Final Drainage Report
for

Rolling Hills Ranch Filing 3

at

Meridian Ranch

EL PASO COUNTY, COLORADO

May 2021

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-21-016

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.

COLORADO REGISTERED THOMAS A. KERBY 31429 5-24-21 PROFESSIONAL ENGINEER

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.

6/1/2021

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

Date

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.
County Engineer / ECM Administrator

APPROVED
Engineering Department

07/29/2021 12:10:10 PM
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EPC Planning & Community Development Department

Rolling Hills Ranch at Meridian Ranch Filing 3
Preliminary Drainage Report

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EXECUTIVE SUMMARY

The purpose of the following Final Drainage (FDR) is to present the changes to the drainage patterns as a result the Rolling Hills Ranch Filing 3 at Meridian Ranch (RHR3) 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"*

Rolling Hills Ranch Filing 3 encompasses 64.8± acres and is located in Section 20, 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 (FDR) is to present proposed changes to the drainage patterns as a result of the development of Rolling Hills Ranch Filing 3. 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

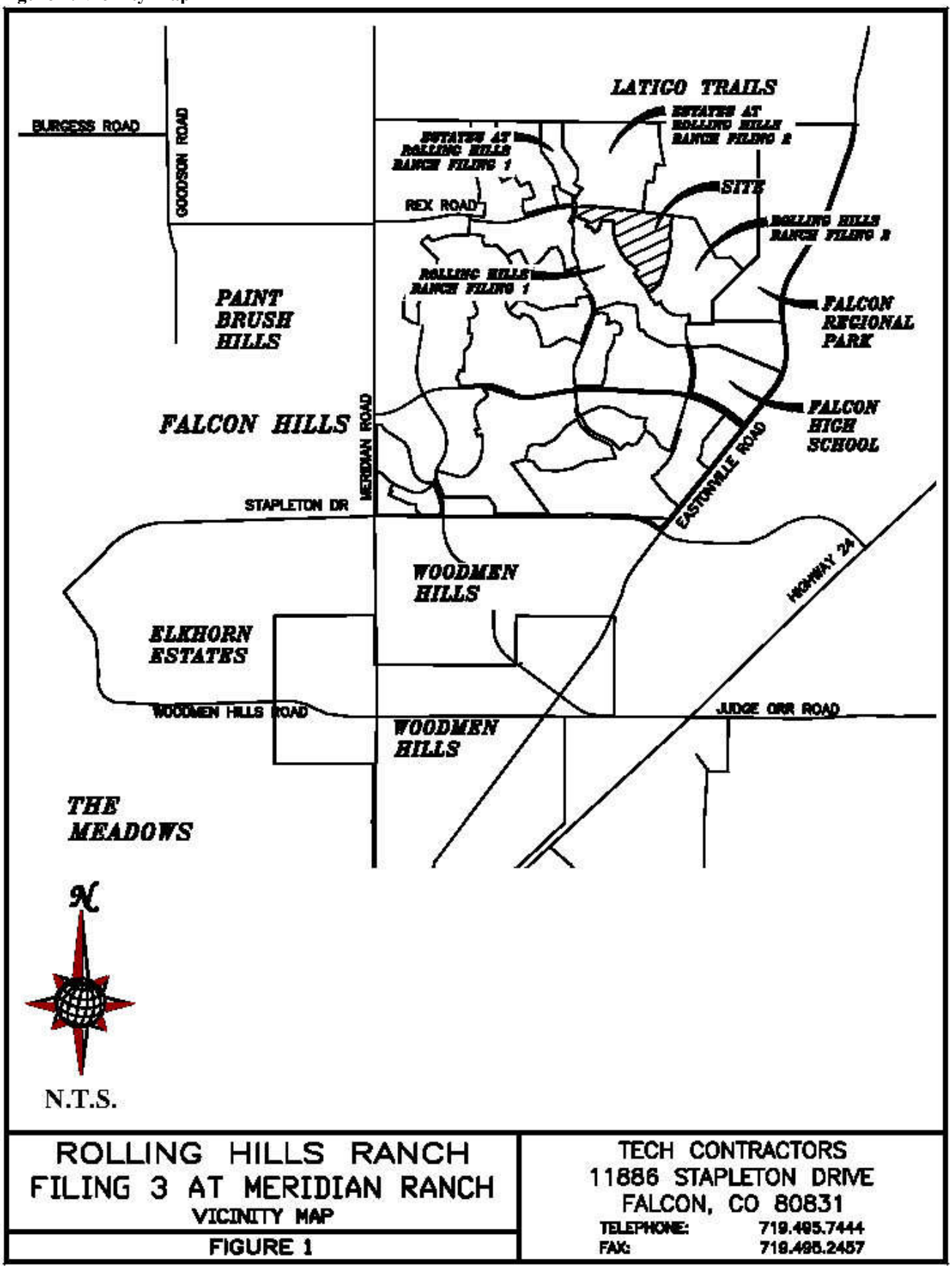
On November 16, 2000 the El Paso County Board of County Commissioners approved the rezoning of the Meridian Ranch project (PUD-00-010) from A-35 to PUD with several conditions. Condition number seven stated in part that "drainage plans shall release and/or retain at approximately eight percent (80%) 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.

The Sketch Plan Amendment (SKP-17-001) was processed and approved in 2018 by the El Paso County Board of County Commissioners by resolution 18-104 for Meridian Ranch. The resolution eliminated the required restriction of 80% of historic peak flow rates mentioned above. The detention pond proposed with this project will release at historic or less peak flow rates as per the current El Paso County stormwater requirements.

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.

Figure 1: Vicinity Map



EXISTING CONDITIONS

General Location

Rolling Hills Ranch Filing 3 project encompasses 64.8± 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. 08041C0552G, dated 12/07/2018) indicates that this project is not located within a designated floodplain. Please see Figure 2: Rolling Hills Ranch Filing 3 Federal Emergency Management Agency (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 (17.0 ac.) and Stapleton series (47.8 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

Figure 2: FEMA Floodplain Map

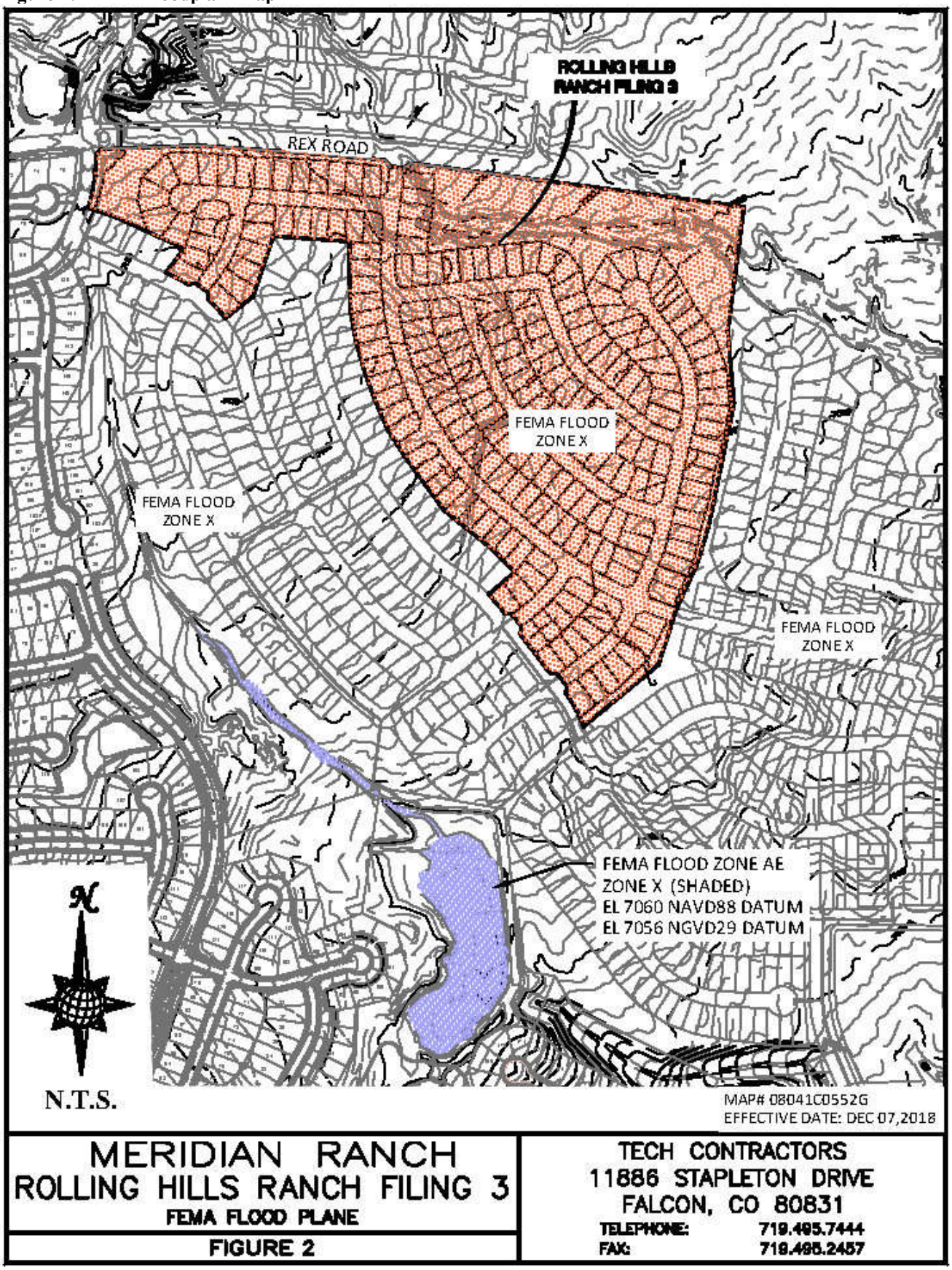
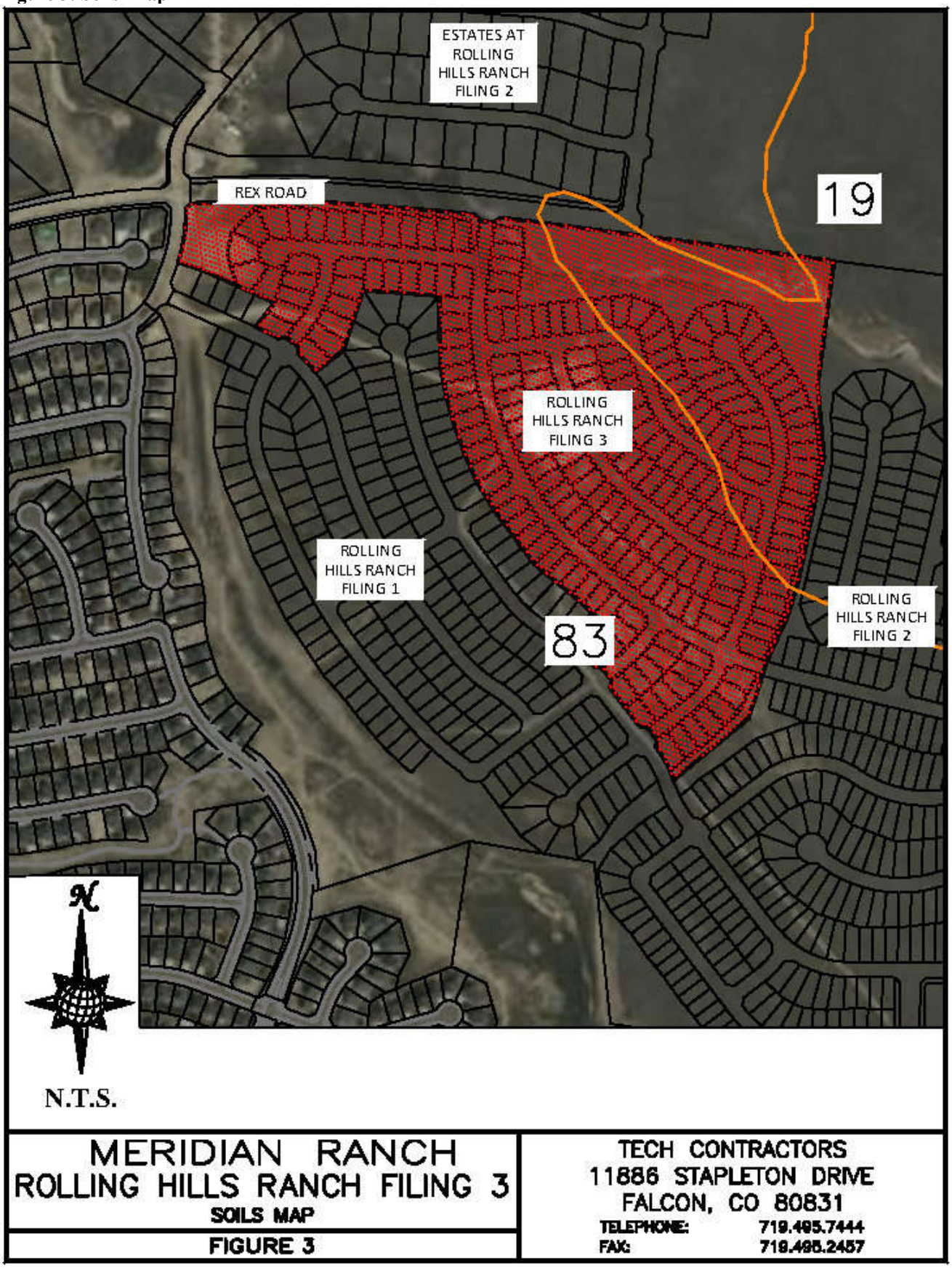


Figure 3: Soils Map



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 Rolling Hills Ranch Filing 3 – 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.

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 RHR3 in the proposed developed condition. The current existing conditions assume all approved projects tributary to RHR3 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 RHR3 is completed.

The interim scenario was analyzed to ensure that the historic flow rates at the outlets of Pond G (Design Point G12) located upstream of and adjacent to the Falcon Regional Park and Pond E (Design Points H08 & H09) located along Eastonville Road were maintained. The development of Rolling Hills Ranch Filing 3 will complete the development of the 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.

The idea behind full spectrum detention is to release the developed runoff flow rates that will approximate those of the pre-developed condition. Most of this project discharges runoff into Pond G and a small portion of the subdivision discharges directly into Pond D. The design of these ponds and the outlet control structures meet or exceed the intent and spirit of the concept. This project will complete development of areas tributary to Pond D.

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	53	3.7	4.6	7053.1
5-YEAR STORM	111	11	7.1	7053.8
10-YEAR STORM	177	18	10.7	7054.6
50-YEAR STORM	405	90	20.0	7056.3
100-YEAR STORM	531	134	25.3	7057.0
FUTURE CONDITIONS				
2-YEAR STORM	53	3.7	4.6	7053.1
5-YEAR STORM	111	11	7.1	7053.8
10-YEAR STORM	177	18	10.7	7054.6
50-YEAR STORM	405	90	20.0	7056.3
100-YEAR STORM	531	134	25.3	7057.0

POND G				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	12	4.2	3.1	7026.2
5-YEAR STORM	45	14	7.2	7027.2
10-YEAR STORM	96	35	9.4	7027.6
50-YEAR STORM	327	229	17.8	7029.0
100-YEAR STORM	509	383	21.8	7029.7
FUTURE CONDITIONS				
2-YEAR STORM	24	5.1	4.6	7026.6
5-YEAR STORM	75	20	8.0	7027.4
10-YEAR STORM	149	51	10.7	7027.8
50-YEAR STORM	451	307	19.8	7029.4
100-YEAR STORM	653	465	24.8	7030.2

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 and within existing and proposed storm drain networks to existing detention ponds. A small portion (2.3 ac.) of the site tributary the existing Detention Pond D will direct the surface runoff to an existing storm drain system constructed with Rolling Hills Ranch Filing 1 located within Rolling Peaks Drive then discharged directly into the pond. The remaining portions of the site (62.5 ac.) are tributary the existing Detention Pond G; runoff will be directed overland to proposed storm drain pipes and conveyed to an existing storm drain system constructed with Rolling Hills Ranch Filing 2 located in Rolling Ranch Drive then conveyed via the storm drain system to the Pond G. Additionally, both Ponds D & G have water quality capture volume included in the design and are utilized as an extended detention pond. Pond D discharges to an existing storm drain system connected to the existing Pond E. Pond E discharges across Eastonville Road to the development of 4-Way Ranch at or below the historic peak flow rates for the full spectrum of design storms as required by the El Paso County DCM.

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.

Rear lots adjacent to the natural arroyo channel will drain into open space and then will be directed via a shallow swale to the arroyo. This surface runoff meets or exceeds the parameters associated with the exemption to discharge to a water of the state before being discharged to a regional WQCV facility. Pond G qualifies as a regional WQCV facility.

Figure 5: Rolling Hills Ranch Filing 3 SCS Calculations – Historic Conditions Map, Figure 6: Rolling Hills Ranch Filing 3 SCS Calculations – Interim Conditions Map and Figure 7: Rolling Hills Ranch Filing 3 SCS Calculations – Future Conditions Map depict the historic, interim and future general drainage patterns for RHR3.

The purpose of this report is to show that the development of RHR3 will not adversely impact the existing drainage facilities adjacent to and downstream of the developed area and the existing Ponds D, E, & G are properly sized for the anticipated future development of Rolling Hills Ranch.

SCS Calculations

<u>Historic Drainage - SCS Calculation Method</u>

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 Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	81	53	12	3.9	0.5
OS06-G02	0.1313	79	52	12	3.8	0.5
OS05	0.0578	40	26	5.9	1.8	0.2
OS05-G01	0.0578	38	26	5.7	1.8	0.2
HG01	0.0547	33	21	4.8	1.6	0.2
G01	0.1125	71	47	10	3.3	0.5
G01-G02	0.1125	70	47	10	3.3	0.5
HG02	0.0906	46	30	6.9	2.4	0.4
G02	0.3344	194	129	28	9.4	1.4
G02-G03	0.3344	192	127	28	9.3	1.4
HG03	0.1828	79	51	12	4.4	0.8
OS07	0.0328	25	17	4.6	1.7	0.3
OS07-G03	0.0328	24	17	4.4	1.7	0.3
G03	0.55	295	195	44	15	2.4
G03-G04	0.55	286	192	43	15	2.4
OS09	0.1547	92	64	19	8.5	2.0
OS09-G04	0.1547	91	63	19	8.5	2.0
HG04	0.0891	40	27	6.1	2.2	0.4
HG05	0.1125	50	33	7.6	2.7	0.5
OS08	0.0406	36	25	7.9	3.5	0.8
OS08-G04	0.0406	34	24	7.6	3.5	0.8
G04	0.9469	502	336	78	28	4.9
G04-G05	0.9469	496	322	78	28	4.9
HG06A	0.1375	50	33	7.8	2.9	0.5
G05	1.0844	544	355	86	31	5.4
G05-G06	1.0844	530	353	86	31	5.4
HG06B	0.1031	34	22	5.4	2.1	0.4
G06	1.1875	561	375	91	33	5.8
HG07	0.0984	47	31	7.1	2.4	0.4
HG07-G11	0.0984	47	31	7.0	2.4	0.4
HG08	0.1328	73	48	11	3.6	0.5
G11	0.2312	115	75	17	5.7	0.9
G11-G12	0.2312	114	75	17	5.6	0.9
HG09	0.1781	73	48	11	4.1	0.7
G12	0.4093	187	122	28	9.7	1.6
G12-H08	0.4093	183	121	28	9.7	1.6
HG10	0.1375	39	26	6.5	2.6	0.5
H08	0.5468	216	142	34	12	2.1
HG14	0.2297	81	53	13	4.8	0.9
HG13	0.0844	55	37	9.8	3.9	0.7
G07	0.0844	55	37	9.8	3.9	0.7
G07-G08	0.0844	54	37	9.7	3.8	0.7
G08	0.3141	119	78	20	7.6	1.5
HG15	0.2563	70	46	12	4.7	0.9
H13	0.2563	70	46	12	4.7	0.9
HG11	0.2047	77	51	12	4.5	0.8
H09	0.2047	77	51	12	4.5	0.8
HG12	0.1297	57	38	8.7	3.1	0.5
H10	0.1297	57	38	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 Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	12	3.8	0.0
G1a	0.1313	80	52	12	3.8	0.0
G1a-G2	0.1313	79	52	11	3.6	0.0
OS05	0.0578	39	26	5.6	1.8	0.0
OS05-G1	0.0578	39	25	5.5	1.7	0.0
FG01	0.0531	31	22	6.9	3.3	0.0
FG01-G1	0.0531	31	22	6.9	3.3	0.0
G1	0.1109	61	41	11	4.8	0.0
G1-G2	0.1109	60	41	11	4.8	0.0
FG02	0.0391	32	22	6.2	2.6	0.0
G2	0.2813	166	112	27	10	0.1
G2-G3	0.2813	163	108	27	10	0.1
FG03	0.0203	24	17	5.9	3.0	0.0
FG04	0.0172	22	16	5.8	3.1	0.0
G3	0.3188	184	123	31	12	0.1
G3-POND F	0.3188	183	121	31	12	0.1
FG06	0.0677	51	36	11.3	5.3	0.1
OS07a-POND F	0.0170	13	9.1	2.3	0.9	0.0
POND F IN	0.4615	291	198	54	23	0.3
POND F	0.4615	178	121	16	8.1	0.0
POND F-G7	0.4615	177	121	16	8.1	0.0
OS07b	0.0156	15	10	3	1.0	0.0
OS07b-G4	0.0156	14	10	2.5	0.9	0.0
FG21a	0.0095	6	4.2	1.1	0.4	0.0
G4	0.0251	20	13.5	3.6	1.4	0.0
OS08-G8	0.0397	34	23	7	3	0.0
FG23a	0.0216	21	15	5	3	0.0
G8	0.7026	262	171	46	23.6	0.3
G8-G10	0.7026	261	170	46	23.2	0.3
OS09	0.1527	90	62	18	8.2	0.1
OS09-G9	0.1527	88	62	18.0	8.1	0.1
FG24	0.1394	63	42	9.9	3.7	0.0
G9	0.2921	150	102	28	12	0.1
G9-G10	0.2921	149	101	28	12	0.1
FG23b	0.0359	21	14	3.3	1.2	0.0
G10	1.0306	414	262	65	29	0.4
G10-G11	1.0306	413	258	65	29	0.4
FG23c	0.0081	6.5	4.6	1.5	0.7	0.0
G11	1.0387	416	259	66	29	0.4
FG25	0.1086	112	85	36	22	1.2
FG28	0.0681	38	26	6.8	2.7	0.0
POND G IN	1.2154	509	327	96	45	1
POND G	1.2154	383	229	35	14	0.3
G12	1.2154	383	229	35	14	0.3
G12-G06	1.2154	383	229	35	14	0.2
FG29	0.0997	60	39	8.7	2.8	0.0
FG32	0.0402	29	19	4.2	1.3	0.0

INTERIM MDDP (Full Spectrum)						
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
FG32-G06	0.0402	28	19	4.1	1.3	0.0
G06	1.3553	403	241	37	15	0.2
FG10A	0.0806	103	77	32	20	0.7
FG08A	0.0750	116	90	41	27	3
FG08A-G05	0.0750	110	86	41	27	2
FG08B	0.0630	86	67	31	20	2
FG08B-G05	0.0630	84	65	29	19	2
FG11	0.0625	75	59	28	19	2.2
FG09	0.0484	48	36	14	8.3	0.3
FG09-G05	0.0484	48	36	14	8.0	0.3
FG10B	0.0416	42	31	12	7.0	0.2
G05	0.3711	455	347	153	95	7
FG13	0.0534	34	24	7.5	3.6	0.0
FG12	0.0328	50	40	20	14	2.1
POND D IN	0.4573	531	405	177	111	9
POND D	0.4573	134	90	18	11	1.1
POND D-G17	0.4573	133	90	18	11	1.1
FG15	0.0103	15	12	5.8	3.9	0.5
FG15-G17A	0.0103	15	12	5.8	3.9	0.5
G17A	0.4676	136	92	18	11	1.1
FG14	0.1000	98	74	32	20	1.3
G17	0.5676	201	134	42	25	2
G17-G18	0.5676	199	134	42	25	2
FG16	0.0791	133	104	50	34	4
G18	0.6467	247	179	78	50	5
G18-POND E	0.6467	247	177	77	50	5
FG31	0.0922	116	92	45	31	5
FG30	0.0389	30	20	4.3	1.3	0.0
FG30-PONDHS	0.0389	28	19	4.2	1.2	0.0

