disturb an area until it is necessary for the construction activity to proceed
- Cover or stabilize as soon as possible.
- Time the construction activities to reduce the impacts from seasonal climatic changes or weather events.
- The construction of filtration BMP's should wait until the end of the construction project when upstream drainage areas have been stabilized.
- Do not remove the temporary perimeter controls until after all upstream areas are stabilized.

Four Step Process

The following four step process is recommended for selecting structural BMP's in developing urban areas:

Step 1: Employ Runoff Reduction Practices

This development incorporates wider rights-of-way than other developments, thus decreasing the amount area devoted to pavement. The rights-of-way within Meridian Ranch are 20% wider, 60 ft. instead of 50 ft., creating more landscaped area within the development.

The project has over ten acres of open space, accounting for over 20% of the entire project, creating a lower density development.

Home owners and builders are encouraged to direct roof drains to the sideyards where the runoff will travel overland to the streets and creating an opportunity to allow the runoff to infiltrate into the ground.

Step 2: Stabilize Drainageways

The drainage swale located adjacent and south of the project was designed to have a wide flat bottom and slope reducing the velocity of the concentrated flow traveling along the drainageway. The construction of the swale also included erosion control mat along the entire length of the swale. At steeper sections of the swale straw logs or rip-rap has been installed to reduce velocities and erosion.

Step 3: Provide Water Quality Capture Volume (WQCV)

An existing extended detention pond with water quality capture volume is located to the east of the project that was designed to accommodate the runoff from this development.

Step 4: Consider Need for Industrial and Commercial BMP's

This project is neither industrial nor commercial and therefore this section does not apply.

Temporary Sedimentation Pond

Temporary sedimentation ponds installed during the overlot grading process will act as the primary water quality control for the areas upstream. Runoff will travel overland toward the existing sedimentation ponds, collected and diverted into the proposed storm drain system and discharged into existing downstream systems. The pond will provide initial sediment control over exposed upstream areas.

Detention Pond

The detention ponds will act as the primary water quality control for the areas within the project boundaries. Runoff will be collected by the proposed storm drainage system and diverted into the detention pond where practical. The pond will serve a dual purpose: first, by facilitating the settling of sediment in runoff during and after construction (by means of the WQCV) and, second, by maintaining runoff at or below existing levels.

Silt Fence

Silt fence will be place along downstream limits of disturbed areas. This will prevent suspended sediment from leaving the site during infrastructure construction. Silt fencing is to remain in place until vegetation is reestablished.

Erosion Bales

Erosion bales will be placed ten (10) feet from the inlet of all culverts during construction to prevent culverts from filling with sediment. Erosion bales will remain in place until vegetation is reestablished. Erosion bale checks will be used on slopes greater than 1 percent to reduce flow velocities until vegetation is reestablished.

Miscellaneous

Best erosion control practices will be utilized as deemed necessary by the Contractor or Engineer and are not limited to the measures described above.

REFERENCES

1. "City of Colorado Springs/El Paso County Drainage Criteria Manual" September 1987, Revised November 1991, Revised October 1994.

2. Chapter 6, Hydrology and Chapter 11, Storage, Section 3.2.1 of the "City of Colorado Springs Drainage Criteria Manual" May 2014.

3. "Volume 2, El Paso County/City of Colorado Springs Drainage Criteria Manual-Stormwater Quality Policies, Procedures and Best Management Practices" November 1, 2002.

4. "Urban Storm Drainage Criteria Manual" September 1969, Revised January 2016.

5. Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas. Federal Emergency Management Agency, Revised March 17, 1997.

6. Soils Survey of El Paso County area, Natural Resources Conservation Services of Colorado.

7. Master Development Drainage Plan Meridian Ranch. August 2000. Prepared by URS Corp.

8. Revision to Master Development Drainage Plan Meridian Ranch. January 2018. Prepared by Tech Contractors.

9. Master Development Drainage Plan Latigo Trails. October 2001. Prepared by URS Corp.

10. Final Drainage Report for Meridian Ranch Filing 3. August 2011. Prepared by Tech Contractors.

11. Preliminary and Final Drainage Report for Meridian Ranch Filing 7. June 2012. Prepared by Tech Contractors.

12. Final Drainage Report for Meridian Ranch Estates Filing 2. July 2013. Prepared by Tech Contractors.

13. Final Drainage Report for Meridian Ranch Filing 11A. March 2014. Prepared by Tech Contractors.

14. Preliminary and Final Drainage Report for Meridian Ranch Filing 8. December 2014. Prepared by Tech Contractors.

15. Final Drainage Report for Meridian Ranch Filing 9. May 2015. Prepared by Tech Contractors.

16. Final Drainage Report for Meridian Ranch Estates Filing 3. October 2015. Prepared by Tech Contractors.

17. Final Drainage Report for the Vistas Filing 1 at Meridian Ranch. July 2016. Prepared by Tech Contractors.

18. Final Drainage Report for Stonebridge Filing 3 at Meridian Ranch. April 2017. Prepared by Tech Contractors.

19. Interim Drainage Report for WindingWalk Grading. February 2018. Prepared by Tech Contractors.

20. Final Drainage Report Report for WindingWalk Filings 1 & 2 PUD and Final Drainage Report for WindingWalk Filing 1 at Meridian Ranch. April 2018. Prepared by Tech Contractors.

21. Final Drainage Report for WindingWalk Filing 2 at Meridian Ranch. August 2018. Prepared by Tech Contractors.

22. Final Drainage Report for Stonebridge Filing 4 at Meridian Ranch. September 2018. Prepared by Tech Contractors.

Appendices

Appendix A – Rational Calculations

Table 6-6. Runoff Coefficients for Rational Method

(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency

IDF Equations

$I_{100} = -2.52 \ln(D) + 12.735$

$I_{50} = -2.25 \ln(D) + 11.375$

$I_{25} = -2.00 \ln(D) + 10.111$

$I_{10} = -1.75 \ln(D) + 8.847$

$I_{5} = -1.50 \ln(D) + 7.583$

$I_{2} = -1.19 \ln(D) + 6.035$

Note: Values calculated by equations may not precisely duplicate values read from figure.

COMPOSITE 'C' FACTORS

PROJECT: **Rolling Hills Ranch Filing 1** 10/8/2019

BASIN DESIGNATION	AREA (AC.)							COMPOSITE FACTOR		Percent Impervious
	GRADED	3 DU/AC	4 DU/AC	5 DU/AC	STREETS	OPEN SPACE PARKS/GC	TOTAL	5-year	100-year	
B01		1.1	1.2				2.3	**0.28**	**0.49**	**35.1%**
B02		2.8	2.9				5.6	**0.28**	**0.49**	**35.1%**
B03		1.8	1.9			0.7	4.3	**0.27**	**0.47**	**29.6%**
B04		1.5	1.6				3.0	**0.28**	**0.49**	**35.1%**
B05		1.6	1.7				3.2	**0.28**	**0.49**	**35.1%**
B06		1.5	1.6				3.1	**0.28**	**0.49**	**35.1%**
B07		2.3	2.4				4.8	**0.28**	**0.49**	**35.1%**
B08		1.2	1.3				2.5	**0.28**	**0.49**	**35.1%**
B09		1.3	1.4				2.7	**0.28**	**0.49**	**35.1%**
B10		1.6	1.7				3.3	**0.28**	**0.49**	**35.1%**
B11		1.5	1.6				3.1	**0.28**	**0.49**	**35.1%**
SUBTOTAL		18	19			0.7	38	**0.27**	**0.48**	**34.5%**
C01		1.5	1.6				3.2	**0.28**	**0.49**	**35.1%**
C02		1.7	1.8				3.5	**0.28**	**0.49**	**35.1%**
C03		0.7	0.7				1.3	**0.28**	**0.49**	**35.1%**
C04		1.5	1.6				3.1	**0.28**	**0.49**	**35.1%**
C05		0.3	0.3				0.6	**0.28**	**0.49**	**35.2%**
C06		0.5	0.5				1.0	**0.28**	**0.49**	**35.1%**
C07		0.2	0.2			0.6	0.9	**0.25**	**0.44**	**14.4%**
SUBTOTAL		6.4	6.7			0.6	14	**0.27**	**0.48**	**33.8%**
E01	16						16.2	**0.20**	**0.40**	**0.0%**
E03	9.0						9.0	**0.20**	**0.40**	**0.0%**
E06			0.7	0.6			1.3	**0.32**	**0.51**	**41.4%**
E07			1.1	1.0			2.1	**0.32**	**0.51**	**41.4%**
E08			2.2	2.0			4.2	**0.32**	**0.51**	**41.4%**
E09			2.9	2.6			5.4	**0.32**	**0.51**	**41.4%**
E10			3.7	3.3			7.0	**0.32**	**0.51**	**41.4%**
E11			1.0	2.1		9.9	13.0	**0.26**	**0.44**	**11.6%**
E12					1.0	0.6	1.6	**0.64**	**0.74**	**61.4%**
E13			1.3	2.5	1.0	1.2	6.0	**0.41**	**0.57**	**44.0%**
SUBTOTAL	25		13	14	2.0	12	66	**0.28**	**0.47**	**20.4%**
TOTAL	25	25	39	14	2.0	13	117	**0.28**	**0.47**	**26.5%**

TIME OF CONCENTRATION

PROJECT: **Rolling Hills Ranch Filing 1** DATE: 10/8/2019

TIME OF CONCENTRATION																	
SUBBASIN DATA			INIT./OVERLAND TIME (T_i)				TRAVEL TIME (T_t)							TOTAL	Tc Check (Urbanized Basins)		FINAL T_c
										CONVEYANCE							
BASIN DESIGNATION	C_5	AREA (AC)	LENGTH (FT)	ΔH	SLOPE %	Ti (Min.)*	LENGTH (FT)	ΔH	SLOPE %	TYPE	COEF.	VEL. (FPS)	Tt(Min.)**	Ti+Tt(Min.)	L (FT)	Tc = (L/180) + 10	(min)
B01	0.28	2.3	242	6.0	2.5%	17.4	838	16	1.9%	P	20	2.8	5.1	22.4	1080.00	16.0	**16.0**
B02	0.28	5.6	300	9.0	3.0%	18.2	902	17	1.9%	P	20	2.7	5.5	23.6	1202.00	16.7	**16.7**
B03	0.27	4.3	280	10.0	3.6%	16.7	494	11	2.1%	P	20	2.9	2.8	19.5	774.00	14.3	**14.3**
B04	0.28	3.0	43	0.9	2.0%	7.9	1352	26	1.9%	P	20	2.8	8.1	16.0	1395.00	17.8	**16.0**
B05	0.28	3.2	130	2.6	2.0%	13.7	845	20	2.4%	P	20	3.1	4.6	18.3	975.00	15.4	**15.4**
B06	0.28	3.1	30	0.6	2.0%	6.6	914	19	2.1%	P	20	2.9	5.3	11.9	944.00	15.2	**11.9**
B07	0.28	4.8	67	1.3	2.0%	9.8	1380	25	1.8%	P	20	2.7	8.5	18.4	1447.00	18.0	**18.0**
B08	0.28	2.5	155	3.2	2.1%	14.8	731	16	2.2%	P	20	3.0	4.1	18.9	886.00	14.9	**14.9**
B09	0.28	2.7	155	3.2	2.1%	14.8	916	18	1.9%	P	20	2.8	5.5	20.3	1071.00	16.0	**16.0**
B10	0.28	3.3	160	3.2	2.0%	15.2	962	18	1.8%	P	20	2.7	5.9	21.1	1122.00	16.2	**16.2**
B11	0.28	3.1	155	3.2	2.1%	14.8	843	18	2.1%	P	20	2.9	4.9	19.7	998.00	15.5	**15.5**
C01	0.28	3.2	155	3.2	2.1%	14.8	745	20	2.7%	P	20	3.3	3.8	18.6	900.00	15.0	**15.0**
C02	0.28	3.5	160	4.2	2.6%	13.9	745	20	2.7%	P	20	3.3	3.8	17.6	905.00	15.0	**15.0**
C03	0.28	1.3	135	2.7	2.0%	13.9	404	4	1.0%	P	20	2.0	3.4	17.3	539.00	13.0	**13.0**
C04	0.28	3.1	217	4.5	2.1%	17.5	346	3	0.9%	P	20	1.9	3.1	20.6	563.00	13.1	**13.1**
C05	0.28	0.6	80	1.6	2.0%	10.7	334	3	0.9%	P	20	1.9	2.9	13.7	414.00	12.3	**12.3**
C06	0.28	1.0	50	1.0	2.0%	8.5	602	5	0.8%	P	20	1.8	5.5	14.0	652.00	13.6	**13.6**
C07	0.25	0.9	160	3.0	1.9%	15.9	167	2	1.0%	G	15	1.5	1.8	17.8	327.00	11.8	**11.8**
D01	0.29	6.9	125	2.5	2.0%	13.1	1060	23	2.2%	P	20	2.9	6.0	19.1	1185.00	16.6	**16.6**
D02	0.29	3.8	260	10.0	3.8%	15.2	880	16	1.8%	P	20	2.7	5.4	20.7	1140.00	16.3	**16.3**
D03	0.29	3.8	40	0.8	2.0%	7.4	1140	28	2.4%	P	20	3.1	6.1	13.5	1180.00	16.6	**13.5**
E01	0.20	16.2	145	2.9	2.0%	15.8	1772	36	2.0%	B	10	1.4	20.7	36.5	1917.00	20.7	**20.7**
E03	0.20	9.0	247	6.0	2.4%	19.3	985	7	0.7%	B	10	0.8	19.5	38.8	1232.00	16.8	**16.8**
E06	0.32	1.3	140	2.8	2.0%	13.4	307	6	2.0%	P	20	2.8	1.8	15.2	447.00	12.5	**12.5**
E07	0.32	2.1	280	11.0	3.9%	15.1	200	8	4.0%	P	20	4.0	0.8	15.9	480.00	12.7	**12.7**
E08	0.32	4.2	140	2.8	2.0%	13.4	740	16	2.2%	P	20	2.9	4.2	17.6	880.00	14.9	**14.9**
E09	0.32	5.4	255	8.0	3.1%	15.5	625	18	2.9%	P	20	3.4	3.1	18.6	880.00	14.9	**14.9**

TIME OF CONCENTRATION

SUBBASIN DATA			INIT./OVERLAND TIME (T_i)				TRAVEL TIME (T_t)							TOTAL	Tc Check (Urbanized Basins)		FINAL T_c
										CONVEYANCE							
BASIN DESIGNATION	C_5	AREA (AC)	LENGTH (FT)	ΔH	SLOPE %	Ti (Min.)*	LENGTH (FT)	ΔH	SLOPE %	TYPE	COEF.	VEL. (FPS)	Tt(Min.)**	Ti+Tt(Min.)	L (FT)	Tc = (L/180) + 10	(min)
E10	0.32	7.0	172	6.0	3.5%	12.3	1583	35	2.2%	P	20	3.0	8.9	21.2	1755.00	19.8	**19.8**
E11	0.26	13.0	182	3.0	1.6%	17.5	1696	35	2.1%	L	7	1.0	28.1	45.6	NON-URBAN AREA		**45.6**
E12	0.64	1.6	25	0.5	2.0%	3.3	1350	12	0.9%	P	20	1.9	11.9	15.3	1375.00	17.6	**15.3**
E13	0.41	6.0	161	6.0	3.7%	10.3	1188	22	1.9%	P	20	2.7	7.3	17.6	1349.00	17.5	**17.5**

Notes:

$$* \; Ti = \frac{* \; Ti = 0.395\,(1.1-C5)L^{0.5}}{S^{0.33}}$$

$$V = C_V S_W^{0.5}$$

$$** \; Tt = L \times V$$

TYPE OF SURFACE		C_V
HEAVY MEADOW	H	2.5
TILLAGE/FIELD	T	5
RIPRAP (not buried)	R	6.5
SHORT PASTURE AND LAWNS	L	7
NEARLY BARE GROUND	B	10
GRASSED WATERWAY	G	15
PAVED AREAS	P	20

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
SURFACE ROUTING

PROJECT: **Rolling Hills Ranch Filing 1** Date: 10/8/2019

	DIRECT RUNOFF											TOTAL RUNOFF							OVERLAND TRAVEL TIME						
				I (in./ hr.)		COEFF. ©		CA		Q			I (in./ hr.)		CA		Q								
DESIGN POINT	BASIN	AREA (AC)	Tc (Min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	Sum Tc (min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	**(5 YR)**	**(100 YR)**	DESTINATION DP	CONVEYANCE TYPE	COEFFICIENT C_V	SLOPE %	VEL. (FPS)	LENGTH (FT)	TRAVEL TIME Tt
I04	B01	2.3	16.0	3.42	5.75	0.28	0.49	0.63	1.11	2.2	6.4						**2.2**	**6.4**							
I05	B02	5.6	16.7	3.36	5.64	0.28	0.49	1.55	2.73	5.2	15						**5.2**	**15**	I14	P	20.0	2.54%	3.2	865	4.5
DP1	B03	4.3	14.3	3.59	6.03	0.27	0.47	1.17	2.05	4.2	12						**4.2**	**12**	I06	P	20.0	2.23%	3.0	963	5.4
I06	B04	3.0	16.0	3.42	5.75	0.28	0.49	0.84	1.47	2.9	8.5	19.7	3.11	5.23	2.01	3.52	**6.2**	**18**	I10	P	20.0	2.00%	2.8	852	5.0
I07	B05	3.2	15.4	3.48	5.84	0.28	0.49	0.89	1.56	3.1	9.1						**3.1**	**9.1**							
I08	B06	3.1	11.9	3.87	6.50	0.28	0.49	0.86	1.52	3.3	9.9						**3.3**	**9.9**							
I09	B07	4.8	18.0	3.24	5.45	0.28	0.49	1.31	2.31	4.3	13						**4.3**	**13**	I12	P	20.0	1.86%	2.7	970	5.9
I10	B08	2.5	14.9	3.53	5.92	0.28	0.49	0.70	1.23	2.5	7.3	19.9	3.09	5.19	0.70	1.46	**2.5**	**7.6**							
I11	B09	2.7	16.0	3.43	5.76	0.28	0.49	0.76	1.33	2.6	7.7						**2.6**	**7.7**							
I12	B10	3.3	16.2	3.40	5.71	0.28	0.49	0.92	1.62	3.1	9.2						**3.1**	**9.2**							
I12	B11	3.1	15.5	3.47	5.82	0.28	0.49	0.84	1.48	2.9	8.6	24.0	2.82	4.73	1.92	3.73	**5.4**	**18**							
I13	C01	3.2	15.0	3.52	5.91	0.28	0.49	0.87	1.53	3.1	9.0						**3.1**	**9.0**							
I14	C02	3.5	15.0	3.52	5.91	0.28	0.49	0.98	1.72	3.4	10	21.2	3.00	5.04	0.98	2.04	**3.4**	**10**							
I15	C03	1.3	13.0	3.74	6.27	0.28	0.49	0.37	0.65	1.4	4.0						**1.4**	**4.0**							
I16	C04	3.1	13.1	3.72	6.25	0.28	0.49	0.85	1.50	3.2	9.4						**3.2**	**9.4**	I18	P	20.0	1.00%	2.0	165	1.4
I17	C05	0.6	12.3	3.82	6.41	0.28	0.49	0.16	0.28	0.6	1.8						**0.6**	**1.8**							
I18	C06	1.0	13.6	3.67	6.15	0.28	0.49	0.28	0.50	1.0	3.1	14.5	3.57	6.00	0.28	1.00	**1.0**	**6.0**							
CB1	C07	0.9	11.8	3.88	6.51	0.25	0.44	0.22	0.39	0.9	2.5						**0.9**	**2.5**							
I36	E03	9.0	16.8	3.35	5.62	0.20	0.40	1.80	3.60	6.0	20						**6.0**	**20**	I36	B	10.0	0.85%	0.9	30	0.5
I37	E01	16.2	20.7	3.04	5.11	0.20	0.40	3.24	6.48	9.9	33						**9.9**	**33**	I34	B	10.0	1.90%	1.4	315	3.8
I38	E06	1.3	12.5	3.80	6.37	0.32	0.51	0.41	0.65	1.6	4.2						**1.6**	**4.2**							
I39	E07	2.1	12.7	3.77	6.34	0.32	0.51	0.66	1.05	2.5	6.7						**2.5**	**6.7**	I41	P	20.0	2.80%	3.3	675	3.4
I40	E08	4.2	14.9	3.53	5.93	0.32	0.51	1.35	2.14	4.8	13						**4.8**	**13**	EI1	P	20.0	2.30%	3.0	1290	7.1
I41	E09	5.4	14.9	3.53	5.93	0.32	0.51	1.76	2.80	6.2	17	16.0	3.42	5.74	1.76	3.27	**6.2**	**19**	I43	P	20.0	1.10%	2.1	545	4.3
I42	E10	7.0	19.8	3.11	5.22	0.32	0.51	2.26	3.59	7.0	19						**7.0**	**19**							
CB3	E11	13.0	45.6	1.85	3.11	0.26	0.44	3.42	5.69	6.3	18						**6.3**	**18**							
I43	E12	1.6	15.3	3.49	5.86	0.64	0.74	1.02	1.19	3.6	7.0	20.4	3.06	5.14	1.02	2.09	**3.6**	**11**	EI3	P	20.0	1.25%	2.2	1190	8.9
EI1	E13	6.0	17.5	3.29	5.52	0.41	0.57	2.48	3.45	8.2	19	22.0	2.95	4.95	2.48	3.92	**8.2**	**19**	EI2	P	20.0	1.25%	2.2	560	4.2

TYPE OF SURFACE		C_V
HEAVY MEADOW	H	3
TILLAGE/FIELD	T	5
RIPRAP (not buried)	R	7
SHORT PASTURE AND LAWNS	L	7
NEARLY BARE GROUND	B	10
GRASSED WATERWAY	G	15
PAVED AREAS	P	20

STORM DRAINAGE SYSTEM DESIGN
INLET CALCULATIONS

PROJECT: **Rolling Hills Ranch Filing 1** Date: 10/8/2019

								Q_{Total}		$Q_{Capture}$				$Q_{Flow\text{-}by}$				DEPTH (max)		SPREAD	
DP	BASIN	Inlet size L(i)	Proposed or Existing	INLET TYPE	CROSS SLOPE	STREET SLOPE	T_c	Q_5 (cfs)	Q_{100} (cfs)	Q_5 (cfs)	Q_{100} (cfs)	$CA_{eqv.}$ (5-yr)	$CA_{eqv.}$ (100-yr)	Q_5 (cfs)	Q_{100} (cfs)	$CA_{eqv.}$ (5-yr)	$CA_{eqv.}$ (100-yr)	Q_5 (ft)	Q_{100} (ft)	Q_5 (ft)	Q_{100} (ft)
I04	B01	10	PROP	SUMP[1]	2.0%		16.0	2.2	6.4	2.2	6.4	0.63	1.11	-	-	-	-	0.47	0.47		
I05	B02	15	PROP	SUMP[1]	2.0%		16.7	5.2	15	5.2	14	1.55	2.41	-	1.8	-	0.33	0.47	0.47		
I06	B04	20	PROP	SUMP[1]	2.0%		19.7	6.2	18	6.2	17	2.01	3.30	-	1.2	-	0.23	0.47	0.47		
I07	B05	10	PROP	SUMP[1]	2.0%		15.4	3.1	9.1	3.1	9.1	0.89	1.56	-	-	-	-	0.47	0.47		
I08	B06	10	PROP	SUMP[1]	2.0%		11.9	3.3	9.9	3.3	9.9	0.86	1.52	-	-	-	-	0.47	0.47		
I09	B07	20	PROP	FLOW-BY	2.0%	1.0%	18.0	4.3	13	3.7	9.2	1.15	1.68	0.5	3.4	0.16	0.63	0.33	0.46	12.4	18.6
I10	B08	10	PROP	SUMP[1]	2.0%		19.9	2.5	7.6	2.5	7.6	0.80	1.46	-	-	-	-	0.47	0.47		
I11	B09	10	PROP	SUMP	2.0%		16.0	2.6	7.7	2.6	7.7	0.76	1.33	-	-	-	-	0.50	0.70		
I12	B10 B11	20	PROP	SUMP	2.0%		24.0	5.4	18	5.4	18	1.92	3.73	-	-	-	-	0.50	0.70		
I13	C01	10	PROP	SUMP[1]	2.0%		15.0	3.1	9.0	3.1	9.0	0.87	1.53	-	-	-	-	0.47	0.47		
I14	C02	15	PROP	SUMP[1]	2.0%		21.2	3.4	10	3.4	10	1.14	2.04	-	-	-	-	0.47	0.47		
I15	C03	5	PROP	SUMP[1]	2.0%		13.0	1.4	4.0	1.4	4.0	0.37	0.65	-	-	-	-	0.47	0.47		
I16	C04	5	PROP	SUMP[1]	2.0%		13.1	3.2	9.4	3.2	6.3	0.85	1.01	-	3.1	-	0.50	0.47	0.47		
I17	C05	5	PROP	SUMP	2.0%		12.3	0.6	1.8	0.6	1.8	0.16	0.28	-	-	-	-	0.50	0.70		
I18	C06	5	PROP	SUMP	2.0%		14.5	1.0	6.0	1.0	6.0	0.29	1.00	-	-	-	-	0.50	0.70		
CB1	C07	Type C	PROP	SUMP	2.0%		11.8	0.9	2.5	0.9	2.5	0.22	0.39	-	-	-	-	0.13	0.27		
I36	E03	15	PROP	SUMP	2.0%		16.8	6.0	20	6.0	20	1.80	3.60	-	-	-	-	1.00	1.00		
I37	E01	20	PROP	SUMP	2.0%		20.7	9.9	33	9.9	33	3.24	6.48	-	-	-	-	1.00	1.00		
I38	E06	5	PROP	SUMP[1]	2.0%		12.5	1.6	4.2	1.6	4.2	0.41	0.65	-	-	-	-	0.47	0.47		
I39	E07	15	PROP	FLOW-BY	2.0%	2.0%	12.7	2.5	6.7	2.0	4.5	0.52	0.70	0.5	2.2	0.14	0.35	0.26	0.34	8.9	12.9
I40	E08	10	PROP	SUMP[1]	2.0%		14.9	4.8	13	4.8	9.9	1.35	1.67	-	2.8	-	0.47	0.47	0.47		
I41	E09	15	PROP	SUMP[1]	2.0%		16.0	6.2	19	6.2	14	1.82	2.36	-	5.2	-	0.90	0.47	0.47		
I42	E10	20	PROP	SUMP	2.0%		19.8	7.0	19	7.0	19	2.26	3.59	-	-	-	-	0.50	0.70		
CB3	E11	Type C	PROP	SUMP	2.0%		45.6	6.3	18	6.3	18	3.42	5.69	-	-	-	-	0.45	0.70		
I43	E12	20	PROP	FLOW-BY	2.0%	1.0%	20.4	3.6	10.8	3.2	8.0	1.05	1.56	0.4	2.7	0.12	0.53	0.32	0.44	11.6	17.6
EI1	E13	15	PROP	SUMP[1]	2.0%		22.0	8.2	19	8.2	13	2.77	2.61	-	6.5	-	1.31	0.45	0.45		