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 Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	12	3.8	0.0
G1a	0.1313	80	52	12	3.8	0.0
G1a-G2	0.1313	79	52	11	3.6	0.0
OS05	0.0578	39	26	5.6	1.8	0.0
OS05-G1	0.0578	39	25	5.5	1.7	0.0
FG01	0.0531	31	22	6.9	3.3	0.0
FG01-G1	0.0531	31	22	6.9	3.3	0.0
G1	0.1109	61	41	11	4.8	0.0
G1-G2	0.1109	60	41	11	4.8	0.0
FG02	0.0391	32	22	6.2	2.6	0.0

FUTURE MDDP (Full Spectrum)						
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
G2	0.2813	166	112	27	10	0.1
G2-G3	0.2813	163	108	27	10	0.1
FG03	0.0203	24	17	5.9	3.0	0.0
FG04	0.0172	22	16	5.8	3.1	0.0
G3	0.3188	184	123	31	12	0.1
G3-POND F	0.3188	183	121	31	12	0.1
FG06	0.0677	51	36	11	5.3	0.1
FG05	0.0580	45	33	12	6.7	0.2
OS07a	0.0170	14	9.2	2.5	0.9	0.0
OS07a-POND F	0.0170	13	9.1	2.3	0.9	0.0
POND F IN	0.4615	291	198	54	23	0.3
POND F	0.4615	178	121	16	8.1	0.0
POND F-G7	0.4615	177	121	16	8.1	0.0
OS07b	0.0156	15	10	3	1.0	0.0
OS07b-G4	0.0156	14	10	2.5	0.9	0.0
FG21a	0.0095	6.1	4.2	1.1	0.4	0.0
G4	0.0251	20.2	13.5	3.6	1.4	0.0
G4-G7	0.0251	20	13	3	1.3	0.0
FG21b	0.0150	21	15	6	3.8	0.1
G7	0.5016	190	129	18	9	0.1
G7-G8	0.5016	189	128	17.9	8.8	0.1
FG22	0.1397	119	85	29.3	14.9	0.2
OS08	0.0397	35	24	7.5	3.4	0.0
OS08-G8	0.0397	34	23	7.3	3.4	0.0
FG23a	0.0216	21	14.9	5.2	2.7	0.0
G8	0.7026	271	175	48	25	0.3
G8-G10	0.7026	271	174	47	24	0.3
OS09	0.1527	90	62	18	8.2	0.1
OS09-G9	0.1527	88	62	18	8.2	0.1
FG24	0.1369	101	72	25	13	0.2
G9	0.2896	179	126	38	17	0.2
G9-G10	0.2896	179	125	37	17	0.2
FG23b	0.0305	27	19	6.1	2.8	0.0
G10	1.0227	450	281	81	39	1
G10-G11	1.0227	450	279	80	39	1
FG23c	0.0122	12	8.7	3.0	1.5	0.0
G11	1.0349	453	281	82	40	1
FG25	0.1086	112	85	36	22	1.2
FG26	0.0863	78	58	22	12	0.3
FG26-POND G	0.0863	77	57	22	12	0.3
FG27	0.0500	52	40	17	11	0.7
FG28	0.0245	24	17	5.5	2.7	0.0
POND G IN	1.3043	653	451	149	75	2
POND G	1.3043	465	307	51	20	0.8
G12	1.3043	465	307	51	20	0.8
G12-G06	1.3043	464	306	51	20	0.8
FG29	0.0997	60	39	8.7	2.8	0.0
FG32	0.0402	72	57	29	20	3
FG32-G06	0.0402	69	54	27	18	3
G06	1.4442	493	324	55	22	3
FG08A	0.0750	116	90	41	27	2.6
FG08A-G05	0.0750	110	86	41	27	2
FG08B	0.0630	86	67	31	20	2
FG08B-G05	0.0630	84	65	29	19	2

FUTURE MDDP (Full Spectrum)						
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
FG09	0.0484	48	36	14	8	0
FG09-G05	0.0484	48	36	14	8	0.3
FG10B	0.0416	42	31	12	7.0	0.2
G05	0.2280	282	215	94	58.8	4.4
FG10A	0.0806	103	77	32	19.8	0.7
FG11	0.0625	75	59	28	19	2
FG13	0.0534	34	24	7.5	3.6	0.0
FG12	0.0328	50	40	20	14	2.1
POND D IN	0.4573	531	405	177	111	9
POND D	0.4573	134	90	18	11	1.1
POND D-G17	0.4573	133	90	18	11	1.1
FG15	0.0103	15	12	5.8	3.9	0.5
FG15-G17A	0.0103	15	12	5.8	3.9	0.5
G17A	0.4676	136	92	18	11	1.1
FG14	0.1000	98	74	32	20	1.3
G17	0.5676	201	134	42	25	2
G17-G18	0.5676	199	134	42	25	2
FG16	0.0791	133	104	50	34	4
G18	0.6467	247	179	78	50	5
G18-POND E	0.6467	247	177	77	50	5
FG31	0.0922	116	92	45	31	5
FG30	0.0389	73	57	29	20	3
FG30-PONDHS	0.0389	70	56	27	18	3
POND HS	0.1311	153	106	36	26	5
FG17a	0.0694	101	78	35	23	2
FG17a-POND E	0.0694	99	76	35	23	2
FG18	0.0644	56	42	18	11	0.6
FG18-POND E	0.0644	56	42	17	11	0.6
FG19	0.0527	84	66	33	23	4
FG17c	0.0313	31	22	6.5	2.9	0.0
FG17b	0.0214	39	31	16	11	1.6
POND E IN	1.0170	618	433	197	126	15
POND E	1.0170	240	149	28	14	2.2
H08	1.0170	204	134	22	10	1.3
H09	0.0000	36	15	5.7	3.8	0.9

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 RHR3 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 an existing natural drainage course or into existing downstream facilities properly sized to safely convey the storm water flows away from the project without damaging adjacent property.

Rational hydrologic calculations were performed for the entire Filing 3 area and hydraulic calculations will be provided in the final drainage report at final plat. 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, directly into Pond D or into the proposed Pond G.

Rational Narrative

The following is a detailed narrative of the storm drainage system located in Rolling Hills Ranch Filing 3. 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.

Storm Drain System A

Storm Drainage System A meets the requirements of as found in the El Paso County Engineering Criteria Manual I.7.1.C.5. (ECM) for storm water quality and discharge into Waters of the State. The discharge point is located upstream of a Regional Detention Facility with WQCV incorporated into the design and construction. At least 20 percent of the upstream imperviousness within the catchment must be disconnected from the storm drainage system and drain though a pervious area that makes up at least 10 percent of the disconnected impervious area. The rooftops within this catchment make up more than 20 percent of the total impervious area of the catchment and is discharged via roof downspouts and drains across the front yard pervious areas equaling more than 10 percent of the rooftop area. Please see Appendix F for information and exhibits.

- Basin A01 (7.5 acres, Q_5= 8.6 CFS, Q_{100} = 22 CFS) contains lots in Rolling Hills Ranch 3 adjacent to Rex Rd and along Monument Vista Ln at the northern end of the project. The surface runoff will sheet flow off the residential lots and be directed to a 15' Type R forced sump inlet located at I01. All of the 5-year storm flow is captured by this inlet (Q_5= 8.6 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 14 CFS) with the remaining flow (Q_{100} = 8.6 CFS) continuing downstream to Inlet 02. The captured flow is conveyed downstream via a 24” RCP to Storm Manhole 01.

- Basin A02 (2.2 acres, Q_5= 2.0 CFS, Q_{100} = 6.5 CFS) contains lots within Rolling Hills 3 along Monument Vista Ln and Rolling Ranch Dr. The surface runoff will sheet flow off the residential lots and be directed to the street, where it is combined with the flow from Basin A01 for a total flow of Q_5= 2.0 CFS, Q_{100} = 14 CFS then conveyed downstream to a 10' Type R sump inlet located at I02. All of the flow is captured by this inlet and conveyed downstream via an 18” RCP to Storm Manhole 01.

- Basin A03 (0.8 acres, Q_5= 1.0 CFS, Q_{100} = 3.1 CFS) contains lots in Rolling Hills 3 along the east side of Rolling Ranch Dr. The surface runoff will sheet flow off the residential lots and be directed to the street then to a 5’ Type R sump inlet located at

I03. All of the flow is captured by this inlet and the combined flow (Q_5= 11 CFS, Q_{100} = 30 CFS) is conveyed downstream via a 24" RCP to a permanent sedimentation/WQCV BMP prior to releasing to the natural arroyo.

Should the sump inlets (I02 & I03) become blocked and cannot take capture all the runoff at the sump inlets, the surface flow will travel overland within lots 79 & 80.

Storm Drain System C

Storm Drainage System C meets the requirements of as found in the El Paso County Engineering Criteria Manual I.7.1.C.5. (ECM) for storm water quality and discharge. This catchment discharges the collected stormwater directly into a Regional Detention Facility with WQCV incorporated into the design and construction. Please see Appendix F for information and exhibits.

- Basin C01 (3.2 acres, Q_5= 3.1 CFS, Q_{100} = 9.0 CFS) contains lots in Rolling Hills Ranch 1 and Rolling Hills Ranch Filing 3 along east side of Rolling Peaks Dr. The surface runoff will sheet flow off 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 the residential lots and directed to the street then to an existing 15' Type R forced sump inlet located at I14. All of the flow is captured by this inlet and conveyed downstream via an existing 18" RCP to Storm Manhole 11.

- The total pipe flow conveyed from MH11 to Storm Manhole 12 via an existing 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 3. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 5'Type R forced sump inlet located at I15. All of the flow is captured by this inlet and conveyed downstream via an existing 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 the residential lots and be conveyed to an existing 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 existing 18" RCP to Storm Manhole 12.

- The total pipe flow conveyed from MH12 to Storm Manhole 13 via an existing 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 3. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 5'Type R sump inlet located at I17. All of the flow is captured by this inlet and conveyed downstream via an existing 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 the residential lots, combine with flow-by (Q_{100} = 3.1 CFS) from inlet I16 and be conveyed to an existing 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 existing 18" RCP to Storm Manhole 13.

- The total pipe flow conveyed from MH13 to Storm Manhole 14 via an existing 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 the adjacent residential lots and be conveyed to an existing 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 an existing 36" RCP.

<u>Storm Drain System D</u>

Storm Drainage System D meets the requirements of as found in the El Paso County Engineering Criteria Manual I.7.1.C.5. (ECM) for storm water quality and discharge. This catchment discharges the collected stormwater directly into a Regional Detention Facility with WQCV incorporated into the design and construction. Please see Appendix F for information and exhibits.

- Basin D01 (6.9 acres, Q_5= 6.8 CFS, Q_{100} = 19 CFS) contains lots in Rolling Hills Ranch 3 along east side of Bluffpoint Dr and Crooked Bluff Dr. The surface runoff will sheet flow off the residential lots and directed to the street then to a 15' Type R forced sump inlet located at I19. All of the 5-year storm flow is captured by this inlet (Q_5= 6.8 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 14 CFS) with the remaining flow (Q_{100} = 5.7 CFS) continuing downstream to Design Point 2. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 15 and via a 24" RCP to Storm Manhole 16.

- Basin D02 (3.8 acres, Q_5= 3.8 CFS, Q_{100} = 11 CFS) contains lots in Rolling Hills Ranch 3 along west side of Crooked Bluff Dr. The surface runoff will sheet flow off the residential lots directed to the street to Design Point 2 then combined with flow-by from I19 for a 5-year flow of 3.8 CFS and a 100-year flow of 16 CFS. The surface flow will continue inlet I20.

- Basin D03 (3.8 acres, Q_5= 4.1 CFS, Q_{100} = 12 CFS) contains lots along the west side of Coastal Hills Ln in Rolling Hills Ranch. The surface runoff will sheet flow off the residential lots and be conveyed to a 20' Type R forced sump inlet located at I20 where it is combined with the surface flow from DP2 for a 5-year flow of 7.3 CFS and a 100-year flow of 21 CFS. All of the 5-year storm flow is captured by this inlet (Q_5= 7.3 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 17 CFS) with the remaining flow (Q_{100} = 3.4 CFS) continuing downstream to Design Point 3. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 16.

- The total pipe flow conveyed from MH16 to Storm Manhole 17 via a 30" RCP is Q_5= 14 CFS, Q_{100} = 30 CFS.

- Basin D04 (5.3 acres, Q_5= 5.0 CFS, Q_{100} = 14 CFS) contains lots along the west side of Coastal Hills Ln and Bluffpoint Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots directed to the street to Design Point 3 then combined with flow-by from I20 for a 5-year flow of 5.0 CFS and a 100-year flow of 17 CFS. The surface flow will continue inlet I21.

- Basin D05 (2.0 acres, Q_5= 2.2 CFS, Q_{100} = 6.3 CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Rolling Hills Ranch 1. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R forced sump inlet located at I21 where it is combined with the surface flow from DP3 and flow-by from I22 for a 5-year flow of 6.9 CFS and a 100-year flow of 24 CFS. All of the 5-year storm flow is captured by this inlet (Q_5= 6.9 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 14 CFS) with the remaining flow (Q_{100} = 10 CFS) continuing downstream to inlet I26. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 17.

- The total pipe flow conveyed from MH17 to Storm Manhole 19 via a 30" RCP is Q_5= 20 CFS, Q_{100} = 41 CFS.

- Basin D06 (3.2 acres, Q_5= 3.2 CFS, Q_{100} = 9.0 CFS) contains lots along the east side of Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 15'Type R flow-by inlet located at I22. Most of the flow is captured by this inlet (Q_5= 2.6 CFS, Q_{100} = 6.2 CFS) with the remaining (Q_5= 0.6 CFS, Q_{100} = 2.8 CFS) continuing downstream to Inlet 21. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.

- Basin D07 (6.6 acres, Q_5= 6.1 CFS, Q_{100} = 17 CFS) contains lots along the west side of Rolling Ranch Dr in Rolling Hills Ranch 31. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R forced sump inlet located at I23. All of the 5-year storm flow is captured by this inlet (Q_5= 6.9 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 9.9 CFS) with the remaining flow (Q_{100} = 7.4 CFS) continuing downstream to inlet I24. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.

- The total pipe flow conveyed from MH18 to Storm Manhole 19 via a 24" RCP is Q_5= 9.1 CFS, Q_{100} = 17 CFS.

- Basin D08 (1.6 acres, Q_5= 1.8 CFS, Q_{100} = 5.1 CFS) contains lots along the west side of Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R forced sump inlet located at I24. All of the 5-year storm flow is captured by this inlet (Q_5= 1.8 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 9.9 CFS) with the remaining flow (Q_{100} = 1.0 CFS) continuing downstream to inlet I25. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.

- The total pipe flow conveyed from MH19 to Storm Manhole 20 via a 42" RCP is Q_5= 29 CFS, Q_{100} = 66 CFS.

- Basin D09 (1.6 acres, Q_5= 1.2 CFS, Q_{100} = 3.4 CFS) contains runoff from the adjacent residential lots and open space in Rolling Hills Ranch Filings 2 & 3. The surface runoff will sheet flow off the adjacent residential lots and be conveyed to an existing Type C grated inlet located at CB2. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to inlet I25.

- Basin D10 (0.8 acres, Q_5= 0.9 CFS, Q_{100} = 2.5 CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to an exisitng 10' Type R sump inlet located at I25. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 20.

- Basin D11 (4.2 acres, Q_5= 2.4 CFS, Q_{100} = 6.9 CFS) contains runoff from an open space in Rolling Hills Ranch 3. The surface runoff will sheet flow off the adjacent residential lots and be conveyed to an existing 18" flared end section located at ES1. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to inlet I26.

- Basin D12 (2.7 acres, Q_5= 2.4 CFS, Q_{100} = 6.9 CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots, combine with flow-by (Q_{100} = 10 CFS) from inlet I21 and be conveyed to an existing 20' Type R sump inlet located at I26. All of the flow is captured by this inlet and conveyed downstream via a 24" RCP to Storm Manhole 20.

- The total pipe flow conveyed from existing Storm Manhole 20 to the existing Storm Manhole 21 located in Rolling Hills Ranch Filing 2 via an existing 42" RCP is Q_5= 29 CFS, Q_{100} = 71 CFS.

<u>Various Rear yard discharges to Waters of the State</u>

There are various areas along natural and manmade drainage courses that meet the requirements of as found in the El Paso County Engineering Criteria Manual I.7.1.C.5.

(ECM) for storm water quality and discharge into Waters of the State. These rear yards, as depicted in an exhibit shown in Appendix D, discharge into drainage courses located upstream of a Regional Detention Facility with WQCV incorporated into the design and construction. At least 20 percent of the upstream imperviousness within the catchment must be disconnected from the storm drainage system and drain though a pervious area that makes up at least 10 percent of the disconnected impervious area. The rooftops within this catchment make up more than 20 percent of the total impervious area of the catchment and is discharged via roof downspouts and drains across the front yard pervious areas equaling more than 10 percent of the rooftop area. Please see Appendix D for information and exhibits.

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

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	53	3.7	4.6	7053.1
5-YEAR STORM	111	11	7.1	7053.8
10-YEAR STORM	177	18	10.7	7054.6
50-YEAR STORM	405	90	20.0	7056.3
100-YEAR STORM	531	134	25.3	7057.0
FUTURE CONDITIONS				
2-YEAR STORM	53	3.7	4.6	7053.1
5-YEAR STORM	111	11	7.1	7053.8
10-YEAR STORM	177	18	10.7	7054.6
50-YEAR STORM	405	90	20.0	7056.3
100-YEAR STORM	531	134	25.3	7057.0

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 RHR3. Table 6 provides summary data for the various design storms for the completed development for all areas tributary to Pond D including RHR3. Rolling Hills Ranch Filing 3 completes the development of all areas tributary to Pond D.

Water quality (WQCV) was added to the required storage volume when the pond was designed and constructed in 2012. The pond was constructed to meet the final build out condition. 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.

Existing Pond G Detention Storage Criteria

Detention Pond G was constructed with Rolling Hills Ranch Standalone Grading in anticipation of the future development of the RHR3 in accordance with the approved Sketch Plan. The pond is located within the Gieck Ranch Drainage Basin in the eastern portion of Rolling Hills Ranch adjacent to the Falcon Regional Park. The pond is owned and maintained by the Meridian Service Metropolitan District (MSMD) and a maintenance agreement between the Meridian Service Metropolitan District and El Paso County will be recorded with the Rolling Hills Ranch Filing 1 final plat.

The existing Pond G and Pond F located upstream of Rolling Hills Ranch work in series such that the peak flow rates from the Meridian Ranch development do not adversely affect the drainage patterns downstream of the Meridian Ranch project. The pond is designed to accommodate the developed final inflow from all the remaining areas to be developed within Meridian Ranch. A permanent concrete control structure has been built to handle full build out of the tributary area and reduce the developed flows to approximate the historic peak flow rates for the full spectrum of design storms. No alterations or improvements to the pond or control structure will be necessary as a result of this development.

WQCV calculations were completed for Pond G based on proposed future development of the proposed tributary area to the pond; this analysis shows that Pond G will require 0.9 acre-ft of storage for water quality for all the areas tributary to the pond. The control structure at DP H12 is proposed to consist of a 12" diameter water quality control riser with a trash grate having a top elevation of 7025.20 to achieve the required 0.9 ac-ft of storage.

Table 7: Pond G Summary Data

POND G				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
INTERIM CONDITIONS				
2-YEAR STORM	12	4.2	3.1	7026.2
5-YEAR STORM	45	14	7.2	7027.2
10-YEAR STORM	96	35	9.4	7027.6
50-YEAR STORM	327	229	17.8	7029.0
100-YEAR STORM	509	383	21.8	7029.7
FUTURE CONDITIONS				
2-YEAR STORM	24	5.1	4.6	7026.6
5-YEAR STORM	75	20	8.0	7027.4
10-YEAR STORM	149	51	10.7	7027.8
50-YEAR STORM	451	307	19.8	7029.4
100-YEAR STORM	653	465	24.8	7030.2

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.

The proposed concrete control structure the outlet of Pond G will attenuate the peak developed flow rates to approximately historic peak rates for the full spectrum of design storms as per the requirements set forth in Resolution 15-042 adopted by the Board of County Commissioners, County of El Paso. The control structure consists of a water quality control standpipe, a rectangular slotted orifice located on the front and a grated top to reduce the developed peak flow rates. Table 8 provides summary data for the various design storms for the completed development for all areas tributary to Pond G including RHR3.

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.

The outlet (DP G12) for Pond G is located west of the Falcon Regional Park, upstream of Eastonville Rd (DP G06). Pond G will discharge 465 CFS during the 100-yr storm event into an existing natural drainage course that traverses the regional park. The 100-year historical

peak flow rate at the western boundary of the regional park is 544 CFS. The calculated 100-year developed flow rate will be 85% of the historic flow rate. 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 8 for a complete comparative list of the peak flow rates for the key design points impacted by the development of Rolling Hills Ranch.

Table 8: Key Design Point Comparison - SCS

MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (FUTURE)					
		PEAK DISCHARGE Q_{100} (CFS)	PEAK DISCHARGE Q_{50} (CFS)	PEAK DISCHARGE Q_{10} (CFS)	PEAK DISCHARGE Q_5 (CFS)
G12 - POND G OUTLET REGIONAL PARK (G05 - HISTORIC)	Historic	544	355	86	31
	Future	465	307	51	20
	% of Historic	85%	87%	59%	65%
G06 - EASTONVILLE ROAD[1]	Historic	561	375	91	33
	Future	493	324	55.2	22
	% of Historic	88%	86%	61%	67%
H08 - EASTONVILLE ROAD (POND E NORTH OUTLET)	Historic	216	142	34	12
	Future	204	134	22	10
	% of Historic	95%	95%	66%	84%
H09 - EASTONVILLE ROAD (POND E SOUTH OUTLET)	Historic	77	51	12	4.5
	Future	36	15	5.7	3.8
	% of Historic	47%	30%	47%	85%

[1] Flow rate at Eastonville Rd. listed for reference only

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.

Homeowners 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.

The development has been designed to direct surface sheet flow from rear yard space toward the natural open space between the home sites and the drainage courses (see below) thus increasing the infiltration and serving to reduce the total runoff from the project site.

Step 2: Stabilize Drainageways

The drainage swale located on the west side 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. This swale discharges directly into an existing extended detention pond with WQCV built into the design.

A natural arroyo drainage course exists adjacent to the project on the northeast side. This natural sandy bottom arroyo will readily infiltrate runoff during lower intensity, more frequent rain events; decreasing the total stormwater volume leaving the sight.

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.

The project includes a proposed extended detention pond along the eastern boundary of the project. The WQCV within the proposed detention pond is of sufficient size to accommodate the runoff from this project and all future projects tributary to the proposed detention pond.

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

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

The measures from Steps 1, 2, & 3 incorporated into the design of the project work together to promote greater infiltration rates and reduce the total volume of storm runoff from the project. A key component of the design is the overland sheet flow directed toward the drainage swales, this allows the runoff to move across the land at a lower rate and increase the likelihood of infiltration. By directing the runoff toward the sandy bottom arroyo, the water has increased chances to infiltrate. By providing a regional water quality facility the design provides greater flexibility to direct the runoff to natural swales to convey to the facility as opposed to conveyance through storm drain pipe.

Temporary Sedimentation Pond

Temporary sedimentation ponds installed during the overlot grading process will act as the primary water quality control for the areas upstream during construction. 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 existing and proposed detention ponds will act as the primary water quality control for the areas within the project boundaries. Runoff will travel overland toward the natural drainage swales or 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. Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas. Federal Emergency Management Agency, Revised March 17, 1997.

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

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

7. Revision to Master Development Drainage Plan Meridian Ranch. May 2015. Prepared by Tech Contractors.

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

9. Final Drainage Report for Meridian Ranch Filing 1. November 2001. Prepared by URS Corp.

10. Preliminary Drainage Plan for Meridian Ranch Phase II. September 2003. Prepared by URS.

11. Final Drainage Plan for The Trails Filing No.7. March 2005. Prepared by URS.

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

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

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

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

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

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

18. Revision to Master Development Drainage Plan Meridian Ranch. July 2015. Prepared by Tech Contractors.

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

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

21. Preliminary Drainage Report for Rolling Hills Ranch 1-3 PUD, February 2020. Prepared by Tech Contractors.

22. Final Drainage Report for Rolling Hills Ranch Filing 1 at Meridian Ranch. June 2020. Prepared by Tech Contractors.

23. Final Drainage Report for Estates at Rolling Hills Ranch Filing 1 at Meridian Ranch. March 2020. Prepared by Tech Contractors.