[1] Forced sump at intersection

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
PIPE ROUTING

PROJECT: **Rolling Hills Ranch Filing 1** Date: 10/8/2019

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW							SYSTEM FLOW							TRAVEL TIME						
			I (in./ hr.)		CA		Q			I (in./ hr.)		CA		Q								
		Tc (Min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	Sum Tc (min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	**(5 YR)**	**(100 YR)**	PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)*	TRAVEL TIME Tt
I04	B01	16.0	3.42	5.75	0.63	1.11	2.2	6.4						**2.2**	**6.4**	18	0.013	I05	0.53%	75	4	0.3
I05	B02	16.7	3.36	5.64	1.55	2.41	5.2	14	16.7	3.36	5.64	2.18	3.52	**7.3**	**20**	24	0.013	J02	0.97%	5.2	7	0.0
J02									16.7	3.36	5.64	2.18	3.52	**7.3**	**20**	24	0.013	J03	0.51%	215	5	0.7
I06	B04	19.7	3.11	5.23	2.01	3.30	6.2	17						**6.2**	**17**	18	0.013	J03	19.34%	5.2	26	0.0
J03									19.7	3.11	5.23	4.19	6.82	**13**	**36**	30	0.013	J04	0.53%	75	6	0.2
I07	B05	15.4	3.48	5.84	0.89	1.56	3.1	9.1						**3.1**	**9.1**	18	0.013	J04	19.34%	5.2	26	0.0
J04									19.9	3.10	5.20	5.08	8.38	**16**	**44**	36	0.013	J05	0.51%	225	7	0.6
I08	B06	11.9	3.87	6.50	0.86	1.52	3.3	9.9						**3.3**	**9.9**	18	0.013	J05	19.34%	5.2	26	0.0
J05									20.4	3.06	5.13	5.94	9.90	**18**	**51**	36	0.013	J06	0.54%	64	7	0.2
I09	B07	18.0	3.24	5.45	1.15	1.68	3.7	9.2						**3.7**	**9.2**	18	0.013	J06	9.67%	5.2	19	0.0
J06									20.6	3.05	5.11	7.08	11.58	**22**	**59**	36	0.013	J07	1.29%	448	11	0.7
J07									21.3	3.00	5.03	7.08	11.58	**21**	**58**	36	0.013	J10	2.46%	407	15	0.5
I10	B08	19.9	3.09	5.19	0.80	1.46	2.5	7.6						**2.5**	**7.6**	18	0.013	J08	0.56%	54	4	0.2
J08									20.1	3.08	5.17	0.80	1.46	**2.5**	**7.5**	18	0.013	J09	0.75%	193	5	0.6
I11	B09	16.0	3.43	5.76	0.76	1.33	2.6	7.7						**2.6**	**7.7**	18	0.013	J09	0.99%	25	6	0.1
I12	B10 B11	24.0	2.82	4.73	1.92	3.73	5.4	18						**5.4**	**18**	18	0.013	J09	4.84%	5.2	13	0.0
J09									24.0	2.82	4.73	3.48	6.51	**9.8**	**31**	24	0.013	J10	0.60%	83	6	0.2
J10									24.2	2.80	4.70	10.56	18.09	**30**	**85**	42	0.013	OS2	2.06%	267	15	0.3
I13	C01	15.0	3.52	5.91	0.87	1.53	3.1	9.0						**3.1**	**9.0**	24	0.013	J11	1.00%	45	7	0.1
I14	C02	21.2	3.00	5.04	1.14	2.04	3.4	10						**3.4**	**10**	24	0.013	J11	2.58%	25	12	0.0
J11									21.2	3.00	5.03	2.01	3.57	**6.0**	**18**	24	0.013	J12	1.02%	295	7	0.7
I15	C03	13.0	3.74	6.27	0.37	0.65	1.4	4.0						**1.4**	**4.0**	18	0.013	J12	1.00%	45	6	0.1
I16	C04	13.1	3.72	6.25	0.85	1.01	3.2	6.3						**3.2**	**6.3**	18	0.013	J12	1.59%	25	8	0.1
J12									21.9	2.95	4.96	3.23	5.22	**9.5**	**26**	30	0.013	J13	0.64%	165	7	0.4
I17	C05	12.3	3.82	6.41	0.16	0.28	0.6	1.8						**0.6**	**1.8**	18	0.013	J13	0.99%	25	6	0.1
I18	C06	14.5	3.57	6.00	0.29	1.00	1.0	6.0						**1.0**	**6.0**	18	0.013	J13	4.84%	5.2	13	0.0
J13									22.3	2.92	4.91	3.68	6.50	**11**	**32**	36	0.013	J14	0.98%	77	9	0.1
CB1	C07	11.8	3.88	6.51	0.22	0.39	0.9	2.5						**0.9**	**2.5**	18	0.013	J14	2.81%	68	10	0.1
J14									22.5	2.92	4.89	3.91	6.89	**11**	**34**	36	0.013	OS3	1.03%	472	10	0.8
									23.3													

* Velocity estimated for calculation of travel time. Refer to Hydraulics for calculated velocity.

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW							SYSTEM FLOW							TRAVEL TIME						
			I (in./ hr.)		CA		Q			I (in./ hr.)		CA		Q								
		Tc (Min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	Sum Tc (min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	**(5 YR)**	**(100 YR)**	PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)*	TRAVEL TIME Tt
I37	E01	20.7	3.04	5.11	3.24	6.48	9.9	33						**9.9**	**33**	18	0.013	J27	0.76%	7	5	0.0
I36	E03	16.8	3.35	5.62	1.80	3.60	6.0	20.2						**6.0**	**20**	18	0.013	J29	1.00%	25	6	0.1
J30									20.7	3.04	5.10	5.04	10.08	**15**	**51**	36	0.013	J31	1.03%	44	10	0.1
J31									20.7	3.03	5.09	5.04	10.08	**15**	**51**	36	0.013	J36	0.79%	272	8	0.5
I38	E06	12.5	3.80	6.37	0.41	0.65	1.6	4.2						**1.6**	**4.2**	18	0.013	J32	1.16%	90	6	0.2
J32									12.7	3.77	6.33	0.41	0.65	**1.5**	**4.1**	18	0.013	J33	4.61%	348	13	0.5
I39	E07	12.7	3.77	6.34	0.52	0.70	2.0	4.5						**2.0**	**4.5**	18	0.013	J33	3.70%	26	11	0.0
J33									13.2	3.72	6.24	0.93	1.36	**3.5**	**8.5**	18	0.013	J34	1.95%	151	8	0.3
I40	E08	14.9	3.53	5.93	1.35	1.67	4.8	9.9						**4.8**	**9.9**	18	0.013	J34	1.04%	24	6	0.1
J34									15.0	3.53	5.92	2.28	3.03	**8.0**	**18**	24	0.013	J35	3.02%	478	13	0.6
J35									15.6	3.46	5.81	2.28	3.03	**8.0**	**18**	24	0.013	J36	1.29%	62	8	0.1
I41	E09	16.0	3.42	5.74	1.82	2.36	6.2	14						**6.2**	**14**	24	0.013	J36	1.03%	24	7	0.1
J36									21.3	3.00	5.03	9.14	15.48	**27**	**78**	42	0.013	J37	1.03%	316	11	0.5
I42	E10	19.8	3.11	5.22	2.26	3.59	7.0	19						**7.0**	**19**	24	0.013	J37	1.04%	106	7	0.2
J37									21.8	2.96	4.97	11.40	19.07	**34**	**95**	48	0.013	J38	1.22%	201	13	0.3
CB3	E11	45.6	1.85	3.11	3.42	5.69	6.3	18						**6.3**	**18**	18	0.013	J38	1.52%	112	7	0.3
I43	E12	20.4	3.06	5.14	1.05	1.56	3.2	8.0						**3.2**	**8.0**	18	0.013	J38	1.14%	13	6	0.0
J38									20.4	3.06	5.14	15.87	26.32	**49**	**135**	54	0.013	EJ01	2.39%	227	19	0.2
EI1	E13	22.0	2.95	4.95	2.77	2.61	8.2	13						**8.2**	**13**	18	0.013	EJ02	2.20%	4.5	9	0.0
CA's FROM MERIDIAN RANCH FILING 11A FDR, TIME OF CONCENTRATION ADJUSTED TO MATCH FLOW RATE FROM SCS METHOD									87.5	0.88	1.47	22.47	92.72	**20**	**136**							
EJ02									87.5	0.88	1.47	25.24	95.33	**22**	**140**	54	0.013	EJ01	0.49%	67	9	0.1

* Velocity estimated for calculation of travel time. Refer to Hydraulics for calculated velocity.

STORM DRAINAGE SYSTEM DESIGN

HYDRAULICS

PROJECT: **Rolling Hills Ranch Filing 1** Date: 10/8/2019

Label	Upstrm Node	Dnstrm Node	Intlet CA (acres)	Inlet Tc (min)	Inlet Flow (ft³/s)	System CA (acres)	System Flow Time (min)	System Intensity (in/hr)	Section Size (in)	Length (ft)	Slope (%)	Capacity (Full Flow) (ft³/s)	System Flow (ft³/s)	Velocity (Ave) (ft/s)	Elevation Ground (Upstrm) (ft)	Hydraulic Grade Line (Upstrm) (ft)	Invert (Upstrm) (ft)	Elevation Ground (Dnstrm) (ft)	Hydraulic Grade Line (Dnstrm) (ft)	Invert (Dnstrm) (ft)
P05	I04	I05	1.11	16.0	6.4	1.11	16.0	5.75	18	75.4	0.53%	8	6.4	3.6	7094.25	7091.9	7089.75	7094.44	7091.6	7089.35
P06	I05	J02	2.41	16.7	14	3.52	16.7	5.64	24	5.2	0.97%	22	20	6.4	7094.44	7091.6	7088.85	7094.47	7091.6	7088.80
P07	J02	J03				3.52	16.7	5.64	30	214.7	0.51%	29	20	4.1	7094.47	7091.3	7088.30	7094.28	7090.8	7087.20
P08	J03	J04				6.82	19.7	5.22	30	75.4	0.53%	30	36	7.3	7094.28	7090.7	7087.20	7094.26	7090.1	7086.80
P09	J04	J05				8.38	19.9	5.20	36	224.7	0.51%	48	44	6.2	7094.26	7090.0	7086.30	7094.27	7089.0	7085.15
P10	J05	J06				9.90	20.5	5.13	36	64.5	0.54%	49	51	7.2	7094.27	7088.6	7085.15	7093.76	7088.2	7084.80
P11	J06	J07				11.58	20.6	5.11	36	448.2	1.29%	76	60	12	7093.76	7087.3	7084.80	7084.74	7081.6	7079.00
P12	I06	J03	3.30	19.7	17	3.30	19.7	5.22	18	5.2	19.34%	46	17	9.8	7094.45	7091.6	7089.20	7094.28	7091.5	7088.20
P13	I07	J04	1.56	15.4	9.2	1.56	15.4	5.84	18	5.2	19.34%	46	9	5	7094.43	7090.6	7088.80	7094.26	7090.5	7087.80
P14	I08	J05	1.52	11.9	10	1.52	11.9	6.49	18	5.2	19.34%	46	10	5.6	7094.44	7089.2	7087.65	7094.27	7089.2	7086.65
P15	I09	J06	1.68	18.0	9.2	1.68	18.0	5.45	18	5.2	9.67%	33	9.2	16	7093.99	7088.0	7086.80	7093.76	7088.1	7086.30
P16	I10	J08	1.46	19.9	7.7	1.46	19.9	5.20	18	53.6	0.56%	8	7.7	4.3	7077.24	7075.8	7072.75	7076.93	7075.5	7072.45
P17	J08	J09				1.46	20.1	5.17	18	193.1	0.75%	9	7.6	4.3	7076.93	7075.3	7072.45	7075.53	7074.3	7071.00
P18	J09	J10				6.52	24.0	4.73	24	83.0	0.60%	18	31	9.9	7075.53	7073.7	7070.50	7076.78	7072.2	7070.00
P19	J10	OS2				18.10	24.2	4.71	42	267.0	2.06%	144	86	16	7076.78	7071.4	7068.50	7068.00	7065.0	7063.00
P20	J07	J10				11.58	21.3	5.03	36	406.9	2.46%	105	59	15	7084.74	7081.5	7079.00	7076.78	7072.3	7069.00
P22	I11	J09	1.33	16.0	7.7	1.33	16.0	5.75	18	25.2	0.99%	11	7.7	4.4	7075.76	7074.2	7071.25	7075.53	7074.0	7071.00
P23	I12	J09	3.73	24.0	18	3.73	24.0	4.73	18	5.2	4.84%	23	17.8	10.1	7075.76	7074.6	7071.25	7075.53	7074.5	7071.00
P25	I13	J11	1.53	15.0	9.1	1.53	15.0	5.91	18	45.2	1.00%	11	9.1	6.7	7072.13	7068.8	7067.60	7072.23	7068.4	7067.15
P26	J11	J12				3.57	21.2	5.03	24	295.0	1.02%	23	18.1	8.1	7072.23	7068.2	7066.65	7069.23	7065.0	7063.65
P27	J12	J13				5.23	21.9	4.96	30	165.3	0.64%	33	26.2	7.4	7069.23	7064.9	7063.15	7067.63	7063.8	7062.10
P28	J13	J14				6.51	22.2	4.92	36	76.8	0.98%	66	32.3	9.3	7067.63	7063.4	7061.60	7068.43	7063.2	7060.85
P29	J14	OS3				6.90	22.4	4.90	36	471.7	1.03%	68	34.1	9.6	7068.43	7062.8	7060.85	7061.00	7057.5	7056.00
P30	I15	J12	0.65	13.0	4.1	0.65	13.0	6.27	18	45.2	1.00%	11	4.1	5.6	7069.13	7065.4	7064.60	7069.23	7065.4	7064.15
P31	I16	J12	1.01	13.1	6.4	1.01	13.1	6.25	18	25.2	1.59%	13	6.4	7.4	7069.08	7065.5	7064.55	7069.23	7065.4	7064.15
P32	I17	J13	0.28	12.3	1.8	0.28	12.3	6.41	18	25.2	0.99%	11	1.8	4.4	7067.87	7063.9	7063.35	7067.63	7063.9	7063.10
P33	I18	J13	1.00	14.5	6.0	1.00	14.5	6.00	18	5.2	4.84%	23	6.0	11	7067.87	7064.3	7063.35	7067.63	7063.8	7063.10
P34	CB1	J14	0.39	11.8	2.6	0.39	11.8	6.52	18	67.6	2.81%	18	2.6	7.1	7067.00	7064.9	7064.25	7068.43	7062.7	7062.35
P35	I14	J11	2.04	21.2	10	2.04	21.2	5.04	18	25.2	2.58%	17	10	10	7072.33	7069.0	7067.80	7072.23	7068.4	7067.15
P74	J30	J31				10.08	20.7	5.10	36	43.7	1.03%	68	52	11	7030.40	7026.7	7024.35	7030.41	7026.0	7023.90
P75	J31	J36				10.08	20.8	5.09	42	272.0	0.79%	89	52	9.6	7030.41	7025.7	7023.40	7027.76	7024.9	7021.25
P76	I38	J32	0.65	12.5	4.2	0.65	12.5	6.37	18	90.5	1.16%	11	4.2	5.9	7063.08	7059.3	7058.55	7061.76	7058.4	7057.50
P77	J32	J33				0.65	12.8	6.32	18	347.8	4.61%	23	4.1	9.7	7061.76	7058.3	7057.50	7046.59	7042.8	7041.45
P78	J33	J34				1.35	13.4	6.20	18	151.5	1.95%	15	8.4	8.6	7046.59	7042.6	7041.45	7043.51	7039.8	7038.50
P79	J34	J35				3.02	15.0	5.92	24	478.1	3.02%	39	18	12	7043.51	7039.5	7038.00	7028.30	7025.2	7023.55
P80	J35	J36				3.02	15.6	5.81	24	62.2	1.29%	26	18	8.8	7028.30	7025.1	7023.55	7027.76	7024.9	7022.75
P81	J36	J37				15.96	23.9	4.74	42	315.8	1.03%	102	76	12	7027.76	7024.0	7021.25	7024.27	7020.3	7018.00
P82	J37	J38				19.55	24.3	4.69	48	201.2	1.22%	159	93	13	7024.27	7020.4	7017.50	7022.16	7017.3	7015.05
P83	J38	EJ01				26.79	45.8	3.10	54	226.9	2.39%	304	84	16	7022.16	7017.2	7014.55	7018.68	7012.9	7009.12
P84	EJ01	EX PIPE				122.12	86.2	1.50	60	545.8	1.14%	278	185	15	7018.68	7012.5	7008.62	7011.86	7005.4	7002.41
P87	I36	J30	3.60	16.8	20	3.60	16.8	5.63	18	24.7	1.01%	11	20	12	7030.36	7028.4	7026.10	7030.40	7027.5	7025.85
P88	I37	J30	6.48	20.7	33	6.48	20.7	5.10	18	4.7	5.35%	24	33	19	7030.36	7027.9	7026.10	7030.40	7027.5	7025.85
P89	I39	J33	0.70	12.7	4.5	0.70	12.7	6.33	18	25.7	3.70%	20	4.5	9.2	7046.92	7043.2	7042.40	7046.59	7042.7	7041.45
P90	I40	J34	1.67	14.9	10	1.67	14.9	5.93	18	24.0	1.04%	11	10	6.9	7043.24	7040.0	7038.75	7043.51	7039.8	7038.50
P91	I41	J36	2.86	23.8	14	2.86	23.8	4.75	24	24.2	1.03%	23	14	7.6	7027.99	7024.3	7023.00	7027.76	7024.1	7022.75
P92	I42	J37	3.59	19.8	19	3.59	19.8	5.21	24	106.0	1.04%	23	19	8.2	7026.54	7022.2	7020.60	7024.27	7021.3	7019.50
P93	CB3	J38	5.69	45.6	18	5.69	45.6	3.11	24	112.2	1.52%	28	18	9.4	7022.00	7020.3	7018.75	7022.16	7018.2	7017.05
P94	I43	J38	1.55	25.6	7.1	1.55	25.6	4.56	18	13.2	1.14%	11	7.1	6.7	7022.21	7018.7	7017.70	7022.16	7018.5	7017.55
P95	EI1	EJ02	2.61	22.0	13	2.61	22.0	4.95	18	4.5	2.20%	16	13	7.4	7018.73	7014.7	7012.55	7019.36	7014.7	7012.45
P97	ROM POND	EJ02	92.72	86.0	141	92.72	86.0	1.51	42	161.8	4.17%	206	141	23	7025.72	7020.6	7017.20	7019.36	7014.1	7010.45
P98	EJ02	EJ01				95.33	86.1	1.51	54	66.8	0.49%	138	145	9.9	7019.36	7013.7	7009.45	7018.68	7013.4	7009.12

Appendix B - HEC-HMS Data

Input Data

Rolling Hills Ranch Filing 1

BASIN	AREA (acre)	AREA (mi^2)	CURVE NO.	LAG TIME (min)
HISTORIC				
OS05	37	0.0578	61.0	15.2
OS06	84	0.1313	61.0	18.7
OS07	21	0.0328	63.1	15.4
OS08	26	0.0406	65.7	15.9
OS09	98	0.1527	65.0	29.5
HG01	35	0.0547	61.0	19.6
HG02	58	0.0906	61.0	25.4
HG03	117	0.1828	61.1	33.8
HG04	57	0.0891	61.0	30.7
HG05	72	0.1125	61.0	31.8
HG06A	88	0.1375	61.0	43.2
HG06B	66	0.1031	61.0	49.5
HG07	63	0.0984	61.0	28.3
HG08	85	0.1328	61.0	22.9
HG09	114	0.1781	61.0	35.6
HG10	88	0.1375	61.0	61.4
HG11	131	0.2047	61.0	40.4
HG12	83	0.1297	61.0	32.0
HG13	54	0.0844	63.1	21.2
HG14	147	0.2297	61.0	45.1
HG15	164	0.2563	61.0	65.1
HG18	21	0.0328	61.0	14.1
HG19	3	0.0047	61.0	6.1
HG20	1	0.0016	61.0	6.9
HG21	14	0.0219	61.0	13.8

BASIN	AREA (acre)	AREA (mi^2)	CURVE NO.	LAG TIME (min)
INTERIM				
FG08A	48	0.0750	76.8	13.3
FG08B	40	0.0630	76.7	16.6
FG09	31	0.0484	71.7	20.8
FG10a	52	0.0806	72.6	12.4

BASIN	AREA (acre)	AREA (mi^2)	CURVE NO.	LAG TIME (min)
FG10b	27	0.0416	71.4	20.0
FG11	40	0.0625	78.2	23.2
FG12	21	0.0328	80.0	16.1
FG13	34	0.0534	66.3	29.6
FG14	64	0.1000	70.3	12.8
FG15	7	0.0103	78.6	15.6
FG16	51	0.0791	78.8	13.0
FG17a	44	0.0694	76.5	14.4
FG17b	14	0.0214	79.9	11.4
FG17c	20	0.0313	65.2	11.8
FG18	41	0.0644	73.5	29.9
FG19	34	0.0527	80.3	15.3
FG20	7	0.0109	92.9	10.1
FG30	25	0.0389	61.0	12.0
FG31	59	0.0922	80.0	24.0

BASIN	AREA (acre)	AREA (mi^2)	CURVE NO.	LAG TIME (min)
FUTURE				
OS05	37	0.0578	61.0	15.2
OS06	84	0.1313	61.0	18.7
OS07a	11	0.0170	63.1	13.9
OS07b	10	0.0156	63.1	10.9
OS08	26	0.0406	65.7	15.9
OS09	98	0.1527	65.0	29.5
FG01	34	0.0538	66.4	33.8
FG02	25	0.0391	64.6	16.1
FG03	13	0.0203	68.0	11.6
FG04	11	0.0172	68.0	7.6
FG05	37	0.0580	70.1	28.7
FG06	39	0.0608	65.4	18.4
FG08A	48	0.0750	76.8	13.3
FG08B	40	0.0630	76.7	16.6
FG09	31	0.0484	71.7	20.8

BASIN	AREA (acre)	AREA (mi^2)	CURVE NO.	LAG TIME (min)
FG10a	52	0.0806	73.2	23.3
FG10b	27	0.0416	71.4	20.0
FG11	40	0.0625	78.2	23.2
FG12	21	0.0328	80.0	16.1
FG13	34	0.0534	66.3	29.6
FG14	64	0.1000	74.6	26.4
FG15	7	0.0103	78.6	15.6
FG16	51	0.0791	78.8	13.0
FG17a	44	0.0694	76.5	14.4
FG17b	14	0.0214	79.9	11.4
FG17c	20	0.0313	65.2	11.8
FG18	41	0.0644	73.5	29.9
FG19	34	0.0527	80.3	15.3
FG19a	5	0.0077	75.2	16.4
FG20	7	0.0109	92.9	10.1
FG21a	5	0.0072	63.9	10.1
FG21b	11	0.0170	78.5	15.3
FG22	88	0.1380	67.3	24.8
FG23a	14	0.0216	68.6	18.0
FG23b	18	0.0286	64.7	16.5
FG23c	8	0.0122	67.3	14.0
FG24	88	0.1373	68.1	24.9
FG25	70	0.1086	74.1	36.6
FG26	55	0.0863	70.7	23.1
FG27	32	0.0500	74.7	23.9
FG28	16	0.0245	66.6	23.0
FG29	64	0.0997	61.0	19.1
FG30	25	0.0389	80.0	10.9
FG31	59	0.0922	80.0	24.0
FG32	26	0.0402	80.0	12.1
FG33	19	0.0302	73.5	19.3
FG34	38	0.0600	62.0	23.5
FG35	22	0.0344	63.4	26.4
FG36	18	0.0281	61.0	25.0
FG37	51	0.0797	61.0	24.7

NOAA Atlas 14, Volume 8, Version 2
Location name: Peyton, Colorado, USA*
Latitude: 38.9783°, Longitude: -104.5842°
Elevation: 7054.14 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