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

Appendices

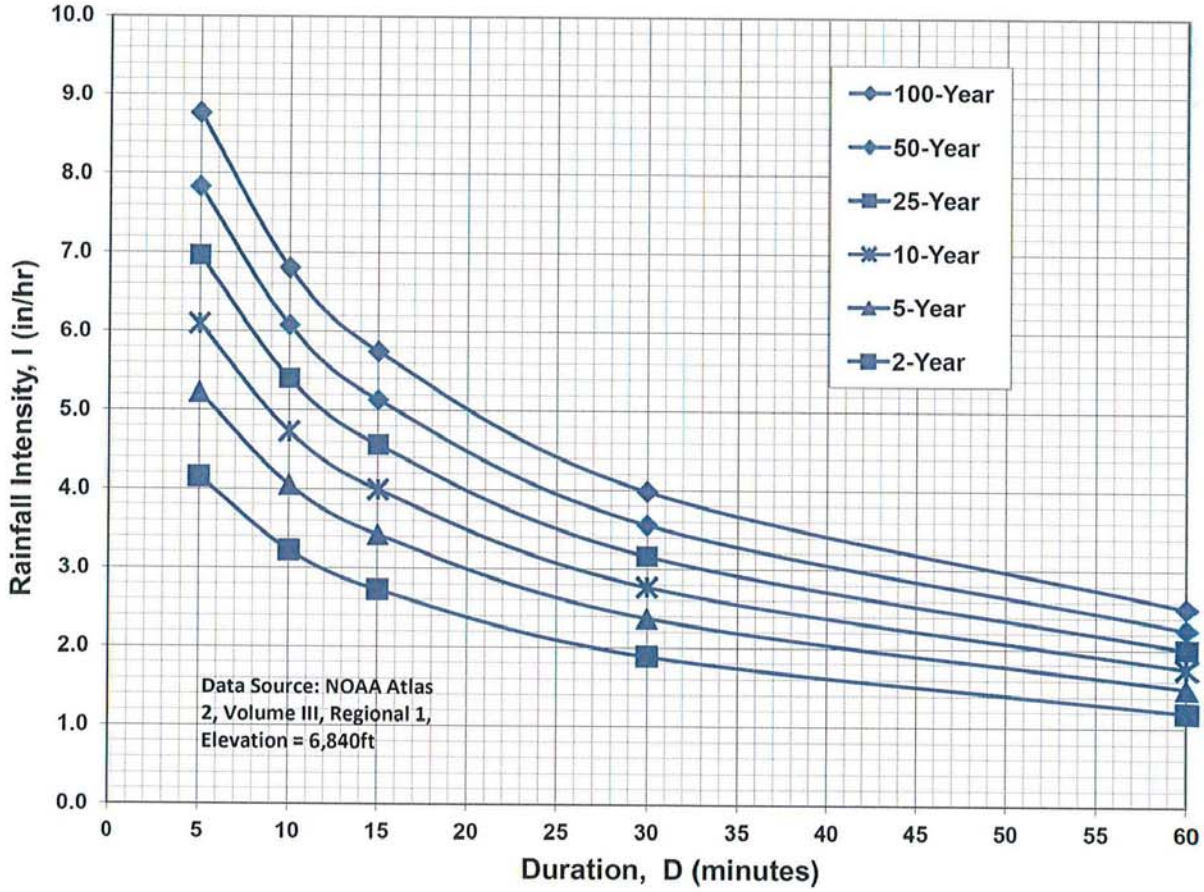
Appendix A – Rational Calculations

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 3** 10/22/2020

BASIN DESIGNATION	AREA (AC.)								COMPOSITE FACTOR		Percent Impervious
	UNDEV	2 DU/AC	3 DU/AC	4 DU/AC	5 DU/AC	STREETS	OPEN SPACE PARKS/GC	TOTAL	5-year	100-year	
A01		1.2	2.2			1.1	2.9	7.5	**0.34**	**0.52**	**28.8%**
A02		0.8	1.4					2.2	**0.24**	**0.47**	**28.2%**
A03		0.3	0.5			0.1		0.8	**0.29**	**0.50**	**33.7%**
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%**
D01			1.0	5.9				6.9	**0.29**	**0.50**	**38.6%**
D02			0.6	3.3				3.8	**0.29**	**0.50**	**38.6%**
D03			0.6	3.3				3.8	**0.29**	**0.50**	**38.6%**
D04			0.8	4.5				5.3	**0.29**	**0.50**	**38.6%**
D05			0.3	1.7				2.0	**0.29**	**0.50**	**38.6%**
D06			0.5	2.7				3.2	**0.29**	**0.50**	**38.6%**
D07			0.9	5.7				6.6	**0.29**	**0.50**	**38.6%**
D08			0.2	1.4				1.6	**0.29**	**0.50**	**38.6%**
D09			0.1	0.5			1.1	1.6	**0.26**	**0.44**	**13.9%**
D10			0.1	0.7				0.8	**0.29**	**0.50**	**38.5%**
D11			0.4	2.2			1.6	4.2	**0.27**	**0.46**	**24.6%**
D12			0.4	2.3				2.7	**0.29**	**0.50**	**38.6%**

TIME OF CONCENTRATION

PROJECT: **Rolling Hills Ranch Filing 3** DATE: 12/22/2020

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)
A01	0.34	7.5	185	9.0	4.9%	11.2	985	25	2.5%	P	20	3.2	5.2	16.4	1170.00	16.5	**16.4**
A02	0.24	2.2	215	4.5	2.1%	18.1	230	4	1.7%	P	20	2.6	1.5	19.5	445.00	12.5	**12.5**
A03	0.29	0.8	25	0.5	2.0%	5.9	230	4	1.7%	P	20	2.6	1.5	7.4	255.00	11.4	**7.4**
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**
D04	0.29	5.3	90	1.8	2.0%	11.1	1390	32	2.3%	P	20	3.0	7.6	18.8	1480.00	18.2	**18.2**
D05	0.29	2.0	155	3.1	2.0%	14.6	350	5	1.4%	P	20	2.4	2.4	17.1	505.00	12.8	**12.8**
D06	0.29	3.2	140	2.8	2.0%	13.9	1005	26	2.6%	P	20	3.2	5.2	19.1	1145.00	16.4	**16.4**
D07	0.29	6.6	215	4.3	2.0%	17.2	1420	35	2.5%	P	20	3.1	7.5	24.8	1635.00	19.1	**19.1**
D08	0.29	1.6	150	3.0	2.0%	14.4	405	4	1.0%	P	20	2.0	3.4	17.8	555.00	13.1	**13.1**
D09	0.26	1.6	175	3.5	2.0%	16.2	285	3	1.0%	L	7	0.7	6.8	23.0	NON-URBAN AREA		**23.0**
D10	0.29	0.8	80	1.6	2.0%	10.5	435	4	0.9%	P	20	1.9	3.8	14.3	515.00	12.9	**12.9**
D11	0.27	4.2	195	6.0	3.1%	14.6	975	10	1.0%	L	7	0.7	22.9	37.5	NON-URBAN AREA		**37.5**
D12	0.29	2.7	150	3.0	2.0%	14.4	1565	16	1.0%	P	20	2.0	12.9	27.3	1715.00	19.5	**19.5**

TIME OF CONCENTRATION

PROJECT: **Rolling Hills Ranch Filing 3** DATE: 10/22/2020

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)
A01	0.34	7.5	185	9.0	4.9%	11.2	985	25	2.5%	P	20	3.2	5.2	16.4	1170.00	16.5	**16.4**
A02	0.24	2.2	215	4.5	2.1%	18.1	230	4	1.7%	P	20	2.6	1.5	19.5	445.00	12.5	**12.5**
A03	0.29	0.8	25	0.5	2.0%	5.9	230	4	1.7%	P	20	2.6	1.5	7.4	255.00	11.4	**7.4**
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**
D04	0.29	5.3	90	1.8	2.0%	11.1	1390	32	2.3%	P	20	3.0	7.6	18.8	1480.00	18.2	**18.2**
D05	0.29	2.0	155	3.1	2.0%	14.6	350	5	1.4%	P	20	2.4	2.4	17.1	505.00	12.8	**12.8**
D06	0.29	3.2	140	2.8	2.0%	13.9	1005	26	2.6%	P	20	3.2	5.2	19.1	1145.00	16.4	**16.4**
D07	0.29	6.6	215	4.3	2.0%	17.2	1420	35	2.5%	P	20	3.1	7.5	24.8	1635.00	19.1	**19.1**
D08	0.29	1.6	150	3.0	2.0%	14.4	405	4	1.0%	P	20	2.0	3.4	17.8	555.00	13.1	**13.1**
D09	0.26	1.6	175	3.5	2.0%	16.2	285	3	1.0%	L	7	0.7	6.8	23.0	NON-URBAN AREA		**23.0**
D10	0.29	0.8	80	1.6	2.0%	10.5	435	4	0.9%	P	20	1.9	3.8	14.3	515.00	12.9	**12.9**
D11	0.27	4.2	195	6.0	3.1%	14.6	975	10	1.0%	L	7	0.7	22.9	37.5	NON-URBAN AREA		**37.5**
D12	0.29	2.7	150	3.0	2.0%	14.4	1565	16	1.0%	P	20	2.0	12.9	27.3	1715.00	19.5	**19.5**

Notes:

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

$$V = C_V S_W^{0.5} \qquad ** \; Tt = L \times V$$

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 3**

Date: 10/22/2020

	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
	DEVELOPED																								
I01	A01	7.5	16.4	3.39	5.68	0.34	0.52	2.55	3.90	8.6	22						**8.6**	**22**	I02	P	20.0	1.00%	2.0	61	0.5
I02	A02	2.2	12.5	3.80	6.38	0.24	0.47	0.53	1.03	2.0	6.5	16.9	3.34	5.61	0.53	2.54	**2.0**	**14**							
I03	A03	0.8	7.4	4.59	7.71	0.29	0.50	0.23	0.40	1.0	3.1						**1.0**	**3.1**							
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**							
I19	D01	6.9	16.6	3.37	5.66	0.29	0.50	2.01	3.41	6.8	19						**6.8**	**19**	DP2	P	20.0	9.50%	6.2	110	0.3
DP2	D02	3.8	16.3	3.39	5.70	0.29	0.50	1.12	1.90	3.8	11	16.9	3.34	5.61	1.12	2.90	**3.8**	**16**	I20	P	20.0	0.95%	1.9	210	1.8
I20	D03	3.8	13.5	3.67	6.17	0.29	0.50	1.12	1.90	4.1	12	18.1	3.24	5.43	2.25	3.80	**7.3**	**21**	DP3	P	20.0	0.50%	1.4	40	0.5
DP3	D04	5.3	18.2	3.23	5.42	0.29	0.50	1.55	2.63	5.0	14	18.6	3.20	5.37	1.55	3.26	**5.0**	**17**	I24	P	20.0	0.70%	1.7	285	2.8
I21	D05	2.0	12.8	3.76	6.31	0.29	0.50	0.59	0.99	2.2	6.3	21.4	2.99	5.01	2.31	4.75	**6.9**	**24**	I26	P	20.0	0.95%	1.9	215	1.8
I22	D06	3.2	16.4	3.39	5.69	0.29	0.50	0.94	1.59	3.2	9.0						**3.2**	**9.0**	I24	P	20.0	1.40%	2.4	350	2.5
I23	D07	6.6	19.1	3.16	5.30	0.29	0.50	1.93	3.27	6.1	17						**6.1**	**17**	I23	P	20.0	0.95%	1.9	315	2.7
I24	D08	1.6	13.1	3.73	6.26	0.29	0.50	0.48	0.81	1.8	5.1	21.8	2.96	4.97	0.48	2.21	**1.8**	**11**	I25	P	20.0	0.95%	1.9	220	1.9
CB2	D09	1.6	23.0	2.88	4.83	0.26	0.44	0.42	0.71	1.2	3.4						**1.2**	**3.4**							
I25	D10	0.8	12.9	3.75	6.30	0.29	0.50	0.24	0.40	0.9	2.5	23.7	2.84	4.76	0.24	0.61	**0.9**	**2.9**							
ES1	D11	4.2	37.5	2.15	3.60	0.27	0.46	1.13	1.93	2.4	6.9						**2.4**	**6.9**							
I26	D12	2.7	19.5	3.13	5.25	0.29	0.50	0.78	1.32	2.4	6.9	23.3	2.86	4.80	0.78	3.36	**2.4**	**16**							

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 3** Date: 10/22/2020

								Q_{Total}		$Q_{Capture}$				$Q_{Flow-by}$				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)
I01	A01	15	PROP	SUMP[1]	2.0%		16.4	8.6	22	8.6	14	2.55	2.39	-	8.6	-	1.51	0.47	0.47		
I02	A02	10	PROP	SUMP	2.0%		16.9	2.0	14	2.0	14	0.60	2.54	-	-	-	-	0.50	0.70		
I03	A03	5	PROP	SUMP	2.0%		7.4	1.0	3.1	1.0	3.1	0.23	0.40	-	-	-	-	0.50	0.70		
I13	C01	10	EXIST	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	EXIST	SUMP[1]	2.0%		21.2	3.4	10	3.4	10	1.14	2.04	-	-	-	-	0.47	0.47		
I15	C03	5	EXIST	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	EXIST	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	EXIST	SUMP	2.0%		12.3	0.6	1.8	0.6	1.8	0.16	0.28	-	-	-	-	0.50	0.70		
I18	C06	5	EXIST	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	EXIST	SUMP	2.0%		11.8	0.9	2.5	0.9	2.5	0.22	0.39	-	-	-	-	0.13	0.27		
I19	D01	15	PROP	SUMP[1]	2.0%		16.6	6.8	19	6.8	14	2.01	2.40	-	5.7	-	1.00	0.47	0.47		
I20	D03	20	PROP	SUMP[1]	2.0%		18.1	7.3	21	7.3	17	2.25	3.17	-	3.4	-	0.63	0.47	0.47		
I21	D05	15	PROP	SUMP[1]	2.0%		21.4	6.9	24	6.9	14	2.31	2.71	-	10	-	2.04	0.47	0.47		
I22	D06	15	PROP	FLOW-BY	2.0%	1.0%	16.4	3.2	9.0	2.6	6.2	0.77	1.09	0.6	2.8	0.17	0.50	0.31	0.41	11.1	16.5
I23	D07	10	PROP	SUMP[1]	2.0%		19.1	6.1	17	6.1	9.9	1.93	1.87	-	7.4	-	1.39	0.47	0.47		
I24	D08	10	PROP	SUMP[1]	2.0%		21.8	1.8	11	1.8	9.9	0.60	2.00	-	1.0	-	0.21	0.47	0.47		
CB2	D09	Type C	EXIST	SUMP	2.0%		23.0	1.2	3.4	1.2	3.4	0.42	0.71	-	-	-	-	0.17	0.34		
I25	D10	10	EXIST	SUMP	2.0%		23.7	0.9	2.9	0.9	2.9	0.31	0.61	-	-	-	-	0.50	0.70		
ES1	D11	FES	EXIST	SUMP	2.0%		37.5	2.4	6.9	2.4	6.9	1.13	1.93	-	-	-	-	0.27	0.47		
I26	D12	20	EXIST	SUMP	2.0%		23.3	2.4	16	2.4	16	0.85	3.36	-	-	-	-	0.50	0.70		

[1] Forced sump at intersection

STORM DRAINAGE SYSTEM DESIGN

HYDRAULICS

PROJECT: **Rolling Hills Ranch Filing 3** Date: 10/22/2020

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)
P01	I01	J01	2.39	16.4	13.7	2.39	16.4	5.69	24	65.33	0.99%	23	13.7	4.4	7102.03	7099.6	7097.50	7102.12	7099.3	7096.85
P04	I02	J01	2.54	16.9	14.4	2.54	16.9	5.61	18	4.67	8.57%	31	14.4	8.1	7102.36	7099.3	7097.75	7102.12	7099.2	7097.35
P02	J01	I03				4.93	16.9	5.61	24	24.67	1.01%	23	27.9	8.9	7102.12	7098.9	7096.85	7102.36	7098.5	7096.60
P03	I03	OS1	0.40	7.4	3.1	5.33	17.0	5.60	24	172.13	2.67%	37	30.1	13.1	7102.36	7098.5	7096.60	7095.00	7093.4	7092.00
P25	I13	J11	1.53	15.0	9.1	1.53	15.0	5.91	18	45.17	1.00%	11	9.1	6.7	7072.13	7068.8	7067.60	7072.23	7068.4	7067.15
P35	I14	J11	2.04	21.2	10.4	2.04	21.2	5.04	18	25.17	2.58%	17	10.4	10.0	7072.33	7069.0	7067.80	7072.23	7068.4	7067.15
P26	J11	J12				3.57	21.2	5.03	24	295.00	1.02%	23	18.1	8.1	7072.23	7068.2	7066.65	7069.23	7065.0	7063.65
P30	I15	J12	0.65	13.0	4.1	0.65	13.0	6.27	18	45.17	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	25.17	1.59%	13	6.4	7.4	7069.08	7065.5	7064.55	7069.23	7065.4	7064.15
P27	J12	J13				5.23	21.9	4.96	30	165.29	0.64%	33	26.2	7.4	7069.23	7064.9	7063.15	7067.63	7063.8	7062.10
P32	I17	J13	0.28	12.3	1.8	0.28	12.3	6.41	18	25.17	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	5.17	4.84%	23	6.0	11.0	7067.87	7064.3	7063.35	7067.63	7063.8	7063.10
P28	J13	J14				6.51	22.2	4.92	36	76.76	0.98%	66	32.3	9.3	7067.63	7063.4	7061.60	7068.43	7063.2	7060.85
P34	CB1	J14	0.39	11.8	2.6	0.39	11.8	6.52	18	67.55	2.81%	18	2.6	7.1	7067.00	7064.9	7064.25	7068.43	7062.7	7062.35
P29	J14	OS3				6.90	22.4	4.90	36	471.65	1.03%	68	34.1	9.6	7068.43	7062.8	7060.85	7061.00	7057.5	7056.00
P36	I19	J15	2.40	16.6	13.7	2.40	16.6	5.66	18	53.60	1.03%	11	13.7	7.7	7072.63	7069.9	7068.10	7072.32	7068.9	7067.55
P37	J15	J16				2.40	16.7	5.64	24	252.29	0.73%	19	13.6	6.7	7072.32	7068.4	7067.05	7070.40	7066.9	7065.20
P54	I20	J16	3.17	18.1	17	3.17	18.1	5.44	18	25.17	0.99%	11	17	9.8	7070.45	7068.0	7065.95	7070.40	7067.3	7065.70
P38	J16	J17				5.57	18.1	5.43	30	331.02	0.57%	31	31	7.2	7070.40	7066.7	7064.70	7068.13	7065.1	7062.80
P56	I21	J17	2.71	21.4	14	2.71	21.4	5.02	18	5.17	0.97%	10	14	7.8	7068.34	7066.0	7063.85	7068.13	7065.9	7063.80
P42	J17	J19				8.28	21.4	5.01	30	24.57	1.02%	41	42	9.6	7068.13	7065.0	7062.80	7068.45	7064.9	7062.55
P57	I22	J18	1.09	16.4	6.2	1.09	16.4	5.69	18	43.20	3.01%	18	6.2	9.3	7072.25	7068.7	7067.75	7071.49	7067.6	7066.45
P58	I23	J18	1.87	19.1	10	1.87	19.1	5.30	18	44.86	1.00%	11	10	6.8	7071.39	7068.1	7066.90	7071.49	7067.6	7066.45
P40	J18	J19				2.96	19.2	5.29	24	295.84	0.98%	22	16	7.7	7071.49	7067.4	7065.95	7068.45	7064.3	7063.05
P59	I24	J19	2.00	21.8	10	2.00	21.8	4.97	18	44.66	0.90%	10	10	6.4	7068.44	7065.2	7063.95	7068.45	7064.9	7063.55
P43	J19	J20				13.24	21.9	4.96	42	203.53	2.78%	168	66	16	7068.45	7064.1	7061.55	7066.47	7058.7	7055.90
P60	CB2	I25	0.71	23.0	3.5	0.71	23.0	4.83	18	32.05	4.21%	22	3.5	8.9	7064.00	7062.0	7061.25	7066.70	7060.9	7059.90
P61	I25	J20	0.61	23.7	2.9	1.32	23.7	4.76	18	24.67	8.11%	30	6.3	13	7066.70	7060.9	7059.90	7066.47	7059.4	7057.90
P62	FES1	I26	1.93	37.5	7.0	1.93	37.5	3.60	18	53.75	0.56%	8	7.0	5.0	7062.00	7059.6	7058.25	7066.70	7059.4	7057.95
P63	I26	J20	3.36	23.3	16	5.29	37.7	3.59	24	4.67	1.07%	23	19	8.3	7066.70	7059.4	7057.45	7066.47	7059.4	7057.40
P69	J20	J21				19.85	37.7	3.59	42	510.19	0.75%	87	72	10	7066.47	7058.6	7055.90	7059.10	7055.6	7052.05

Appendix B - HEC-HMS Data

Input Data

Rolling Hills Ranch Filing 3

BASIN	AREA		CURVE NO.	LAG TIME (min)
	(acre)	(mi^2)		
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		CURVE NO.	LAG TIME (min)
	(acre)	(mi^2)		
INTERIM				
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	25	0.0397	65.7	15.9
OS09	98	0.1527	65.0	29.5
FG01	34	0.0531	66.4	33.8
FG02	25	0.0391	64.4	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	43	0.0677	66.1	21.2
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	73.2	14.5
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	6	0.0095	63.2	21.4
FG21b	10	0.0150	72.9	12.7
FG22	89	0.1397	67.9	20.3
FG23a	14	0.0216	68.6	18.0
FG23b	23	0.0359	61.8	21.5
FG23c	5	0.0081	67.0	20.6
FG24	89	0.1394	61.6	32.3
FG25	70	0.1086	74.1	23.8
FG28	44	0.0681	63.0	25.6
FG29	64	0.0997	61.0	19.1
FG30	25	0.0389	61.0	12.0
FG31	59	0.0922	80.0	24.0
FG32	26	0.0402	61.0	13.6

BASIN	AREA		CURVE NO.	LAG TIME (min)
	(acre)	(mi^2)		
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	25	0.0397	65.7	15.9
OS09	98	0.1527	65.0	29.5
FG01	34	0.0531	66.4	33.8
FG02	25	0.0391	64.4	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	43	0.0677	66.1	21.2
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	73.2	14.5
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	6	0.0095	63.2	21.4
FG21b	10	0.0150	72.9	12.7
FG22	89	0.1397	67.9	20.3
FG23a	14	0.0216	68.6	18.0
FG23b	20	0.0305	66.3	16.5
FG23c	8	0.0122	67.3	14.0
FG24	88	0.1369	68.1	26.2
FG25	70	0.1086	74.1	23.8
FG26	55	0.0863	70.7	23.1
FG27	32	0.0500	74.7	23.9
FG28	16	0.0245	66.6	14.0
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

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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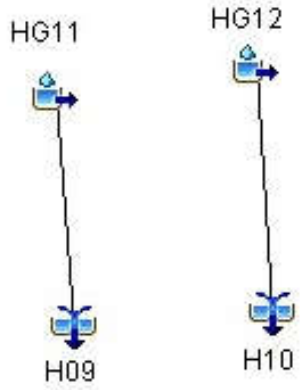
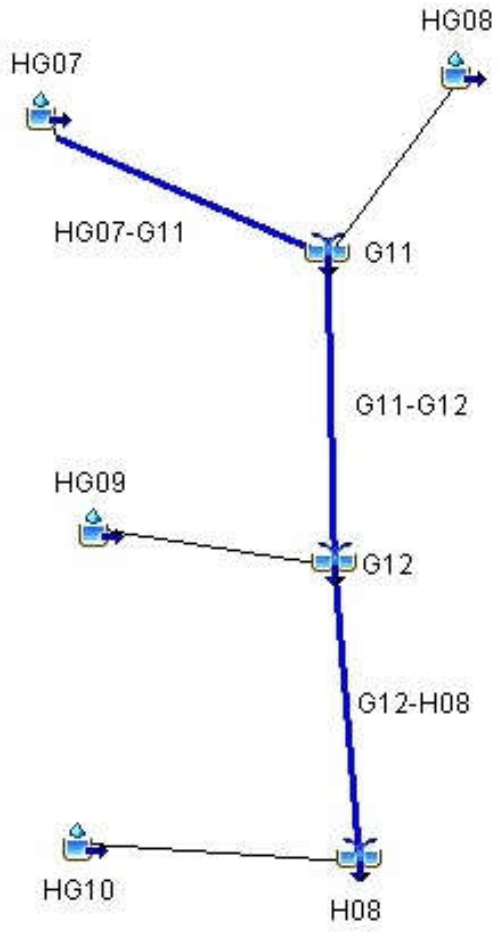
HISTORIC MDDP (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
OS06	0.1313	81	01Jul2015, 12:12	9.4
OS06-G02	0.1313	79	01Jul2015, 12:24	9.3
OS05	0.0578	40	01Jul2015, 12:12	4.2
OS05-G01	0.0578	38	01Jul2015, 12:12	4.1
HG01	0.0547	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)

HAEGLER HISTORIC

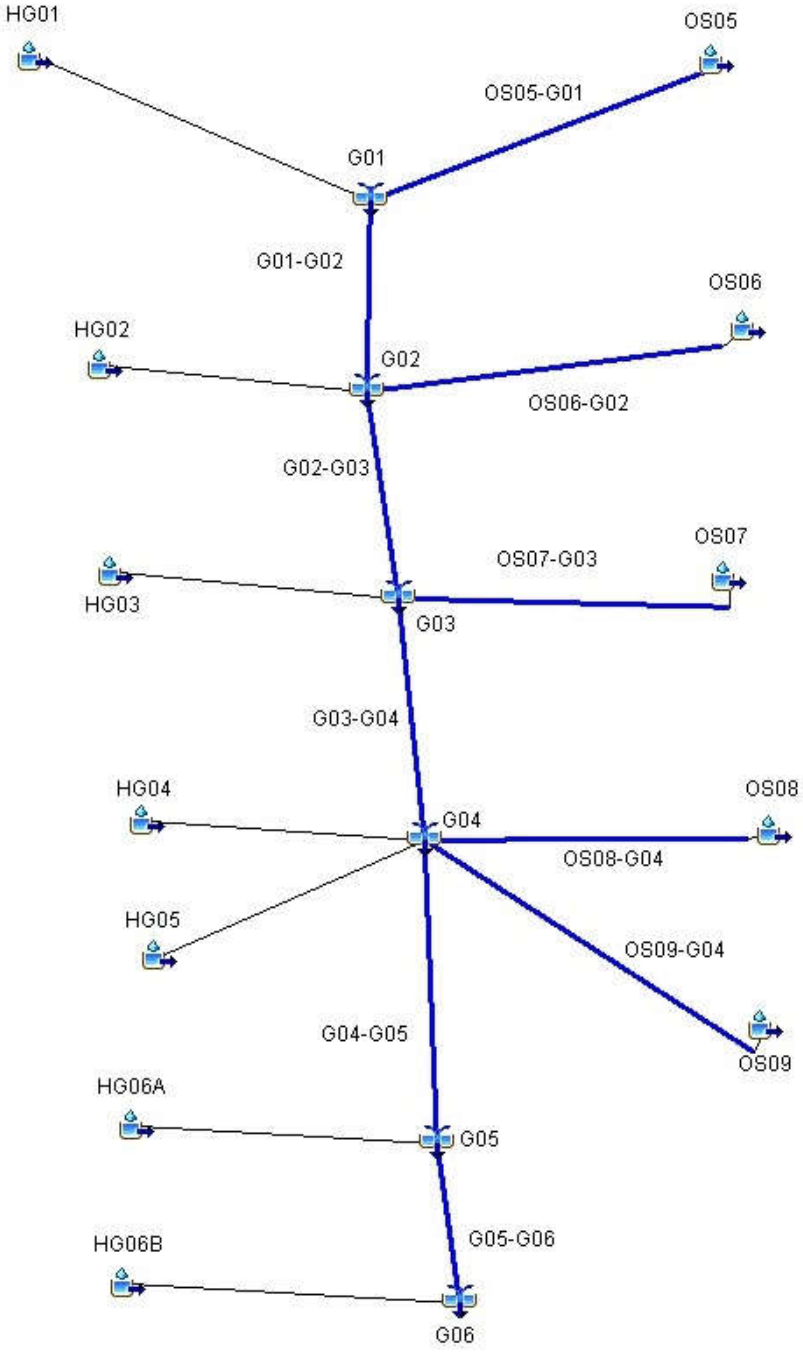




HISTORIC MDDP (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
OS06	0.1313	53	01Jul2015, 12:12	6.6
OS06-G02	0.1313	52	01Jul2015, 12:24	6.5
OS05	0.0578	26	01Jul2015, 12:12	2.9
OS05-G01	0.0578	26	01Jul2015, 12:18	2.9
HG01	0.0547	21	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)

GIECK. HISTORIC



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	9	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	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	1	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.)
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	0.0531	31	01Jul2015, 12:30	4.8
FG01-G1	0.0531	31	01Jul2015, 12:30	4.8
G1	0.1109	61	01Jul2015, 12:18	8.9
G1-G2	0.1109	60	01Jul2015, 12:18	8.9
FG02	0.0391	32	01Jul2015, 12:12	3.3
G2	0.2813	166	01Jul2015, 12:18	21.4
G2-G3	0.2813	163	01Jul2015, 12:18	21.2
FG03	0.0203	24	01Jul2015, 12:06	2.0
FG04	0.0172	22	01Jul2015, 12:00	1.7
G3	0.3188	184	01Jul2015, 12:18	24.9
G3-POND F	0.3188	183	01Jul2015, 12:18	24.9
FG06	0.0677	51	01Jul2015, 12:18	6.1
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	0.4615	291	01Jul2015, 12:18	38.4
POND F	0.4615	178	01Jul2015, 12:42	36.0
POND F-G7	0.4615	177	01Jul2015, 12:42	35.7
OS07b	0.0156	15	01Jul2015, 12:06	1.2
OS07b-G4	0.0156	14	01Jul2015, 12:12	1.2
FG21a	0.0095	6.1	01Jul2015, 12:18	0.8
G4	0.0251	20	01Jul2015, 12:12	2.0
G4-G7	0.0251	20	01Jul2015, 12:18	1.9
FG21b	0.0150	21	01Jul2015, 12:06	1.8
G7	0.5016	190	01Jul2015, 12:42	39.5
G7-G8	0.5016	190	01Jul2015, 12:48	39.1
FG22	0.1397	119	01Jul2015, 12:12	13.6
OS08	0.0397	35	01Jul2015, 12:12	3.5
OS08-G8	0.0397	34	01Jul2015, 12:12	3.5
OS08-G8	0.0397	34	01Jul2015, 12:12	3.5
FG23a	0.0216	21	01Jul2015, 12:12	2.2
G8	0.7026	262	01Jul2015, 12:36	58.4
G8-G10	0.7026	261	01Jul2015, 12:42	57.8
OS09	0.1527	90	01Jul2015, 12:24	13.0
OS09-G9	0.1527	88	01Jul2015, 12:36	12.8
FG24	0.1394	63	01Jul2015, 12:30	10.1
G9	0.2921	150	01Jul2015, 12:30	22.9
G9-G10	0.2921	149	01Jul2015, 12:36	22.8
FG23b	0.0359	21	01Jul2015, 12:18	2.6
G10	1.0306	414	01Jul2015, 12:42	83.2
G10-G11	1.0306	413	01Jul2015, 12:42	83.0
FG23c	0.0081	6.5	01Jul2015, 12:12	0.8
G11	1.0387	416	01Jul2015, 12:42	83.8
FG25	0.1086	112	01Jul2015, 12:18	13.4

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.)
FG28	0.0681	38	01Jul2015, 12:18	5.3
POND G IN	1.2154	509	01Jul2015, 12:36	102.5
POND G	1.2154	383	01Jul2015, 13:00	93.2
G12	1.2154	383	01Jul2015, 13:00	93.2
G12-G06	1.2154	383	01Jul2015, 13:06	92.6
FG29	0.0997	60	01Jul2015, 12:12	7.1
FG32	0.0402	29	01Jul2015, 12:06	2.9
FG32-G06	0.0402	28	01Jul2015, 12:12	2.8
G06	1.3553	403	01Jul2015, 13:06	102.5
FG10A	0.0806	103	01Jul2015, 12:06	9.7
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	4.7
G05	0.3711	455	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	531	01Jul2015, 12:12	57.1
POND D	0.4573	134	01Jul2015, 12:54	46.3
POND D-G17	0.4573	133	01Jul2015, 13:00	46.3
FG15	0.0103	15	01Jul2015, 12:06	1.5
FG15-G17A	0.0103	15	01Jul2015, 12:12	1.5
G17A	0.4676	136	01Jul2015, 12:54	47.8
FG14	0.1000	98	01Jul2015, 12:18	12.5
G17	0.5676	201	01Jul2015, 12:30	60.3
G17-G18	0.5676	199	01Jul2015, 12:30	60.3
FG16	0.0791	133	01Jul2015, 12:06	11.5
G18	0.6467	247	01Jul2015, 12:24	71.8
G18-POND E	0.6467	247	01Jul2015, 12:24	71.7
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	9.4
FG17a-POND E	0.0694	99	01Jul2015, 12:06	9.4
FG18	0.0644	56	01Jul2015, 12:24	7.8
FG18-POND E	0.0644	56	01Jul2015, 12:24	7.8
FG19	0.0527	84	01Jul2015, 12:06	8.1
FG17c	0.0313	31	01Jul2015, 12:06	2.7
FG17b	0.0214	39	01Jul2015, 12:06	3.2
POND E IN	1.0170	556	01Jul2015, 12:12	119.4
POND E	1.0170	231	01Jul2015, 13:36	94.6
H08	1.0170	198	01Jul2015, 13:36	82.9
H09	0.0000	33	01Jul2015, 13:36	11.7

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.)
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	0.0531	22	01Jul2015, 12:30	3.5
FG01-G1	0.0531	22	01Jul2015, 12:30	3.5
G1	0.1109	41	01Jul2015, 12:18	6.4
G1-G2	0.1109	41	01Jul2015, 12:18	6.4
FG02	0.0391	22	01Jul2015, 12:12	2.4
G2	0.2813	112	01Jul2015, 12:18	15.2
G2-G3	0.2813	108	01Jul2015, 12:24	15.1
FG03	0.0203	17	01Jul2015, 12:06	1.5
FG04	0.0172	16	01Jul2015, 12:00	1.3
G3	0.3188	123	01Jul2015, 12:18	17.8
G3-POND F	0.3188	121	01Jul2015, 12:18	17.8
FG06	0.0677	36	01Jul2015, 12:18	4.5
FG05	0.0580	33	01Jul2015, 12:24	4.6
OS07a	0.0170	9.2	01Jul2015, 12:12	1.0
OS07a-POND F	0.0170	9.1	01Jul2015, 12:18	0.9
POND F IN	0.4615	198	01Jul2015, 12:18	27.8
POND F	0.4615	121	01Jul2015, 12:42	25.8
POND F-G7	0.4615	121	01Jul2015, 12:48	25.6
OS07b	0.0156	10	01Jul2015, 12:06	0.9
OS07b-G4	0.0156	9.6	01Jul2015, 12:12	0.9
FG21a	0.0095	4.2	01Jul2015, 12:18	0.5
G4	0.0251	14	01Jul2015, 12:12	1.4
G4-G7	0.0251	13	01Jul2015, 12:24	1.4
FG21b	0.0150	15	01Jul2015, 12:06	1.4
G7	0.5016	129	01Jul2015, 12:48	28.3
G7-G8	0.5016	129	01Jul2015, 12:54	28.0
FG22	0.1397	85	01Jul2015, 12:12	10.0
OS08	0.0397	24	01Jul2015, 12:12	2.6
OS08-G8	0.0397	23	01Jul2015, 12:12	2.6
OS08-G8	0.0397	23	01Jul2015, 12:12	2.6
FG23a	0.0216	15	01Jul2015, 12:12	1.6
G8	0.7026	171	01Jul2015, 12:48	42.3
G8-G10	0.7026	170	01Jul2015, 12:54	41.7
OS09	0.1527	62	01Jul2015, 12:24	9.4
OS09-G9	0.1527	62	01Jul2015, 12:36	9.3
FG24	0.1394	42	01Jul2015, 12:30	7.1
G9	0.2921	102	01Jul2015, 12:36	16.4
G9-G10	0.2921	101	01Jul2015, 12:36	16.3
FG23b	0.0359	14	01Jul2015, 12:18	1.9
G10	1.0306	262	01Jul2015, 12:48	59.9
G10-G11	1.0306	258	01Jul2015, 12:54	59.8
FG23c	0.0081	4.6	01Jul2015, 12:18	0.6
G11	1.0387	259	01Jul2015, 12:48	60.3
FG25	0.1086	85	01Jul2015, 12:18	10.3

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.)
FG28	0.0681	26	01Jul2015, 12:24	3.8
POND G IN	1.2154	327	01Jul2015, 12:30	74.4
POND G	1.2154	229	01Jul2015, 13:18	65.7
G12	1.2154	229	01Jul2015, 13:18	65.7
G12-G06	1.2154	229	01Jul2015, 13:18	65.2
FG29	0.0997	39	01Jul2015, 12:18	5.0
FG32	0.0402	19	01Jul2015, 12:12	2.0
FG32-G06	0.0402	19	01Jul2015, 12:12	2.0
G06	1.3553	241	01Jul2015, 13:18	72.2
FG10A	0.0806	77	01Jul2015, 12:06	7.4
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	347	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	405	01Jul2015, 12:12	43.9
POND D	0.4573	90	01Jul2015, 13:06	34.2
POND D-G17	0.4573	90	01Jul2015, 13:06	34.2
FG15	0.0103	12	01Jul2015, 12:12	1.2
FG15-G17A	0.0103	12	01Jul2015, 12:12	1.2
G17A	0.4676	92	01Jul2015, 13:06	35.3
FG14	0.1000	74	01Jul2015, 12:18	9.6
G17	0.5676	134	01Jul2015, 12:36	45.0
G17-G18	0.5676	134	01Jul2015, 12:36	44.9
FG16	0.0791	104	01Jul2015, 12:06	9.0
G18	0.6467	179	01Jul2015, 12:12	54.0
G18-POND E	0.6467	177	01Jul2015, 12:12	53.9
FG31	0.0922	92	01Jul2015, 12:18	11.0
FG30	0.0389	20	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	2.6
POND E IN	1.0170	424	01Jul2015, 12:12	90.8
POND E	1.0170	141	01Jul2015, 14:06	66.9
H08	1.0170	127	01Jul2015, 14:06	58.8
H09	0.0000	14	01Jul2015, 14:06	8.1

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.)
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	0.0531	6.9	01Jul2015, 12:36	1.4
FG01-G1	0.0531	6.9	01Jul2015, 12:36	1.4
G1	0.1109	11	01Jul2015, 12:24	2.3
G1-G2	0.1109	11	01Jul2015, 12:30	2.3
FG02	0.0391	6.2	01Jul2015, 12:12	0.9
G2	0.2813	27	01Jul2015, 12:24	5.3
G2-G3	0.2813	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	0.3188	31	01Jul2015, 12:30	6.4
G3-POND F	0.3188	31	01Jul2015, 12:30	6.4
FG06	0.0677	11	01Jul2015, 12:18	1.7
FG05	0.0580	12	01Jul2015, 12:24	2.0
OS07a	0.0170	2.5	01Jul2015, 12:12	0.3
OS07a-POND F	0.0170	2.3	01Jul2015, 12:24	0.3
POND F IN	0.4615	54	01Jul2015, 12:30	10.4
POND F	0.4615	16	01Jul2015, 13:48	9.1
POND F-G7	0.4615	16	01Jul2015, 14:00	9.0
OS07b	0.0156	2.6	01Jul2015, 12:06	0.3
OS07b-G4	0.0156	2.5	01Jul2015, 12:18	0.3
FG21a	0.0095	1.1	01Jul2015, 12:18	0.2
G4	0.0251	3.6	01Jul2015, 12:18	0.5
G4-G7	0.0251	3.5	01Jul2015, 12:30	0.5
FG21b	0.0150	6.4	01Jul2015, 12:06	0.6
G7	0.5016	18	01Jul2015, 13:42	10.1
G7-G8	0.5016	18	01Jul2015, 13:48	9.9
FG22	0.1397	29	01Jul2015, 12:18	4.1
OS08	0.0397	7.5	01Jul2015, 12:12	1.0
OS08-G8	0.0397	7.3	01Jul2015, 12:18	1.0
OS08-G8	0.0397	7.3	01Jul2015, 12:18	1.0
FG23a	0.0216	5.4	01Jul2015, 12:12	0.7
G8	0.7026	46	01Jul2015, 12:18	15.6
G8-G10	0.7026	46	01Jul2015, 12:30	15.3
OS09	0.1527	18	01Jul2015, 12:30	3.5
OS09-G9	0.1527	18	01Jul2015, 12:42	3.5
FG24	0.1394	9.9	01Jul2015, 12:36	2.4
G9	0.2921	28	01Jul2015, 12:42	5.9
G9-G10	0.2921	28	01Jul2015, 12:48	5.8
FG23b	0.0359	3.3	01Jul2015, 12:24	0.6
G10	1.0306	65	01Jul2015, 12:36	21.7
G10-G11	1.0306	65	01Jul2015, 12:42	21.6
FG23c	0.0081	1.5	01Jul2015, 12:18	0.2
G11	1.0387	66	01Jul2015, 12:42	21.8
FG25	0.1086	36	01Jul2015, 12:18	4.7

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.)
FG28	0.0681	6.8	01Jul2015, 12:24	1.3
POND G IN	1.2154	96	01Jul2015, 12:36	27.9
POND G	1.2154	35	01Jul2015, 15:00	20.7
G12	1.2154	35	01Jul2015, 15:00	20.7
G12-G06	1.2154	35	01Jul2015, 15:06	20.5
FG29	0.0997	8.7	01Jul2015, 12:18	1.6
FG32	0.0402	4.2	01Jul2015, 12:12	0.7
FG32-G06	0.0402	4.1	01Jul2015, 12:18	0.7
G06	1.3553	37	01Jul2015, 15:06	22.8
FG10A	0.0806	32	01Jul2015, 12:12	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	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	153	01Jul2015, 12:12	17.1
FG13	0.0534	7.5	01Jul2015, 12:30	1.4
FG12	0.0328	20	01Jul2015, 12:12	2.0
POND D IN	0.4573	177	01Jul2015, 12:12	20.5
POND D	0.4573	18	01Jul2015, 14:24	13.9
POND D-G17	0.4573	18	01Jul2015, 14:30	13.9
FG15	0.0103	5.8	01Jul2015, 12:12	0.6
FG15-G17A	0.0103	5.8	01Jul2015, 12:12	0.6
G17A	0.4676	18	01Jul2015, 14:18	14.4
FG14	0.1000	32	01Jul2015, 12:24	4.5
G17	0.5676	42	01Jul2015, 12:24	18.9
G17-G18	0.5676	42	01Jul2015, 12:30	18.9
FG16	0.0791	50	01Jul2015, 12:06	4.5
G18	0.6467	78	01Jul2015, 12:12	23.4
G18-POND E	0.6467	77	01Jul2015, 12:12	23.4
FG31	0.0922	45	01Jul2015, 12:18	5.6
FG30	0.0389	4.3	01Jul2015, 12:12	0.7
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	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	6.5	01Jul2015, 12:06	0.8
FG17b	0.0214	16	01Jul2015, 12:06	1.3
POND E IN	1.0170	190	01Jul2015, 12:12	41.1
POND E	1.0170	26	01Jul2015, 18:24	20.7
H08	1.0170	20	01Jul2015, 18:24	16.0
H09	0.0000	5.5	01Jul2015, 18:24	4.7

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.)
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	0.0531	3.3	01Jul2015, 12:36	0.8
FG01-G1	0.0531	3.3	01Jul2015, 12:36	0.8
G1	0.1109	4.8	01Jul2015, 12:36	1.3
G1-G2	0.1109	4.8	01Jul2015, 12:36	1.3
FG02	0.0391	2.6	01Jul2015, 12:18	0.5
G2	0.2813	10	01Jul2015, 12:30	2.9
G2-G3	0.2813	10	01Jul2015, 12:42	2.8
FG03	0.0203	3.0	01Jul2015, 12:06	0.4
FG04	0.0172	3.1	01Jul2015, 12:06	0.3
G3	0.3188	12	01Jul2015, 12:36	3.5
G3-POND F	0.3188	12	01Jul2015, 12:42	3.5
FG06	0.0677	5.3	01Jul2015, 12:24	1.0
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	0.4615	23	01Jul2015, 12:36	5.9
POND F	0.4615	8.1	01Jul2015, 14:18	4.8
POND F-G7	0.4615	8.1	01Jul2015, 14:24	4.8
OS07b	0.0156	1.0	01Jul2015, 12:12	0.2
OS07b-G4	0.0156	0.9	01Jul2015, 12:24	0.2
FG21a	0.0095	0.4	01Jul2015, 12:24	0.1
G4	0.0251	1.4	01Jul2015, 12:24	0.3
G4-G7	0.0251	1.3	01Jul2015, 12:36	0.3
FG21b	0.0150	3.8	01Jul2015, 12:06	0.4
G7	0.5016	8.8	01Jul2015, 14:18	5.4
G7-G8	0.5016	8.8	01Jul2015, 14:30	5.3
FG22	0.1397	15	01Jul2015, 12:18	2.5
OS08	0.0397	3.4	01Jul2015, 12:12	0.6
OS08-G8	0.0397	3.4	01Jul2015, 12:18	0.6
OS08-G8	0.0397	3.4	01Jul2015, 12:18	0.6
FG23a	0.0216	2.8	01Jul2015, 12:18	0.4
G8	0.7026	24	01Jul2015, 12:24	8.8
G8-G10	0.7026	23	01Jul2015, 12:36	8.5
OS09	0.1527	8.2	01Jul2015, 12:36	2.0
OS09-G9	0.1527	8.1	01Jul2015, 12:54	2.0
FG24	0.1394	3.7	01Jul2015, 12:42	1.3
G9	0.2921	12	01Jul2015, 12:48	3.2
G9-G10	0.2921	12	01Jul2015, 13:00	3.2
FG23b	0.0359	1.2	01Jul2015, 12:30	0.3
G10	1.0306	29	01Jul2015, 12:48	12.0
G10-G11	1.0306	29	01Jul2015, 12:48	11.9
FG23c	0.0081	0.7	01Jul2015, 12:18	0.1
G11	1.0387	29	01Jul2015, 12:48	12.1
FG25	0.1086	22	01Jul2015, 12:18	3.1

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.)
FG28	0.0681	2.7	01Jul2015, 12:30	0.7
POND G IN	1.2154	45	01Jul2015, 12:42	15.9
POND G	1.2154	14	01Jul2015, 17:54	9.3
G12	1.2154	14	01Jul2015, 17:54	9.3
G12-G06	1.2154	14	01Jul2015, 18:00	9.1
FG29	0.0997	2.8	01Jul2015, 12:24	0.9
FG32	0.0402	1.3	01Jul2015, 12:18	0.3
FG32-G06	0.0402	1.3	01Jul2015, 12:24	0.3
G06	1.3553	15	01Jul2015, 17:54	10.3
FG10A	0.0806	20	01Jul2015, 12:12	2.2
FG08A	0.0750	27	01Jul2015, 12:06	2.6
FG08A-G05	0.0750	27	01Jul2015, 12:12	2.6
FG08B	0.0630	20	01Jul2015, 12:12	2.2
FG08B-G05	0.0630	19	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	8.0	01Jul2015, 12:24	1.2
FG10B	0.0416	7.0	01Jul2015, 12:18	1.0
G05	0.3711	95	01Jul2015, 12:12	11.4
FG13	0.0534	3.6	01Jul2015, 12:30	0.8
FG12	0.0328	14	01Jul2015, 12:12	1.4
POND D IN	0.4573	111	01Jul2015, 12:12	13.6
POND D	0.4573	11	01Jul2015, 14:48	8.2
POND D-G17	0.4573	11	01Jul2015, 14:48	8.2
FG15	0.0103	3.9	01Jul2015, 12:12	0.4
FG15-G17A	0.0103	3.9	01Jul2015, 12:12	0.4
G17A	0.4676	11	01Jul2015, 14:42	8.6
FG14	0.1000	20	01Jul2015, 12:24	3.0
G17	0.5676	25	01Jul2015, 12:24	11.6
G17-G18	0.5676	25	01Jul2015, 12:24	11.6
FG16	0.0791	34	01Jul2015, 12:06	3.1
G18	0.6467	50	01Jul2015, 12:12	14.7
G18-POND E	0.6467	50	01Jul2015, 12:12	14.7
FG31	0.0922	31	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	19	01Jul2015, 12:42	4.3
FG17a	0.0694	23	01Jul2015, 12:12	2.4
FG17a-POND E	0.0694	23	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
FG17c	0.0313	2.9	01Jul2015, 12:12	0.4
FG17b	0.0214	11	01Jul2015, 12:06	0.9
POND E IN	1.0170	122	01Jul2015, 12:12	26.7
POND E	1.0170	13	01Jul2015, 21:54	10.1
H08	1.0170	9.1	01Jul2015, 21:54	7.1
H09	0.0000	3.7	01Jul2015, 21:54	3.1