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	0.239 (0.190-0.301)	0.291 (0.232-0.367)	0.381 (0.302-0.482)	0.460 (0.363-0.585)	0.576 (0.442-0.764)	0.670 (0.501-0.899)	0.770 (0.556-1.06)	0.875 (0.606-1.23)	1.02 (0.680-1.48)	1.14 (0.737-1.66)
10-min	0.349 (0.278-0.441)	0.426 (0.339-0.538)	0.558 (0.443-0.706)	0.674 (0.532-0.857)	0.843 (0.647-1.12)	0.982 (0.734-1.32)	1.13 (0.814-1.55)	1.28 (0.888-1.80)	1.50 (0.996-2.16)	1.67 (1.08-2.44)
15-min	0.426 (0.340-0.538)	0.519 (0.413-0.656)	0.680 (0.540-0.861)	0.822 (0.648-1.04)	1.03 (0.789-1.36)	1.20 (0.895-1.61)	1.37 (0.993-1.89)	1.56 (1.08-2.20)	1.82 (1.22-2.64)	2.03 (1.31-2.97)
30-min	0.608 (0.485-0.768)	0.741 (0.590-0.936)	0.969 (0.769-1.23)	1.17 (0.923-1.49)	1.46 (1.12-1.94)	1.70 (1.27-2.28)	1.95 (1.41-2.68)	2.21 (1.53-3.12)	2.58 (1.72-3.73)	2.87 (1.86-4.20)
60-min	0.778 (0.620-0.982)	0.934 (0.744-1.18)	1.21 (0.962-1.54)	1.47 (1.16-1.86)	1.84 (1.42-2.46)	2.16 (1.62-2.91)	2.50 (1.81-3.44)	2.87 (1.99-4.05)	3.38 (2.26-4.91)	3.80 (2.46-5.56)
2-hr	0.948 (0.762-1.19)	1.13 (0.905-1.41)	1.46 (1.16-1.83)	1.76 (1.40-2.22)	2.23 (1.73-2.96)	2.62 (1.99-3.51)	3.05 (2.23-4.18)	3.52 (2.47-4.95)	4.19 (2.82-6.04)	4.73 (3.09-6.87)
3-hr	1.04 (0.839-1.29)	1.22 (0.986-1.52)	1.57 (1.26-1.96)	1.90 (1.51-2.38)	2.41 (1.90-3.21)	2.86 (2.18-3.83)	3.35 (2.47-4.59)	3.90 (2.75-5.47)	4.68 (3.18-6.75)	5.33 (3.50-7.71)
6-hr	1.21 (0.980-1.49)	1.40 (1.14-1.73)	1.78 (1.44-2.21)	2.16 (1.74-2.68)	2.76 (2.19-3.65)	3.29 (2.53-4.38)	3.88 (2.88-5.28)	4.53 (3.23-6.34)	5.49 (3.76-7.88)	6.29 (4.17-9.04)
12-hr	1.39 (1.14-1.70)	1.62 (1.33-1.98)	2.06 (1.68-2.53)	2.48 (2.02-3.06)	3.16 (2.53-4.14)	3.76 (2.92-4.96)	4.42 (3.31-5.97)	5.15 (3.70-7.14)	6.22 (4.30-8.85)	7.10 (4.75-10.1)
24-hr	1.61 (1.33-1.95)	1.88 (1.55-2.29)	2.39 (1.97-2.92)	2.88 (2.35-3.52)	3.63 (2.91-4.69)	4.27 (3.34-5.58)	4.98 (3.75-6.66)	5.75 (4.17-7.90)	6.87 (4.78-9.70)	7.79 (5.25-11.1)
2-day	1.86 (1.55-2.24)	2.19 (1.83-2.64)	2.79 (2.31-3.36)	3.33 (2.75-4.04)	4.15 (3.35-5.30)	4.85 (3.81-6.25)	5.59 (4.25-7.39)	6.40 (4.67-8.70)	7.55 (5.30-10.6)	8.49 (5.77-12.0)
3-day	2.04 (1.71-2.45)	2.41 (2.01-2.88)	3.05 (2.54-3.66)	3.63 (3.01-4.38)	4.51 (3.65-5.71)	5.24 (4.14-6.72)	6.03 (4.59-7.92)	6.87 (5.03-9.29)	8.07 (5.69-11.2)	9.04 (6.18-12.7)
4-day	2.20 (1.85-2.62)	2.58 (2.16-3.08)	3.25 (2.72-3.89)	3.86 (3.21-4.63)	4.77 (3.87-6.01)	5.53 (4.38-7.06)	6.34 (4.85-8.31)	7.22 (5.31-9.73)	8.46 (5.98-11.7)	9.46 (6.50-13.2)
7-day	2.60 (2.20-3.08)	3.00 (2.54-3.56)	3.71 (3.13-4.41)	4.36 (3.65-5.20)	5.33 (4.36-6.67)	6.14 (4.89-7.78)	7.00 (5.40-9.11)	7.93 (5.87-10.6)	9.26 (6.59-12.8)	10.3 (7.14-14.4)
10-day	2.96 (2.51-3.48)	3.39 (2.88-4.00)	4.16 (3.52-4.92)	4.85 (4.08-5.76)	5.88 (4.82-7.31)	6.73 (5.38-8.48)	7.63 (5.91-9.88)	8.61 (6.39-11.5)	9.97 (7.13-13.7)	11.1 (7.70-15.4)
20-day	3.95 (3.38-4.61)	4.55 (3.89-5.32)	5.57 (4.75-6.52)	6.44 (5.46-7.58)	7.68 (6.32-9.39)	8.67 (6.97-10.8)	9.69 (7.54-12.4)	10.8 (8.04-14.1)	12.2 (8.79-16.6)	13.3 (9.36-18.4)
30-day	4.75 (4.09-5.51)	5.49 (4.72-6.38)	6.70 (5.74-7.81)	7.72 (6.58-9.04)	9.12 (7.52-11.1)	10.2 (8.24-12.6)	11.3 (8.83-14.3)	12.4 (9.32-16.2)	13.9 (10.1-18.7)	15.0 (10.6-20.6)
45-day	5.73 (4.96-6.62)	6.62 (5.72-7.65)	8.05 (6.93-9.33)	9.21 (7.89-10.7)	10.8 (8.91-12.9)	12.0 (9.68-14.6)	13.1 (10.3-16.5)	14.3 (10.7-18.5)	15.8 (11.4-21.1)	16.9 (12.0-23.0)
60-day	6.56 (5.70-7.55)	7.55 (6.55-8.69)	9.12 (7.88-10.5)	10.4 (8.92-12.0)	12.1 (9.98-14.4)	13.3 (10.8-16.1)	14.5 (11.4-18.1)	15.6 (11.8-20.2)	17.1 (12.5-22.8)	18.2 (12.9-24.8)

[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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HISTORIC MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
OS06	0.1313	81	01Jul2015, 12:12	9.4
OS06-G02	0.1313	79	01Jul2015, 12:24	9.3
OS05	0.0578	40	01Jul2015, 12:12	4.2
OS05-G01	0.0578	38	01Jul2015, 12:12	4.1
HG01	0.0547	33	01Jul2015, 12:12	3.9
G01	0.1125	71	01Jul2015, 12:12	8.0
G01-G02	0.1125	70	01Jul2015, 12:24	7.9
HG02	0.0906	46	01Jul2015, 12:24	6.5
G02	0.3344	194	01Jul2015, 12:24	23.7
G02-G03	0.3344	192	01Jul2015, 12:30	23.4
HG03	0.1828	79	01Jul2015, 12:30	13.1
OS07	0.0328	25	01Jul2015, 12:12	2.6
OS07-G03	0.0328	24	01Jul2015, 12:30	2.5
G03	0.5500	295	01Jul2015, 12:30	38.9
G03-G04	0.5500	286	01Jul2015, 12:30	38.6
OS09	0.1547	92	01Jul2015, 12:24	13.3
OS09-G04	0.1547	91	01Jul2015, 12:30	13.2
HG04	0.0891	40	01Jul2015, 12:30	6.3
HG05	0.1125	50	01Jul2015, 12:30	8.0
OS08	0.0406	36	01Jul2015, 12:12	3.6
OS08-G04	0.0406	34	01Jul2015, 12:30	3.5
G04	0.9469	502	01Jul2015, 12:30	69.6
G04-G05	0.9469	496	01Jul2015, 12:36	69.3
HG06A	0.1375	50	01Jul2015, 12:42	9.7
G05	1.0844	544	01Jul2015, 12:36	79.1
G05-G06	1.0844	530	01Jul2015, 12:36	78.6
HG06B	0.1031	34	01Jul2015, 12:48	7.3
G06	1.1875	561	01Jul2015, 12:36	85.9
HG07	0.0984	47	01Jul2015, 12:24	7.0
HG07-G11	0.0984	47	01Jul2015, 12:30	7.0
HG08	0.1328	73	01Jul2015, 12:18	9.5
G11	0.2312	115	01Jul2015, 12:24	16.5
G11-G12	0.2312	114	01Jul2015, 12:30	16.3
HG09	0.1781	73	01Jul2015, 12:30	12.7
G12	0.4093	187	01Jul2015, 12:30	29.0
G12-H08	0.4093	183	01Jul2015, 12:36	28.3
HG10	0.1375	39	01Jul2015, 13:06	9.6
H08	0.5468	216	01Jul2015, 12:42	38.0
HG14	0.2297	81	01Jul2015, 12:42	16.2
HG13	0.0844	55	01Jul2015, 12:18	6.7
G07	0.0844	55	01Jul2015, 12:18	6.7
G07-G08	0.0844	54	01Jul2015, 12:18	6.6
G08	0.3141	119	01Jul2015, 12:30	22.9
HG15	0.2563	70	01Jul2015, 13:06	17.9
H13	0.2563	70	01Jul2015, 13:06	17.9
HG11	0.2047	77	01Jul2015, 12:36	14.5
H09	0.2047	77	01Jul2015, 12:36	14.5
HG12	0.1297	57	01Jul2015, 12:30	9.2
H10	0.1297	57	01Jul2015, 12:30	9.2

Highlighted green rows reference key design points (Typical all charts this section)

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HISTORIC MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
OS06	0.1313	53	01Jul2015, 12:12	6.6
OS06-G02	0.1313	52	01Jul2015, 12:24	6.5
OS05	0.0578	26	01Jul2015, 12:12	2.9
OS05-G01	0.0578	26	01Jul2015, 12:18	2.9
HG01	0.0547	21	01Jul2015, 12:18	2.8
G01	0.1125	47	01Jul2015, 12:18	5.6
G01-G02	0.1125	47	01Jul2015, 12:24	5.5
HG02	0.0906	30	01Jul2015, 12:24	4.5
G02	0.3344	129	01Jul2015, 12:24	16.6
G02-G03	0.3344	127	01Jul2015, 12:30	16.3
HG03	0.1828	51	01Jul2015, 12:30	9.2
OS07	0.0328	17	01Jul2015, 12:12	1.9
OS07-G03	0.0328	17	01Jul2015, 12:30	1.8
G03	0.5500	195	01Jul2015, 12:30	27.3
G03-G04	0.5500	192	01Jul2015, 12:36	27.0
OS09	0.1547	64	01Jul2015, 12:24	9.7
OS09-G04	0.1547	63	01Jul2015, 12:36	9.5
HG04	0.0891	27	01Jul2015, 12:30	4.5
HG05	0.1125	33	01Jul2015, 12:30	5.6
OS08	0.0406	25	01Jul2015, 12:12	2.6
OS08-G04	0.0406	24	01Jul2015, 12:36	2.5
G04	0.9469	336	01Jul2015, 12:36	49.1
G04-G05	0.9469	322	01Jul2015, 12:42	48.9
HG06A	0.1375	33	01Jul2015, 12:42	6.8
G05	1.0844	355	01Jul2015, 12:42	55.7
G05-G06	1.0844	353	01Jul2015, 12:42	55.3
HG06B	0.1031	22	01Jul2015, 12:54	5.1
G06	1.1875	375	01Jul2015, 12:42	60.4
HG07	0.0984	31	01Jul2015, 12:24	4.9
HG07-G11	0.0984	31	01Jul2015, 12:30	4.9
HG08	0.1328	48	01Jul2015, 12:18	6.7
G11	0.2312	75	01Jul2015, 12:24	11.6
G11-G12	0.2312	75	01Jul2015, 12:30	11.4
HG09	0.1781	48	01Jul2015, 12:36	8.9
G12	0.4093	122	01Jul2015, 12:30	20.3
G12-H08	0.4093	121	01Jul2015, 12:42	19.8
HG10	0.1375	26	01Jul2015, 13:06	6.7
H08	0.5468	142	01Jul2015, 12:42	26.6
HG14	0.2297	53	01Jul2015, 12:48	11.4
HG13	0.0844	37	01Jul2015, 12:18	4.8
G07	0.0844	37	01Jul2015, 12:18	4.8
G07-G08	0.0844	37	01Jul2015, 12:24	4.7
G08	0.3141	78	01Jul2015, 12:30	16.1
HG15	0.2563	46	01Jul2015, 13:12	12.5
H13	0.2563	46	01Jul2015, 13:12	12.5
HG11	0.2047	51	01Jul2015, 12:42	10.2
H09	0.2047	51	01Jul2015, 12:42	10.2
HG12	0.1297	38	01Jul2015, 12:30	6.5
H10	0.1297	38	01Jul2015, 12:30	6.5

Highlighted green rows reference key design points (Typical all charts this section)

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HISTORIC MDDP (25-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q25 (CFS)	TIME OF PEAK	TOTAL VOLUME Q25 (AC. FT.)
OS06	0.1313	31	01Jul2015, 12:18	4.4
OS06-G02	0.1313	31	01Jul2015, 12:24	4.3
OS05	0.0578	16	01Jul2015, 12:12	1.9
OS05-G01	0.0578	16	01Jul2015, 12:18	1.9
HG01	0.0547	13	01Jul2015, 12:18	1.8
G01	0.1125	28	01Jul2015, 12:18	3.7
G01-G02	0.1125	27	01Jul2015, 12:24	3.7
HG02	0.0906	18	01Jul2015, 12:24	3.0
G02	0.3344	76	01Jul2015, 12:24	11.0
G02-G03	0.3344	75	01Jul2015, 12:36	10.7
HG03	0.1828	31	01Jul2015, 12:36	6.1
OS07	0.0328	11	01Jul2015, 12:12	1.3
OS07-G03	0.0328	9.9	01Jul2015, 12:36	1.2
G03	0.5500	115	01Jul2015, 12:36	18.0
G03-G04	0.5500	113	01Jul2015, 12:42	17.8
OS09	0.1547	41	01Jul2015, 12:30	6.7
OS09-G04	0.1547	41	01Jul2015, 12:36	6.5
HG04	0.0891	16	01Jul2015, 12:30	2.9
HG05	0.1125	19	01Jul2015, 12:30	3.7
OS08	0.0406	17	01Jul2015, 12:12	1.8
OS08-G04	0.0406	15	01Jul2015, 12:42	1.8
G04	0.9469	200	01Jul2015, 12:42	32.8
G04-G05	0.9469	193	01Jul2015, 12:42	32.6
HG06A	0.1375	20	01Jul2015, 12:48	4.5
G05	1.0844	212	01Jul2015, 12:42	37.1
G05-G06	1.0844	211	01Jul2015, 12:48	36.8
HG06B	0.1031	13	01Jul2015, 12:54	3.4
G06	1.1875	225	01Jul2015, 12:48	40.2
HG07	0.0984	18	01Jul2015, 12:30	3.3
HG07-G11	0.0984	18	01Jul2015, 12:30	3.2
HG08	0.1328	28	01Jul2015, 12:18	4.4
G11	0.2312	44	01Jul2015, 12:24	7.6
G11-G12	0.2312	44	01Jul2015, 12:30	7.5
HG09	0.1781	29	01Jul2015, 12:36	5.9
G12	0.4093	72	01Jul2015, 12:36	13.4
G12-H08	0.4093	71	01Jul2015, 12:48	13.0
HG10	0.1375	16	01Jul2015, 13:06	4.5
H08	0.5468	85	01Jul2015, 12:48	17.5
HG14	0.2297	32	01Jul2015, 12:48	7.5
HG13	0.0844	23	01Jul2015, 12:18	3.2
G07	0.0844	23	01Jul2015, 12:18	3.2
G07-G08	0.0844	23	01Jul2015, 12:24	3.2
G08	0.3141	48	01Jul2015, 12:36	10.7
HG15	0.2563	28	01Jul2015, 13:12	8.3
H13	0.2563	28	01Jul2015, 13:12	8.3
HG11	0.2047	30	01Jul2015, 12:42	6.7
H09	0.2047	30	01Jul2015, 12:42	6.7
HG12	0.1297	22	01Jul2015, 12:30	4.3
H10	0.1297	22	01Jul2015, 12:30	4.3

Highlighted green rows reference key design points (Typical all charts this section)

HISTORIC MDDP (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
OS06	0.1313	12	01Jul2015, 12:18	2.2
OS06-G02	0.1313	12	01Jul2015, 12:30	2.2
OS05	0.0578	5.9	01Jul2015, 12:12	1.0
OS05-G01	0.0578	5.7	01Jul2015, 12:24	1.0
HG01	0.0547	4.8	01Jul2015, 12:18	0.9
G01	0.1125	10	01Jul2015, 12:18	1.9
G01-G02	0.1125	10	01Jul2015, 12:36	1.8
HG02	0.0906	6.9	01Jul2015, 12:30	1.5
G02	0.3344	28	01Jul2015, 12:30	5.5
G02-G03	0.3344	28	01Jul2015, 12:48	5.4
HG03	0.1828	12	01Jul2015, 12:36	3.1
OS07	0.0328	4.6	01Jul2015, 12:12	0.7
OS07-G03	0.0328	4.4	01Jul2015, 12:42	0.7
G03	0.5500	44	01Jul2015, 12:48	9.1
G03-G04	0.5500	43	01Jul2015, 12:54	9.0
OS09	0.1547	19	01Jul2015, 12:30	3.7
OS09-G04	0.1547	19	01Jul2015, 12:42	3.6
HG04	0.0891	6.1	01Jul2015, 12:36	1.5
HG05	0.1125	7.6	01Jul2015, 12:36	1.9
OS08	0.0406	7.9	01Jul2015, 12:12	1.0
OS08-G04	0.0406	7.6	01Jul2015, 12:48	1.0
G04	0.9469	78	01Jul2015, 12:48	17.0
G04-G05	0.9469	78	01Jul2015, 12:54	16.8
HG06A	0.1375	7.8	01Jul2015, 12:54	2.3
G05	1.0844	86	01Jul2015, 12:54	19.1
G05-G06	1.0844	86	01Jul2015, 13:00	18.9
HG06B	0.1031	5.4	01Jul2015, 13:00	1.7
G06	1.1875	91	01Jul2015, 13:00	20.6
HG07	0.0984	7.1	01Jul2015, 12:30	1.6
HG07-G11	0.0984	7.0	01Jul2015, 12:36	1.6
HG08	0.1328	11	01Jul2015, 12:24	2.2
G11	0.2312	17	01Jul2015, 12:30	3.9
G11-G12	0.2312	17	01Jul2015, 12:42	3.8
HG09	0.1781	11	01Jul2015, 12:42	3.0
G12	0.4093	28	01Jul2015, 12:42	6.8
G12-H08	0.4093	28	01Jul2015, 13:00	6.5
HG10	0.1375	6.5	01Jul2015, 13:18	2.2
H08	0.5468	34	01Jul2015, 13:00	8.8
HG14	0.2297	13	01Jul2015, 12:54	3.8
HG13	0.0844	9.8	01Jul2015, 12:18	1.7
G07	0.0844	9.8	01Jul2015, 12:18	1.7
G07-G08	0.0844	9.7	01Jul2015, 12:30	1.7
G08	0.3141	20	01Jul2015, 12:36	5.5
HG15	0.2563	12	01Jul2015, 13:24	4.2
H13	0.2563	12	01Jul2015, 13:24	4.2
HG11	0.2047	12	01Jul2015, 12:48	3.4
H09	0.2047	12	01Jul2015, 12:48	3.4
HG12	0.1297	8.7	01Jul2015, 12:36	2.2
H10	0.1297	8.7	01Jul2015, 12:36	2.2

Highlighted green rows reference key design points (Typical all charts this section)

HISTORIC MDDP (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
OS06	0.1313	3.9	01Jul2015, 12:24	1.1
OS06-G02	0.1313	3.8	01Jul2015, 12:42	1.1
OS05	0.0578	1.8	01Jul2015, 12:18	0.5
OS05-G01	0.0578	1.8	01Jul2015, 12:30	0.5
HG01	0.0547	1.6	01Jul2015, 12:24	0.5
G01	0.1125	3.3	01Jul2015, 12:30	1.0
G01-G02	0.1125	3.3	01Jul2015, 12:42	0.9
HG02	0.0906	2.4	01Jul2015, 12:36	0.8
G02	0.3344	9.4	01Jul2015, 12:42	2.8
G02-G03	0.3344	9.3	01Jul2015, 13:00	2.7
HG03	0.1828	4.4	01Jul2015, 12:48	1.6
OS07	0.0328	1.7	01Jul2015, 12:18	0.4
OS07-G03	0.0328	1.7	01Jul2015, 13:00	0.4
G03	0.5500	15	01Jul2015, 13:00	4.7
G03-G04	0.5500	15	01Jul2015, 13:12	4.5
OS09	0.1547	8.5	01Jul2015, 12:36	2.1
OS09-G04	0.1547	8.5	01Jul2015, 12:48	2.0
HG04	0.0891	2.2	01Jul2015, 12:42	0.8
HG05	0.1125	2.7	01Jul2015, 12:42	1.0
OS08	0.0406	3.5	01Jul2015, 12:12	0.6
OS08-G04	0.0406	3.5	01Jul2015, 13:00	0.6
G04	0.9469	28	01Jul2015, 13:12	8.9
G04-G05	0.9469	28	01Jul2015, 13:18	8.8
HG06A	0.1375	2.9	01Jul2015, 13:00	1.2
G05	1.0844	31	01Jul2015, 13:18	9.9
G05-G06	1.0844	31	01Jul2015, 13:24	9.8
HG06B	0.1031	2.1	01Jul2015, 13:12	0.9
G06	1.1875	33	01Jul2015, 13:24	10.6
HG07	0.0984	2.4	01Jul2015, 12:42	0.8
HG07-G11	0.0984	2.4	01Jul2015, 12:48	0.8
HG08	0.1328	3.6	01Jul2015, 12:30	1.1
G11	0.2312	5.7	01Jul2015, 12:42	2.0
G11-G12	0.2312	5.6	01Jul2015, 12:54	1.9
HG09	0.1781	4.1	01Jul2015, 12:48	1.5
G12	0.4093	9.7	01Jul2015, 12:54	3.4
G12-H08	0.4093	9.7	01Jul2015, 13:18	3.3
HG10	0.1375	2.6	01Jul2015, 13:30	1.1
H08	0.5468	12	01Jul2015, 13:18	4.4
HG14	0.2297	4.8	01Jul2015, 13:06	1.9
HG13	0.0844	3.9	01Jul2015, 12:24	0.9
G07	0.0844	3.9	01Jul2015, 12:24	0.9
G07-G08	0.0844	3.8	01Jul2015, 12:36	0.9
G08	0.3141	7.6	01Jul2015, 12:54	2.8
HG15	0.2563	4.7	01Jul2015, 13:36	2.1
H13	0.2563	4.7	01Jul2015, 13:36	2.1
HG11	0.2047	4.5	01Jul2015, 13:00	1.7
H09	0.2047	4.5	01Jul2015, 13:00	1.7
HG12	0.1297	3.1	01Jul2015, 12:42	1.1
H10	0.1297	3.1	01Jul2015, 12:42	1.1

Highlighted green rows reference key design points (Typical all charts this section)

HISTORIC MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
OS06	0.1313	0.5	01Jul2015, 13:30	0.4
OS06-G02	0.1313	0.5	01Jul2015, 14:00	0.3
OS05	0.0578	0.2	01Jul2015, 13:18	0.2
OS05-G01	0.0578	0.2	01Jul2015, 13:36	0.2
HG01	0.0547	0.2	01Jul2015, 13:30	0.1
G01	0.1125	0.5	01Jul2015, 13:36	0.3
G01-G02	0.1125	0.5	01Jul2015, 14:00	0.3
HG02	0.0906	0.4	01Jul2015, 13:42	0.2
G02	0.3344	1.4	01Jul2015, 13:54	0.9
G02-G03	0.3344	1.4	01Jul2015, 14:30	0.8
HG03	0.1828	0.8	01Jul2015, 13:48	0.5
OS07	0.0328	0.3	01Jul2015, 12:54	0.1
OS07-G03	0.0328	0.3	01Jul2015, 14:12	0.1
G03	0.5500	2.4	01Jul2015, 14:18	1.4
G03-G04	0.5500	2.4	01Jul2015, 14:36	1.3
OS09	0.1547	2.0	01Jul2015, 12:54	0.8
OS09-G04	0.1547	2.0	01Jul2015, 13:18	0.8
HG04	0.0891	0.4	01Jul2015, 13:48	0.2
HG05	0.1125	0.5	01Jul2015, 13:48	0.3
OS08	0.0406	0.8	01Jul2015, 12:24	0.2
OS08-G04	0.0406	0.8	01Jul2015, 13:36	0.2
G04	0.9469	4.9	01Jul2015, 14:30	2.9
G04-G05	0.9469	4.9	01Jul2015, 14:42	2.8
HG06A	0.1375	0.5	01Jul2015, 14:12	0.4
G05	1.0844	5.4	01Jul2015, 14:42	3.2
G05-G06	1.0844	5.4	01Jul2015, 14:54	3.1
HG06B	0.1031	0.4	01Jul2015, 14:24	0.3
G06	1.1875	5.8	01Jul2015, 14:54	3.4
HG07	0.0984	0.4	01Jul2015, 13:42	0.3
HG07-G11	0.0984	0.4	01Jul2015, 14:00	0.3
HG08	0.1328	0.5	01Jul2015, 13:36	0.4
G11	0.2312	0.9	01Jul2015, 13:48	0.6
G11-G12	0.2312	0.9	01Jul2015, 14:12	0.6
HG09	0.1781	0.7	01Jul2015, 13:54	0.5
G12	0.4093	1.6	01Jul2015, 14:06	1.0
G12-H08	0.4093	1.6	01Jul2015, 14:54	0.9
HG10	0.1375	0.5	01Jul2015, 14:42	0.3
H08	0.5468	2.1	01Jul2015, 14:48	1.3
HG14	0.2297	0.9	01Jul2015, 14:18	0.6
HG13	0.0844	0.7	01Jul2015, 13:00	0.3
G07	0.0844	0.7	01Jul2015, 13:00	0.3
G07-G08	0.0844	0.7	01Jul2015, 13:18	0.3
G08	0.3141	1.5	01Jul2015, 13:54	0.9
HG15	0.2563	0.9	01Jul2015, 14:48	0.6
H13	0.2563	0.9	01Jul2015, 14:48	0.6
HG11	0.2047	0.8	01Jul2015, 14:06	0.5
H09	0.2047	0.8	01Jul2015, 14:06	0.5
HG12	0.1297	0.5	01Jul2015, 13:48	0.3
H10	0.1297	0.5	01Jul2015, 13:48	0.3