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

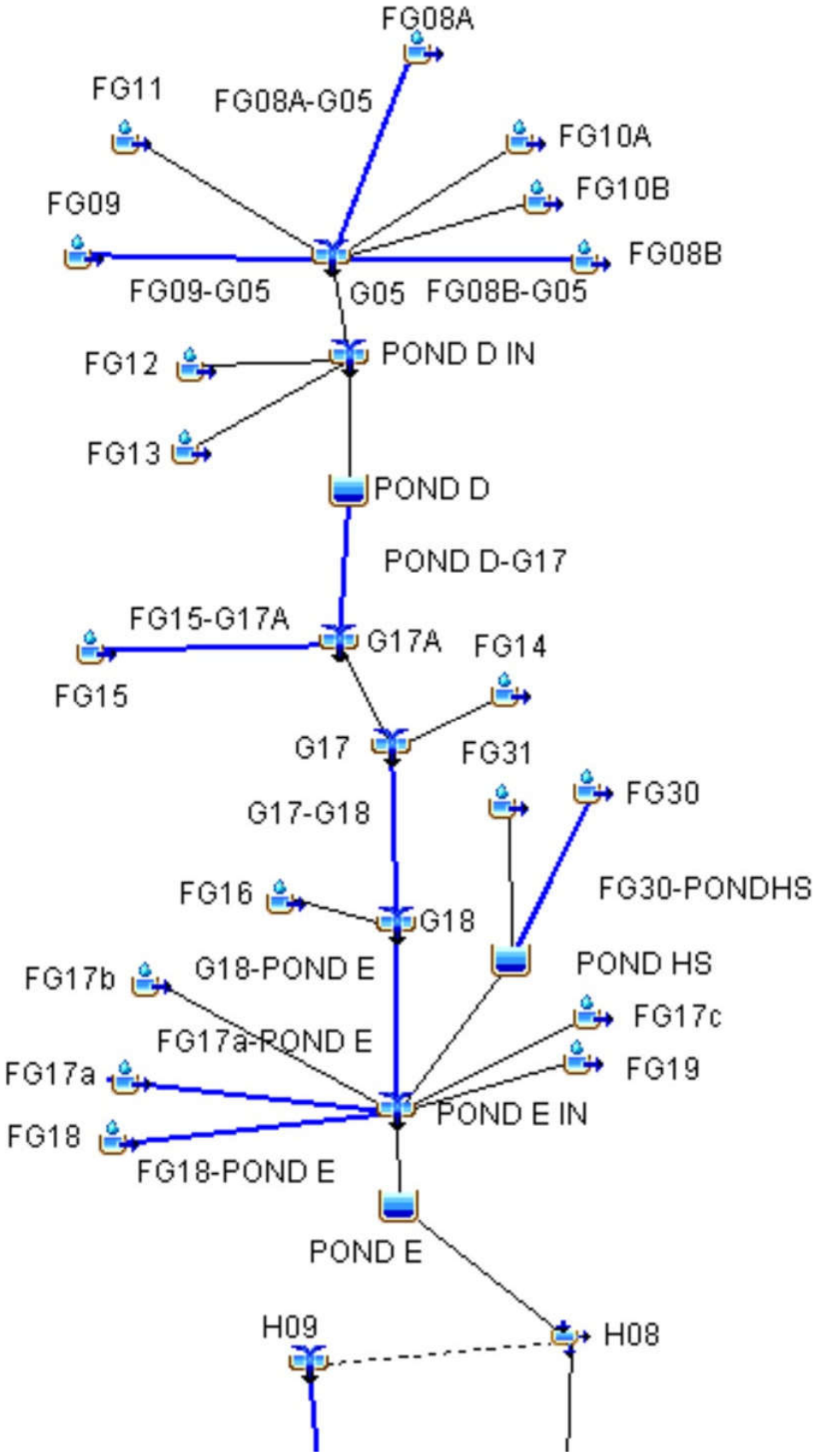
INTERIM MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE QWQCV (CFS)	TIME OF PEAK	TOTAL VOLUME QWQCV (AC. FT.)
OS06	0.1313	0.00	01Jul2015, 00:00	0.0
G1a	0.1313	0.00	01Jul2015, 00:00	0.0
G1a-G2	0.1313	0.00	01Jul2015, 00:00	0.0
OS05	0.0578	0.00	01Jul2015, 00:00	0.0
OS05-G1	0.0578	0.00	01Jul2015, 00:00	0.0
FG01	0.0531	0.04	01Jul2015, 23:54	0.0
FG01-G1	0.0531	0.04	01Jul2015, 23:54	0.0
G1	0.1109	0.04	01Jul2015, 23:54	0.0
G1-G2	0.1109	0.04	02Jul2015, 00:00	0.0
FG02	0.0391	0.02	01Jul2015, 23:48	0.0
G2	0.2813	0.06	01Jul2015, 23:48	0.0
G2-G3	0.2813	0.06	02Jul2015, 00:00	0.0
FG03	0.0203	0.03	01Jul2015, 16:36	0.0
FG04	0.0172	0.02	01Jul2015, 16:30	0.0
G3	0.3188	0.11	01Jul2015, 23:42	0.1
G3-POND F	0.3188	0.11	01Jul2015, 23:48	0.1
FG06	0.0677	0.05	01Jul2015, 23:48	0.0
FG05	0.0580	0.16	01Jul2015, 13:42	0.1
OS07a	0.0170	0.00	01Jul2015, 23:48	0.0
OS07a-POND F	0.0170	0.00	02Jul2015, 00:00	0.0
POND F IN	0.4615	0.26	01Jul2015, 17:54	0.2
POND F	0.4615	0.04	02Jul2015, 00:00	0.0
POND F-G7	0.4615	0.04	02Jul2015, 00:00	0.0
OS07b	0.0156	0.00	01Jul2015, 23:42	0.0
OS07b-G4	0.0156	0.00	02Jul2015, 00:00	0.0
FG21a	0.0095	0.00	01Jul2015, 23:48	0.0
G4	0.0251	0.01	01Jul2015, 23:54	0.0
G4-G7	0.0251	0.00	02Jul2015, 00:00	0.0
FG21b	0.0150	0.12	01Jul2015, 12:24	0.1
G7	0.5016	0.12	01Jul2015, 12:24	0.1
G7-G8	0.5016	0.12	01Jul2015, 13:18	0.1
FG22	0.1397	0.18	01Jul2015, 16:42	0.1
OS08	0.0397	0.03	01Jul2015, 23:42	0.0
OS08-G8	0.0397	0.03	01Jul2015, 23:54	0.0
OS08-G8	0.0397	0.03	01Jul2015, 23:54	0.0
FG23a	0.0216	0.04	01Jul2015, 14:06	0.0
G8	0.7026	0.30	01Jul2015, 17:48	0.3
G8-G10	0.7026	0.30	01Jul2015, 18:48	0.2
OS09	0.1527	0.09	01Jul2015, 23:54	0.0
OS09-G9	0.1527	0.08	02Jul2015, 00:00	0.0
FG24	0.1394	0.00	02Jul2015, 00:00	0.0
G9	0.2921	0.09	02Jul2015, 00:00	0.0
G9-G10	0.2921	0.08	02Jul2015, 00:00	0.0
FG23b	0.0359	0.00	02Jul2015, 00:00	0.0
G10	1.0306	0.36	01Jul2015, 20:54	0.2
G10-G11	1.0306	0.36	01Jul2015, 21:06	0.2
FG23c	0.0081	0.01	01Jul2015, 17:54	0.0
G11	1.0387	0.36	01Jul2015, 21:06	0.2
FG25	0.1086	1.2	01Jul2015, 12:36	0.4

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

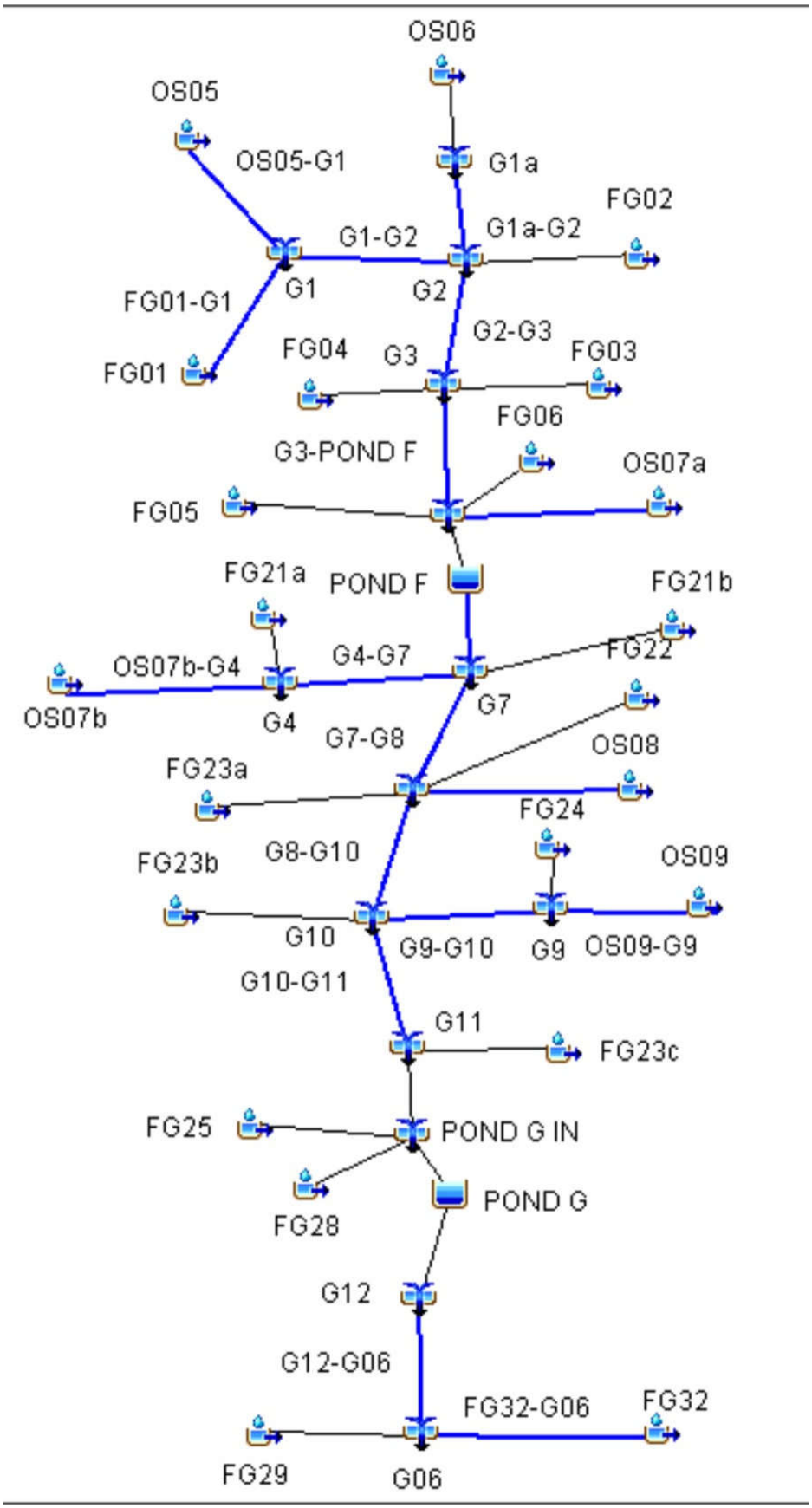
INTERIM MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE QWQCV (CFS)	TIME OF PEAK	TOTAL VOLUME QWQCV (AC. FT.)
FG28	0.0681	0.0	01Jul2015, 23:54	0.0
POND G IN	1.2154	1.2	01Jul2015, 12:36	0.7
POND G	1.2154	0.3	02Jul2015, 00:00	0.2
G12	1.2154	0.3	02Jul2015, 00:00	0.2
G12-G06	1.2154	0.2	02Jul2015, 00:00	0.1
FG29	0.0997	0.0	01Jul2015, 00:00	0.0
FG32	0.0402	0.0	01Jul2015, 00:00	0.0
FG32-G06	0.0402	0.0	01Jul2015, 00:00	0.0
G06	1.3553	0.2	02Jul2015, 00:00	0.1
FG10A	0.0806	0.7	01Jul2015, 12:24	0.3
FG08A	0.0750	2.6	01Jul2015, 12:12	0.5
FG08A-G05	0.0750	2.4	01Jul2015, 12:24	0.5
FG08B	0.0630	1.9	01Jul2015, 12:18	0.4
FG08B-G05	0.0630	1.8	01Jul2015, 12:24	0.4
FG11	0.0625	2.2	01Jul2015, 12:24	0.5
FG09	0.0484	0.3	01Jul2015, 13:00	0.1
FG09-G05	0.0484	0.3	01Jul2015, 13:12	0.1
FG10B	0.0416	0.2	01Jul2015, 13:06	0.1
G05	0.3711	7.3	01Jul2015, 12:24	1.8
FG13	0.0534	0.0	01Jul2015, 23:48	0.0
FG12	0.0328	2.1	01Jul2015, 12:12	0.3
POND D IN	0.4573	9.0	01Jul2015, 12:24	2.1
POND D	0.4573	1.1	02Jul2015, 00:00	0.8
POND D-G17	0.4573	1.1	02Jul2015, 00:00	0.8
FG15	0.0103	0.5	01Jul2015, 12:12	0.1
FG15-G17A	0.0103	0.5	01Jul2015, 12:18	0.1
G17A	0.4676	1.1	01Jul2015, 23:54	0.9
FG14	0.1000	1.3	01Jul2015, 12:36	0.4
G17	0.5676	1.8	01Jul2015, 12:36	1.3
G17-G18	0.5676	1.8	01Jul2015, 12:36	1.3
FG16	0.0791	4.5	01Jul2015, 12:12	0.6
G18	0.6467	5.2	01Jul2015, 12:12	2.0
G18-POND E	0.6467	5.1	01Jul2015, 12:18	2.0
FG31	0.0922	4.7	01Jul2015, 12:24	0.9
FG30	0.0389	0.0	01Jul2015, 00:00	0.0
FG30-PONDHS	0.0389	0.0	01Jul2015, 00:00	0.0
POND HS	0.1311	3.6	01Jul2015, 12:42	0.9
FG17a	0.0694	2.0	01Jul2015, 12:12	0.4
FG17a-POND E	0.0694	2.0	01Jul2015, 12:18	0.4
FG18	0.0644	0.6	01Jul2015, 12:54	0.2
FG18-POND E	0.0644	0.6	01Jul2015, 12:54	0.2
FG19	0.0527	3.8	01Jul2015, 12:12	0.5
FG17c	0.0313	0.0	01Jul2015, 23:42	0.0
FG17b	0.0214	1.6	01Jul2015, 12:06	0.2
POND E IN	1.0170	15	01Jul2015, 12:12	4.2
POND E	1.0170	2.0	02Jul2015, 00:00	1.0
H08	1.0170	1.2	02Jul2015, 00:00	0.6
H09	0.0000	0.8	02Jul2015, 00:00	0.4

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

INTERIM CONDITIONS
Ponds D-E



INTERIM CONDITIONS
Ponds F-G



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	0.0531	31	01Jul2015, 12:30	4.8
FG01-G1	0.0531	31	01Jul2015, 12:30	4.8
G1	0.1109	61	01Jul2015, 12:18	8.9
G1-G2	0.1109	60	01Jul2015, 12:18	8.9
FG02	0.0391	32	01Jul2015, 12:12	3.3
G2	0.2813	166	01Jul2015, 12:18	21.4
G2-G3	0.2813	163	01Jul2015, 12:18	21.2
FG03	0.0203	24	01Jul2015, 12:06	2.0
FG04	0.0172	22	01Jul2015, 12:00	1.7
G3	0.3188	184	01Jul2015, 12:18	24.9
G3-POND F	0.3188	183	01Jul2015, 12:18	24.9
FG06	0.0677	51	01Jul2015, 12:18	6.1
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	0.4615	291	01Jul2015, 12:18	38.4
POND F	0.4615	178	01Jul2015, 12:42	36.0
POND F-G7	0.4615	177	01Jul2015, 12:42	35.7
OS07b	0.0156	15	01Jul2015, 12:06	1.2
OS07b-G4	0.0156	14	01Jul2015, 12:12	1.2
FG21a	0.0095	6.1	01Jul2015, 12:18	0.8
G4	0.0251	20	01Jul2015, 12:12	2.0
G4-G7	0.0251	20	01Jul2015, 12:18	1.9
FG21b	0.0150	21	01Jul2015, 12:06	1.8
G7	0.5016	190	01Jul2015, 12:42	39.5
G7-G8	0.5016	189	01Jul2015, 12:42	39.3
FG22	0.1397	119	01Jul2015, 12:12	13.6
OS08	0.0397	35	01Jul2015, 12:12	3.5
OS08-G8	0.0397	34	01Jul2015, 12:12	3.5
FG23a	0.0216	21	01Jul2015, 12:12	2.2
G8	0.7026	271	01Jul2015, 12:30	58.6
G8-G10	0.7026	271	01Jul2015, 12:36	58.0
OS09	0.1527	90	01Jul2015, 12:24	13.0
OS09-G9	0.1527	88	01Jul2015, 12:36	12.8
FG24	0.1369	101	01Jul2015, 12:18	13.4
G9	0.2896	179	01Jul2015, 12:30	26.2
G9-G10	0.2896	179	01Jul2015, 12:30	26.1
FG23b	0.0305	27	01Jul2015, 12:12	2.8
G10	1.0227	450	01Jul2015, 12:36	86.9
G10-G11	1.0227	450	01Jul2015, 12:36	86.7
FG23c	0.0122	12	01Jul2015, 12:06	1.2
G11	1.0349	453	01Jul2015, 12:36	87.8
FG25	0.1086	112	01Jul2015, 12:18	13.4

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.)
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	24	01Jul2015, 12:06	2.3
POND G IN	1.3043	653	01Jul2015, 12:24	119.1
POND G	1.3043	465	01Jul2015, 12:54	109.6
G12	1.3043	465	01Jul2015, 12:54	109.6
G12-G06	1.3043	464	01Jul2015, 13:00	108.9
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	1.4442	493	01Jul2015, 12:54	122.0
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
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	4.7
G05	0.2280	282	01Jul2015, 12:12	28.8
FG10A	0.0806	103	01Jul2015, 12:06	9.7
FG11	0.0625	75	01Jul2015, 12:18	8.9
FG13	0.0534	34	01Jul2015, 12:24	4.8
FG12	0.0328	50	01Jul2015, 12:12	5.0
POND D IN	0.4573	531	01Jul2015, 12:12	57.1
POND D	0.4573	134	01Jul2015, 12:54	46.3
POND D-G17	0.4573	133	01Jul2015, 13:00	46.3
FG15	0.0103	15	01Jul2015, 12:06	1.5
FG15-G17A	0.0103	15	01Jul2015, 12:12	1.5
G17A	0.4676	136	01Jul2015, 12:54	47.8
FG14	0.1000	98	01Jul2015, 12:18	12.5
G17	0.5676	201	01Jul2015, 12:30	60.3
G17-G18	0.5676	199	01Jul2015, 12:30	60.3
FG16	0.0791	133	01Jul2015, 12:06	11.5
G18	0.6467	247	01Jul2015, 12:24	71.8
G18-POND E	0.6467	247	01Jul2015, 12:24	71.7
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	9.4
FG17a-POND E	0.0694	99	01Jul2015, 12:06	9.4
FG18	0.0644	56	01Jul2015, 12:24	7.8
FG18-POND E	0.0644	56	01Jul2015, 12:24	7.8
FG19	0.0527	84	01Jul2015, 12:06	8.1
FG17c	0.0313	31	01Jul2015, 12:06	2.7
FG17b	0.0214	39	01Jul2015, 12:06	3.2
POND E IN	1.0170	618	01Jul2015, 12:18	122.5
POND E	1.0170	240	01Jul2015, 13:30	97.7
H08	1.0170	204	01Jul2015, 13:30	85.3
H09	0.0000	36	01Jul2015, 13:30	12.3

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	0.0531	22	01Jul2015, 12:30	3.5
FG01-G1	0.0531	22	01Jul2015, 12:30	3.5
G1	0.1109	41	01Jul2015, 12:18	6.4
G1-G2	0.1109	41	01Jul2015, 12:18	6.4
FG02	0.0391	22	01Jul2015, 12:12	2.4
G2	0.2813	112	01Jul2015, 12:18	15.2
G2-G3	0.2813	108	01Jul2015, 12:24	15.1
FG03	0.0203	17	01Jul2015, 12:06	1.5
FG04	0.0172	16	01Jul2015, 12:00	1.3
G3	0.3188	123	01Jul2015, 12:18	17.8
G3-POND F	0.3188	121	01Jul2015, 12:18	17.8
FG06	0.0677	36	01Jul2015, 12:18	4.5
FG05	0.0580	33	01Jul2015, 12:24	4.6
OS07a	0.0170	9.2	01Jul2015, 12:12	1.0
OS07a-POND F	0.0170	9.1	01Jul2015, 12:18	0.9
POND F IN	0.4615	198	01Jul2015, 12:18	27.8
POND F	0.4615	121	01Jul2015, 12:42	25.8
POND F-G7	0.4615	121	01Jul2015, 12:48	25.6
OS07b	0.0156	10	01Jul2015, 12:06	0.9
OS07b-G4	0.0156	10	01Jul2015, 12:12	0.9
FG21a	0.0095	4.2	01Jul2015, 12:18	0.5
G4	0.0251	14	01Jul2015, 12:12	1.4
G4-G7	0.0251	13	01Jul2015, 12:24	1.4
FG21b	0.0150	15	01Jul2015, 12:06	1.4
G7	0.5016	129	01Jul2015, 12:48	28.3
G7-G8	0.5016	128	01Jul2015, 12:48	28.2
FG22	0.1397	85	01Jul2015, 12:12	10.0
OS08	0.0397	24	01Jul2015, 12:12	2.6
OS08-G8	0.0397	23	01Jul2015, 12:12	2.6
FG23a	0.0216	15	01Jul2015, 12:12	1.6
G8	0.7026	175	01Jul2015, 12:42	42.4
G8-G10	0.7026	174	01Jul2015, 12:48	41.9
OS09	0.1527	62	01Jul2015, 12:24	9.4
OS09-G9	0.1527	62	01Jul2015, 12:36	9.3
FG24	0.1369	72	01Jul2015, 12:24	9.9
G9	0.2896	126	01Jul2015, 12:30	19.2
G9-G10	0.2896	125	01Jul2015, 12:30	19.1
FG23b	0.0305	19	01Jul2015, 12:12	2.0
G10	1.0227	281	01Jul2015, 12:42	63.1
G10-G11	1.0227	279	01Jul2015, 12:42	62.9
FG23c	0.0122	8.7	01Jul2015, 12:06	0.9
G11	1.0349	281	01Jul2015, 12:42	63.7
FG25	0.1086	85	01Jul2015, 12:18	10.3

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.)
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	17	01Jul2015, 12:06	1.7
POND G IN	1.3043	451	01Jul2015, 12:24	87.5
POND G	1.3043	307	01Jul2015, 13:00	78.6
G12	1.3043	307	01Jul2015, 13:00	78.6
G12-G06	1.3043	306	01Jul2015, 13:06	78.0
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	1.4442	324	01Jul2015, 13:06	87.8
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
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	0.2280	215	01Jul2015, 12:12	22.1
FG10A	0.0806	77	01Jul2015, 12:06	7.4
FG11	0.0625	59	01Jul2015, 12:18	7.0
FG13	0.0534	24	01Jul2015, 12:24	3.5
FG12	0.0328	40	01Jul2015, 12:12	3.9
POND D IN	0.4573	405	01Jul2015, 12:12	43.9
POND D	0.4573	90	01Jul2015, 13:06	34.2
POND D-G17	0.4573	90	01Jul2015, 13:06	34.2
FG15	0.0103	12	01Jul2015, 12:12	1.2
FG15-G17A	0.0103	12	01Jul2015, 12:12	1.2
G17A	0.4676	92	01Jul2015, 13:06	35.3
FG14	0.1000	74	01Jul2015, 12:18	9.6
G17	0.5676	134	01Jul2015, 12:36	45.0
G17-G18	0.5676	134	01Jul2015, 12:36	44.9
FG16	0.0791	104	01Jul2015, 12:06	9.0
G18	0.6467	179	01Jul2015, 12:12	54.0
G18-POND E	0.6467	177	01Jul2015, 12:12	53.9
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
FG17c	0.0313	22	01Jul2015, 12:06	2.0
FG17b	0.0214	31	01Jul2015, 12:06	2.6
POND E IN	1.0170	433	01Jul2015, 12:12	93.5
POND E	1.0170	149	01Jul2015, 14:00	69.5
H08	1.0170	134	01Jul2015, 14:00	61.1
H09	0.0000	15	01Jul2015, 14:00	8.3