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
FG10A	0.0806	111	01Jul2015, 12:06	9.5
FG08A	0.0750	116	01Jul2015, 12:06	10.2
FG08A-G05	0.0750	110	01Jul2015, 12:12	10.2
FG08B	0.0630	86	01Jul2015, 12:12	8.5
FG08B-G05	0.0630	84	01Jul2015, 12:12	8.5
FG11	0.0625	75	01Jul2015, 12:18	8.9
FG09	0.0484	48	01Jul2015, 12:12	5.5
FG09-G05	0.0484	48	01Jul2015, 12:18	5.5
FG10B	0.0416	42	01Jul2015, 12:12	4.6
G05	0.3711	451	01Jul2015, 12:12	47.1
FG13	0.0534	34	01Jul2015, 12:24	4.8
FG12	0.0328	50	01Jul2015, 12:12	5.0
POND D IN	0.4573	527	01Jul2015, 12:12	56.9
POND D	0.4573	134	01Jul2015, 12:54	46.6
POND D-G17	0.4573	134	01Jul2015, 13:00	46.6
FG15	0.0103	15	01Jul2015, 12:06	1.5
FG15-G17A	0.0103	15	01Jul2015, 12:12	1.5
G17	0.5676	159	01Jul2015, 12:42	58.8
FG16	0.0791	133	01Jul2015, 12:06	11.5
G18	0.6467	277	01Jul2015, 12:06	70.3
G18-POND E	0.6467	272	01Jul2015, 12:12	70.2
FG31	0.0922	116	01Jul2015, 12:18	13.9
FG30	0.0389	30	01Jul2015, 12:06	2.8
FG30-PONDHS	0.0389	28	01Jul2015, 12:18	2.7
POND HS	0.1311	112	01Jul2015, 12:30	16.6
FG17a	0.0694	101	01Jul2015, 12:06	9.3
FG17a-POND E	0.0694	99	01Jul2015, 12:06	9.3
FG18	0.0644	56	01Jul2015, 12:24	7.7
FG18-POND E	0.0644	56	01Jul2015, 12:24	7.7
FG19	0.0527	84	01Jul2015, 12:06	8.0
FG17c	0.0313	31	01Jul2015, 12:06	2.7
FG17b	0.0214	39	01Jul2015, 12:06	3.2
POND E IN	1.0170	590	01Jul2015, 12:12	117.9
POND E	1.0170	224	01Jul2015, 13:36	93.9
H08	1.0170	193	01Jul2015, 13:36	82.3
FG20	0.0109	28	01Jul2015, 12:06	2.4
H08A	1.0279	195	01Jul2015, 13:30	84.7
H09	0.0000	31	01Jul2015, 13:36	11.6

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
FG10A	0.0806	83	01Jul2015, 12:06	7.2
FG08A	0.0750	90	01Jul2015, 12:06	7.9
FG08A-G05	0.0750	86	01Jul2015, 12:12	7.9
FG08B	0.0630	67	01Jul2015, 12:12	6.6
FG08B-G05	0.0630	65	01Jul2015, 12:12	6.6
FG11	0.0625	59	01Jul2015, 12:18	7.0
FG09	0.0484	36	01Jul2015, 12:12	4.1
FG09-G05	0.0484	36	01Jul2015, 12:18	4.1
FG10B	0.0416	31	01Jul2015, 12:12	3.5
G05	0.3711	345	01Jul2015, 12:12	36.3
FG13	0.0534	24	01Jul2015, 12:24	3.5
FG12	0.0328	40	01Jul2015, 12:12	3.9
POND D IN	0.4573	402	01Jul2015, 12:12	43.7
POND D	0.4573	90	01Jul2015, 13:00	34.5
POND D-G17	0.4573	90	01Jul2015, 13:06	34.5
FG15	0.0103	12	01Jul2015, 12:12	1.2
FG15-G17A	0.0103	12	01Jul2015, 12:12	1.2
G17	0.5676	110	01Jul2015, 12:06	43.7
FG16	0.0791	104	01Jul2015, 12:06	9.0
G18	0.6467	207	01Jul2015, 12:06	52.7
G18-POND E	0.6467	202	01Jul2015, 12:12	52.7
FG31	0.0922	92	01Jul2015, 12:18	11.0
FG30	0.0389	20.0	01Jul2015, 12:06	1.9
FG30-PONDHS	0.0389	19	01Jul2015, 12:18	1.9
POND HS	0.1311	63	01Jul2015, 12:36	12.9
FG17a	0.0694	78	01Jul2015, 12:06	7.3
FG17a-POND E	0.0694	76	01Jul2015, 12:06	7.3
FG18	0.0644	42	01Jul2015, 12:24	5.9
FG18-POND E	0.0644	42	01Jul2015, 12:24	5.9
FG19	0.0527	66	01Jul2015, 12:06	6.4
FG17c	0.0313	22	01Jul2015, 12:06	2.0
FG17b	0.0214	31	01Jul2015, 12:06	2.5
POND E IN	1.0170	449	01Jul2015, 12:12	89.6
POND E	1.0170	138	01Jul2015, 14:06	66.4
H08	1.0170	125	01Jul2015, 14:06	58.3
FG20	0.0109	23	01Jul2015, 12:06	2.0
H08A	1.0279	126.1	01Jul2015, 14:06	60.3
H09	0.0000	13	01Jul2015, 14:06	8.1

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (25-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q25 (CFS)	TIME OF PEAK	TOTAL VOLUME Q25 (AC. FT.)
FG10A	0.0806	59	01Jul2015, 12:06	5.2
FG08A	0.0750	66	01Jul2015, 12:06	5.9
FG08A-G05	0.0750	64	01Jul2015, 12:12	5.9
FG08B	0.0630	49	01Jul2015, 12:12	5.0
FG08B-G05	0.0630	48	01Jul2015, 12:12	4.9
FG11	0.0625	44	01Jul2015, 12:18	5.2
FG09	0.0484	25	01Jul2015, 12:18	3.0
FG09-G05	0.0484	25	01Jul2015, 12:18	3.0
FG10B	0.0416	22	01Jul2015, 12:12	2.5
G05	0.3711	251	01Jul2015, 12:12	26.8
FG13	0.0534	15	01Jul2015, 12:24	2.4
FG12	0.0328	30	01Jul2015, 12:12	3.0
POND D IN	0.4573	292	01Jul2015, 12:12	32.2
POND D	0.4573	50	01Jul2015, 13:24	24.2
POND D-G17	0.4573	50	01Jul2015, 13:24	24.2
FG15	0.0103	9	01Jul2015, 12:12	0.9
FG15-G17A	0.0103	9	01Jul2015, 12:12	0.9
G17	0.5676	74	01Jul2015, 12:12	30.8
FG16	0.0791	78	01Jul2015, 12:06	6.8
G18	0.6467	147	01Jul2015, 12:06	37.6
G18-POND E	0.6467	144	01Jul2015, 12:12	37.6
FG31	0.0922	69	01Jul2015, 12:18	8.4
FG30	0.0389	11.5	01Jul2015, 12:06	1.3
FG30-PONDHS	0.0389	11	01Jul2015, 12:18	1.3
POND HS	0.1311	40	01Jul2015, 12:42	9.6
FG17a	0.0694	57	01Jul2015, 12:06	5.4
FG17a-POND E	0.0694	56	01Jul2015, 12:12	5.4
FG18	0.0644	30	01Jul2015, 12:24	4.3
FG18-POND E	0.0644	30	01Jul2015, 12:24	4.3
FG19	0.0527	50	01Jul2015, 12:06	4.9
FG17c	0.0313	14	01Jul2015, 12:06	1.4
FG17b	0.0214	24	01Jul2015, 12:06	1.9
POND E IN	1.0170	326	01Jul2015, 12:12	65.1
POND E	1.0170	70	01Jul2015, 14:42	43.0
H08	1.0170	62	01Jul2015, 14:42	36.5
FG20	0.0109	19	01Jul2015, 12:06	1.6
H08A	1.0279	62.9	01Jul2015, 14:42	38.1
H09	0.0000	8	01Jul2015, 14:42	6.5

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
FG10A	0.0806	34	01Jul2015, 12:06	3.2
FG08A	0.0750	41	01Jul2015, 12:06	3.8
FG08A-G05	0.0750	41	01Jul2015, 12:12	3.8
FG08B	0.0630	31	01Jul2015, 12:12	3.2
FG08B-G05	0.0630	29	01Jul2015, 12:18	3.2
FG11	0.0625	28	01Jul2015, 12:18	3.4
FG09	0.0484	14	01Jul2015, 12:18	1.8
FG09-G05	0.0484	14	01Jul2015, 12:18	1.8
FG10B	0.0416	12	01Jul2015, 12:18	1.5
G05	0.3711	152	01Jul2015, 12:12	17.0
FG13	0.0534	7	01Jul2015, 12:30	1.4
FG12	0.0328	20	01Jul2015, 12:12	2.0
POND D IN	0.4573	176	01Jul2015, 12:12	20.3
POND D	0.4573	18	01Jul2015, 14:18	14.7
POND D-G17	0.4573	18	01Jul2015, 14:24	14.7
FG15	0.0103	6	01Jul2015, 12:12	0.6
FG15-G17A	0.0103	6	01Jul2015, 12:12	0.6
G17	0.5676	41	01Jul2015, 12:06	18.7
FG16	0.0791	50	01Jul2015, 12:06	4.5
G18	0.6467	88	01Jul2015, 12:06	23.2
G18-POND E	0.6467	87	01Jul2015, 12:12	23.2
FG31	0.0922	45	01Jul2015, 12:18	5.6
FG30	0.0389	4	01Jul2015, 12:12	0.6
FG30-PONDHS	0.0389	4.2	01Jul2015, 12:24	0.6
POND HS	0.1311	28	01Jul2015, 12:42	6.2
FG17a	0.0694	35	01Jul2015, 12:06	3.5
FG17a-POND E	0.0694	35.1	01Jul2015, 12:12	3.5
FG18	0.0644	18	01Jul2015, 12:24	2.7
FG18-POND E	0.0644	17	01Jul2015, 12:30	2.7
FG19	0.0527	33	01Jul2015, 12:12	3.3
FG17c	0.0313	7	01Jul2015, 12:06	0.7
FG17b	0.0214	16	01Jul2015, 12:06	1.3
POND E IN	1.0170	199.1	01Jul2015, 12:12	40.9
POND E	1.0170	26.9	01Jul2015, 18:06	22.0
H08	1.0170	21	01Jul2015, 18:06	17.0
FG20	0.0109	15	01Jul2015, 12:06	1.2
H08A	1.0279	21.6	01Jul2015, 18:06	18.2
H09	0.0000	6	01Jul2015, 18:06	5.0

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
FG10A	0.0806	20.2	01Jul2015, 12:06	2.1
FG08A	0.0750	26.8	01Jul2015, 12:06	2.6
FG08A-G05	0.0750	26.5	01Jul2015, 12:12	2.6
FG08B	0.0630	20.1	01Jul2015, 12:12	2.2
FG08B-G05	0.0630	19.5	01Jul2015, 12:18	2.2
FG11	0.0625	18.6	01Jul2015, 12:18	2.4
FG09	0.0484	8.3	01Jul2015, 12:18	1.2
FG09-G05	0.0484	8.0	01Jul2015, 12:24	1.2
FG10B	0.0416	7.0	01Jul2015, 12:18	1.0
G05	0.3711	94.5	01Jul2015, 12:12	11.3
FG13	0.0534	4	01Jul2015, 12:30	0.8
FG12	0.0328	14	01Jul2015, 12:12	1.4
POND D IN	0.4573	110.1	01Jul2015, 12:12	13.6
POND D	0.4573	11.7	01Jul2015, 14:36	9.1
POND D-G17	0.4573	12	01Jul2015, 14:36	9.1
FG15	0.0103	4	01Jul2015, 12:12	0.4
FG15-G17A	0.0103	3.9	01Jul2015, 12:12	0.4
G17	0.5676	24.1	01Jul2015, 12:12	11.7
FG16	0.0791	33.9	01Jul2015, 12:06	3.1
G18	0.6467	55.2	01Jul2015, 12:12	14.8
G18-POND E	0.6467	55.0	01Jul2015, 12:12	14.8
FG31	0.0922	31.0	01Jul2015, 12:18	3.9
FG30	0.0389	1.3	01Jul2015, 12:12	0.3
FG30-PONDHS	0.0389	1.2	01Jul2015, 12:36	0.3
POND HS	0.1311	18.8	01Jul2015, 12:42	4.2
FG17a	0.0694	23.0	01Jul2015, 12:12	2.4
FG17a-POND E	0.0694	22.9	01Jul2015, 12:12	2.4
FG18	0.0644	10.6	01Jul2015, 12:30	1.8
FG18-POND E	0.0644	10.6	01Jul2015, 12:30	1.8
FG19	0.0527	22.9	01Jul2015, 12:12	2.3
FG17c	0.0313	2.8	01Jul2015, 12:12	0.4
FG17b	0.0214	10.8	01Jul2015, 12:06	0.9
POND E IN	1.0170	127.7	01Jul2015, 12:12	26.8
POND E	1.0170	13.9	01Jul2015, 20:30	11.4
H08	1.0170	10	01Jul2015, 20:30	8.0
FG20	0.0109	12	01Jul2015, 12:06	1.0
H08A	1.0279	13.0	01Jul2015, 12:06	9.0
H09	0.0000	4	01Jul2015, 20:30	3.4

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
FG10A	0.0806	8.3	01Jul2015, 12:12	1.1
FG08A	0.0750	13.4	01Jul2015, 12:12	1.5
FG08A-G05	0.0750	13.1	01Jul2015, 12:18	1.5
FG08B	0.0630	10.1	01Jul2015, 12:12	1.2
FG08B-G05	0.0630	10.0	01Jul2015, 12:18	1.2
FG11	0.0625	9.8	01Jul2015, 12:18	1.4
FG09	0.0484	3.2	01Jul2015, 12:18	0.6
FG09-G05	0.0484	3.2	01Jul2015, 12:24	0.6
FG10B	0.0416	2.7	01Jul2015, 12:18	0.5
G05	0.3711	45.1	01Jul2015, 12:18	6.2
FG13	0.0534	0.9	01Jul2015, 12:42	0.3
FG12	0.0328	7.8	01Jul2015, 12:12	0.8
POND D IN	0.4573	52.4	01Jul2015, 12:18	7.4
POND D	0.4573	4.3	01Jul2015, 18:00	3.9
POND D-G17	0.4573	4.3	01Jul2015, 18:06	3.9
FG15	0.0103	2.1	01Jul2015, 12:12	0.2
FG15-G17A	0.0103	2.1	01Jul2015, 12:12	0.2
G17	0.5676	9.6	01Jul2015, 12:12	5.2
FG16	0.0791	18.3	01Jul2015, 12:06	1.8
G18	0.6467	26.6	01Jul2015, 12:12	7.0
G18-POND E	0.6467	26.2	01Jul2015, 12:12	7.0
FG31	0.0922	17.2	01Jul2015, 12:18	2.4
FG30	0.0389	0.2	01Jul2015, 13:18	0.1
FG30-PONDHS	0.0389	0.2	01Jul2015, 13:48	0.1
POND HS	0.1311	10.0	01Jul2015, 12:42	2.5
FG17a	0.0694	11.7	01Jul2015, 12:12	1.3
FG17a-POND E	0.0694	11.6	01Jul2015, 12:12	1.3
FG18	0.0644	4.7	01Jul2015, 12:30	0.9
FG18-POND E	0.0644	4.6	01Jul2015, 12:30	0.9
FG19	0.0527	13.1	01Jul2015, 12:12	1.4
FG17c	0.0313	0.5	01Jul2015, 12:18	0.2
FG17b	0.0214	6.1	01Jul2015, 12:06	0.5
POND E IN	1.0170	64.1	01Jul2015, 12:12	13.9
POND E	1.0170	5.9	02Jul2015, 00:00	5.5
H08	1.0170	3.6	02Jul2015, 00:00	3.3
FG20	0.0109	8.5	01Jul2015, 12:06	0.7
H08A	1.0279	8.8	01Jul2015, 12:06	4.0
H09	0.0000	2.3	02Jul2015, 00:00	2.2

Highlighted green rows reference key design points (Typical all charts this section)

INTERIM CONDITIONS

FUTURE MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
OS06	0.1313	80	01Jul2015, 12:12	9.3
G1a	0.1313	80	01Jul2015, 12:12	9.3
G1a-G2	0.1313	79	01Jul2015, 12:18	9.2
OS05	0.0578	39	01Jul2015, 12:12	4.1
OS05-G1	0.0578	39	01Jul2015, 12:12	4.1
FG01	0.0538	31	01Jul2015, 12:30	4.9
FG01-G1	0.0538	31	01Jul2015, 12:30	4.9
G1	0.1116	61	01Jul2015, 12:18	9.0
G1-G2	0.1116	61	01Jul2015, 12:18	9.0
FG02	0.0391	32	01Jul2015, 12:12	3.3
G2	0.2820	167	01Jul2015, 12:18	21.5
G2-G3	0.2820	163	01Jul2015, 12:18	21.3
FG03	0.0203	24	01Jul2015, 12:06	2.0
FG04	0.0172	22	01Jul2015, 12:00	1.7
G3	0.3195	185	01Jul2015, 12:18	25.0
G3-POND F	0.3195	183	01Jul2015, 12:18	25.0
FG06	0.0608	49	01Jul2015, 12:12	5.3
FG05	0.0580	45	01Jul2015, 12:24	6.1
OS07a	0.0170	14	01Jul2015, 12:06	1.3
OS07a-POND F	0.0170	13	01Jul2015, 12:18	1.3
POND F IN	0.4553	286	01Jul2015, 12:18	37.7
POND F	0.4553	177	01Jul2015, 12:42	35.7
POND F-G7	0.4553	177	01Jul2015, 12:42	35.5
FG21b	0.0170	25	01Jul2015, 12:06	2.4
FG21a	0.0072	7	01Jul2015, 12:06	0.6
FG21a-G7	0.0072	7	01Jul2015, 12:18	0.6
G7	0.4795	186	01Jul2015, 12:42	38.5
G7-G8	0.4795	185	01Jul2015, 12:42	38.5
FG22	0.1380	102	01Jul2015, 12:18	13.0
OS08	0.0406	35	01Jul2015, 12:12	3.6
OS08-G8	0.0406	34	01Jul2015, 12:12	3.6
FG23a	0.0216	21	01Jul2015, 12:12	2.2
OS07b	0.0156	15	01Jul2015, 12:06	1.2
OS07b-G7	0.0156	14	01Jul2015, 12:12	1.2
G8	0.6953	291	01Jul2015, 12:30	58.5
G8-G10	0.6953	288	01Jul2015, 12:30	58.3
OS09	0.1527	90	01Jul2015, 12:24	13.0
OS09-G10	0.1527	88	01Jul2015, 12:36	12.8
FG24	0.1373	105	01Jul2015, 12:18	13.4
G9	0.2900	180	01Jul2015, 12:24	26.2
G9-G10	0.2900	178	01Jul2015, 12:30	26.2
FG23b	0.0286	23	01Jul2015, 12:12	2.4
G10	1.0139	478	01Jul2015, 12:30	86.9
G10-G11	1.0139	474	01Jul2015, 12:30	86.7
FG23c	0.0122	12	01Jul2015, 12:06	1.2
G11	1.0261	479	01Jul2015, 12:30	87.9

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
FG25	0.1086	85	01Jul2015, 12:30	13.3
FG26	0.0863	78	01Jul2015, 12:18	9.4
FG26-POND G	0.0863	77	01Jul2015, 12:18	9.4
FG27	0.0500	52	01Jul2015, 12:18	6.3
FG28	0.0245	18	01Jul2015, 12:18	2.2
POND G IN	1.2955	684	01Jul2015, 12:30	119.1
POND G	1.2955	478	01Jul2015, 12:54	110.0
G12	1.2955	478	01Jul2015, 12:54	110.0
G12-G06	1.2955	478	01Jul2015, 13:00	109.3
FG29	0.0997	60	01Jul2015, 12:12	7.1
FG32	0.0402	72	01Jul2015, 12:06	6.1
FG32-G06	0.0402	69	01Jul2015, 12:06	6.1
G06	1.4354	506	01Jul2015, 12:54	122.5
FG10A	0.0806	81	01Jul2015, 12:18	9.6
FG08A	0.0750	116	01Jul2015, 12:06	10.2
FG08A-G05	0.0750	110	01Jul2015, 12:12	10.2
FG08B	0.0630	86	01Jul2015, 12:12	8.5
FG08B-G05	0.0630	84	01Jul2015, 12:12	8.5
FG11	0.0625	75	01Jul2015, 12:18	8.9
FG09	0.0484	48	01Jul2015, 12:12	5.5
FG09-G05	0.0484	48	01Jul2015, 12:18	5.5
FG10B	0.0416	42	01Jul2015, 12:12	4.6
G05	0.3711	433	01Jul2015, 12:12	47.3
FG13	0.0534	34	01Jul2015, 12:24	4.8
FG12	0.0328	50	01Jul2015, 12:12	5.0
POND D IN	0.4573	509	01Jul2015, 12:12	57.0
POND D	0.4573	134	01Jul2015, 13:00	46.8
POND D-G17	0.4573	134	01Jul2015, 13:00	46.7
FG15	0.0103	15	01Jul2015, 12:06	1.5
FG15-G17A	0.0103	15	01Jul2015, 12:12	1.5
G17A	0.4676	137	01Jul2015, 13:00	48.2
FG14	0.1000	98	01Jul2015, 12:18	12.5
G17	0.5676	196	01Jul2015, 12:30	60.8
G17-G18	0.5676	196	01Jul2015, 12:36	60.7
FG16	0.0791	133	01Jul2015, 12:06	11.5
G18	0.6467	240	01Jul2015, 12:24	72.2
G18-POND E	0.6467	240	01Jul2015, 12:24	72.2
FG31	0.0922	116	01Jul2015, 12:18	13.9
FG30	0.0389	73	01Jul2015, 12:06	5.9
FG30-PONDHS	0.0389	70	01Jul2015, 12:12	5.8
POND HS	0.1311	153	01Jul2015, 12:24	19.7
FG17a	0.0694	101	01Jul2015, 12:06	9.3
FG17a-POND E	0.0694	99	01Jul2015, 12:06	9.3
FG18	0.0644	56	01Jul2015, 12:24	7.7
FG18-POND E	0.0644	56	01Jul2015, 12:24	7.7
FG19	0.0527	84	01Jul2015, 12:06	8.0

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
FG17c	0.0313	31	01Jul2015, 12:06	2.7
FG17b	0.0214	39	01Jul2015, 12:06	3.2
POND E IN	1.0170	610	01Jul2015, 12:18	122.9
POND E	1.0170	242	01Jul2015, 13:30	98.9
H08	1.0170	205	01Jul2015, 13:30	86.2
H09	0.0000	37	01Jul2015, 13:30	12.6
FG34	0.0600	34	01Jul2015, 12:18	4.5
G14	0.0600	34	01Jul2015, 12:18	4.5
G14-G15	0.0600	34	01Jul2015, 12:24	4.4
FG35	0.0344	20	01Jul2015, 12:24	2.7
G15	0.0944	53	01Jul2015, 12:24	7.1
G15-G08	0.0944	52	01Jul2015, 12:24	7.1
FG37	0.0797	41	01Jul2015, 12:18	5.6
FG36	0.0281	14	01Jul2015, 12:18	2.0
FG36-G08	0.0281	14	01Jul2015, 12:24	2.0
G08	0.2022	106	01Jul2015, 12:24	14.7

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
OS06	0.1313	52	01Jul2015, 12:12	6.5
G1a	0.1313	52	01Jul2015, 12:12	6.5
G1a-G2	0.1313	52	01Jul2015, 12:18	6.5
OS05	0.0578	26	01Jul2015, 12:12	2.9
OS05-G1	0.0578	25	01Jul2015, 12:12	2.9
FG01	0.0538	22	01Jul2015, 12:30	3.6
FG01-G1	0.0538	22	01Jul2015, 12:30	3.6
G1	0.1116	41	01Jul2015, 12:18	6.4
G1-G2	0.1116	41	01Jul2015, 12:18	6.4
FG02	0.0391	22	01Jul2015, 12:12	2.4
G2	0.2820	112	01Jul2015, 12:18	15.3
G2-G3	0.2820	109	01Jul2015, 12:24	15.2
FG03	0.0203	17	01Jul2015, 12:06	1.5
FG04	0.0172	16	01Jul2015, 12:00	1.2
G3	0.3195	123	01Jul2015, 12:18	17.9
G3-POND F	0.3195	121	01Jul2015, 12:18	17.9
FG06	0.0608	34	01Jul2015, 12:12	3.9
FG05	0.0580	33	01Jul2015, 12:24	4.6
OS07a	0.0170	9	01Jul2015, 12:12	1.0
OS07a-POND F	0.0170	9	01Jul2015, 12:18	0.9
POND F IN	0.4553	194	01Jul2015, 12:18	27.3
POND F	0.4553	121	01Jul2015, 12:42	25.6
POND F-G7	0.4553	120	01Jul2015, 12:48	25.5
FG21b	0.0170	20	01Jul2015, 12:06	1.9
FG21a	0.0072	5	01Jul2015, 12:06	0.4
FG21a-G7	0.0072	5	01Jul2015, 12:18	0.4
G7	0.4795	126	01Jul2015, 12:48	27.8
G7-G8	0.4795	126	01Jul2015, 12:48	27.8
FG22	0.1380	73	01Jul2015, 12:18	9.6
OS08	0.0406	25	01Jul2015, 12:12	2.6
OS08-G8	0.0406	24	01Jul2015, 12:12	2.6
FG23a	0.0216	15	01Jul2015, 12:12	1.6
OS07b	0.0156	10	01Jul2015, 12:06	0.9
OS07b-G7	0.0156	10	01Jul2015, 12:12	0.9
G8	0.6953	186	01Jul2015, 12:36	42.5
G8-G10	0.6953	186	01Jul2015, 12:42	42.3
OS09	0.1527	62	01Jul2015, 12:24	9.4
OS09-G10	0.1527	62	01Jul2015, 12:36	9.3
FG24	0.1373	76	01Jul2015, 12:18	9.9
G9	0.2900	125	01Jul2015, 12:30	19.2
G9-G10	0.2900	125.0	01Jul2015, 12:30	19.2
FG23b	0.0286	16	01Jul2015, 12:12	1.8
G10	1.0139	307	01Jul2015, 12:36	63.2
G10-G11	1.0139	305	01Jul2015, 12:36	63.0
FG23c	0.0122	9	01Jul2015, 12:06	0.9
G11	1.0261	308	01Jul2015, 12:36	63.9