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.)
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	0.0531	6.9	01Jul2015, 12:36	1.4
FG01-G1	0.0531	6.9	01Jul2015, 12:36	1.4
G1	0.1109	11	01Jul2015, 12:24	2.3
G1-G2	0.1109	11	01Jul2015, 12:30	2.3
FG02	0.0391	6.2	01Jul2015, 12:12	0.9
G2	0.2813	27	01Jul2015, 12:24	5.3
G2-G3	0.2813	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	0.3188	31	01Jul2015, 12:30	6.4
G3-POND F	0.3188	31	01Jul2015, 12:30	6.4
FG06	0.0677	11	01Jul2015, 12:18	1.7
FG05	0.0580	12	01Jul2015, 12:24	2.0
OS07a	0.0170	2.5	01Jul2015, 12:12	0.3
OS07a-POND F	0.0170	2.3	01Jul2015, 12:24	0.3
POND F IN	0.4615	54	01Jul2015, 12:30	10.4
POND F	0.4615	16	01Jul2015, 13:48	9.1
POND F-G7	0.4615	16	01Jul2015, 14:00	9.0
OS07b	0.0156	2.6	01Jul2015, 12:06	0.3
OS07b-G4	0.0156	2.5	01Jul2015, 12:18	0.3
FG21a	0.0095	1.1	01Jul2015, 12:18	0.2
G4	0.0251	3.6	01Jul2015, 12:18	0.5
G4-G7	0.0251	3.5	01Jul2015, 12:30	0.5
FG21b	0.0150	6.4	01Jul2015, 12:06	0.6
G7	0.5016	18	01Jul2015, 13:42	10.1
G7-G8	0.5016	18	01Jul2015, 13:42	10.0
FG22	0.1397	29	01Jul2015, 12:18	4.1
OS08	0.0397	7.5	01Jul2015, 12:12	1.0
OS08-G8	0.0397	7.3	01Jul2015, 12:18	1.0
FG23a	0.0216	5.2	01Jul2015, 12:12	0.7
G8	0.7026	48	01Jul2015, 12:18	15.7
G8-G10	0.7026	47	01Jul2015, 12:24	15.4
OS09	0.1527	18	01Jul2015, 12:30	3.5
OS09-G9	0.1527	18	01Jul2015, 12:42	3.5
FG24	0.1369	25	01Jul2015, 12:24	4.0
G9	0.2896	38	01Jul2015, 12:36	7.5
G9-G10	0.2896	37	01Jul2015, 12:36	7.5
FG23b	0.0305	6.1	01Jul2015, 12:12	0.8
G10	1.0227	81	01Jul2015, 12:30	23.6
G10-G11	1.0227	80	01Jul2015, 12:36	23.5
FG23c	0.0122	3.0	01Jul2015, 12:12	0.3
G11	1.0349	82	01Jul2015, 12:36	23.8
FG25	0.1086	36	01Jul2015, 12:18	4.7

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.)
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	5.5	01Jul2015, 12:12	0.7
POND G IN	1.3043	149	01Jul2015, 12:30	34.5
POND G	1.3043	51	01Jul2015, 14:00	27.1
G12	1.3043	51	01Jul2015, 14:00	27.1
G12-G06	1.3043	51	01Jul2015, 14:12	26.8
FG29	0.0997	8.7	01Jul2015, 12:18	1.6
FG32	0.0402	29	01Jul2015, 12:06	2.5
FG32-G06	0.0402	27	01Jul2015, 12:06	2.4
G06	1.4442	55	01Jul2015, 14:06	30.9
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
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	0.2280	94	01Jul2015, 12:12	10.3
FG10A	0.0806	32	01Jul2015, 12:12	3.3
FG11	0.0625	28	01Jul2015, 12:18	3.4
FG13	0.0534	7.5	01Jul2015, 12:30	1.4
FG12	0.0328	20	01Jul2015, 12:12	2.0
POND D IN	0.4573	177	01Jul2015, 12:12	20.5
POND D	0.4573	18	01Jul2015, 14:24	13.9
POND D-G17	0.4573	18	01Jul2015, 14:30	13.9
FG15	0.0103	5.8	01Jul2015, 12:12	0.6
FG15-G17A	0.0103	5.8	01Jul2015, 12:12	0.6
G17A	0.4676	18	01Jul2015, 14:18	14.4
FG14	0.1000	32	01Jul2015, 12:24	4.5
G17	0.5676	42	01Jul2015, 12:24	18.9
G17-G18	0.5676	42	01Jul2015, 12:30	18.9
FG16	0.0791	50	01Jul2015, 12:06	4.5
G18	0.6467	78	01Jul2015, 12:12	23.4
G18-POND E	0.6467	77	01Jul2015, 12:12	23.4
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	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	6.5	01Jul2015, 12:06	0.8
FG17b	0.0214	16	01Jul2015, 12:06	1.3
POND E IN	1.0170	197	01Jul2015, 12:12	42.8
POND E	1.0170	28	01Jul2015, 18:06	22.2
H08	1.0170	22	01Jul2015, 18:06	17.3
H09	0.0000	5.7	01Jul2015, 18:06	4.9

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.)
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	0.0531	3.3	01Jul2015, 12:36	0.8
FG01-G1	0.0531	3.3	01Jul2015, 12:36	0.8
G1	0.1109	4.8	01Jul2015, 12:36	1.3
G1-G2	0.1109	4.8	01Jul2015, 12:36	1.3
FG02	0.0391	2.6	01Jul2015, 12:18	0.5
G2	0.2813	10	01Jul2015, 12:30	2.9
G2-G3	0.2813	10	01Jul2015, 12:42	2.8
FG03	0.0203	3.0	01Jul2015, 12:06	0.4
FG04	0.0172	3.1	01Jul2015, 12:06	0.3
G3	0.3188	12	01Jul2015, 12:36	3.5
G3-POND F	0.3188	12	01Jul2015, 12:42	3.5
FG06	0.0677	5.3	01Jul2015, 12:24	1.0
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	0.4615	23	01Jul2015, 12:36	5.9
POND F	0.4615	8.1	01Jul2015, 14:18	4.8
POND F-G7	0.4615	8.1	01Jul2015, 14:24	4.8
OS07b	0.0156	1.0	01Jul2015, 12:12	0.2
OS07b-G4	0.0156	0.9	01Jul2015, 12:24	0.2
FG21a	0.0095	0.4	01Jul2015, 12:24	0.1
G4	0.0251	1.4	01Jul2015, 12:24	0.3
G4-G7	0.0251	1.3	01Jul2015, 12:36	0.3
FG21b	0.0150	3.8	01Jul2015, 12:06	0.4
G7	0.5016	8.8	01Jul2015, 14:18	5.4
G7-G8	0.5016	8.8	01Jul2015, 14:24	5.4
FG22	0.1397	15	01Jul2015, 12:18	2.5
OS08	0.0397	3.4	01Jul2015, 12:12	0.6
OS08-G8	0.0397	3.4	01Jul2015, 12:18	0.6
FG23a	0.0216	2.7	01Jul2015, 12:18	0.4
G8	0.7026	25	01Jul2015, 12:18	8.8
G8-G10	0.7026	24	01Jul2015, 12:30	8.6
OS09	0.1527	8.2	01Jul2015, 12:36	2.0
OS09-G9	0.1527	8.2	01Jul2015, 12:48	2.0
FG24	0.1369	13	01Jul2015, 12:24	2.4
G9	0.2896	17	01Jul2015, 12:48	4.4
G9-G10	0.2896	17	01Jul2015, 12:48	4.4
FG23b	0.0305	2.8	01Jul2015, 12:18	0.5
G10	1.0227	39	01Jul2015, 12:30	13.4
G10-G11	1.0227	39	01Jul2015, 12:36	13.3
FG23c	0.0122	1.5	01Jul2015, 12:12	0.2
G11	1.0349	40	01Jul2015, 12:36	13.5
FG25	0.1086	22	01Jul2015, 12:18	3.1

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.)
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	2.7	01Jul2015, 12:12	0.4
POND G IN	1.3043	75	01Jul2015, 12:36	20.4
POND G	1.3043	20	01Jul2015, 15:48	13.6
G12	1.3043	20	01Jul2015, 15:48	13.6
G12-G06	1.3043	20	01Jul2015, 15:54	13.4
FG29	0.0997	2.8	01Jul2015, 12:24	0.9
FG32	0.0402	20	01Jul2015, 12:06	1.7
FG32-G06	0.0402	18	01Jul2015, 12:12	1.7
G06	1.4442	22	01Jul2015, 15:54	16.0
FG08A	0.0750	27	01Jul2015, 12:06	2.6
FG08A-G05	0.0750	27	01Jul2015, 12:12	2.6
FG08B	0.0630	20	01Jul2015, 12:12	2.2
FG08B-G05	0.0630	19	01Jul2015, 12:18	2.2
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	0.2280	59	01Jul2015, 12:18	6.9
FG10A	0.0806	20	01Jul2015, 12:12	2.2
FG11	0.0625	19	01Jul2015, 12:18	2.4
FG13	0.0534	3.6	01Jul2015, 12:30	0.8
FG12	0.0328	14	01Jul2015, 12:12	1.4
POND D IN	0.4573	111	01Jul2015, 12:12	13.6
POND D	0.4573	11	01Jul2015, 14:48	8.2
POND D-G17	0.4573	11	01Jul2015, 14:48	8.2
FG15	0.0103	3.9	01Jul2015, 12:12	0.4
FG15-G17A	0.0103	3.9	01Jul2015, 12:12	0.4
G17A	0.4676	11	01Jul2015, 14:42	8.6
FG14	0.1000	20	01Jul2015, 12:24	3.0
G17	0.5676	25	01Jul2015, 12:24	11.6
G17-G18	0.5676	25	01Jul2015, 12:24	11.6
FG16	0.0791	34	01Jul2015, 12:06	3.1
G18	0.6467	50	01Jul2015, 12:12	14.7
G18-POND E	0.6467	50	01Jul2015, 12:12	14.7
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	23	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
FG17c	0.0313	2.9	01Jul2015, 12:12	0.4
FG17b	0.0214	11	01Jul2015, 12:06	0.9
POND E IN	1.0170	126	01Jul2015, 12:12	28.0
POND E	1.0170	14	01Jul2015, 20:36	11.1
H08	1.0170	10	01Jul2015, 20:36	7.8
H09	0.0000	3.8	01Jul2015, 20:36	3.2

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

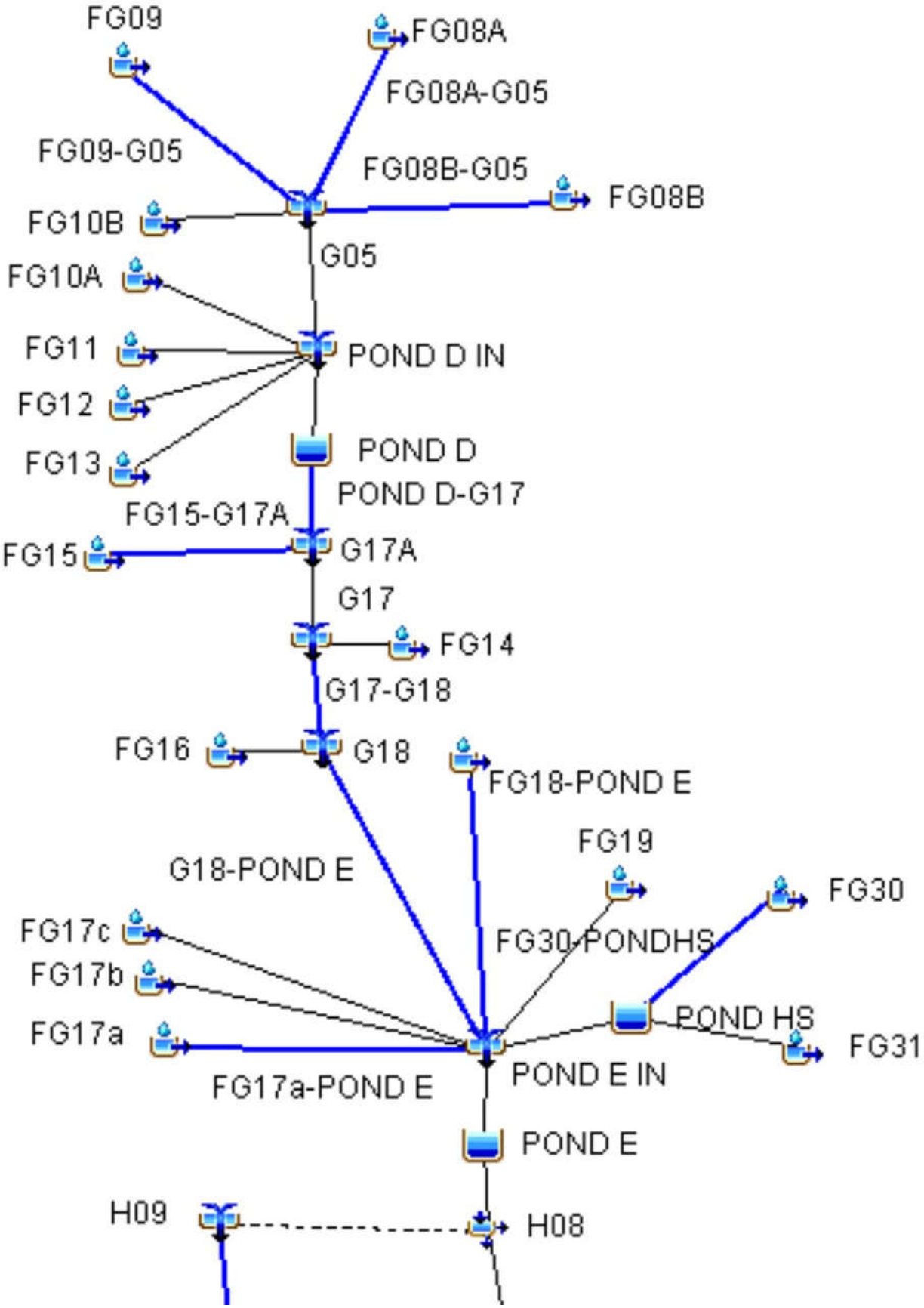
FUTURE MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE QWQCV (CFS)	TIME OF PEAK	TOTAL VOLUME QWQCV (AC. FT.)
OS06	0.1313	0.00	01Jul2015, 00:00	0.0
G1a	0.1313	0.00	01Jul2015, 00:00	0.0
G1a-G2	0.1313	0.00	01Jul2015, 00:00	0.0
OS05	0.0578	0.00	01Jul2015, 00:00	0.0
OS05-G1	0.0578	0.00	01Jul2015, 00:00	0.0
FG01	0.0531	0.04	01Jul2015, 23:54	0.0
FG01-G1	0.0531	0.04	01Jul2015, 23:54	0.0
G1	0.1109	0.04	01Jul2015, 23:54	0.0
G1-G2	0.1109	0.04	02Jul2015, 00:00	0.0
FG02	0.0391	0.02	01Jul2015, 23:48	0.0
G2	0.2813	0.06	01Jul2015, 23:48	0.0
G2-G3	0.2813	0.06	02Jul2015, 00:00	0.0
FG03	0.0203	0.03	01Jul2015, 16:36	0.0
FG04	0.0172	0.02	01Jul2015, 16:30	0.0
G3	0.3188	0.11	01Jul2015, 23:42	0.1
G3-POND F	0.3188	0.11	01Jul2015, 23:48	0.1
FG06	0.0677	0.05	01Jul2015, 23:48	0.0
FG05	0.0580	0.16	01Jul2015, 13:42	0.1
OS07a	0.0170	0.00	01Jul2015, 23:48	0.0
OS07a-POND F	0.0170	0.00	02Jul2015, 00:00	0.0
POND F IN	0.4615	0.26	01Jul2015, 17:54	0.2
POND F	0.4615	0.04	02Jul2015, 00:00	0.0
POND F-G7	0.4615	0.04	02Jul2015, 00:00	0.0
OS07b	0.0156	0.00	01Jul2015, 23:42	0.0
OS07b-G4	0.0156	0.00	02Jul2015, 00:00	0.0
FG21a	0.0095	0.00	01Jul2015, 23:48	0.0
G4	0.0251	0.01	01Jul2015, 23:54	0.0
G4-G7	0.0251	0.00	02Jul2015, 00:00	0.0
FG21b	0.0150	0.12	01Jul2015, 12:24	0.1
G7	0.5016	0.12	01Jul2015, 12:24	0.1
G7-G8	0.5016	0.12	01Jul2015, 12:48	0.1
FG22	0.1397	0.18	01Jul2015, 16:42	0.1
OS08	0.0397	0.03	01Jul2015, 23:42	0.0
OS08-G8	0.0397	0.03	01Jul2015, 23:54	0.0
FG23a	0.0216	0.03	01Jul2015, 14:12	0.0
G8	0.7026	0.30	01Jul2015, 16:42	0.3
G8-G10	0.7026	0.30	01Jul2015, 17:36	0.2
OS09	0.1527	0.09	01Jul2015, 23:54	0.0
OS09-G9	0.1527	0.08	02Jul2015, 00:00	0.0
FG24	0.1369	0.19	01Jul2015, 16:42	0.2
G9	0.2896	0.24	01Jul2015, 23:48	0.2
G9-G10	0.2896	0.24	02Jul2015, 00:00	0.2
FG23b	0.0305	0.03	01Jul2015, 23:42	0.0
G10	1.0227	0.54	02Jul2015, 00:00	0.4
G10-G11	1.0227	0.54	02Jul2015, 00:00	0.4
FG23c	0.0122	0.01	01Jul2015, 17:48	0.0
G11	1.0349	0.55	02Jul2015, 00:00	0.4
FG25	0.1086	1.2	01Jul2015, 12:36	0.4

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

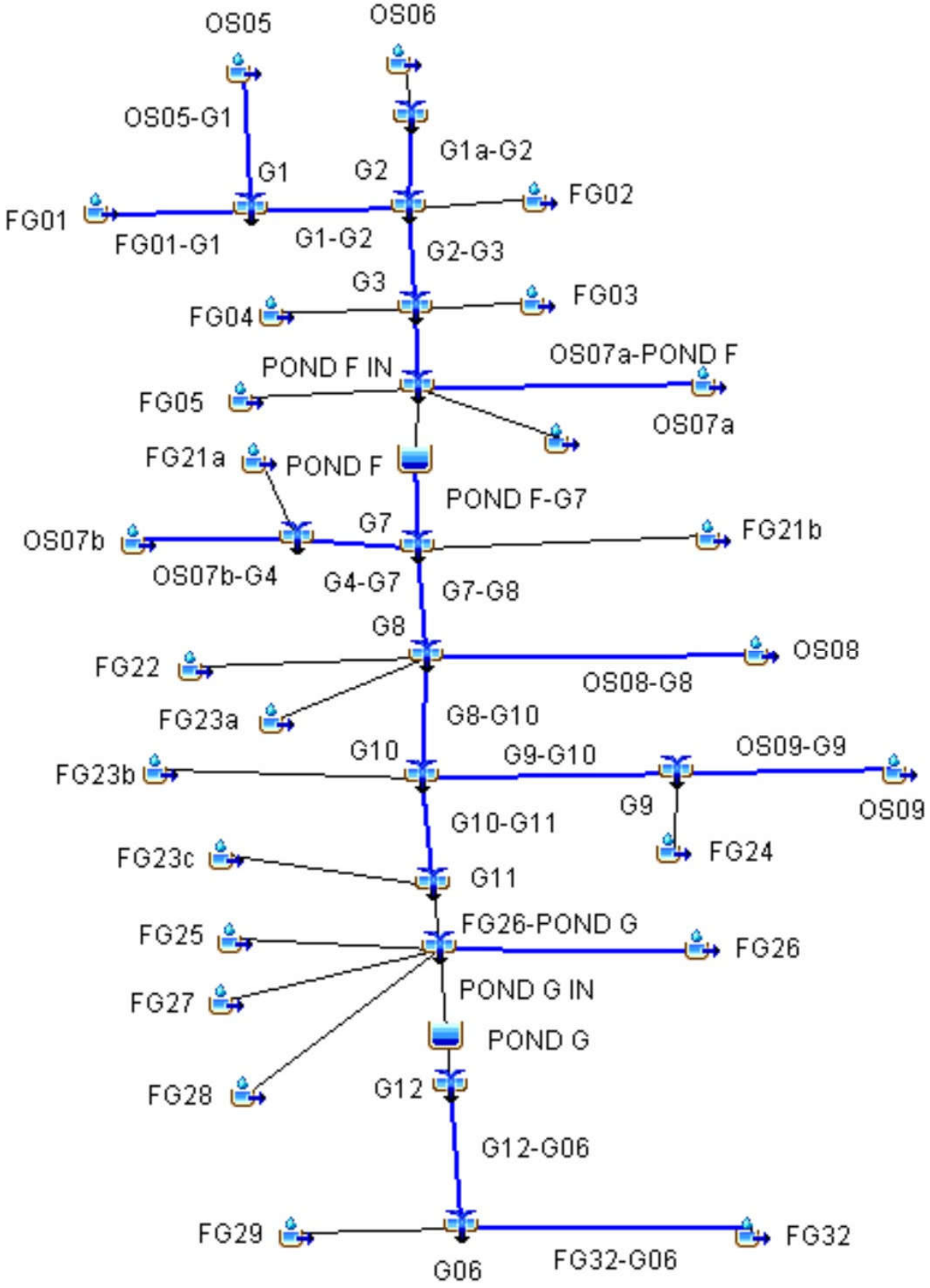
FUTURE MDDP (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE QWQCV (CFS)	TIME OF PEAK	TOTAL VOLUME QWQCV (AC. FT.)
FG26	0.0863	0.31	01Jul2015, 13:18	0.2
FG26-POND G	0.0863	0.31	01Jul2015, 13:24	0.2
FG27	0.0500	0.68	01Jul2015, 12:30	0.2
FG28	0.0245	0.02	01Jul2015, 19:42	0.0
POND G IN	1.3043	2.0	01Jul2015, 12:36	1.3
POND G	1.3043	0.83	02Jul2015, 00:00	0.4
G12	1.3043	0.83	02Jul2015, 00:00	0.4
G12-G06	1.3043	0.81	02Jul2015, 00:00	0.4
FG29	0.0997	0.00	01Jul2015, 00:00	0.0
FG32	0.0402	3.0	01Jul2015, 12:06	0.4
FG32-G06	0.0402	3.0	01Jul2015, 12:12	0.4
G06	1.4442	3.0	01Jul2015, 12:12	0.8
FG08A	0.0750	2.6	01Jul2015, 12:12	0.5
FG08A-G05	0.0750	2.4	01Jul2015, 12:24	0.5
FG08B	0.0630	1.9	01Jul2015, 12:18	0.4
FG08B-G05	0.0630	1.8	01Jul2015, 12:24	0.4
FG09	0.0484	0.25	01Jul2015, 13:00	0.1
FG09-G05	0.0484	0.25	01Jul2015, 13:12	0.1
FG10B	0.0416	0.19	01Jul2015, 13:06	0.1
G05	0.2280	4.36	01Jul2015, 12:24	1.1
FG10A	0.0806	0.72	01Jul2015, 12:24	0.3
FG11	0.0625	2.2	01Jul2015, 12:24	0.5
FG13	0.0534	0.04	01Jul2015, 23:48	0.0
FG12	0.0328	2.1	01Jul2015, 12:12	0.3
POND D IN	0.4573	9.0	01Jul2015, 12:24	2.1
POND D	0.4573	1.1	02Jul2015, 00:00	0.8
POND D-G17	0.4573	1.1	02Jul2015, 00:00	0.8
FG15	0.0103	0.50	01Jul2015, 12:12	0.1
FG15-G17A	0.0103	0.49	01Jul2015, 12:18	0.1
G17A	0.4676	1.1	01Jul2015, 23:54	0.9
FG14	0.1000	1.3	01Jul2015, 12:36	0.4
G17	0.5676	1.8	01Jul2015, 12:36	1.3
G17-G18	0.5676	1.8	01Jul2015, 12:36	1.3
FG16	0.0791	4.5	01Jul2015, 12:12	0.6
G18	0.6467	5.2	01Jul2015, 12:12	2.0
G18-POND E	0.6467	5.1	01Jul2015, 12:18	2.0
FG31	0.0922	4.7	01Jul2015, 12:24	0.9
FG30	0.0389	3.1	01Jul2015, 12:06	0.4
FG30-PONDHS	0.0389	3.0	01Jul2015, 12:24	0.4
POND HS	0.1311	4.6	01Jul2015, 12:42	1.2
FG17a	0.0694	2.0	01Jul2015, 12:12	0.4
FG17a-POND E	0.0694	2.0	01Jul2015, 12:18	0.4
FG18	0.0644	0.6	01Jul2015, 12:54	0.2
FG18-POND E	0.0644	0.6	01Jul2015, 12:54	0.2
FG19	0.0527	3.8	01Jul2015, 12:12	0.5
FG17c	0.0313	0.0	01Jul2015, 23:42	0.0
FG17b	0.0214	1.6	01Jul2015, 12:06	0.2
POND E IN	1.0170	15	01Jul2015, 12:12	4.5
POND E	1.0170	2.2	02Jul2015, 00:00	1.2
H08	1.0170	1.3	02Jul2015, 00:00	0.7
H09	0.0000	0.9	02Jul2015, 00:00	0.5

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

INTERIM CONDITIONS
Ponds D-E



INTERIM CONDITIONS
Ponds F-G



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.=	7057.0
100 year storage vol.=	25.3
100 year discharge=	134
5 year storage elev.=	7053.8
5 year storage vol.=	7.1
5 year discharge=	11
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
50 year storage vol.=	20.0
10 year storage elev.=	7054.6
10 year discharge=	18
10 year storage vol.=	10.7
2 year storage elev.=	7053.1
2 year discharge=	3.7
2 year storage vol.=	4.6

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
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 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.=	41.5
100 year discharge=	231
5 year storage elev.=	6971.2
5 year storage vol.=	16.6
5 year discharge=	13
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.=	35.6
50 year discharge=	141
10 year storage elev.=	6971.8
10 year storage vol.=	21.8
10 year discharge=	26
2 year storage elev.=	6970.3
2 year storage vol.=	8.8
2 year discharge=	5.6

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-INTERIM 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.=	6973.5
100 year storage vol.=	41.5
100 year discharge=	198
5 year storage elev.=	6971.2
5 year storage vol.=	16.6
5 year discharge=	9.1
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	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

50 year storage elev.=	6973.0
50 year discharge=	127
10 year storage elev.=	6971.8
10 year discharge=	20
2 year storage elev.=	6970.3
2 year discharge=	3.4

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.			

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 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.=	6973.5
100 year storage vol.=	41.5
100 year discharge=	33
5 year storage elev.=	6971.2
5 year storage vol.=	16.6
5 year discharge=	3.7
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

50 year storage elev.=	6973.0
50 year discharge=	14
10 year storage elev.=	6971.8
10 year discharge=	5.5
2 year storage elev.=	6970.3
2 year discharge=	2.2

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.			

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 G-FINAL INTERIM DESIGN (G12)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	500
embankment elev =	7034
spillway length =	130
spillway elevation =	7031.5
100 year storage elev.=	7029.7
100 year storage vol.=	21.8
100 year discharge=	383
5 year storage elev.=	7027.2
5 year storage vol.=	7.2
5 year discharge=	14
WQCV storage elev.=	7025.8
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
Rectangular	Orifice 3:	V	2	0.43		Area =	0.860	Elev to cl =		7025.34
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.=	7029.0
50 year storage vol.=	17.8
50 year discharge=	229
10 year storage elev.=	7027.6
10 year storage vol.=	9.4
10 year discharge=	35
2 year storage elev.=	7026.2
2 year storage vol.=	3.1
2 year discharge=	4.2

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	-	-	0.05	-	-	-	-	-	51		0.0	0.05
7025	1.7	39917	0.92	0.5	0.50	-	-	0.17	-	-	-	-	-	111		0.2	0.17
7026	2.7	126469	2.90	1.9	2.41	-	-	0.32	-	3.4	-	-	-	184		3.7	3.7
7026.5	3.2	166675	3.83	3.6	4.06	-	-	0.36	-	4.5	-	-	-	224		4.8	4.8
7027	3.7	206880	4.75	2.1	6.20	-	-	0.40	-	5.3	-	-	-	268		5.7	5.7
7027.5	4.2	232032	5.33	4.6	8.64	-	-	0.43	9.0	6.1	-	9.0	-	304		25	25
7028	4.7	257183	5.90	5.3	11.53	-	-	0.47	25.5	6.8	4.2	25.5	-	337		62	62
7028.5	5.2	264196	6.07	5.7	14.33	-	-	0.50	43.9	7.4	9.7	43.9	27	373		133	133
7029	5.7	271209	6.23	6.1	17.59	-	-	0.52	54.2	7.9	12.7	54.2	92	406		222	222
7029.5	6.2	276106	6.34	11.7	20.30	-	-	0.58	62.9	8.5	15.1	62.9	179	436		329	329
7030	6.7	281003	6.45	9.4	23.72	-	-	0.60	70.5	8.9	17.1	70.5	283	464		450	450
7030.5	7.2	286003	6.57	6.5	26.75	-	-	0.60	77.3	9.4	19.0	77.3	402	491		491	491
7031	7.7	291002	6.68	6.6	30.28	-	-	0.63	83.6	9.9	20.7	83.6	533	516		516	516
7031.5	8.2	296443	6.81	6.7	33.44	-	-	0.65	89.5	10.3	22.2	89.5	677	540		540	540
7032	8.7	301883	6.93	3.4	36.87	137.9	137.9	0.67	95.0	10.7	23.7	95.0	832	563		563	701
7032.5	9.2	309236	7.10	7.0	40.39	390.0	390.0	0.69	100.2	11.1	25.1	100.2	997	586		586	976
7033	9.7	316589	7.27	3.6	44.0	716.5	716.5	0.71	105.1	11.5	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.

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.=	7057.0
100 year storage vol.=	25.3
100 year discharge=	134
5 year storage elev.=	7053.8
5 year storage vol.=	7.1
5 year discharge=	11
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 storage vol.=	20.0
50 year discharge=	90
10 year storage elev.=	7054.6
10 year storage vol.=	10.7
10 year discharge=	18
2 year storage elev.=	7053.1
2 year storage vol.=	4.6
2 year discharge=	3.7

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.=	42.2
100 year discharge=	240
5 year storage elev.=	6971.3
5 year storage vol.=	17.2
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.=	36.2
50 year discharge=	150
10 year storage elev.=	6971.8
10 year storage vol.=	22.4
10 year discharge=	28
2 year storage elev.=	6970.4
2 year storage vol.=	9.5
2 year discharge=	5.8

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.=	42.2
100 year discharge=	204
5 year storage elev.=	6971.3
5 year storage vol.=	17.2
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.=	0.75

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.=	6973.0
50 year discharge=	134
10 year storage elev.=	6971.8
10 year discharge=	22
2 year storage elev.=	6970.4
2 year discharge=	3.5

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.=	42.2
100 year discharge=	36
5 year storage elev.=	6971.3
5 year storage vol.=	17.2
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.=	0.8

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

50 year storage elev.=	6973.0
50 year discharge=	15
10 year storage elev.=	6971.8
10 year discharge=	5.7
2 year storage elev.=	6970.4
2 year discharge=	2.3

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.			

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 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.=	7030.2
100 year storage vol.=	24.8
100 year discharge=	465
5 year storage elev.=	7027.4
5 year storage vol.=	8.0
5 year discharge=	20
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
Rectangular	Orifice 3:	V	2	0.43		Area =	0.860	Elev to cl =		7025.34
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.=	7029.4
50 year storage vol.=	19.8
50 year discharge=	307
10 year storage elev.=	7027.8
10 year storage vol.=	10.7
10 year discharge=	51
2 year storage elev.=	7026.6
2 year storage vol.=	4.6
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	-	-	0.05	-	-	-	-	-	51		0.0	0.05
7025	1.7	39917	0.92	0.5	0.50	-	-	0.17	-	-	-	-	-	111		0.2	0.17
7026	2.7	126469	2.90	1.9	2.41	-	-	0.32	-	3.4	-	-	-	184		3.7	3.7
7026.5	3.2	166675	3.83	3.6	4.06	-	-	0.36	-	4.5	-	-	-	224		4.8	4.8
7027	3.7	206880	4.75	2.1	6.20	-	-	0.40	-	5.3	-	-	-	268		5.7	5.7
7027.5	4.2	232032	5.33	4.6	8.64	-	-	0.43	9.0	6.1	-	9.0	-	304		25	25
7028	4.7	257183	5.90	5.3	11.5	-	-	0.47	25.5	6.8	4.2	25.5	-	337		62	62
7028.5	5.2	264196	6.07	5.7	14.3	-	-	0.50	43.9	7.4	9.7	43.9	27	373		133	133
7029	5.7	271209	6.23	6.1	17.6	-	-	0.52	54.2	7.9	12.7	54.2	92	406		222	222
7029.5	6.2	276106	6.34	11.7	20.3	-	-	0.58	62.9	8.5	15.1	62.9	179	436		329	329
7030	6.7	281003	6.45	9.4	23.7	-	-	0.60	70.5	8.9	17.1	70.5	283	464		450	450
7030.5	7.2	286003	6.57	6.5	26.8	-	-	0.60	77.3	9.4	19.0	77.3	402	491		491	491
7031	7.7	291002	6.68	6.6	30.3	-	-	0.63	83.6	9.9	20.7	83.6	533	516		516	516
7031.5	8.2	296443	6.81	6.7	33.4	-	-	0.65	89.5	10.3	22.2	89.5	677	540		540	540
7032	8.7	301883	6.93	3.4	36.9	137.9	137.9	0.67	95.0	10.7	23.7	95.0	832	563		563	701
7032.5	9.2	309236	7.10	7.0	40.4	390.0	390.0	0.69	100.2	11.1	25.1	100.2	997	586		586	976
7033	9.7	316589	7.27	3.6	44.0	716.5	716.5	0.71	105.1	11.5	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.

ROLLING HILLS RANCH FILING 3 INTERIM CONDITION

Simulation Run: RHR3-100 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	531(CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	134 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:00
Total Inflow:	57.1 (AC-FT)	Peak Storage:	25.3 (AC-FT)
Total Outflow:	46.3 (AC-FT)	Peak Elevation:	7057.0 (FT)

Simulation Run: RHR3-005 YR Reservoir: POND D

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	111 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	11 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 14:36
Total Inflow:	13.6 (AC-FT)	Peak Storage:	7.1 (AC-FT)
Total Outflow:	8.2 (AC-FT)	Peak Elevation:	7053.8 (FT)

Simulation Run: RHR3-100 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	556 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	231 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:30
Total Inflow:	119.4 (AC-FT)	Peak Storage:	41.5 (AC-FT)
Total Outflow:	94.6 (AC-FT)	Peak Elevation:	6973.5 (FT)

Simulation Run: RHR3-005 YR Reservoir: POND E

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	122 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	13 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 20:00
Total Inflow:	26.7 (AC-FT)	Peak Storage:	16.6 (AC-FT)
Total Outflow:	10.1 (AC-FT)	Peak Elevation:	6971.2 (FT)

Simulation Run: RHR3-100 YR Reservoir: POND G

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	05Feb2020 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, 12:36
Peak Outflow:	383 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:06
Total Inflow:	102.5 (AC-FT)	Peak Storage:	21.8 (AC-FT)
Total Outflow:	93.2 (AC-FT)	Peak Elevation:	7029.7 (FT)

Simulation Run: RHR3-005 YR Reservoir: POND G

Start of Run:	01Jul2015, 00:00	Basin Model:	RHRF3
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 005YR
Compute Time:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	45 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:48
Peak Outflow:	14 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 18:18
Total Inflow:	15.9 (AC-FT)	Peak Storage:	7.2 (AC-FT)
Total Outflow:	9.3 (AC-FT)	Peak Elevation:	7027.2 (FT)

ROLLING HILLS RANCH FILING 3 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:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	531(CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:12
Peak Outflow:	134 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:00
Total Inflow:	57.1 (AC-FT)	Peak Storage:	25.3 (AC-FT)
Total Outflow:	46.3 (AC-FT)	Peak Elevation:	7057.0 (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:	05Feb2020 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	111 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	11 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 14:36
Total Inflow:	13.6 (AC-FT)	Peak Storage:	7.1 (AC-FT)
Total Outflow:	8.2 (AC-FT)	Peak Elevation:	7053.8 (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:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	618 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	240 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:30
Total Inflow:	122.5 (AC-FT)	Peak Storage:	42.2 (AC-FT)
Total Outflow:	97.7 (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:	05Feb2020 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:	14 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 20:00
Total Inflow:	28.0 (AC-FT)	Peak Storage:	17.2 (AC-FT)
Total Outflow:	11.1 (AC-FT)	Peak Elevation:	6971.3 (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:	05Feb2020 13:11:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	653 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:06
Peak Outflow:	465 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:32
Total Inflow:	119.1 (AC-FT)	Peak Storage:	24.8 (AC-FT)
Total Outflow:	109.6 (AC-FT)	Peak Elevation:	7030.2 (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:	05Feb2020 13:26:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	75 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:30
Peak Outflow:	20 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 15:24
Total Inflow:	20.4 (AC-FT)	Peak Storage:	8.0 (AC-FT)
Total Outflow:	13.6 (AC-FT)	Peak Elevation:	7027.4 (FT)

Appendix D – Regional Stormwater Quality Analysis

Several Regional Detention Facilities are located within the Meridian Ranch, all the detention facilities have Water Quality Capture Volume incorporated into the design and construction. The facilities are owned and maintained by the Meridian Service Metropolitan District under the jurisdiction and authority of El Paso County. The design and construction of the facilities meet the minimum standards of the County as outlined in the Drainage Criteria Manual and Engineering Criteria Manual. The WQCV found in each of the detention facilities was designed to provide water quality for 100 percent of the tributary area for the facility. Regional Facilities are designed and are intended as flood control and water quality as the primary use.

Below is the governing section from the ECM regarding the use of regional detention facilities with a WQCV component for reference:

Appendix I Stormwater Quality Policy and Procedures-revisions
I.7.1.C.5.

Applicable Development Site Draining to a Regional WQCV Facility The regional WQCV facility is designed to accept drainage from the Applicable development site. Stormwater from the site may discharge to a water of the state before being discharged to the regional WQCV facility. Before discharging to a water of the state, at least 20 percent of the upstream imperviousness of the applicable development site must be disconnected from the storm drainage system and drain through a receiving pervious area control measure comprising a footprint of at least 10 percent of the upstream disconnected impervious area of the applicable development site. The control measure must be designed in accordance with a design manual identified by the permittee. In addition,
The stream channel between the discharge point of the applicable development site and the regional WQCV facility must be stabilized. The regional WQCV facility must meet the following requirements:

a. The regional WQCV facility must be implemented, functional, and maintained following good engineering, hydrologic and pollution control practices.
b. The regional WQCV facility must be designed and maintained for 100% WQCV for its entire drainage area.
c. The regional WQCV facility must have capacity to accommodate the drainage from the applicable development site.
d. The regional WQCV facility must be designed and built to comply with all assumptions for the development activities planned by the County within its drainage area, including the imperviousness of its drainage area and the applicable development site.
e. Evaluation of the minimum drain time shall be based on the pollutant removal mechanism and functionality of the facility. Consideration of drain time shall include maintaining vegetation necessary for operation of the facility (e.g., wetland vegetation).
f. The County shall require site plans and perform a site plan review consistent with the requirements of this ECM to ensure the regional WQCV facility and control measures for the applicable development site plans include:
    i. Design details for all structural control measures implemented to meet the requirements of Part I.E.4.
    ii. A narrative reference for all non-structural control measures for the site, if applicable. "Non-structural control measures” are control measures that are not

structural control measures and include, but are not limited to, control measures that preventor reduce pollutants being introduced to water or that prevent or reduce the generation of runoff or illicit discharges.

iii. Documentation of operation and maintenance procedures to ensure the long-term observation, maintenance, and operation of the control measures. The documentation shall include frequencies for routine inspections and maintenance activities.

iv. Documentation regarding easements or other legal means for access of the control measure sites for operation, maintenance, and inspection of control measures.

v. Confirmation that control measures meet the requirements of section I.7.C.

vi. Confirmation that site plans meet the requirements of County's Site plan review and approval requirements.

g. The regional WQCV facility must be subject to the County's authority consistent with requirements and actions for a Control Measure in accordance with a base design standard.

h. Regional Facilities must be designed and implemented with flood control or water quality as the primary use. Recreational ponds and reservoirs may not be considered Regional Facilities. Water bodies listed by name in surface water quality classifications and standards regulations (5CCR1002-32 through 5CCR1002-38) may not be considered regional facilities.

See the exhibits on the following pages for impacted areas, calculations and more information.

The following exhibits show the typical lot types, general drainage areas and calculations for each area. Two locations will have individual water quality facilities when the sites/lots are developed. Three locations drain the rear yards and open spaces where there would be little to no impervious areas. The final two areas include the lots where the runoff will enter directly into a storm drain facility prior to reaching Pond G and receive water quality treatment.

The lots are all 0.5 acres or larger and will qualify for the exemption.

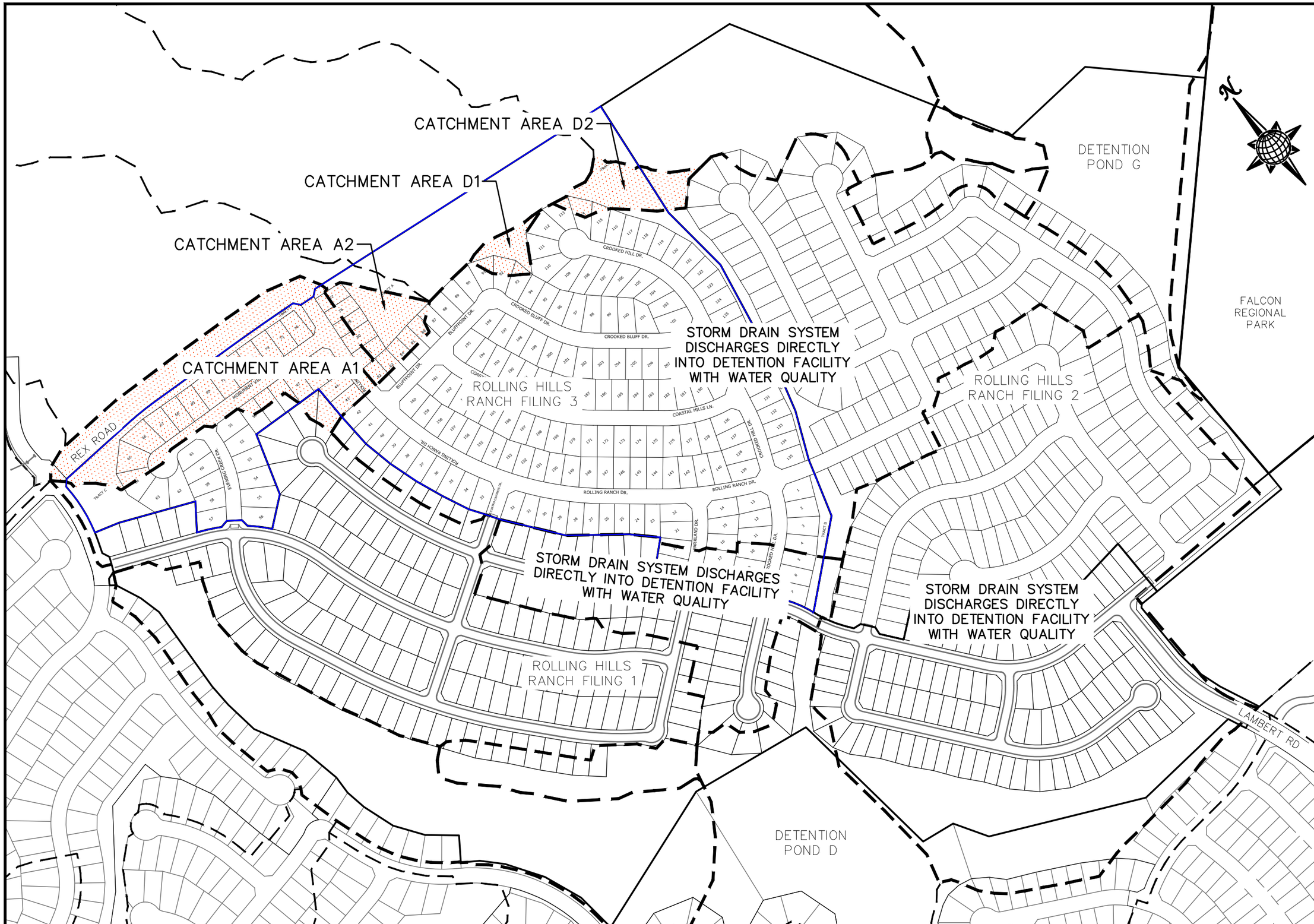
Areas A, B1, & B2 consist of open space and rear yard drainage tributary to storm drain systems. Any pervious areas would be relatively small compared to the large areas and would qualify for the exemption. Anticipated pervious areas could include a shed, RV garage, or sports court.

Two locations include areas where Meridian Service Metropolitan District build improvements. These improvements would likely require specialized water quality features, such as oil/water separators. These facilities would be necessary at the time of development of these areas.

The area draining overland easterly away from the development adjacent to Estate Ridge Drive will drain overland to a temporary sedimentation pond then into the arroyo. This area has tributary areas with little to no imperviousness. It is anticipated this area will qualify for the exemption upon development of the lands to the east.

Area B3 includes the main portion of the developed lots with surface drainage collected by the installed storm drain system. This area consists of 64.6 acres in total with an impervious factor of 24.1% based on the Rational Drainage Calculations. The total impervious area is estimated at 15.6 acres. Assuming the homes in the area will have footprint of 2,500 sf on average the total roof top area will be 4.1 acres or 26.3% of the total imperviousness of the area. The roof tops will discharge onto the surface from downspouts and surface drain overland to the streets and into the storm drain system. The estimated receiving pervious surface area is estimated to be approximately 6.3 acres of land or 153% of the total roof top area. The receiving pervious area consists of side yard and rear yard areas as the surface drainage is directed to the front yards onto the streets.

Area C includes the rear yards of lots along the south side of Crescent Creek Drive. These lots will surface discharge to the adjacent rip-rap lined channel then be conveyed to Pond G. The lots will have no direct impervious area and any indirect pervious area will discharge across the rear yards of the lots into the channel.



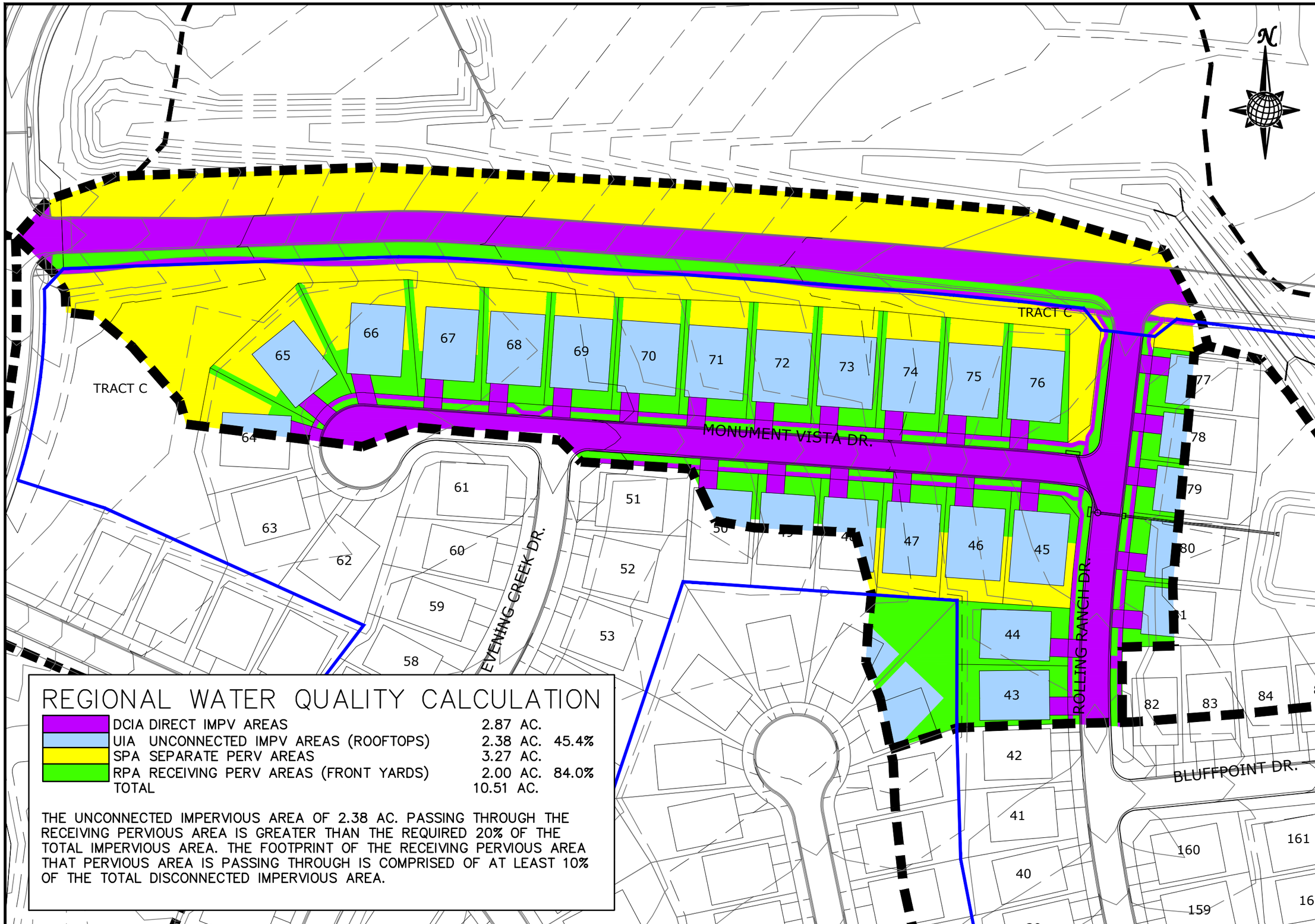
TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.3349

REGIONAL WATER QUALITY

OVERALL MAP

ROLLING HILLS RANCH PUD

Drawn by	TAK
Checked by	-
Date	AUG 2020
Scale	N.T.S.
Sheet Number	1



REGIONAL WATER QUALITY CALCULATION

	DCIA DIRECT IMPV AREAS	2.87 AC.	
	UIA UNCONNECTED IMPV AREAS (ROOFTOPS)	2.38 AC.	45.4%
	SPA SEPARATE PERV AREAS	3.27 AC.	
	RPA RECEIVING PERV AREAS (FRONT YARDS)	2.00 AC.	84.0%
	TOTAL	10.51 AC.	