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
FG25	0.1086	64	01Jul2015, 12:30	10.2
FG26	0.0863	58	01Jul2015, 12:18	7.1
FG26-POND G	0.0863	57	01Jul2015, 12:18	7.0
FG27	0.0500	40	01Jul2015, 12:18	4.8
FG28	0.0245	13	01Jul2015, 12:18	1.6
POND G IN	1.2955	454	01Jul2015, 12:30	87.6
POND G	1.2955	333	01Jul2015, 13:00	79.1
G12	1.2955	333	01Jul2015, 13:00	79.1
G12-G06	1.2955	332	01Jul2015, 13:00	78.6
FG29	0.0997	39	01Jul2015, 12:18	5.0
FG32	0.0402	57	01Jul2015, 12:06	4.8
FG32-G06	0.0402	54	01Jul2015, 12:06	4.8
G06	1.4354	352	01Jul2015, 13:00	88.4
FG10A	0.0806	61	01Jul2015, 12:18	7.3
FG08A	0.0750	90	01Jul2015, 12:06	7.9
FG08A-G05	0.0750	86	01Jul2015, 12:12	7.9
FG08B	0.0630	67	01Jul2015, 12:12	6.6
FG08B-G05	0.0630	65	01Jul2015, 12:12	6.6
FG11	0.0625	59	01Jul2015, 12:18	7.0
FG09	0.0484	36	01Jul2015, 12:12	4.1
FG09-G05	0.0484	36	01Jul2015, 12:18	4.1
FG10B	0.0416	31	01Jul2015, 12:12	3.5
G05	0.3711	330	01Jul2015, 12:12	36.4
FG13	0.0534	24	01Jul2015, 12:24	3.5
FG12	0.0328	40	01Jul2015, 12:12	3.9
POND D IN	0.4573	387	01Jul2015, 12:12	43.9
POND D	0.4573	91	01Jul2015, 13:06	34.7
POND D-G17	0.4573	91	01Jul2015, 13:06	34.6
FG15	0.0103	12	01Jul2015, 12:12	1.2
FG15-G17A	0.0103	12	01Jul2015, 12:12	1.2
G17A	0.4676	93	01Jul2015, 13:06	35.8
FG14	0.1000	74	01Jul2015, 12:18	9.6
G17	0.5676	132	01Jul2015, 12:36	45.4
G17-G18	0.5676	131	01Jul2015, 12:36	45.4
FG16	0.0791	104	01Jul2015, 12:06	9.0
G18	0.6467	178	01Jul2015, 12:12	54.4
G18-POND E	0.6467	176	01Jul2015, 12:12	54.4
FG31	0.0922	92	01Jul2015, 12:18	11.0
FG30	0.0389	57	01Jul2015, 12:06	4.7
FG30-PONDHS	0.0389	56	01Jul2015, 12:12	4.6
POND HS	0.1311	106	01Jul2015, 12:30	15.5
FG17a	0.0694	78	01Jul2015, 12:06	7.3
FG17a-POND E	0.0694	76	01Jul2015, 12:06	7.3
FG18	0.0644	42	01Jul2015, 12:24	5.9
FG18-POND E	0.0644	42	01Jul2015, 12:24	5.9
FG19	0.0527	66	01Jul2015, 12:06	6.4

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
FG17c	0.0313	22	01Jul2015, 12:06	2.0
FG17b	0.0214	31	01Jul2015, 12:06	2.5
POND E IN	1.0170	432	01Jul2015, 12:12	94.0
POND E	1.0170	153	01Jul2015, 13:54	70.7
H08	1.0170	137	01Jul2015, 13:54	62.1
H09	0.0000	16	01Jul2015, 13:54	8.5
FG34	0.0600	23	01Jul2015, 12:18	3.2
G14	0.0600	23	01Jul2015, 12:18	3.2
G14-G15	0.0600	22	01Jul2015, 12:24	3.1
FG35	0.0344	13.4	01Jul2015, 12:24	2.0
G15	0.0944	35.6	01Jul2015, 12:24	5.1
G15-G08	0.0944	35	01Jul2015, 12:30	5.0
FG37	0.0797	27	01Jul2015, 12:24	4.0
FG36	0.0281	9	01Jul2015, 12:24	1.4
FG36-G08	0.0281	9	01Jul2015, 12:30	1.4
G08	0.2022	69	01Jul2015, 12:24	10.4

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (25-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q25 (CFS)	TIME OF PEAK	TOTAL VOLUME Q25 (AC. FT.)
OS06	0.1313	30	01Jul2015, 12:18	4.3
G1a	0.1313	30	01Jul2015, 12:18	4.3
G1a-G2	0.1313	30	01Jul2015, 12:18	4.2
OS05	0.0578	15	01Jul2015, 12:12	1.9
OS05-G1	0.0578	15	01Jul2015, 12:12	1.9
FG01	0.0538	14	01Jul2015, 12:30	2.5
FG01-G1	0.0538	14	01Jul2015, 12:30	2.5
G1	0.1116	25	01Jul2015, 12:18	4.4
G1-G2	0.1116	25	01Jul2015, 12:24	4.3
FG02	0.0391	14	01Jul2015, 12:12	1.6
G2	0.2820	67	01Jul2015, 12:18	10.2
G2-G3	0.2820	66	01Jul2015, 12:24	10.1
FG03	0.0203	12	01Jul2015, 12:06	1.0
FG04	0.0172	11	01Jul2015, 12:00	0.9
G3	0.3195	74	01Jul2015, 12:24	12.0
G3-POND F	0.3195	74	01Jul2015, 12:24	12.0
FG06	0.0608	22	01Jul2015, 12:12	2.7
FG05	0.0580	23	01Jul2015, 12:24	3.3
OS07a	0.0170	6	01Jul2015, 12:12	0.6
OS07a-POND F	0.0170	6	01Jul2015, 12:24	0.6
POND F IN	0.4553	120	01Jul2015, 12:24	18.6
POND F	0.4553	61	01Jul2015, 12:54	17.2
POND F-G7	0.4553	60	01Jul2015, 13:00	17.1
FG21b	0.0170	15	01Jul2015, 12:12	1.5
FG21a	0.0072	3	01Jul2015, 12:06	0.3
FG21a-G7	0.0072	3	01Jul2015, 12:24	0.3
G7	0.4795	64	01Jul2015, 13:00	18.8
G7-G8	0.4795	64	01Jul2015, 13:00	18.8
FG22	0.1380	47	01Jul2015, 12:18	6.7
OS08	0.0406	16	01Jul2015, 12:12	1.8
OS08-G8	0.0406	15	01Jul2015, 12:18	1.8
FG23a	0.0216	10	01Jul2015, 12:12	1.1
OS07b	0.0156	6	01Jul2015, 12:06	0.6
OS07b-G7	0.0156	6	01Jul2015, 12:12	0.6
G8	0.6953	95	01Jul2015, 12:18	29.0
G8-G10	0.6953	94	01Jul2015, 12:24	28.9
OS09	0.1527	39	01Jul2015, 12:30	6.4
OS09-G10	0.1527	39	01Jul2015, 12:36	6.3
FG24	0.1373	50	01Jul2015, 12:18	7.0
G9	0.2900	81	01Jul2015, 12:30	13.3
G9-G10	0.2900	79.0	01Jul2015, 12:30	13.3
FG23b	0.0286	10	01Jul2015, 12:12	1.2
G10	1.0139	174	01Jul2015, 12:30	43.3
G10-G11	1.0139	173	01Jul2015, 12:30	43.2
FG23c	0.0122	6	01Jul2015, 12:12	0.6
G11	1.0261	176	01Jul2015, 12:30	43.8

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (25-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q25 (CFS)	TIME OF PEAK	TOTAL VOLUME Q25 (AC. FT.)
FG25	0.1086	45.9	01Jul2015, 12:30	7.5
FG26	0.0863	40	01Jul2015, 12:18	5.1
FG26-POND G	0.0863	39	01Jul2015, 12:18	5.0
FG27	0.0500	29	01Jul2015, 12:18	3.6
FG28	0.0245	8	01Jul2015, 12:18	1.1
POND G IN	1.2955	287	01Jul2015, 12:24	61.0
POND G	1.2955	170	01Jul2015, 13:12	53.1
G12	1.2955	170	01Jul2015, 13:12	53.1
G12-G06	1.2955	170	01Jul2015, 13:18	52.7
FG29	0.0997	23	01Jul2015, 12:18	3.3
FG32	0.0402	44	01Jul2015, 12:06	3.7
FG32-G06	0.0402	41	01Jul2015, 12:06	3.7
G06	1.4354	181	01Jul2015, 13:18	59.6
FG10A	0.0806	43	01Jul2015, 12:18	5.4
FG08A	0.0750	66	01Jul2015, 12:06	5.9
FG08A-G05	0.0750	64	01Jul2015, 12:12	5.9
FG08B	0.0630	49	01Jul2015, 12:12	5.0
FG08B-G05	0.0630	48	01Jul2015, 12:12	4.9
FG11	0.0625	44	01Jul2015, 12:18	5.2
FG09	0.0484	25	01Jul2015, 12:18	3.0
FG09-G05	0.0484	25	01Jul2015, 12:18	3.0
FG10B	0.0416	22	01Jul2015, 12:12	2.5
G05	0.3711	239	01Jul2015, 12:12	26.9
FG13	0.0534	15	01Jul2015, 12:24	2.4
FG12	0.0328	30.2	01Jul2015, 12:12	3.0
POND D IN	0.4573	279.7	01Jul2015, 12:12	32.4
POND D	0.4573	50	01Jul2015, 13:24	24.3
POND D-G17	0.4573	50	01Jul2015, 13:24	24.3
FG15	0.0103	9	01Jul2015, 12:12	0.9
FG15-G17A	0.0103	9	01Jul2015, 12:12	0.9
G17A	0.4676	51	01Jul2015, 13:24	25.2
FG14	0.1000	53	01Jul2015, 12:18	7.1
G17	0.5676	75	01Jul2015, 12:24	32.3
G17-G18	0.5676	75	01Jul2015, 12:24	32.2
FG16	0.0791	78	01Jul2015, 12:06	6.8
G18	0.6467	128	01Jul2015, 12:12	39.1
G18-POND E	0.6467	126	01Jul2015, 12:12	39.0
FG31	0.0922	69	01Jul2015, 12:18	8.4
FG30	0.0389	44	01Jul2015, 12:06	3.5
FG30-PONDHS	0.0389	42	01Jul2015, 12:12	3.5
POND HS	0.1311	53	01Jul2015, 12:42	11.9
FG17a	0.0694	57	01Jul2015, 12:06	5.4
FG17a-POND E	0.0694	56	01Jul2015, 12:12	5.4
FG18	0.0644	30	01Jul2015, 12:24	4.3
FG18-POND E	0.0644	30	01Jul2015, 12:24	4.3
FG19	0.0527	50	01Jul2015, 12:06	4.9

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (25-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q25 (CFS)	TIME OF PEAK	TOTAL VOLUME Q25 (AC. FT.)
FG17c	0.0313	14	01Jul2015, 12:06	1.4
FG17b	0.0214	24	01Jul2015, 12:06	1.9
POND E IN	1.0170	318	01Jul2015, 12:12	68.8
POND E	1.0170	80	01Jul2015, 14:36	46.5
H08	1.0170	72	01Jul2015, 14:36	39.8
H09	0.0000	8	01Jul2015, 14:36	6.7
FG34	0.0600	13	01Jul2015, 12:24	2.1
G14	0.0600	13	01Jul2015, 12:24	2.1
G14-G15	0.0600	13	01Jul2015, 12:30	2.1
FG35	0.0344	8.3	01Jul2015, 12:24	1.3
G15	0.0944	21.3	01Jul2015, 12:30	3.4
G15-G08	0.0944	21	01Jul2015, 12:30	3.3
FG37	0.0797	16	01Jul2015, 12:24	2.6
FG36	0.0281	5	01Jul2015, 12:24	0.9
FG36-G08	0.0281	5	01Jul2015, 12:30	0.9
G08	0.2022	41	01Jul2015, 12:30	6.8

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
OS06	0.1313	12	01Jul2015, 12:18	2.2
G1a	0.1313	12	01Jul2015, 12:18	2.2
G1a-G2	0.1313	11	01Jul2015, 12:24	2.1
OS05	0.0578	5.6	01Jul2015, 12:12	1.0
OS05-G1	0.0578	5.5	01Jul2015, 12:18	1.0
FG01	0.0538	7.0	01Jul2015, 12:36	1.4
FG01-G1	0.0538	6.9	01Jul2015, 12:36	1.4
G1	0.1116	11	01Jul2015, 12:24	2.3
G1-G2	0.1116	11	01Jul2015, 12:30	2.3
FG02	0.0391	6.4	01Jul2015, 12:12	0.9
G2	0.2820	27	01Jul2015, 12:24	5.4
G2-G3	0.2820	27	01Jul2015, 12:30	5.3
FG03	0.0203	5.9	01Jul2015, 12:06	0.6
FG04	0.0172	5.8	01Jul2015, 12:06	0.5
G3	0.3195	31	01Jul2015, 12:30	6.4
G3-POND F	0.3195	31	01Jul2015, 12:30	6.4
FG06	0.0608	10	01Jul2015, 12:18	1.5
FG05	0.0580	12.2	01Jul2015, 12:24	2.0
OS07a	0.0170	2	01Jul2015, 12:12	0.3
OS07a-POND F	0.0170	2	01Jul2015, 12:30	0.3
POND F IN	0.4553	52.3	01Jul2015, 12:30	10.2
POND F	0.4553	16.7	01Jul2015, 13:48	9.3
POND F-G7	0.4553	16.7	01Jul2015, 13:54	9.3
FG21b	0.0170	9.6	01Jul2015, 12:12	1.0
FG21a	0.0072	1	01Jul2015, 12:06	0.2
FG21a-G7	0.0072	1	01Jul2015, 12:24	0.2
G7	0.4795	18	01Jul2015, 13:36	10.4
G7-G8	0.4795	17.9	01Jul2015, 13:42	10.3
FG22	0.1380	24.0	01Jul2015, 12:24	3.8
OS08	0.0406	7.7	01Jul2015, 12:12	1.0
OS08-G8	0.0406	7	01Jul2015, 12:18	1.0
FG23a	0.0216	5	01Jul2015, 12:12	0.7
OS07b	0.0156	3	01Jul2015, 12:06	0.3
OS07b-G7	0.0156	2	01Jul2015, 12:18	0.3
G8	0.6953	47	01Jul2015, 12:18	16.1
G8-G10	0.6953	46	01Jul2015, 12:24	16.0
OS09	0.1527	18	01Jul2015, 12:30	3.5
OS09-G10	0.1527	18.1	01Jul2015, 12:42	3.5
FG24	0.1373	26	01Jul2015, 12:24	4.0
G9	0.2900	38	01Jul2015, 12:36	7.5
G9-G10	0.2900	36.8	01Jul2015, 12:36	7.5
FG23b	0.0286	5	01Jul2015, 12:12	0.7
G10	1.0139	80	01Jul2015, 12:30	24.2
G10-G11	1.0139	80	01Jul2015, 12:36	24.1
FG23c	0.0122	3	01Jul2015, 12:12	0.3
G11	1.0261	81	01Jul2015, 12:36	24.4

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
FG25	0.1086	27.1	01Jul2015, 12:36	4.7
FG26	0.0863	22	01Jul2015, 12:18	3.0
FG26-POND G	0.0863	22	01Jul2015, 12:24	3.0
FG27	0.0500	17	01Jul2015, 12:18	2.3
FG28	0.0245	4	01Jul2015, 12:18	0.6
POND G IN	1.2955	145.4	01Jul2015, 12:30	35.0
POND G	1.2955	56	01Jul2015, 13:54	28.5
G12	1.2955	56	01Jul2015, 13:54	28.5
G12-G06	1.2955	56	01Jul2015, 14:00	28.2
FG29	0.0997	9	01Jul2015, 12:18	1.6
FG32	0.0402	29	01Jul2015, 12:06	2.4
FG32-G06	0.0402	27	01Jul2015, 12:06	2.4
G06	1.4354	61	01Jul2015, 13:54	32.3
FG10A	0.0806	25	01Jul2015, 12:18	3.3
FG08A	0.0750	41	01Jul2015, 12:06	3.8
FG08A-G05	0.0750	41	01Jul2015, 12:12	3.8
FG08B	0.0630	31	01Jul2015, 12:12	3.2
FG08B-G05	0.0630	29	01Jul2015, 12:18	3.2
FG11	0.0625	28	01Jul2015, 12:18	3.4
FG09	0.0484	14.3	01Jul2015, 12:18	1.8
FG09-G05	0.0484	14	01Jul2015, 12:18	1.8
FG10B	0.0416	12	01Jul2015, 12:18	1.5
G05	0.3711	145	01Jul2015, 12:18	17.1
FG13	0.0534	7	01Jul2015, 12:30	1.4
FG12	0.0328	19.9	01Jul2015, 12:12	2.0
POND D IN	0.4573	168.0	01Jul2015, 12:18	20.4
POND D	0.4573	19	01Jul2015, 14:24	14.8
POND D-G17	0.4573	19	01Jul2015, 14:24	14.8
FG15	0.0103	6	01Jul2015, 12:12	0.6
FG15-G17A	0.0103	6	01Jul2015, 12:12	0.6
G17A	0.4676	19	01Jul2015, 14:12	15.3
FG14	0.1000	32	01Jul2015, 12:24	4.5
G17	0.5676	43	01Jul2015, 12:24	19.8
G17-G18	0.5676	43	01Jul2015, 12:30	19.8
FG16	0.0791	50	01Jul2015, 12:06	4.5
G18	0.6467	79	01Jul2015, 12:12	24.3
G18-POND E	0.6467	78	01Jul2015, 12:12	24.3
FG31	0.0922	45	01Jul2015, 12:18	5.6
FG30	0.0389	29	01Jul2015, 12:06	2.4
FG30-PONDHS	0.0389	27	01Jul2015, 12:12	2.3
POND HS	0.1311	36	01Jul2015, 12:42	7.9
FG17a	0.0694	35	01Jul2015, 12:06	3.5
FG17a-POND E	0.0694	35.1	01Jul2015, 12:12	3.5
FG18	0.0644	18	01Jul2015, 12:24	2.7
FG18-POND E	0.0644	17	01Jul2015, 12:30	2.7
FG19	0.0527	33	01Jul2015, 12:12	3.3

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
FG17c	0.0313	7	01Jul2015, 12:06	0.7
FG17b	0.0214	16	01Jul2015, 12:06	1.3
POND E IN	1.0170	197	01Jul2015, 12:12	43.7
POND E	1.0170	30	01Jul2015, 17:36	24.4
H08	1.0170	24.1	01Jul2015, 17:36	19.1
H09	0.0000	6	01Jul2015, 17:36	5.3
FG34	0.0600	5.5	01Jul2015, 12:24	1.1
G14	0.0600	5.5	01Jul2015, 12:24	1.1
G14-G15	0.0600	5.4	01Jul2015, 12:36	1.1
FG35	0.0344	3.5	01Jul2015, 12:30	0.7
G15	0.0944	8.7	01Jul2015, 12:36	1.8
G15-G08	0.0944	9	01Jul2015, 12:36	1.7
FG37	0.0797	6	01Jul2015, 12:24	1.3
FG36	0.0281	2	01Jul2015, 12:30	0.5
FG36-G08	0.0281	2	01Jul2015, 12:36	0.5
G08	0.2022	16	01Jul2015, 12:36	3.5

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
OS06	0.1313	3.8	01Jul2015, 12:24	1.1
G1a	0.1313	3.8	01Jul2015, 12:24	1.1
G1a-G2	0.1313	3.6	01Jul2015, 12:36	1.1
OS05	0.0578	1.8	01Jul2015, 12:18	0.5
OS05-G1	0.0578	1.7	01Jul2015, 12:24	0.5
FG01	0.0538	3.4	01Jul2015, 12:36	0.8
FG01-G1	0.0538	3.4	01Jul2015, 12:36	0.8
G1	0.1116	4.9	01Jul2015, 12:36	1.3
G1-G2	0.1116	4.8	01Jul2015, 12:36	1.3
FG02	0.0391	2.7	01Jul2015, 12:18	0.5
G2	0.2820	10	01Jul2015, 12:30	2.9
G2-G3	0.2820	10	01Jul2015, 12:42	2.9
FG03	0.0203	0.8	01Jul2015, 12:12	0.2
FG04	0.0172	3.1	01Jul2015, 12:06	0.3
G3	0.3195	11	01Jul2015, 12:36	3.3
G3-POND F	0.3195	11	01Jul2015, 12:42	3.3
FG06	0.0608	4.6	01Jul2015, 12:18	0.8
FG05	0.0580	6.7	01Jul2015, 12:30	1.2
OS07a	0.0170	0.9	01Jul2015, 12:12	0.2
OS07a-POND F	0.0170	0.9	01Jul2015, 12:36	0.2
POND F IN	0.4553	21.6	01Jul2015, 12:36	5.6
POND F	0.4553	8.1	01Jul2015, 14:06	5.0
POND F-G7	0.4553	8.1	01Jul2015, 14:18	5.0
FG21b	0.0170	6.5	01Jul2015, 12:12	0.7
FG21a	0.0072	0.5	01Jul2015, 12:06	0.1
FG21a-G7	0.0072	0.5	01Jul2015, 12:30	0.1
G7	0.4795	9	01Jul2015, 14:12	5.7
G7-G8	0.4795	8.8	01Jul2015, 14:12	5.7
FG22	0.1380	12.0	01Jul2015, 12:24	2.3
OS08	0.0406	3.4	01Jul2015, 12:12	0.6
OS08-G8	0.0406	3	01Jul2015, 12:18	0.6
FG23a	0.0216	3	01Jul2015, 12:18	0.4
OS07b	0.0156	1.0	01Jul2015, 12:12	0.2
OS07b-G7	0.0156	0.9	01Jul2015, 12:18	0.2
G8	0.6953	24	01Jul2015, 12:18	9.1
G8-G10	0.6953	24	01Jul2015, 12:24	9.1
OS09	0.1527	8	01Jul2015, 12:36	2.0
OS09-G10	0.1527	8.2	01Jul2015, 12:48	2.0
FG24	0.1373	13	01Jul2015, 12:24	2.4
G9	0.2900	17	01Jul2015, 12:48	4.4
G9-G10	0.2900	16.8	01Jul2015, 12:48	4.4
FG23b	0.0286	2	01Jul2015, 12:18	0.4
G10	1.0139	39	01Jul2015, 12:24	13.8
G10-G11	1.0139	38.4	01Jul2015, 12:30	13.7
FG23c	0.0122	1.5	01Jul2015, 12:12	0.2
G11	1.0261	39.2	01Jul2015, 12:30	13.9

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
FG25	0.1086	16.7	01Jul2015, 12:36	3.1
FG26	0.0863	12	01Jul2015, 12:24	1.9
FG26-POND G	0.0863	12	01Jul2015, 12:24	1.9
FG27	0.0500	11	01Jul2015, 12:18	1.5
FG28	0.0245	2	01Jul2015, 12:24	0.4
POND G IN	1.2955	78.1	01Jul2015, 12:30	20.8
POND G	1.2955	22	01Jul2015, 15:18	14.9
G12	1.2955	22	01Jul2015, 15:18	14.9
G12-G06	1.2955	22	01Jul2015, 15:24	14.7
FG29	0.0997	3	01Jul2015, 12:24	0.8
FG32	0.0402	20	01Jul2015, 12:06	1.7
FG32-G06	0.0402	18	01Jul2015, 12:12	1.7
G06	1.4354	24	01Jul2015, 15:24	17.3
FG10A	0.0806	15	01Jul2015, 12:18	2.2
FG08A	0.0750	27	01Jul2015, 12:06	2.6
FG08A-G05	0.0750	26.5	01Jul2015, 12:12	2.6
FG08B	0.0630	20.1	01Jul2015, 12:12	2.2
FG08B-G05	0.0630	19.5	01Jul2015, 12:18	2.2
FG11	0.0625	19	01Jul2015, 12:18	2.4
FG09	0.0484	8.3	01Jul2015, 12:18	1.2
FG09-G05	0.0484	8	01Jul2015, 12:24	1.2
FG10B	0.0416	7	01Jul2015, 12:18	1.0
G05	0.3711	93	01Jul2015, 12:18	11.4
FG13	0.0534	4	01Jul2015, 12:30	0.8
FG12	0.0328	13.7	01Jul2015, 12:12	1.4
POND D IN	0.4573	107.0	01Jul2015, 12:18	13.6
POND D	0.4573	12	01Jul2015, 14:36	9.2
POND D-G17	0.4573	12	01Jul2015, 14:42	9.2
FG15	0.0103	4	01Jul2015, 12:12	0.4
FG15-G17A	0.0103	4	01Jul2015, 12:12	0.4
G17A	0.4676	12	01Jul2015, 14:36	9.6
FG14	0.1000	20	01Jul2015, 12:24	3.0
G17	0.5676	25	01Jul2015, 12:24	12.5
G17-G18	0.5676	25	01Jul2015, 12:24	12.5
FG16	0.0791	34	01Jul2015, 12:06	3.1
G18	0.6467	51	01Jul2015, 12:12	15.7
G18-POND E	0.6467	50	01Jul2015, 12:12	15.6
FG31	0.0922	31	01Jul2015, 12:18	3.9
FG30	0.0389	20	01Jul2015, 12:06	1.7
FG30-PONDHS	0.0389	18	01Jul2015, 12:12	1.6
POND HS	0.1311	26	01Jul2015, 12:36	5.6
FG17a	0.0694	23	01Jul2015, 12:12	2.4
FG17a-POND E	0.0694	22.9	01Jul2015, 12:12	2.4
FG18	0.0644	11	01Jul2015, 12:30	1.8
FG18-POND E	0.0644	11	01Jul2015, 12:30	1.8
FG19	0.0527	23	01Jul2015, 12:12	2.3

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
FG17c	0.0313	3	01Jul2015, 12:12	0.4
FG17b	0.0214	11	01Jul2015, 12:06	0.9
POND E IN	1.0170	126	01Jul2015, 12:12	29.0
POND E	1.0170	16	01Jul2015, 20:00	13.1
H08	1.0170	11.8	01Jul2015, 20:00	9.4
H09	0.0000	4.1	01Jul2015, 20:00	3.7
FG34	0.0600	2.0	01Jul2015, 12:30	0.6
G14	0.0600	2.0	01Jul2015, 12:30	0.6
G14-G15	0.0600	2.0	01Jul2015, 12:42	0.6
FG35	0.0344	1.5	01Jul2015, 12:30	0.4
G15	0.0944	3.3	01Jul2015, 12:42	0.9
G15-G08	0.0944	3.3	01Jul2015, 12:48	0.9
FG37	0.0797	2.0	01Jul2015, 12:36	0.7
FG36	0.0281	0.7	01Jul2015, 12:36	0.2
FG36-G08	0.0281	0.7	01Jul2015, 12:48	0.2
G08	0.2022	5.8	01Jul2015, 12:48	1.8

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
OS06	0.1313	0.5	01Jul2015, 13:30	0.3
G1a	0.1313	0.5	01Jul2015, 13:30	0.3
G1a-G2	0.1313	0.5	01Jul2015, 13:48	0.3
OS05	0.0578	0.2	01Jul2015, 13:24	0.2
OS05-G1	0.0578	0.2	01Jul2015, 13:30	0.2
FG01	0.0538	0.9	01Jul2015, 12:48	0.3
FG01-G1	0.0538	0.9	01Jul2015, 12:48	0.3
G1	0.1116	1.1	01Jul2015, 12:54	0.5
G1-G2	0.1116	1.1	01Jul2015, 13:00	0.5
FG02	0.0391	0.5	01Jul2015, 12:30	0.2
G2	0.2820	1.9	01Jul2015, 13:18	1.0
G2-G3	0.2820	1.9	01Jul2015, 13:30	1.0
FG03	0.0203	0.8	01Jul2015, 12:12	0.2
FG04	0.0172	0.9	01Jul2015, 12:06	0.1
G3	0.3195	2.4	01Jul2015, 13:24	1.3
G3-POND F	0.3195	2.4	01Jul2015, 13:30	1.3
FG06	0.0608	0.9	01Jul2015, 12:24	0.3
FG05	0.0580	2.4	01Jul2015, 12:30	0.6
OS07a	0.0170	0.1	01Jul2015, 12:48	0.1
OS07a-POND F	0.0170	0.1	01Jul2015, 13:30	0.1
POND F IN	0.4553	4.7	01Jul2015, 12:48	2.3
POND F	0.4553	2.3	01Jul2015, 16:00	2.0
POND F-G7	0.4553	2.3	01Jul2015, 16:12	1.9
FG21b	0.0170	3.5	01Jul2015, 12:12	0.4
FG21a	0.0072	0.1	01Jul2015, 12:24	0.0
FG21a-G7	0.0072	0.1	01Jul2015, 13:12	0.0
G7	0.4795	3.6	01Jul2015, 12:12	2.4
G7-G8	0.4795	3.5	01Jul2015, 12:12	2.3
FG22	0.1380	3.3	01Jul2015, 12:30	1.0
OS08	0.0406	0.7	01Jul2015, 12:24	0.2
OS08-G8	0.0406	0.7	01Jul2015, 12:30	0.2
FG23a	0.0216	0.8	01Jul2015, 12:18	0.2
OS07b	0.0156	0.1	01Jul2015, 12:48	0.1
OS07b-G7	0.0156	0.1	01Jul2015, 13:00	0.1
G8	0.6953	7.4	01Jul2015, 12:24	3.8
G8-G10	0.6953	7.4	01Jul2015, 12:30	3.8
OS09	0.1527	1.9	01Jul2015, 12:54	0.8
OS09-G10	0.1527	1.9	01Jul2015, 13:18	0.8
FG24	0.1373	4	01Jul2015, 12:30	1.1
G9	0.2900	4	01Jul2015, 13:12	1.9
G9-G10	0.2900	4.4	01Jul2015, 13:12	1.9
FG23b	0.0286	0	01Jul2015, 12:30	0.1
G10	1.0139	11.7	01Jul2015, 12:30	5.8
G10-G11	1.0139	11.6	01Jul2015, 12:36	5.8
FG23c	0.0122	0.4	01Jul2015, 12:18	0.1
G11	1.0261	11.9	01Jul2015, 12:36	5.9

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
FG25	0.1086	7.5	01Jul2015, 12:36	1.7
FG26	0.0863	5	01Jul2015, 12:24	0.9
FG26-POND G	0.0863	4.5	01Jul2015, 12:30	0.9
FG27	0.0500	5.0	01Jul2015, 12:24	0.8
FG28	0.0245	0.5	01Jul2015, 12:30	0.2
POND G IN	1.2955	28.0	01Jul2015, 12:36	9.4
POND G	1.2955	5	02Jul2015, 00:00	5.1
G12	1.2955	5	02Jul2015, 00:00	5.1
G12-G06	1.2955	5	02Jul2015, 00:00	5.0
FG29	0.0997	0.4	01Jul2015, 13:36	0.3
FG32	0.0402	11	01Jul2015, 12:06	1.0
FG32-G06	0.0402	11	01Jul2015, 12:12	1.0
G06	1.4354	11	01Jul2015, 12:12	6.3
FG10A	0.0806	7	01Jul2015, 12:24	1.1
FG08A	0.0750	13.4	01Jul2015, 12:12	1.5
FG08A-G05	0.0750	13.1	01Jul2015, 12:18	1.5
FG08B	0.0630	10.1	01Jul2015, 12:12	1.2
FG08B-G05	0.0630	10.0	01Jul2015, 12:18	1.2
FG11	0.0625	10	01Jul2015, 12:18	1.4
FG09	0.0484	3.2	01Jul2015, 12:18	0.6
FG09-G05	0.0484	3.2	01Jul2015, 12:24	0.6
FG10B	0.0416	3	01Jul2015, 12:18	0.5
G05	0.3711	44.7	01Jul2015, 12:18	6.3
FG13	0.0534	0.9	01Jul2015, 12:42	0.3
FG12	0.0328	7.8	01Jul2015, 12:12	0.8
POND D IN	0.4573	52.1	01Jul2015, 12:18	7.5
POND D	0.4573	4.3	01Jul2015, 18:00	4.0
POND D-G17	0.4573	4.3	01Jul2015, 18:06	4.0
FG15	0.0103	2	01Jul2015, 12:12	0.2
FG15-G17A	0.0103	2	01Jul2015, 12:12	0.2
G17A	0.4676	4	01Jul2015, 17:54	4.2
FG14	0.1000	9	01Jul2015, 12:24	1.6
G17	0.5676	12	01Jul2015, 12:24	5.8
G17-G18	0.5676	12	01Jul2015, 12:30	5.8
FG16	0.0791	18	01Jul2015, 12:06	1.8
G18	0.6467	26	01Jul2015, 12:12	7.6
G18-POND E	0.6467	25	01Jul2015, 12:12	7.6
FG31	0.0922	17	01Jul2015, 12:18	2.4
FG30	0.0389	11	01Jul2015, 12:06	1.0
FG30-PONDHS	0.0389	10.9	01Jul2015, 12:18	1.0
POND HS	0.1311	14.8	01Jul2015, 12:42	3.3
FG17a	0.0694	12	01Jul2015, 12:12	1.3
FG17a-POND E	0.0694	11.6	01Jul2015, 12:12	1.3
FG18	0.0644	4.7	01Jul2015, 12:30	0.9
FG18-POND E	0.0644	5	01Jul2015, 12:30	0.9
FG19	0.0527	13.1	01Jul2015, 12:12	1.4

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
FG17c	0.0313	0.5	01Jul2015, 12:18	0.2
FG17b	0.0214	6.1	01Jul2015, 12:06	0.5
POND E IN	1.0170	64.0	01Jul2015, 12:12	15.4
POND E	1.0170	6.6	02Jul2015, 00:00	5.9
H08	1.0170	4.1	02Jul2015, 00:00	3.6
H09	0.0000	2.4	02Jul2015, 00:00	2.3
FG34	0.0600	0.3	01Jul2015, 13:18	0.2
G14	0.0600	0.3	01Jul2015, 13:18	0.2
G14-G15	0.0600	0.3	01Jul2015, 13:48	0.2
FG35	0.0344	0.3	01Jul2015, 13:06	0.1
G15	0.0944	0.6	01Jul2015, 13:36	0.3
G15-G08	0.0944	0.6	01Jul2015, 13:48	0.3
FG37	0.0797	0.3	01Jul2015, 13:42	0.2
FG36	0.0281	0.1	01Jul2015, 13:42	0.1
FG36-G08	0.0281	0.1	01Jul2015, 14:00	0.1
G08	0.2022	1.0	01Jul2015, 13:48	0.6

Highlighted green rows reference key design points (Typical all charts this section)

FUTURE CONDITIONS
POND D & E NETWORK

FUTURE CONDITIONS
POND F & G NETWORK

FUTURE CONDITIONS
ESTATES, NORTH OF REX RD

Appendix C - Detention Pond Information

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond D - Interim AS-BUILT

Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	710
embankment elev =	7060
spillway length =	100
spillway elevation =	7058
100 year storage elev.=	7057.1
100 year storage vol.=	25.4
100 year discharge=	134
5 year storage elev.=	7053.9
5 year storage vol.=	7.4
5 year discharge=	12
WQCV storage vol.=	1.0
WQCV depth =	2.42
1/2 WQCV storage vol.=	0.50

Data for outlet pipe and grate:

	Type		Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
	Rectangular	Orifice 1:	0.03	2.42		Area =	0.072	Elev to cl =	7050.21
	Circular	Orifice 2:			8	Area =	0.349	Elev to cl =	7051.42
	Rectangular	Orifice 3:	5	0.5		Area =	2.500	Elev to cl =	7053.35
	None Selected	Orifice 4:				Area =	0.000	Elev to cl =	

Stand Pipe Dimensions

Rec Grate	6	x	4.25	Elev =	7054.9
Circ. Grate		dia.		Elev =	

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		4	**Circular**
Area	12.6		TOP		
Outlet I. E.	7048.1		7052.5		
Wall Thick.	5	in.			

50 year storage elev.=	7056.3
50 year discharge=	90
25 year storage elev.=	7055.6
25 year discharge=	50
10 year storage elev.=	7054.7
10 year discharge=	18
2 year storage elev.=	7053.1
2 year discharge=	4.3

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
7049	0	0	0.0	0.00	0.00			-								
7050	1	10705	0.2	0.1	0.12	-	-	0.2	-	-	-	-	13		0.2	0.15
7051	2	36676	0.8	0.5	0.67	-	-	0.3	-	-	-	-	33		0.3	0.31
7052	3	71989	1.7	1.2	1.91	-	-	0.5	1.3	-	-	-	60		1.8	1.8
7053	4	133440	3.1	2.4	4.27	-	-	0.6	2.1	-	-	-	90		2.7	2.7
7054	5	178828	4.1	3.6	7.86	-	-	0.7	2.7	9.7	-	-	119		13.1	13
7055	6	221269	5.1	4.6	12.45	-	-	0.8	3.2	15.5	-	1.4	139		21	21
7055.5	6.5	245509	5.6	2.7	15.13	-	-	0.8	3.4	17.7	-	20.2	148		42	42
7056	7	269749	6.2	5.6	18.08	-	-	0.8	3.6	20	-	50	157		74	74
7058	9	337508	7.7	13.9	32.03	-	-	1.0	4.3	26	-	216	188		188	188
7060	11	405520	9.3	31.0	49.09	-	848.5	1.1	4.9	31	-	277	214		214	1,063
						-	-	-	-	-	-	-			-	-

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E- INTERIM (TOTAL FLOWS)

Gieck Basin - El Paso County, Colorado

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.5
100 year storage vol.=	41.0
100 year discharge=	224
5 year storage elev.=	6971.3
5 year storage vol.=	17.1
5 year discharge=	14
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
WQCV depth =	1.9
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.75

50 year storage elev.=	6973.0
50 year storage vol.=	35.4
50 year discharge=	138
25 year storage elev.=	6972.4
25 year storage vol.=	29.1
25 year discharge=	70
10 year storage elev.=	6971.8
10 year storage vol.=	22.1
10 year discharge=	27
2 year storage elev.=	6970.5
2 year storage vol.=	10.1
2 year discharge=	5.9

STAGE		STORAGE				TOTAL DISCHARGE											
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)		PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**		1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.00			-	-	-	-	-	-	1.4	-	-	-
6967.5	0.5	16136.5	0.37	0.1	0.10	-	-	0.0	-	-	-	-	-	13	-	0.03	0.03
6968	1	30465	0.70	0.3	0.37	-	-	0.1	-	-	-	-	-	26	-	0.11	0.11
6968.5	1.5	81028.5	1.86	0.6	1.01	-	-	0.2	-	-	-	-	-	47	-	0.23	0.23
6969	2	131592	3.02	1.2	2.23	-	-	0.4	-	-	-	-	-	77	-	0.4	0.37
6969.5	2.5	201294.5	4.62	1.9	4.14	-	-	0.5	-	3.0	-	-	-	110	-	3.5	3.5
6970	3	270997	6.22	4.6	6.85	-	-	0.6	-	4	-	-	-	146	-	5	4.9
6970.5	3.5	329360	7.56	3.4	10.30	-	-	0.6	0.2	5	-	-	-	183	-	6	6.1
6970.75	3.75	358540.75	8.23	2.0	12.27			0.7	1.2	6	-	-	-	203	-	8	7.6
6971	4	387722	8.90	7.6	14.41	-	-	0.7	3.1	6	-	-	-	218	-	10	9.8
6971.25	4.25	408751	9.38	2.3	16.70	-	-	0.7	5.5	6	0.20	-	-	236	-	13	13
6971.5	4.5	429780	9.87	4.7	19.10	-	-	0.7	8	7	3.0	-	-	252	-	18	18
6971.75	4.75	450809	10.35	2.5	21.63	-	-	0.8	10	7	7.3	-	-	266	-	25	25
6972	5	471838	10.83	5.2	24.28	-	-	0.8	12	7	13	2.4	-	280	-	35	35
6972.25	5.25	482595.75	11.08	2.7	27.02	-	-	0.8	13	8	17	16	-	292	-	54	54
6972.5	5.5	493354	11.33	5.5	29.82	-	-	0.8	14	8	20	35	-	304	-	78	78
6973	6	514869	11.82	5.8	35.60	-	-	0.9	16	9	30	87	-	327	-	142	142
6973.25	6.25	518272	11.90	3.0	38.57	-	-	0.9	17	9	35	121	-	338	-	183	183
6973.5	6.5	521675	11.98	5.9	41.55	-	-	0.9	18	9	41	163	-	349	-	232	232
6974	7	528481	12.13	12.0	47.58	-	-	1.0	20	10	53	259	-	369	-	307	307
6976	9	553685	12.71	24.8	72.42	-	1,102	1.1	25	11	83	729	-	443	-	443	1,545

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-INTERIM (H08)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974
100 year storage elev.=	6973.5
100 year storage vol.=	41.0
100 year discharge=	193
5 year storage elev.=	6971.3
5 year storage vol.=	17.1
5 year discharge=	10
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular	Orifice 1:	V	0.0248	1.65		Area =	0.041	Invert Elev =	6967.18
Rectangular	Orifice 2:	V	2	0.8		Area =	1.600	Invert Elev =	6970.40
Circular	Orifice 3:	H			10	Area =	0.545	Invert Elev =	6969.00
Rectangular	Orifice 4:	V	6	0.7		Area =	4.200	Invert Elev =	6971.20

Stand Pipe Dimensions

Rec Grate		11	x	7	Elev =	6971.90
Circ. Grate			dia.		Elev =	6971.90

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		3.5	**Circular**
Area	9.6		TOP		
Outlet I. E.	6966.8		6970.58		
Wall Thick.	4	in.			

50 year storage elev.=	6973.0
50 year discharge=	125
25 year storage elev.=	6972.4
25 year discharge=	62
10 year storage elev.=	6971.8
10 year discharge=	21
2 year storage elev.=	6970.5
2 year discharge=	3.6

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.0			-	-	-	-	-	0.91		-	-
6967.5	0.5	16136.5	0.37	0.1	0.1			0.0	-	-	-	-	8.0		0.01	0.01
6968	1	30465	0.70	0.3	0.4			0.1	-	-	-	-	18		0.06	0.06
6968.5	1.5	81028.5	1.86	0.6	1.0			0.1	-	-	-	-	30		0.11	0.11
6969	2	131592	3.02	1.2	2.2			0.2	-	-	-	-	52		0.2	0.2
6969.5	2.5	201294.5	4.62	1.9	4.1			0.2	-	1.9	-	-	75		2.1	2.1
6970	3	270997	6.22	4.6	6.9			0.3	-	2.6	-	-	97		2.9	2.9
6970.5	3.5	329359.5	7.56	3.4	10			0.3	0.2	3.2	-	-	122		3.7	3.7
6970.75	3.75	358540.75	8.23	2.0	12.3			0.3	1.2	3.5	-	-	135		5	5.0
6971	4	387722	8.90	7.6	14			0.3	2.8	3.7	-	-	146		7	6.8
6971.25	4.25	408751	9.38	2.3	17			0.4	4.7	3.9	0.2	-	157		9	9.2
6971.5	4.5	429780	9.87	4.7	19			0.4	6.4	4	3.0	-	167		14	14
6971.75	4.75	450809	10.35	2.5	22			0.4	7.5	4	7.3	-	176		20	20
6972	5	471838	10.83	5.2	24			0.4	8	5	13	2	185		29	29
6972.25	5.25	482595.75	11.08	2.7	27			0.4	9	5	17	16	193		47	47
6972.5	5.5	493354	11.33	5.5	30			0.4	10	5	20	35	201		70	70
6973	6	514869	11.82	5.8	36			0.4	11	5	24	87	217		128	128
6973.25	6.25	518272	11.90	3.0	39			0.5	12	5	26	118	224		162	162
6973.5	6.5	521675	11.98	5.9	42			0.5	13	6	28	152	231		199	199
6974	7	528481	12.13	12.0	48			0.5	14	6	32	228	244		244	244
6976	9	553685	12.71	24.8	72			0.6	18	7	43	623	291		291	291

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-INTERIM (H09)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.5
100 year storage vol.=	41.0
100 year discharge=	31
5 year storage elev.=	6971.3
5 year storage vol.=	17.1
5 year discharge=	3.8
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.75

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular	Orifice 1:	V	0.0248	1.65		Area =	0.041	Invert Elev =	6967.18
Rectangular	Orifice 2:	V	0.75	1		Area =	0.750	Invert Elev =	6970.75
Circular	Orifice 3:	H			8	Area =	0.349	Invert Elev =	6969.00
Rectangular	Orifice 4:	V	3.5	1.25		Area =	4.375	Invert Elev =	6971.75

Stand Pipe Dimensions

Rec Grate		4.25	x	3	Elev =	6973.00
Circ. Grate			dia.		Elev =	6973.00

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		3.5	**Circular**
Area	9.6		TOP		
Outlet I. E.	6966.8		6970.7		
Wall Thick.	5	in.			

50 year storage elev.=	6973.0
50 year discharge=	13
25 year storage elev.=	6972.4
25 year discharge=	7.7
10 year storage elev.=	6971.8
10 year discharge=	5.6
2 year storage elev.=	6970.5
2 year discharge=	2.3

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.0			-	-	-	-	-	0.45		-	-
6967.5	0.5	16136.5	0.37	0.1	0.1			0.0	-	-	-	-	5.0		0.01	0.01
6968	1	30465	0.70	0.3	0.4			0.1	-	-	-	-	8.8		0.06	0.06
6968.5	1.5	81028.5	1.86	0.6	1.0			0.1	-	-	-	-	17		0.11	0.11
6969	2	131592	3.02	1.2	2.2			0.2	-	-	-	-	26		0.2	0.18
6969.5	2.5	201294.5	4.62	1.9	4.1			0.2	-	1.2	-	-	35		1.4	1.4
6970	3	270997	6.22	4.6	6.9			0.3	-	1.7	-	-	48		2.0	2.0
6970.5	3.5	329359.5	7.56	3.4	10.3			0.3	-	2.1	-	-	61		2.4	2.4
6970.75	3.75	358540.75	8.23	2.0	12.3			0.3	-	2.2	-	-	68		2.6	2.6
6971	4	387722	8.90	7.6	14.4			0.3	0.3	2.4	-	-	73		3.0	3.0
6971.25	4.25	408751	9.38	2.3	16.7			0.4	0.8	2.5	-	-	79		3.7	3.7
6971.5	4.5	429780	9.87	4.7	19.1			0.4	1.5	2.7	-	-	85		4.5	4.5
6971.75	4.75	450809	10.35	2.5	21.6			0.4	2.3	2.8	-	-	90		5.4	5.4
6972	5	471838	10.83	5.2	24.3			0.4	3.1	2.9	-	-	95		6.4	6.4
6972.25	5.25	482595.75	11.08	2.7	27.0			0.4	3.6	3.0	-	-	99		7.0	7.0
6972.5	5.5	493354	11.33	5.5	29.8			0.4	4.0	3.1	0.5	-	103		8	8.1
6973	6	514869	11.82	5.8	35.6			0.4	4.8	3.4	5.2	-	111		14	14
6973.25	6.25	518272	11.90	3.0	38.6			0.5	5.1	3.5	8.6	4	114		21	21
6973.5	6.5	521675	11.98	5.9	41.6			0.5	5.4	3.6	13	11	118		33	33
6974	7	528481	12.13	12.0	47.6			0.5	6.0	3.8	22	31	125		63	63
6976	9	553685	12.71	24.8	72.4			0.6	7.9	4.4	40	106	151		151	151

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond D - Future AS-BUILT

Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	710
embankment elev =	7060
spillway length =	100
spillway elevation =	7058
100 year storage elev.=	7057.1
100 year storage vol.=	25.5
100 year discharge=	134
5 year storage elev.=	7053.9
5 year storage vol.=	7.3
5 year discharge=	12
WQCV storage vol.=	1.0
WQCV depth =	2.42
1/2 WQCV storage vol.=	0.50

Data for outlet pipe and grate:

Type			Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular		Orifice 1:	0.03	2.42		Area =	0.072	Elev to cl =	7050.21
Circular		Orifice 2:			8	Area =	0.349	Elev to cl =	7051.42
Rectangular		Orifice 3:	5	0.5		Area =	2.500	Elev to cl =	7053.35
None Selected		Orifice 4:				Area =	0.000	Elev to cl =	

Stand Pipe Dimensions

Rec Grate		6	x	4.25	Elev =	7054.9
Circ. Grate			dia.		Elev =	

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		4	**Circular**
Area	12.6		TOP		
Outlet I. E.	7048.1		7052.5		
Wall Thick.	5	in.			

50 year storage elev.=	7056.3
50 year discharge=	91
25 year storage elev.=	7055.6
25 year discharge=	50
10 year storage elev.=	7054.7
10 year discharge=	19
2 year storage elev.=	7053.2
2 year discharge=	4.3

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
7049	0	0	0.0	0.00	0.00			-								
7050	1	10705	0.2	0.1	0.12	-	-	0.2	-	-	-	-	13		0.2	0.15
7051	2	36676	0.8	0.5	0.67	-	-	0.3	-	-	-	-	33		0.3	0.31
7052	3	71989	1.7	1.2	1.91	-	-	0.5	1.3	-	-	-	60		1.8	1.8
7053	4	133440	3.1	2.4	4.27	-	-	0.6	2.1	-	-	-	90		2.7	2.7
7054	5	178828	4.1	3.6	7.86	-	-	0.7	2.7	9.7	-	-	119		13.1	13
7055	6	221269	5.1	4.6	12.45	-	-	0.8	3.2	15.5	-	1.4	139		21	21
7055.5	6.5	245509	5.6	2.7	15.13	-	-	0.8	3.4	17.7	-	20.2	148		42	42
7056	7	269749	6.2	5.6	18.08	-	-	0.8	3.6	20	-	50	157		74	74
7058	9	337508	7.7	13.9	32.03	-	-	1.0	4.3	26	-	216	188		188	188
7060	11	405520	9.3	31.0	49.09	-	848.5	1.1	4.9	31	-	277	214		214	1,063
						-	-	-	-	-	-	-			-	-

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E- FINAL FUTURE (TOTAL FLOWS)

Gieck Basin - El Paso County, Colorado

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.6
100 year storage vol.=	42.4
100 year discharge=	242
5 year storage elev.=	6971.4
5 year storage vol.=	18.0
5 year discharge=	16
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
WQCV depth =	1.9
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.75

50 year storage elev.=	6973.1
50 year storage vol.=	36.4
50 year discharge=	153
25 year storage elev.=	6972.5
25 year storage vol.=	30.0
25 year discharge=	80
10 year storage elev.=	6971.9
10 year storage vol.=	23.0
10 year discharge=	30
2 year storage elev.=	6970.6
2 year storage vol.=	10.9
2 year discharge=	6.6

STAGE		STORAGE				TOTAL DISCHARGE											
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)		PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**		1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.00			-	-	-	-	-	-	1.4	-	-	-
6967.5	0.5	16136.5	0.37	0.1	0.10	-	-	0.0	-	-	-	-	-	13	-	0.03	0.03
6968	1	30465	0.70	0.3	0.37	-	-	0.1	-	-	-	-	-	26	-	0.11	0.11
6968.5	1.5	81028.5	1.86	0.6	1.01	-	-	0.2	-	-	-	-	-	47	-	0.23	0.23
6969	2	131592	3.02	1.2	2.23	-	-	0.4	-	-	-	-	-	77	-	0.4	0.37
6969.5	2.5	201294.5	4.62	1.9	4.14	-	-	0.5	-	3.0	-	-	-	110	-	3.5	3.5
6970	3	270997	6.22	4.6	6.85	-	-	0.6	-	4	-	-	-	146	-	5	4.9
6970.5	3.5	329360	7.56	3.4	10.30	-	-	0.6	0.2	5	-	-	-	183	-	6	6.1
6970.75	3.75	358540.75	8.23	2.0	12.27			0.7	1.2	6	-	-	-	203	-	8	7.6
6971	4	387722	8.90	7.6	14.41	-	-	0.7	3.1	6	-	-	-	218	-	10	9.8
6971.25	4.25	408751	9.38	2.3	16.70	-	-	0.7	5.5	6	0.20	-	-	236	-	13	13
6971.5	4.5	429780	9.87	4.7	19.10	-	-	0.7	8	7	3.0	-	-	252	-	18	18
6971.75	4.75	450809	10.35	2.5	21.63	-	-	0.8	10	7	7.3	-	-	266	-	25	25
6972	5	471838	10.83	5.2	24.28	-	-	0.8	12	7	13	2.4	-	280	-	35	35
6972.25	5.25	482595.75	11.08	2.7	27.02	-	-	0.8	13	8	17	16	-	292	-	54	54
6972.5	5.5	493354	11.33	5.5	29.82	-	-	0.8	14	8	20	35	-	304	-	78	78
6973	6	514869	11.82	5.8	35.60	-	-	0.9	16	9	30	87	-	327	-	142	142
6973.25	6.25	518272	11.90	3.0	38.57	-	-	0.9	17	9	35	121	-	338	-	183	183
6973.5	6.5	521675	11.98	5.9	41.55	-	-	0.9	18	9	41	163	-	349	-	232	232
6974	7	528481	12.13	12.0	47.58	-	-	1.0	20	10	53	259	-	369	-	307	307
6976	9	553685	12.71	24.8	72.42	-	1,102	1.1	25	11	83	729	-	443	-	443	1,545

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-FINAL FUTURE (H08)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974
100 year storage elev.=	6973.6
100 year storage vol.=	42.4
100 year discharge=	205
5 year storage elev.=	6971.4
5 year storage vol.=	18.0
5 year discharge=	12
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.75

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular	Orifice 1:	V	0.0248	1.65		Area =	0.041	Invert Elev =	6967.18
Rectangular	Orifice 2:	V	2	0.8		Area =	1.600	Invert Elev =	6970.40
Circular	Orifice 3:	H			10	Area =	0.545	Invert Elev =	6969.00
Rectangular	Orifice 4:	V	6	0.7		Area =	4.200	Invert Elev =	6971.20

Stand Pipe Dimensions

Rec Grate		11	x	7	Elev =	6971.90
Circ. Grate			dia.		Elev =	6971.90

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		3.5	**Circular**
Area	9.6		TOP		
Outlet I. E.	6966.8		6970.58		
Wall Thick.	4	in.			

50 year storage elev.=	6973.1
50 year discharge=	137
25 year storage elev.=	6972.5
25 year discharge=	72
10 year storage elev.=	6971.9
10 year discharge=	24
2 year storage elev.=	6970.6
2 year discharge=	4.1

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.0			-	-	-	-	-	0.91		-	-
6967.5	0.5	16136.5	0.37	0.1	0.1			0.0	-	-	-	-	8.0		0.01	0.01
6968	1	30465	0.70	0.3	0.4			0.1	-	-	-	-	18		0.06	0.06
6968.5	1.5	81028.5	1.86	0.6	1.0			0.1	-	-	-	-	30		0.11	0.11
6969	2	131592	3.02	1.2	2.2			0.2	-	-	-	-	52		0.2	0.2
6969.5	2.5	201294.5	4.62	1.9	4.1			0.2	-	1.9	-	-	75		2.1	2.1
6970	3	270997	6.22	4.6	6.9			0.3	-	2.6	-	-	97		2.9	2.9
6970.5	3.5	329359.5	7.56	3.4	10			0.3	0.2	3.2	-	-	122		3.7	3.7
6970.75	3.75	358540.75	8.23	2.0	12.3			0.3	1.2	3.5	-	-	135		5	5.0
6971	4	387722	8.90	7.6	14			0.3	2.8	3.7	-	-	146		7	6.8
6971.25	4.25	408751	9.38	2.3	17			0.4	4.7	3.9	0.2	-	157		9	9.2
6971.5	4.5	429780	9.87	4.7	19			0.4	6.4	4	3.0	-	167		14	14
6971.75	4.75	450809	10.35	2.5	22			0.4	7.5	4	7.3	-	176		20	20
6972	5	471838	10.83	5.2	24			0.4	8	5	13	2	185		29	29
6972.25	5.25	482595.75	11.08	2.7	27			0.4	9	5	17	16	193		47	47
6972.5	5.5	493354	11.33	5.5	30			0.4	10	5	20	35	201		70	70
6973	6	514869	11.82	5.8	36			0.4	11	5	24	87	217		128	128
6973.25	6.25	518272	11.90	3.0	39			0.5	12	5	26	118	224		162	162
6973.5	6.5	521675	11.98	5.9	42			0.5	13	6	28	152	231		199	199
6974	7	528481	12.13	12.0	48			0.5	14	6	32	228	244		244	244
6976	9	553685	12.71	24.8	72			0.6	18	7	43	623	291		291	291

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-FINAL FUTURE (H09)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.6
100 year storage vol.=	42.4
100 year discharge=	37
5 year storage elev.=	6971.4
5 year storage vol.=	18.0
5 year discharge=	4.1
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular	Orifice 1:	V	0.0248	1.65		Area =	0.041	Invert Elev =	6967.18
Rectangular	Orifice 2:	V	0.75	1		Area =	0.750	Invert Elev =	6970.75
Circular	Orifice 3:	H			8	Area =	0.349	Invert Elev =	6969.00
Rectangular	Orifice 4:	V	3.5	1.25		Area =	4.375	Invert Elev =	6971.75

Stand Pipe Dimensions

Rec Grate		4.25	x	3	Elev =	6973.00
Circ. Grate			dia.		Elev =	6973.00

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		3.5	**Circular**
Area	9.6		TOP		
Outlet I. E.	6966.8		6970.7		
Wall Thick.	5	in.			

50 year storage elev.=	6973.1
50 year discharge=	16
25 year storage elev.=	6972.5
25 year discharge=	8.3
10 year storage elev.=	6971.9
10 year discharge=	5.9
2 year storage elev.=	6970.6
2 year discharge=	2.4

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
6967	0	1808	0.04	0.0	0.0			-	-	-	-	-	0.45		-	-
6967.5	0.5	16136.5	0.37	0.1	0.1			0.0	-	-	-	-	5.0		0.01	0.01
6968	1	30465	0.70	0.3	0.4			0.1	-	-	-	-	8.8		0.06	0.06
6968.5	1.5	81028.5	1.86	0.6	1.0			0.1	-	-	-	-	17		0.11	0.11
6969	2	131592	3.02	1.2	2.2			0.2	-	-	-	-	26		0.2	0.18
6969.5	2.5	201294.5	4.62	1.9	4.1			0.2	-	1.2	-	-	35		1.4	1.4
6970	3	270997	6.22	4.6	6.9			0.3	-	1.7	-	-	48		2.0	2.0
6970.5	3.5	329359.5	7.56	3.4	10.3			0.3	-	2.1	-	-	61		2.4	2.4
6970.75	3.75	358540.75	8.23	2.0	12.3			0.3	-	2.2	-	-	68		2.6	2.6
6971	4	387722	8.90	7.6	14.4			0.3	0.3	2.4	-	-	73		3.0	3.0
6971.25	4.25	408751	9.38	2.3	16.7			0.4	0.8	2.5	-	-	79		3.7	3.7
6971.5	4.5	429780	9.87	4.7	19.1			0.4	1.5	2.7	-	-	85		4.5	4.5
6971.75	4.75	450809	10.35	2.5	21.6			0.4	2.3	2.8	-	-	90		5.4	5.4
6972	5	471838	10.83	5.2	24.3			0.4	3.1	2.9	-	-	95		6.4	6.4
6972.25	5.25	482595.75	11.08	2.7	27.0			0.4	3.6	3.0	-	-	99		7.0	7.0
6972.5	5.5	493354	11.33	5.5	29.8			0.4	4.0	3.1	0.5	-	103		8	8.1
6973	6	514869	11.82	5.8	35.6			0.4	4.8	3.4	5.2	-	111		14	14
6973.25	6.25	518272	11.90	3.0	38.6			0.5	5.1	3.5	8.6	4	114		21	21
6973.5	6.5	521675	11.98	5.9	41.6			0.5	5.4	3.6	13	11	118		33	33
6974	7	528481	12.13	12.0	47.6			0.5	6.0	3.8	22	31	125		63	63
6976	9	553685	12.71	24.8	72.4			0.6	7.9	4.4	40	106	151		151	151

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond F-Final

Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	285
embankment elev =	7138.5
spillway length =	87
spillway elevation =	7137.5
100 year storage elev.=	7136.0
100 year storage vol.=	8.8
100 year discharge=	177
5 year storage elev.=	7131.2
5 year storage vol.=	1.9
5 year discharge=	8.1
WQCV storage elev.=	7129.1
WQCV storage vol.=	0.3
1/2 WQCV storage elev.=	7128.6
1/2 WQCV storage vol.=	0.15

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)		
Rectangular	Orifice 1:	V	0.0131	1.25		Area =	0.016	Elev to cl =	7128.45
Rectangular	Orifice 2:	V	4	0.5		Area =	2.000	Elev to cl =	7130.75
Circular	Orifice 3:	H			8	Area =	0.349	Elev to cl =	7129.20
None Selected	Orifice 4:					Area =	0.000	Elev to cl =	

Stand Pipe Dimensions

Rec Grate		6	x	3	Elev =	7133
Circ. Grate			dia.		Elev =	7133

50 year storage elev.=	7134.9
50 year discharge=	121
25 year storage elev.=	7134.1
25 year discharge=	61
10 year storage elev.=	7132.7
10 year discharge=	17
2 year storage elev.=	7130.1
2 year discharge=	2.3

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert		x		4	**Circular**
Area	12.6		TOP		
Outlet I. E.	7126.6		7131.0		
Wall Thick.	5	in.			

STAGE		STORAGE				DISCHARGE										
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)				GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	**Rectangular**	1	2	OUTFLOW	FLOW
7127.7	0	0	0.00	0.00	0.00			-	-	-	-	-				
7128	0.3	2170	0.05	0.01	0.01	-	-	0.0	-	-	-	-	11		0.0	0.0
7129	1.3	17730	0.41	0.23	0.24	-	-	0.1	-	-	-	-	31		0.1	0.1
7130	2.3	33290	0.76	0.59	0.82	-	-	0.1	-	1.5	-	-	57		1.6	1.6
7131	3.3	39060	0.90	0.83	1.65	-	-	0.1	4.2	2.3	-	-	117		6.6	6.6
7132	4.3	44830	1.03	0.96	2.61	-	-	0.1	10.8	2.8	-	-	117		14	14
7133	5.3	55137.5	1.27	1.15	3.76	-	-	0.2	14.4	3.3	-	-	142		18	18
7134	6.3	65445	1.50	1.38	5.15	-	-	0.2	17.4	3.7	-	36	162		57	57
7135	7.3	79535	1.83	1.66	6.81	-	-	0.2	19.9	4.0	-	102	175		126	126
7136	8.3	93625	2.15	1.99	8.80	-	-	0.2	22.1	4.4	-	150	187		177	177
7137	9.3	111620	2.56	2.36	11.15	-	-	0.2	24.1	4.7	-	173	200		200	200
7138	10.3	129615	2.98	2.77	13.92	-	92.3	0.2	25.9	5.0	-	194	211		211	303
7138.5	10.8					-	261.0	0.3	26.8	5.1	-	203	211		-	261

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond G-FINAL FUTURE DESIGN (G12)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	500
embankment elev =	7033.5
spillway length =	130
spillway elevation =	7031.5
100 year storage elev.=	7030.3
100 year storage vol.=	25.3
100 year discharge=	478
5 year storage elev.=	7027.4
5 year storage vol.=	8.3
5 year discharge=	22
WQCV storage elev.=	7025.2
WQCV storage vol.=	0.9
1/2 WQCV storage elev.=	7024.9
1/2 WQCV storage vol.=	0.45

Data for outlet pipe and grate:

Type		H or V	Dimensions Width (ft.)	X Height (ft.)	Dia.(in)		(sqft)			
Rectangular	Orifice 1:	V	0.0263	1.90		Area =	0.050	Elev to cl =		7024.25
Rectangular	Orifice 2:	V	8.5	1.1		Area =	9.350	Elev to cl =		7027.55
Circular	Orifice 3:	H			12	Area =	0.785	Elev to cl =		7025.20
Rectangular	Orifice 4:	V	4	0.6		Area =	2.400	Elev to cl =		7027.80
Rectangular	Orifice 5:	V	8.5	1.1		Area =	9.350	Elev to cl =		7027.55

Stand Pipe Dimensions

Rec Grate		20	x	8	Elev =	7028.10
Circ. Grate			dia.		Elev =	7028.10

Outlet Culvert Dimensions

	Width (ft.)		Height (ft.)	Dia. (ft.)	Type
Outlet Culvert	10	x	4		**Rectangular**
Area	40.0		TOP		
Outlet I. E.	7022.5		7027.50		
Wall Thick.	12	in.			

50 year storage elev.=	7029.5
50 year discharge=	333
25 year storage elev.=	7028.7
25 year discharge=	170
10 year storage elev.=	7027.9
10 year discharge=	56
2 year storage elev.=	7026.8
2 year discharge=	5.1

STAGE		STORAGE				DISCHARGE											
ELEV	HEIGHT	AREA		VOLUME		TOP OF	SPILLWAY	ORIFICE (max outflow)					GRATE (max outflow)	PIPE		REALIZED CULVERT	TOTAL
		sqft	acre	acft	cum acft	BANK		1	2	3	4	5	**Rectangular**	1	2	OUTFLOW	FLOW
7023.3	0	0	0.00	0.0	0.00			-	-	-	-	-	-	12		-	-
7024	0.7	2232	0.05	0.0	0.02	-	-	0.0	-	-	-	-	-	51		0.0	0.05
7025	1.7	39917	0.92	0.5	0.50	-	-	0.2	-	-	-	-	-	111		0.2	0.17
7026	2.7	126469	2.90	1.9	2.41	-	-	0.3	-	3.4	-	-	-	184		3.7	3.7
7026.5	3.2	166675	3.83	3.6	4.06	-	-	0.4	-	4.3	-	-	-	224		4.7	4.7
7027	3.7	206880	4.75	2.1	6.20	-	-	0.4	-	5.1	-	-	-	268		5.5	5.5
7027.5	4.2	232032	5.33	4.6	8.64	-	-	0.4	9.0	5.7	-	9.0	-	304		24	24
7028	4.7	257183	5.90	5.3	11.5	-	-	0.5	25.5	6.3	4.2	25.5	-	337		62	62
7028.5	5.2	264196	6.07	5.7	14.3	-	-	0.5	43.9	6.9	9.7	43.9	27	373		132	132
7029	5.7	271209	6.23	6.1	17.6	-	-	0.5	54.2	7.4	12.7	54.2	92	406		221	221
7029.5	6.2	276106	6.34	11.7	20.3	-	-	0.6	70.5	7.8	17.1	70.5	179	436		345	345
7030	6.7	281003	6.45	9.4	23.7	-	-	0.6	77.3	8.3	19.0	77.3	283	464		464	464
7030.5	7.2	286003	6.57	6.5	26.8	-	-	0.6	77.3	8.7	19.0	77.3	402	491		491	491
7031	7.7	291002	6.68	6.6	30.3	-	-	0.6	83.6	9.1	20.7	83.6	533	516		516	516
7031.5	8.2	296443	6.81	6.7	33.4	-	-	0.6	89.5	9.5	22.2	89.5	677	540		540	540
7032	8.7	301883	6.93	3.4	36.9	137.9	137.9	0.7	95.0	9.9	23.7	95.0	832	563		563	701
7032.5	9.2	309236	7.10	7.0	40.4	390.0	390.0	0.7	100.2	10.2	25.1	100.2	997	586		586	976
7033	9.7	316589	7.27	3.6	44.0	716.5	716.5	0.7	105.1	10.6	26.4	105.1	1,171	607		607	1,323

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

RHR FILING 1 INTERIM CONDITION

Simulation Run: RHRF1-100 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	WW Grading
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	509(CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	134 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:00
Total Inflow :	57.0 (AC-FT)	Peak Storage:	25.4 (AC-FT)
Total Outflow:	46.8 (AC-FT)	Peak Elevation:	7057.1 (FT)

Simulation Run: RHRF1-005 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	WW Grading
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	107 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	12 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 14:36
Total Inflow :	13.6 (AC-FT)	Peak Storage:	7.3 (AC-FT)
Total Outflow:	9.2 (AC-FT)	Peak Elevation:	7053.9 (FT)

Simulation Run: RHRF1-100 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	WW Grading
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	590 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	224 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:30
Total Inflow :	122.9 (AC-FT)	Peak Storage:	41.0 (AC-FT)
Total Outflow:	98.9 (AC-FT)	Peak Elevation:	6973.5 (FT)

Simulation Run: RHRF1-005 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	WW Grading
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	128 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	14 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 20:00
Total Inflow :	29.0 (AC-FT)	Peak Storage:	17.1 (AC-FT)
Total Outflow:	13.1 (AC-FT)	Peak Elevation:	6971.3 (FT)

RHR FILING 1 FUTURE CONDITION
Simulation Run: F-100 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	509(CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	134 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:00
Total Inflow :	57.0 (AC-FT)	Peak Storage:	25.5 (AC-FT)
Total Outflow:	46.8 (AC-FT)	Peak Elevation:	7057.1 (FT)

Simulation Run: F-005 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	107 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	12 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 14:36
Total Inflow :	13.6 (AC-FT)	Peak Storage:	7.5 (AC-FT)
Total Outflow:	9.2 (AC-FT)	Peak Elevation:	7053.9 (FT)

Simulation Run: F-100 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	610 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	242 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:30
Total Inflow :	122.9 (AC-FT)	Peak Storage:	42.4 (AC-FT)
Total Outflow:	98.9 (AC-FT)	Peak Elevation:	6973.6 (FT)

Simulation Run: F-005 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	126 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	16 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 20:00
Total Inflow :	29.0 (AC-FT)	Peak Storage:	18.0 (AC-FT)
Total Outflow:	13.1 (AC-FT)	Peak Elevation:	6971.4 (FT)

Simulation Run: F-100 YR Reservoir: POND F

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	256(CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	164 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:42
Total Inflow :	35.3 (AC-FT)	Peak Storage:	8.0 (AC-FT)
Total Outflow:	33.4 (AC-FT)	Peak Elevation:	7135.8 (FT)

Simulation Run: F-005 YR Reservoir: POND F

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	19 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:36
Peak Outflow:	7.2 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 14:18
Total Inflow :	5.1 (AC-FT)	Peak Storage:	1.6 (AC-FT)
Total Outflow:	4.6 (AC-FT)	Peak Elevation:	7131.1 (FT)

Simulation Run: F-100 YR Reservoir: POND G

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	14Mar2018 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	694 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:06
Peak Outflow:	479 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:32
Total Inflow :	119.4 (AC-FT)	Peak Storage:	25.4 (AC-FT)
Total Outflow:	110.2 (AC-FT)	Peak Elevation:	7030.3 (FT)

Simulation Run: F-005 YR Reservoir: POND G

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	14Mar2018 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	73 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:30
Peak Outflow:	21 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 15:24
Total Inflow :	20.4 (AC-FT)	Peak Storage:	8.2 (AC-FT)
Total Outflow:	14.5 (AC-FT)	Peak Elevation:	7027.4 (FT)

Appendix D – Outlet Protection Design

EXISTING FROM ROLLING HILLS RANCH PUD GRADING

RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

Low Tailwater Design ($y_t \leq D/3$)

OUTLET # OS-2

Outlet Size (D) :	42	in.	Discharge (q):	86	CFS
Capacity (Q): (full flow)	144	CFS	Flow depth (d): (calculated)	26.3	in.

Q_{full} =	144	CFS	q/Q_{full} =	0.60
A_{full} =	9.6	SF		
V_{full} =	15.0	FPS	$Q/D^{2.5}$ =	3.8

d/D	0.63	from HS-20a using q/Q_{full}
d/D	0.68	from HS-20b using $Q/D^{2.5}$

A' (A/A_{full})	0.63	from HS-20a using smaller d/D from above	Flow Area ($a=A' \times A_{full}$)	6.0	SF

Outlet Velocity (V = q/a) 14.3 FPS

$P_d = (V^2 + gd)^{1/2}$ = 17

RIP-RAP SIZE: M from HS-20c

d_{50}= 12 in $T=1.75xd_{50}$ 1.75 ft

Basin Length (L)	14.0	FT.	Cutoff Wall Depth (B=D/2+T)	3.5	FT
Basin Width (W)	14.0	FT.			

Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—Discharge and Flow Area Relationships for Circular and Rectangular Pipes
(Ratios for Flow Based on Manning's n Varying With Depth)
(Stevens and Urbonas 1996)

Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—
Brink Depth for Horizontal Pipe Outlets
(Stevens and Urbonas 1996)

Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—
Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet
(Stevens and Urbonas 1996)

RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

Low Tailwater Design ($y_t \leq D/3$)

OUTLET # OS-3

Outlet Size (D) :	36	in.	Discharge (q):	34	CFS
Capacity (Q): (full flow)	68	CFS	Flow depth (d): (calculated)	18.0	in.

Q_{full} =	68	CFS	q/Q_{full} =	0.50
A_{full} =	7.1	SF		
V_{full} =	9.6	FPS	$Q/D^{2.5}$ =	2.2

d/D	0.56	from HS-20a using q/Q_{full}
d/D	0.50	from HS-20b using $Q/D^{2.5}$

A' (A/A_{full})	0.50	from HS-20a using smaller d/D from above	Flow Area ($a=A' \times A_{full}$)	3.5	SF

Outlet Velocity (V = q/a) 9.6 FPS

$P_d = (V^2 + gd)^{1/2}$ = 12

RIP-RAP SIZE: M from HS-20c

d_{50}= 12 in $T=1.75xd_{50}$ 1.75 ft

Basin Length (L)	12.0	FT.	Cutoff Wall Depth (B=D/2+T)	3.25	FT
Basin Width (W)	12.0	FT.			

Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—Discharge and Flow Area Relationships for Circular and Rectangular Pipes
(Ratios for Flow Based on Manning's n Varying With Depth)
(Stevens and Urbonas 1996)

Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—
Brink Depth for Horizontal Pipe Outlets
(Stevens and Urbonas 1996)

Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—
Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet
(Stevens and Urbonas 1996)

Appendix E – Soil Resource Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

El Paso County Area, Colorado

ROLLING HILLS RANCH PUD

February 21, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 7, 2016—Aug 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	387.7	31.2%
83	Stapleton sandy loam, 3 to 8 percent slopes	855.6	68.8%
Totals for Area of Interest		**1,243.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Flood plains, fan terraces, fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit:
Landform: Swales
Hydric soil rating: Yes

Pleasant

Percent of map unit:

Landform: Depressions
Hydric soil rating: Yes

Other soils
Percent of map unit:
Hydric soil rating: No

83—Stapleton sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 369z
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition
Stapleton and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stapleton

Setting
Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile
A - 0 to 11 inches: sandy loam
Bw - 11 to 17 inches: gravelly sandy loam
C - 17 to 60 inches: gravelly loamy sand

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Ecological site: Gravelly Foothill (R049BY214CO)
Hydric soil rating: No

Minor Components

Pleasant
Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Fluvaquentic haplaquolls
Percent of map unit:
Landform: Swales
Hydric soil rating: Yes

Other soils
Percent of map unit:
Hydric soil rating: No

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Appendix F – Drainage Maps

ROLLING HILLS RANCH FILING 1
MERIDIAN RANCH

HISTORIC MDDP (Full Spectrum)							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	81	53	31	12	3.9	0.5
OS06-G02	0.1313	79	52	31	12	3.8	0.5
OS05	0.0578	40	26	16	5.9	1.8	0.2
OS05-G01	0.0578	38	26	16	5.7	1.8	0.2
HG01	0.0547	33	21	13	4.8	1.6	0.2
G01	0.1125	71	47	28	10	3.3	0.5
G01-G02	0.1125	70	47	27	10	3.3	0.5
HG02	0.0906	46	30	18	6.9	2.4	0.4
G02	0.3344	194	129	76	28	9.4	1.4
G02-G03	0.3344	192	127	75	28	9.3	1.4
HG03	0.1828	79	51	31	12	4.4	0.8
OS07	0.0328	25	17	11	4.6	1.7	0.3
OS07-G03	0.0328	24	17	9.9	4.4	1.7	0.3
G03	0.55	295	195	115	44	15	2.4
G03-G04	0.55	286	192	113	43	15	2.4
OS09	0.1547	92	64	41	19	8.5	2.0
OS09-G04	0.1547	91	63	41	19	8.5	2.0
HG04	0.0891	40	27	16	6.1	2.2	0.4
HG05	0.1125	50	33	19	7.6	2.7	0.5
OS08	0.0406	36	25	17	7.9	3.5	0.8
OS08-G04	0.0406	34	24	15	7.6	3.5	0.8
G04	0.9469	502	336	200	78	28	4.9
G04-G05	0.9469	496	322	193	78	28	4.9
HG06A	0.1375	50	33	20	7.8	2.9	0.5
G05	1.0844	544	355	212	86	31	5.4
G05-G06	1.0844	530	353	211	86	31	5.4
HG06B	0.1031	34	22	13	5.4	2.1	0.4
G06	1.1875	561	375	225	91	33	5.8
HG07	0.0984	47	31	18	7.1	2.4	0.4
HG07-G11	0.0984	47	31	18	7.0	2.4	0.4
HG08	0.1328	73	48	28	11	3.6	0.5
G11	0.2312	115	75	44	17	5.7	0.9
G11-G12	0.2312	114	75	44	17	5.6	0.9
HG09	0.1781	73	48	29	11	4.1	0.7
G12	0.4093	187	122	72	28	9.7	1.6
G12-H08	0.4093	183	121	71	28	9.7	1.6
HG10	0.1375	39	26	16	6.5	2.6	0.5
H08	0.5468	216	142	85	34	12	2.1
HG14	0.2297	81	53	32	13	4.8	0.9
HG13	0.0844	55	37	23	9.8	3.9	0.7
G07	0.0844	55	37	23	9.8	3.9	0.7
G07-G08	0.0844	54	37	23	9.7	3.8	0.7
G08	0.3141	119	78	48	20	7.6	1.5
HG15	0.2563	70	46	28	12	4.7	0.9
H13	0.2563	70	46	28	12	4.7	0.9
HG11	0.2047	77	51	30	12	4.5	0.8
H09	0.2047	77	51	30	12	4.5	0.8
HG12	0.1297	57	38	22	8.7	3.1	0.5
H10	0.1297	57	38	22	8.7	3.1	0.5

TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444

HISTORIC CONDITIONS – SCS MAP

OCT 2019

FIGURE 5

S:\OneDrive\Civil\Proj\Rolling Hills Filing 1\DWG\Plan Sheets\Drainage Maps\FDR\ROLLING HILLS RANCH FILING 1 FDR - SCS - HIST.dwg, 10/9/2019 9:56:25 AM

ROLLING HILL RANCH FILING 1
MERIDIAN RANCH

INTERIM MDDP (Full Spectrum)							
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
FG10A	0.0806	111	83	59	34	20.2	8.3
FG08A	0.0750	116	90	66	41	26.8	13.4
FG08A-G05	0.0750	110	86	64	41	26.5	13.1
FG08B	0.0630	86	67	49	30.9	20.1	10.1
FG08B-G05	0.0630	84	65	48	29.5	19.5	10.0
FG11	0.0625	75	59	44	28.1	18.6	9.8
FG09	0.0484	48	36	25	14.3	8.3	3.2
FG09-G05	0.0484	48	36	25	14	8.0	3.2
FG10B	0.0416	42	31	22	12	7.0	2.7
G05	0.3711	451	345	251	151.6	94.5	45.1
FG13	0.0534	34	24	15	7	4	0.9
FG12	0.0328	50	40	30	20	14	7.8
POND D IN	0.4573	527	402	292	176.2	110.1	52.4
POND D	0.4573	134	90	50	18.4	11.7	4.3
POND D-G17	0.4573	134	90	50	18	12	4.3
FG15	0.0103	15	12	9	6	4	2.1
FG15-G17A	0.0103	15	12	9	5.8	3.9	2.1
G17	0.5676	159	109.8	74.0	41.0	24.1	9.6
G17-G18	0.5676	159	109	74	41	24	9.2
FG16	0.0791	133	104	78	50	33.9	18.3
G18	0.6467	277	207	147	88	55.2	26.6
G18-POND E	0.6467	272	202	144	87	55.0	26.2
FG31	0.0922	116	92	69.5	45.4	31.0	17.2
FG30	0.0389	30	20	11.5	4.3	1.3	0.2
FG30-PONDHS	0.0389	28	19.0	11.3	4.2	1.2	0.2
POND HS	0.1311	112	63	40	28	19	10.0
FG17a	0.0694	101	78	57	35	23	11.7
FG17a-POND E	0.0694	99	76	56	35	22.9	11.6
FG18	0.0644	56	42	30	18	10.6	4.7
FG18-POND E	0.0644	56	42	30	17	10.6	4.6
FG19	0.0527	84	66	50	33.0	22.9	13.1
FG17c	0.0313	31	22	14	6.5	2.8	0.5
FG17b	0.0214	39	31	24	16	11	6.1
POND E IN	1.0170	590	449	326	199	128	64.1
POND E	1.0170	224	138	69.9	26.9	13.9	5.9
H08	1.0170	193	125	62	21	10	3.6
FG20	0.0109	28	23	19	15	12	8.5
H08A	1.0279	195.1	126.1	62.9	21.6	13.0	8.8
H09	0.0000	31	13	8	6	4	2.3

LEGEND

- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY
- SCS MODEL ID / SIZE ACRES — BASIN IDENTIFICATION (FG31 / 2)
- DESIGN POINT
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL

*NOTE: PRELIMINARY STORAGE VOLUMES AND OUTFLOW QUANTITIES HAVE BEEN PROVIDED FOR EACH OF THE FUTURE DETENTION FACILITIES LOCATED WITHIN THE DEVELOPMENT. THE ACTUAL STORAGE VOLUMES AND DISCHARGE RATES WILL BE DETERMINED UPON A COMPLETE ANALYSIS FOR EACH DETENTION FACILITY PRIOR TO CONSTRUCTION. THE VALUES GIVEN FOR DISCHARGE AND VOLUME ARE ESTIMATES FOR PLANNING PURPOSES ONLY.

INTERIM CONDITIONS - SCS MAP

TECH CONTRACTORS
11886 STAPLETON DR.
FALCON, CO 80831
TELEPHONE: 719.495.7444

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FIGURE 6

S:\OneDrive\Civil\Proj\Rolling Hills Filing 1\DWG\Plan Sheets\Drainage Maps\FDR\ROLLING HILLS RANCH FILING 1 FDR - SCS - INTERIM.dwg, 10/9/2019 9:59:15 AM

ROLLING HILL RANCH FILING 1
MERIDIAN RANCH

FUTURE MDDP (Full Spectrum)							
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q25 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	30	12	3.8	0.5
G1a	0.1313	80	52	30	12	3.8	0.5
G1a-G2	0.1313	79	52	30	11	3.6	0.5
OS05	0.0578	39	26	15	5.6	1.8	0.2
OS05-G1	0.0578	39	25	15	5.5	1.7	0.2
FG01	0.0538	31	22	14	7.0	3.4	0.9
FG01-G1	0.0538	31	22	14	6.9	3.4	0.9
G1	0.1116	61	41	25	11	4.9	1.1
G1-G2	0.1116	61	41	25	11	4.8	1.1
FG02	0.0391	32	22	14	6.4	2.7	0.5
G2	0.2820	167	112	67	27	10	1.9
G2-G3	0.2820	163	109	66	27	10	1.9
FG03	0.0203	24	17	12	5.9	0.8	0.8
FG04	0.0172	22	16	11	5.8	3.1	0.9
G3	0.3195	185	123	74	31	11	2.4
G3-POND F	0.3195	183	121	74	31	11	2.4
FG06	0.0608	49	34	22	10	4.6	0.9
FG05	0.0580	45	33	23	12	6.7	2.4
OS07a	0.0170	14	9.2	5.7	2.5	0.9	0.1
OS07a-POND F	0.0170	13	9.0	5.7	2.4	0.9	0.1
POND F IN	0.4553	286	194	120	52	22	4.7
POND F	0.4553	177	121	61	17	8.1	2.3
POND F-G7	0.4553	177	120	60	17	8.1	2.3
FG21b	0.0170	25	20	15	9.6	6.5	3.5
FG21a	0.0072	7.2	5.0	3.2	1.4	0.5	0.1
FG21a-G7	0.0072	6.8	4.9	2.7	1.4	0.5	0.1
G7	0.4795	186	126	64	18	8.8	3.6
G7-G8	0.4795	185	126	64	18	8.8	3.5
FG22	0.1380	102	73	47	24	12	3.3
OS08	0.0406	35	25	16	7.7	3.4	0.7
OS08-G8	0.0406	34	24	15	7.5	3.4	0.7
FG23a	0.0216	21	15	10	5.2	2.7	0.8
OS07b	0.0156	15	10	6.2	2.6	1.0	0.1
OS07b-G7	0.0156	14	10	6.0	2.4	0.9	0.1
G8	0.6953	291	186	95	47	24	7.4
G8-G10	0.6953	288	186	94	46	24	7.4
OS09	0.1527	90	62	39	18	8.2	1.9
OS09-G10	0.1527	88	62	39	18	8.2	1.9
FG24	0.1373	105	76	50	26	13	4.0
G9	0.2900	180	125	81	38	17	4.4
G9-G10	0.2900	178	125	79	37	17	4.4
FG23b	0.0286	23	16	10	4.6	2.0	0.4
G10	1.0139	478	307	174	80	39	12
G10-G11	1.0139	474	305	173	80	38	12
FG23c	0.0122	12	8.7	5.7	3.0	1.5	0.4
G11	1.0261	479	308	176	81	39	12
FG25	0.1086	85	64	46	27	17	7.5
FG26	0.0863	78	58	40	22	12	4.6
FG26-POND G	0.0863	77	57	39	22	12	4.5
FG27	0.0500	52	40	29	17	11	5.0
FG28	0.0245	18	13	8.5	4.1	2.0	0.5
POND G IN	1.2955	684	454	287	145	78	28
POND G	1.2955	478	333	170	56	22	5.1
G12	1.2955	478	333	170	56	22	5.1
G12-G06	1.2955	478	332	170	56	22	5.1
FG29	0.0997	60	39	23	8.7	2.8	0.4
FG32	0.0402	72	57	44	29	20	11
FG32-G06	0.0402	69	54	41	27	18	11
G06	1.4354	506	352	181	61	24	11
FG10A	0.0806	81	61	43	25	15	6.5
FG08A	0.0750	116	90	66	41	27	13
FG08A-G05	0.0750	110	86	64	41	27	13
FG08B	0.0630	86	67	49	31	20	10
FG08B-G05	0.0630	84	65	48	29	19	10
FG11	0.0625	75	59	44	28	19	9.8
FG09	0.0484	48	36	25	14	8.3	3.2
FG09-G05	0.0484	48	36	25	14	8.0	3.2
FG10B	0.0416	42	31	22	12	7.0	2.7
G05	0.3711	433	330	239	145	93	45
FG13	0.0534	34	24	15	7.5	3.6	0.9
FG12	0.0328	50	40	30	20	14	7.8
POND D IN	0.4573	509	387	280	168	107	52
POND D	0.4573	134	91	50	19	12	4.3
POND D-G17	0.4573	134	91	50	19	12	4.3
FG15	0.0103	15	12	9.0	5.8	3.9	2.1
FG15-G17A	0.0103	15	12	8.9	5.8	3.9	2.1
G17A	0.4676	137	93	51	19	12	4.4
FG14	0.1000	98	74	53	32	20	9.2
G17	0.5676	196	132	75	43	25	12
G17-G18	0.5676	196	131	75	43	25	12
FG16	0.0791	133	104	78	50	34	18
G18	0.6467	240	178	128	79	51	26
G18-POND E	0.6467	240	176	126	78	50	25
FG31	0.0922	116	92	69	45	31	17
FG30	0.0389	73	57	44	29	20	11
FG30-PONDHS	0.0389	70	56	42	27	18	11
POND HS	0.1311	153	106	53	36	26	15
FG17a	0.0694	101	78	57	35	23	12
FG17a-POND E	0.0694	99	76	56	35	23	12
FG18	0.0644	56	42	30	18	11	4.7
FG18-POND E	0.0644	56	42	30	17	11	4.6
FG19	0.0527	84	66	50	33	23	13
FG17c	0.0313	31	22	14	6.5	2.8	0.5
FG17b	0.0214	39	31	24	16	11	6.1
POND E IN	1.0170	610	432	318	197	126	64
POND E	1.0170	242	153	80	30	16	6.6
H08	1.0170	205	137	72	24	12	4.1
H09	0.0000	37	16	8.3	5.9	4.1	2.4
FG34	0.0600	34	23	13	5.5	2.0	0.3
G14	0.0600	34	23	13	5.5	2.0	0.3
G14-G15	0.0600	34	22	13	5.4	2.0	0.3
FG35	0.0344	20	13	8.3	3.5	1.5	0.3
G15	0.0944	53	36	21	8.7	3.3	0.6
G15-G08	0.0944	52	35	21	8.7	3.3	0.6
FG37	0.0797	41	27	16	6.0	2.0	0.3
FG36	0.0281	14	9.4	5.5	2.1	0.7	0.1
FG36-G08	0.0281	14	9.3	5.4	2.1	0.7	0.1
G08	0.2022	106	69	41	16	5.8	1.0

As presented, Filing 1 is not readily apparent, what is existing and what is future. UPDATED

Update the hatching/color for Filing 1 area. Identify the other areas on the map as either existing or future. UPDATED

Update pond labels to either note existing, proposed if constructed with this filing or future.

ALL PONDS ARE EXISITNG OR HAVE AND * TO DENOTE FUTURE

Update to "future build-out condition" to be consistent with the description on page 7.

REVISED TO FUTURE

tributary to Ponds D & E.

The final scenario analyzes the future build out conditions for the entirety of Meridian Ranch to ensure the storm drain facilities located at the discharge points of the project are able to properly convey the full spectrum of historic peak flow rates as the storm drainage exits the Meridian Ranch project along Eastonville Road and/or the Falcon Regional Park.

DRAINAGE DESIGN CRITERIA

*NOTE: PRELIMINARY STORAGE VOLUMES AND OUTFLOW QUANTITIES HAVE BEEN PROVIDED FOR EACH OF THE FUTURE DETENTION FACILITIES LOCATED WITHIN THE DEVELOPMENT. THE ACTUAL STORAGE VOLUMES AND DISCHARGE RATES WILL BE DETERMINED UPON A COMPLETE ANALYSIS FOR EACH DETENTION FACILITY PRIOR TO CONSTRUCTION. THE VALUES GIVEN FOR DISCHARGE AND VOLUME ARE ESTIMATES FOR PLANNING PURPOSES ONLY.

LEGEND

- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY
- SCS MODEL ID / SIZE ACRES — BASIN IDENTIFICATION
- DESIGN POINT
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL

DEVELOPED CONDITIONS - SCS MAP

TECH CONTRACTORS
11886 STAPLETON DR.
FALCON, CO 80831
TELEPHONE: 719.495.7444

OCT 2019

FIGURE 5

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GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

N

G01 — BASIN DESIGNATION
2.7 | 0.40 | 0.55 — SUB-WATERSHED DESIGNATION; MINOR/MAJOR STORM COEFFICIENT; BASIN AREA IN ACRES

61 — DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

6130 — EXISTING CONTOUR

6130 — PROPOSED COUNTOUR

PROPOSED STORM SEWER

INITIAL OVERLAND TIME (Ti)

TRAVEL TIME (Tt)

OVERLAND TIME (To)

INDEX MAP

N.T.S.

DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I04	B01	2.29	2.2	6.4	PR 10 ' FORCED SUMP	2.2	6.4	18 " RCP
I05	B02	5.63	5.2	15	PR 15 ' FORCED SUMP	7.3	20	24 " RCP
J02						7.3	20	24 " RCP
DP1	B03	4.34	4.2	12				
I06	B04	3.03	6.2	18	PR 20 ' FORCED SUMP	6.2	17	18 " RCP
J03						13	36	30 " RCP
I07	B05	3.22	3.1	9.1	PR 10 ' FORCED SUMP	3.1	9.1	18 " RCP
J04						16	44	36 " RCP
I08	B06	3.13	3.3	9.9	PR 10 ' FORCED SUMP	3.3	9.9	18 " RCP
J05						18	51	36 " RCP
I09	B07	4.76	4.3	13	PR 20 ' FLOW-BY	3.7	9.2	18 " RCP
J06						22	59	36 " RCP
J07						21	58	36 " RCP
I10	B08	2.54	2.5	7.6	PR 10 ' FORCED SUMP	2.5	7.6	18 " RCP
J08						2.5	7.5	18 " RCP
I11	B09	2.74	2.6	7.7	PR 10 ' SUMP	2.6	7.7	18 " RCP
I12	B10 & B11	6.38	8.5	27	PR 20 ' SUMP	5.4	18	18 " RCP
J09						9.8	31	24 " RCP
J10						30	85	42 " RCP
I13	C01	3.15	3.1	9.0	PR 10 ' FORCED SUMP	3.1	9.0	24 " RCP
I14	C02	3.54	3.4	10	PR 15 ' FORCED SUMP	3.4	10	24 " RCP
J11						6.0	18	24 " RCP
I15	C03	1.33	1.4	4.0	PR 5 ' FORCED SUMP	1.4	4.0	18 " RCP
I16	C04	3.10	3.2	9.4	PR 5 ' FORCED SUMP	3.2	6.3	18 " RCP
J12						9.5	26	30 " RCP
I17	C05	0.58	0.6	1.8	PR 5 ' SUMP	0.6	1.8	18 " RCP
I18	C06	1.03	1.0	6.0	PR 5 ' SUMP	1.0	6.0	18 " RCP
J13						11	32	36 " RCP
CB1	C07	0.88	0.9	2.5	PR Type C	0.9	2.5	18 " RCP
J14						11	34	36 " RCP
I37	E01	16.20	9.9	33	PR 20 ' FORCED SUMP	9.9	33	18 " RCP
I36	E03	9.00	6.0	20	PR 15 ' FORCED SUMP	6.0	20	18 " RCP
J30						15	51	36 " RCP
J31						15	51	36 " RCP
I38	E06	1.27	1.6	4.2	PR 5 ' FORCED SUMP	1.6	4.2	18 " RCP
J32						1.5	4.1	18 " RCP
I39	E07	2.05	2.5	6.7	PR 15 ' FLOW-BY	2.0	4.5	18 " RCP
J33						3.5	8.5	18 " RCP
I40	E08	4.17	4.8	13	PR 10 ' FORCED SUMP	4.8	9.9	18 " RCP
J34						8.0	18	24 " RCP
J35						8.0	18	24 " RCP
I41	E09	5.44	6.2	19	PR 15 ' FORCED SUMP	6.2	14	24 " RCP
J36						27	78	42 " RCP
I42	E10	6.98	7.0	19	PR 20 ' SUMP	7.0	19	24 " RCP
J37						34	95	48 " RCP
CB3	E11	13.04	6.3	18	PR Type C	6.3	18	18 " RCP
I43	E12	1.60	3.6	10.8	PR 20 ' FLOW-BY	3.2	8.0	18 " RCP
J38						49	135	54 " RCP
EI1	E13	6.02	8.2	19	EX 15 ' FORCED SUMP	8.2	13	18 " RCP

BENCH MARK:

INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)

ELEVATION = 6874.00

NOTE:

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No.	Revisions	Date	Inst.	Appr.	Date
-					
-					
-					
-					

TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.3349

MERIDIAN RANCH

RATIONAL DRAINAGE MAP
FINAL DRAINAGE REPORT
ROLLING HILLS RANCH FLING 1

Drawn by TAK
Checked by -
Date OCT 2019

Scale 1" = 100'

1 of 3

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DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I04	B01	2.29	2.2	6.4	PR 10 ' FORCED SUMP	2.2	6.4	18 " RCP
I05	B02	5.63	5.2	15	PR 15 ' FORCED SUMP	7.3	20	24 " RCP
J02						7.3	20	24 " RCP
DP1	B03	4.34	4.2	12				
I06	B04	3.03	6.2	18	PR 20	17	18	18 " RCP
J03							36	30 " RCP
I07	B05	3.22	3.1	9.1	PR 10 ' FORCED SUMP	3.1	9.1	18 " RCP
J04						16	44	36 " RCP
I08	B06	3.13	3.3	9.9	PR 10 ' FORCED SUMP	3.3	9.9	18 " RCP
J05						18	51	36 " RCP
I09	B07	4.76	4.3	13	PR 20 ' FLOW-BY	3.7	9.2	18 " RCP
J06						22	59	36 " RCP
J07						21	58	36 " RCP
I10	B08	2.54	2.5	7.6	PR 10 ' FORCED SUMP	2.5	7.6	18 " RCP
J08						2.5	7.5	18 " RCP
I11	B09	2.74	2.6	7.7	PR 10 ' SUMP	2.6	7.7	18 " RCP
I12	B10 & B11	6.38	8.5	27	PR 20 ' SUMP	5.4	18	18 " RCP
J09						9.8	31	24 " RCP
J10						30	85	42 " RCP
I13	C01	3.15	3.1	9.0	PR 10 ' FORCED SUMP	3.1	9.0	24 " RCP
I14	C02	3.54	3.4	10	PR 15 ' FORCED SUMP	3.4	10	24 " RCP
J11						6.0	18	24 " RCP
I15	C03	1.33	1.4	4.0	PR 5 ' FORCED SUMP	1.4	4.0	18 " RCP
I16	C04	3.10	3.2	9.4	PR 5 ' FORCED SUMP	3.2	6.3	18 " RCP
J12						9.5	26	30 " RCP
I17	C05	0.58	0.6	1.8	PR 5 ' SUMP	0.6	1.8	18 " RCP
I18	C06	1.03	1.0	6.0	PR 5 ' SUMP	1.0	6.0	18 " RCP
J13						11	32	36 " RCP
CB1	C07	0.88	0.9	2.5	PR Type C	0.9	2.5	18 " RCP
J14						11	34	36 " RCP
I37	E01	16.20	9.9	33	PR 20 ' FORCED SUMP	9.9	33	18 " RCP
I36	E03	9.00	6.0	20	PR 15 ' FORCED SUMP	6.0	20	18 " RCP
J30						15	51	36 " RCP
J31						15	51	36 " RCP
I38	E06	1.27	1.6	4.2	PR 5 ' FORCED SUMP	1.6	4.2	18 " RCP
J32						1.5	4.1	18 " RCP
I39	E07	2.05	2.5	6.7	PR 15 ' FLOW-BY	2.0	4.5	18 " RCP
J33						3.5	8.5	18 " RCP
I40	E08	4.17	4.8	13	PR 10 ' FORCED SUMP	4.8	9.9	18 " RCP
J34						8.0	18	24 " RCP
J35						8.0	18	24 " RCP
I41	E09	5.44	6.2	19	PR 15 ' FORCED SUMP	6.2	14	24 " RCP
J36						27	78	42 " RCP
I42	E10	6.98	7.0	19	PR 20 ' SUMP	7.0	19	24 " RCP
J37						34	95	48 " RCP
CB3	E11	13.04	6.3	18	PR Type C	6.3	18	18 " RCP
I43	E12	1.60	3.6	10.8	PR 20 ' FLOW-BY	3.2	8.0	18 " RCP
J38						49	135	54 " RCP
EI1	E13	6.02	8.2	19	EX 15 ' FORCED SUMP	8.2	13	18 " RCP

INDEX MAP

N.T.S.

G01 — BASIN DESIGNATION
2.7 | 0.40 | 0.55 — SUB-WATERSHED DESIGNATION; MINOR/MAJOR STORM COEFFICIENT; BASIN AREA IN ACRES

61 — DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY
SUB-BASIN BOUNDARY
6130 — EXISTING CONTOUR
6130 — PROPOSED COUNTOUR
PROPOSED STORM SEWER
INITIAL OVERLAND TIME (Ti)
TRAVEL TIME (Tt)
OVERLAND TIME (To)

BENCH MARK:

INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)

ELEVATION = 6874.00

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TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.3349

MERIDIAN RANCH

RATIONAL DRANAGE MAP
FINAL DRAINAGE REPORT
ROLLING HILLS RANCH FLING 1

Drawn by TJK
Checked by -
Date OCT 2019

Scale 1" = 100'

2 of 3

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INDEX MAP

N.T.S.

DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I04	B01	2.29	2.2	6.4	PR 10 ' FORCED SUMP	2.2	6.4	18 " RCP
I05	B02	5.63	5.2	15	PR 15 ' FORCED SUMP	7.3	20	24 " RCP
J02						7.3	20	24 " RCP
DP1	B03	4.34	4.2	12				
I06	B04	3.03	6.2	18	PR 20 ' FORCED SUMP	6.2	17	18 " RCP
J03						13	36	30 " RCP
I07	B05	3.22	3.1	9.1	PR 10 ' FORCED SUMP	3.1	9.1	18 " RCP
J04						16	44	36 " RCP
I08	B06	3.13	3.3	9.9	PR 10 ' FORCED SUMP	3.3	9.9	18 " RCP
J05						18	51	36 " RCP
I09	B07	4.76	4.3	13	PR 20 ' FLOW-BY	3.7	9.2	18 " RCP
J06						22	59	36 " RCP
J07						21	58	36 " RCP
I10	B08	2.54	2.5	7.6	PR 10 ' FORCED SUMP	2.5	7.6	18 " RCP
J08						2.5	7.5	18 " RCP
I11	B09	2.74	2.6	7.7	PR 10 ' SUMP	2.6	7.7	18 " RCP
I12	B10 & B11	6.38	8.5	27	PR 20 ' SUMP	5.4	18	18 " RCP
J09						9.8	31	24 " RCP
J10						30	85	42 " RCP
I13	C01	3.15	3.1	9.0	PR 10 ' FORCED SUMP	3.1	9.0	24 " RCP
I14	C02	3.54	3.4	10	PR 15 ' FORCED SUMP	3.4	10	24 " RCP
J11						6.0	18	24 " RCP
I15	C03	1.33	1.4	4.0	PR 5 ' FORCED SUMP	1.4	4.0	18 " RCP
I16	C04	3.10	3.2	9.4	PR 5 ' FORCED SUMP	3.2	6.3	18 " RCP
J12						9.5	26	30 " RCP
I17	C05	0.58	0.6	1.8	PR 5 ' SUMP	0.6	1.8	18 " RCP
I18	C06	1.03	1.0	6.0	PR 5 ' SUMP	1.0	6.0	18 " RCP
J13						11	32	36 " RCP
CB1	C07	0.88	0.9	2.5	PR Type C	0.9	2.5	18 " RCP
J14						11	34	36 " RCP
I37	E01	16.20	9.9	33	PR 20 ' FORCED SUMP	9.9	33	18 " RCP
I36	E03	9.00	6.0	20	PR 15 ' FORCED SUMP	6.0	20	18 " RCP
J30						15	51	36 " RCP
J31						15	51	36 " RCP
I38	E06	1.27	1.6	4.2	PR 5 ' FORCED SUMP	1.6	4.2	18 " RCP
J32						1.5	4.1	18 " RCP
I39	E07	2.05	2.5	6.7	PR 15 ' FLOW-BY	2.0	4.5	18 " RCP
J33						3.5	8.5	18 " RCP
I40	E08	4.17	4.8	13	PR 10 ' FORCED SUMP	4.8	9.9	18 " RCP
J34						8.0	18	24 " RCP
J35						8.0	18	24 " RCP
I41	E09	5.44	6.2	19	PR 15 ' FORCED SUMP	6.2	14	24 " RCP
J36						27	78	42 " RCP
I42	E10	6.98	7.0	19	PR 20 ' SUMP	7.0	19	24 " RCP
J37						34	95	48 " RCP
CB3	E11	13.04	6.3	18	PR Type C	6.3	18	18 " RCP
I43	E12	1.60	3.6	10.8	PR 20 ' FLOW-BY	3.2	8.0	18 " RCP
J38						49	135	54 " RCP
EI1	E13	6.02	8.2	19	EX 15 ' FORCED SUMP	8.2	13	18 " RCP

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

BENCH MARK:

INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)

ELEVATION = 6874.00

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G01 — BASIN DESIGNATION
2.7 — BASIN AREA IN ACRES
0.40 / 0.55 — SUB-WATERSHED DESIGNATION; MINOR/MAJOR STORM COEFFICIENT

61 — DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

6130 — EXISTING CONTOUR

6130 — PROPOSED COUNTOUR

PROPOSED STORM SEWER

INITIAL OVERLAND TIME (TI)

TRAVEL TIME (Tt)

OVERLAND TIME (To)

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