THE UNCONNECTED IMPERVIOUS AREA OF 2.38 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA.

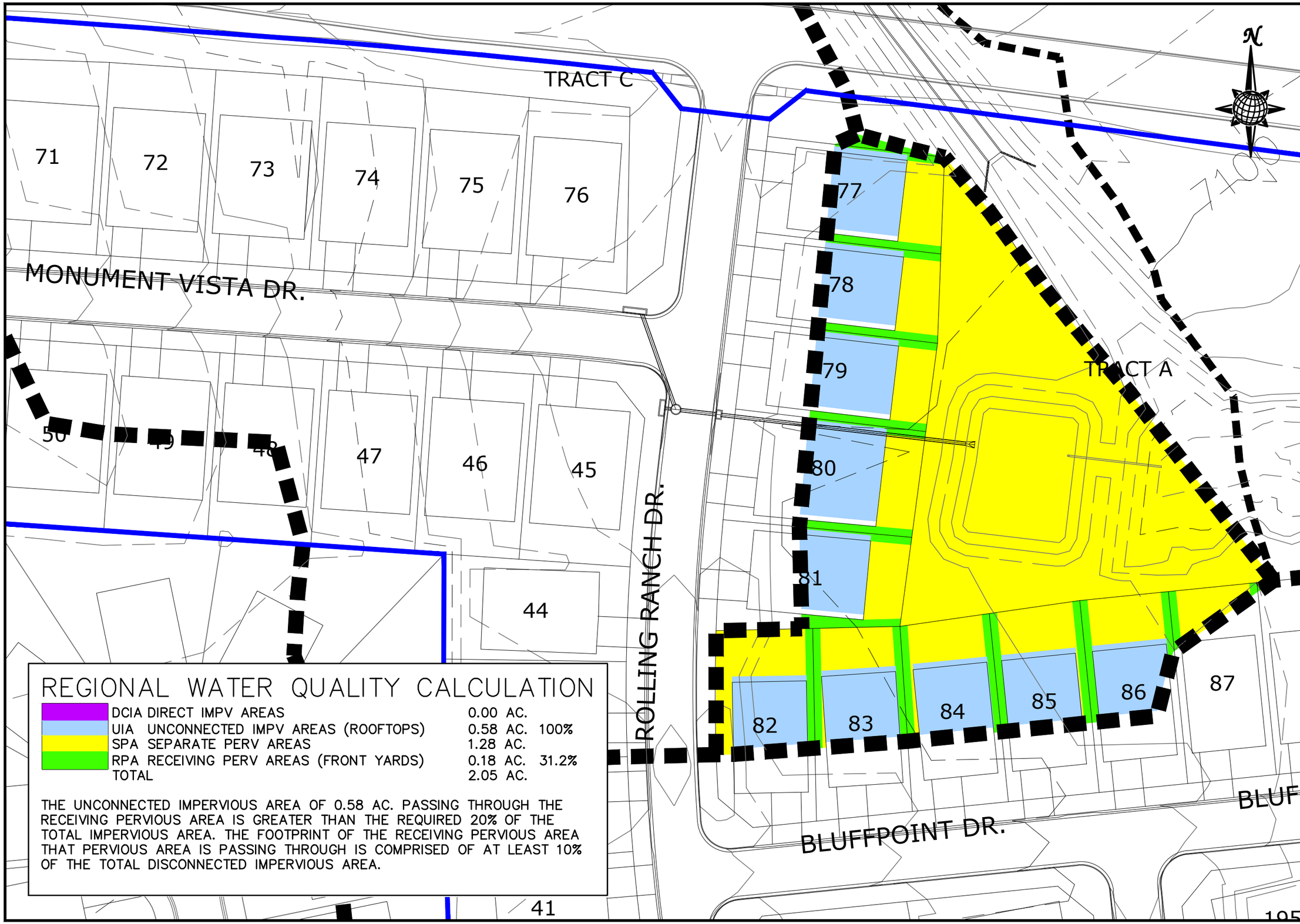
TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.3349

REGIONAL WATER QUALITY

CATCHMENT AREA A1

ROLLING HILLS RANCH PUD

Drawn by	TAK
Checked by	-
Date	FEB 2020
Scale	N.T.S.
Sheet Number	2



REGIONAL WATER QUALITY CALCULATION

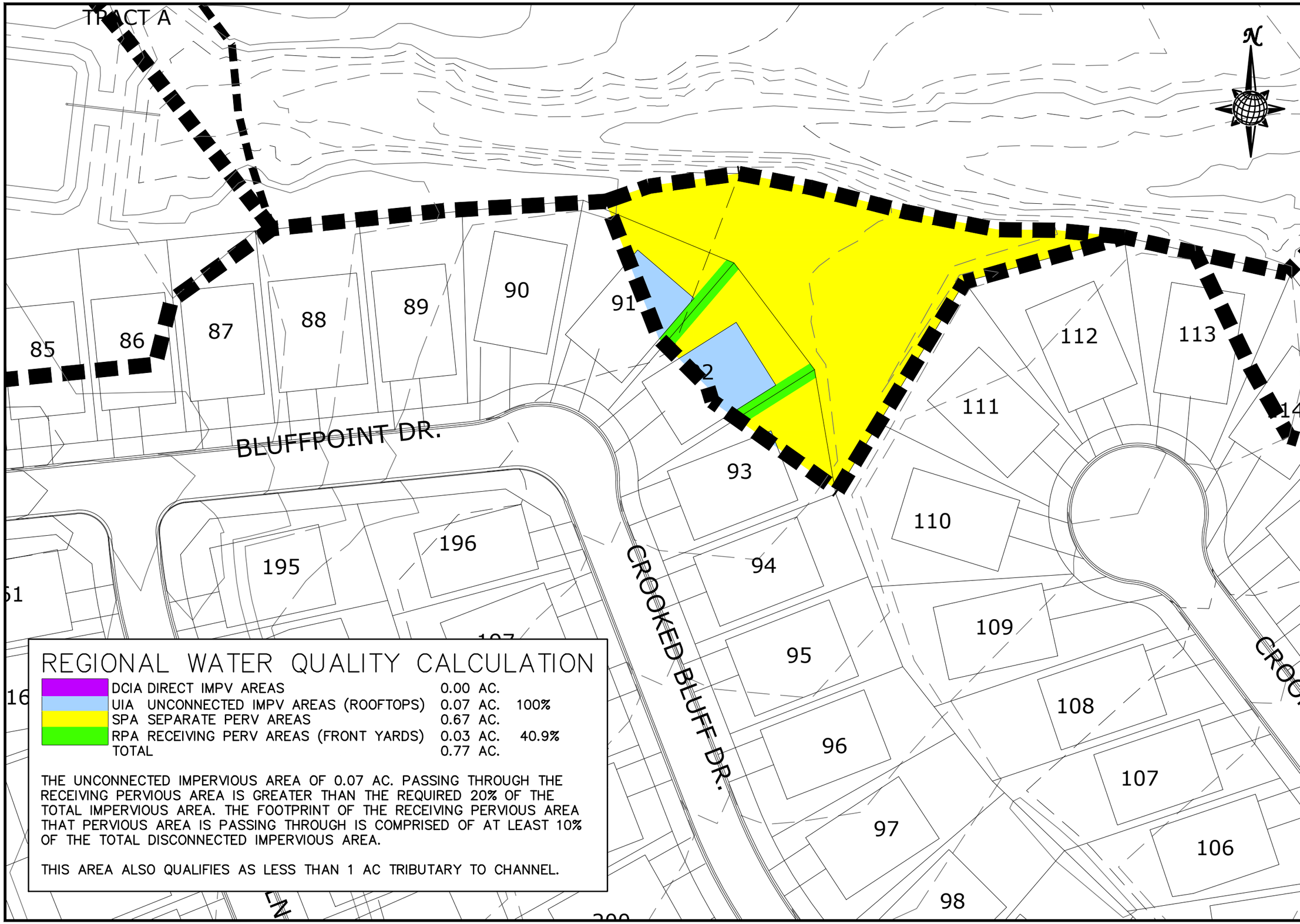
	DCIA DIRECT IMPV AREAS	0.00 AC.	
	UIA UNCONNECTED IMPV AREAS (ROOFTOPS)	0.58 AC.	100%
	SPA SEPARATE PERV AREAS	1.28 AC.	
	RPA RECEIVING PERV AREAS (FRONT YARDS)	0.18 AC.	31.2%
	TOTAL	2.05 AC.	

THE UNCONNECTED IMPERVIOUS AREA OF 0.58 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA.

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

REGIONAL WATER QUALITY
CATCHMENT AREA A2
ROLLING HILLS RANCH PUD

Drawn by TAK	Checked by -
Date FEB 2020	
Scale N.T.S.	Sheet Number 3



REGIONAL WATER QUALITY CALCULATION

	DCIA DIRECT IMPV AREAS	0.00 AC.	
	UIA UNCONNECTED IMPV AREAS (ROOFTOPS)	0.07 AC.	100%
	SPA SEPARATE PERV AREAS	0.67 AC.	
	RPA RECEIVING PERV AREAS (FRONT YARDS)	0.03 AC.	40.9%
	TOTAL	0.77 AC.	

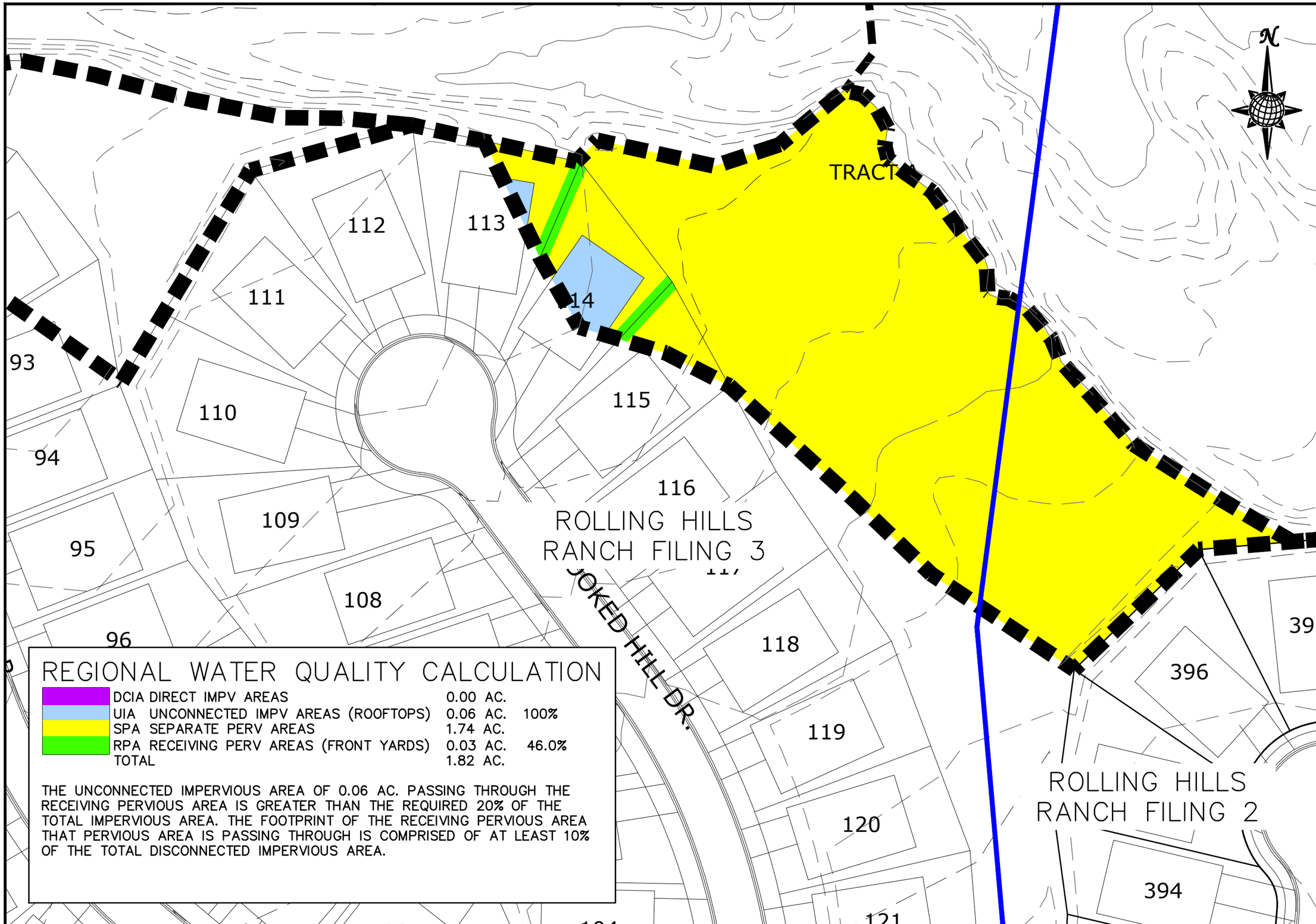
THE UNCONNECTED IMPERVIOUS AREA OF 0.07 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA.

THIS AREA ALSO QUALIFIES AS LESS THAN 1 AC TRIBUTARY TO CHANNEL.

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

REGIONAL WATER QUALITY
CATCHMENT AREA D1
ROLLING HILLS RANCH PUD

Drawn by TAK	Checked by -	Date FEB 2020
Scale N.T.S.	Sheet Number 6	



REGIONAL WATER QUALITY CALCULATION

	DCIA DIRECT IMPV AREAS	0.00 AC.	
	UIA UNCONNECTED IMPV AREAS (ROOFTOPS)	0.06 AC.	100%
	SPA SEPARATE PERV AREAS	1.74 AC.	
	RPA RECEIVING PERV AREAS (FRONT YARDS)	0.03 AC.	46.0%
	TOTAL	1.82 AC.	

THE UNCONNECTED IMPERVIOUS AREA OF 0.06 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA.

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

REGIONAL WATER QUALITY
CATCHMENT AREA D2
ROLLING HILLS RANCH

Drawn by TAK	Checked by -	Date AUG 2020
Scale N.T.S.	Sheet Number 2	

Appendix E – Soil Resource Report

United States Department of Agriculture

NRCS

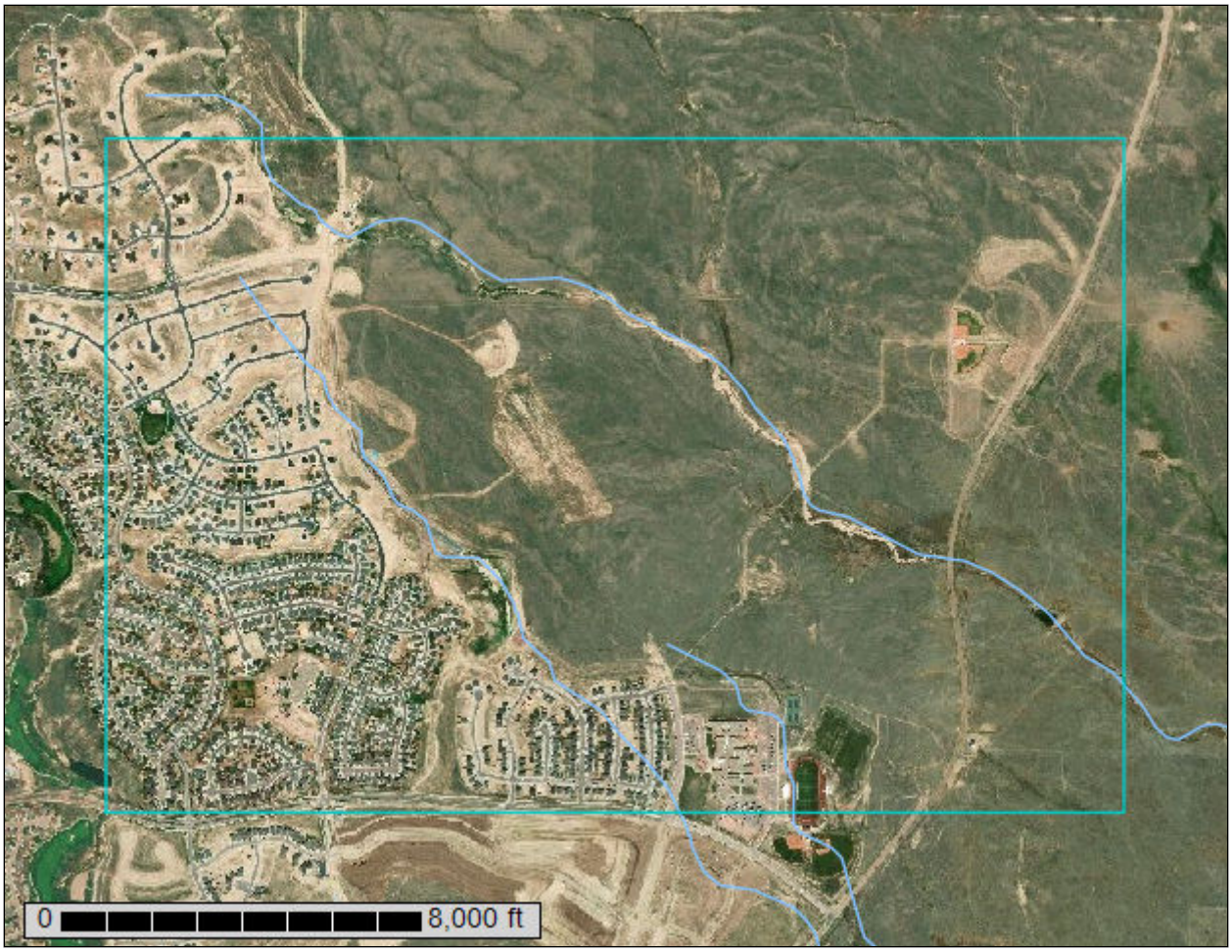
Natural Resources Conservation Service

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

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

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

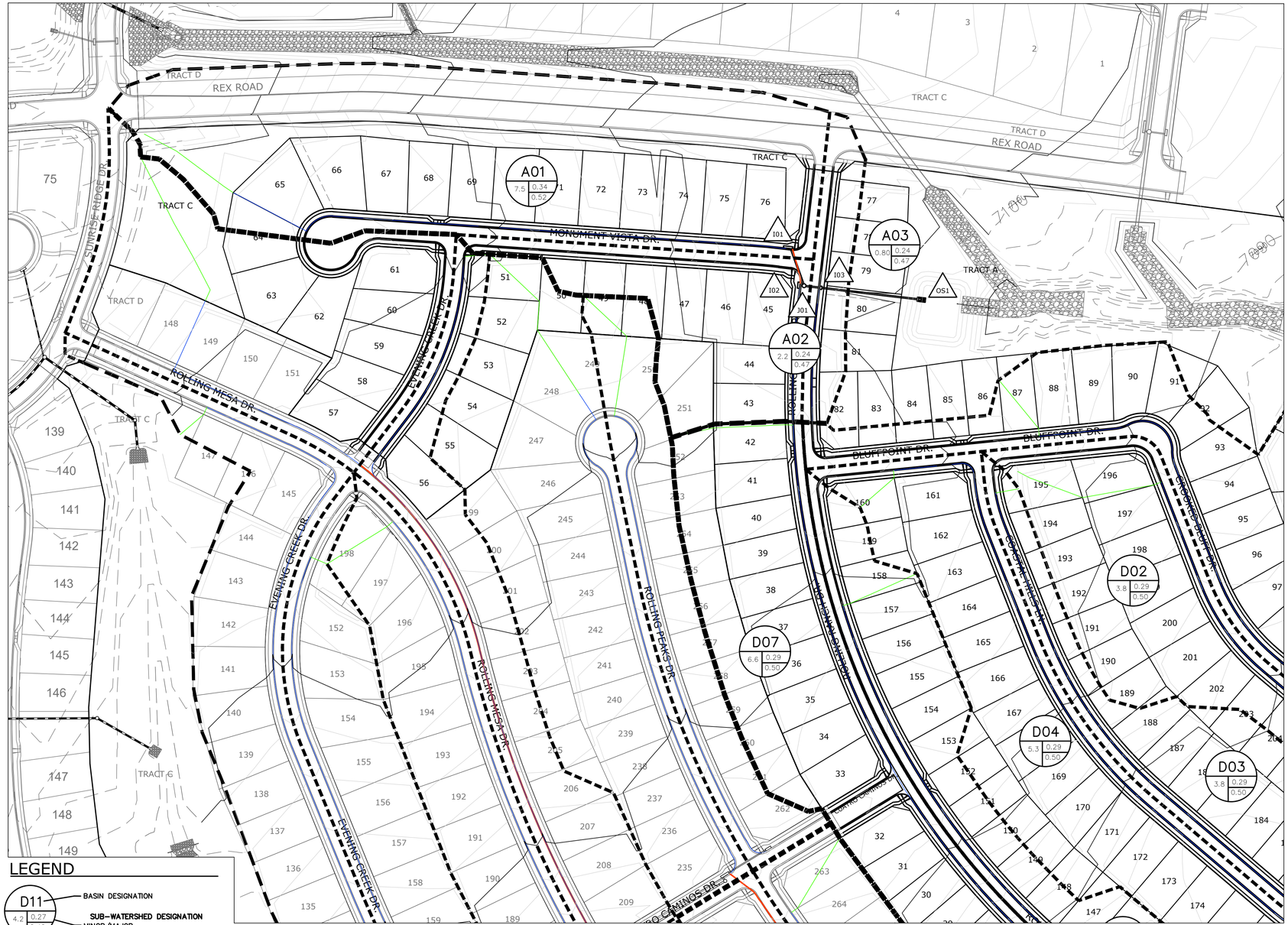
United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

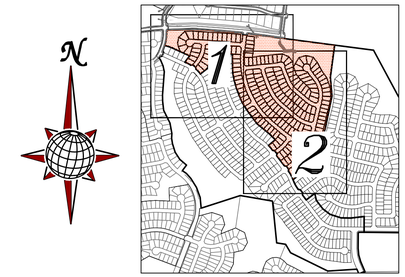
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix F – Drainage Maps





INDEX MAP
N.T.S.

DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I01	A01	7.52	8.6	22	PR 15 ' FORCED SUMP	8.6	14	PR 24 " RCP
I02	A02	2.20	2.0	14	PR 10 ' SUMP	2.0	14	PR 18 " RCP
J01						11	28	PR 24 " RCP
I03	A03	0.79	1.0	3.1	PR 5 ' SUMP	11	30	PR 24 " RCP
I13	C01	3.15	3.1	9.0	EX 10 ' FORCED SUMP	3.1	9.0	EX 18 " RCP
I14	C02	3.54	3.4	10	EX 15 ' FORCED SUMP	3.4	10	EX 18 " RCP
J11						6.0	18	EX 24 " RCP
I15	C03	1.33	1.4	4.0	EX 5 ' FORCED SUMP	1.4	4.0	EX 18 " RCP
I16	C04	3.10	3.2	9.4	EX 5 ' FORCED SUMP	3.2	6.3	EX 18 " RCP
J12						9.5	26	EX 30 " RCP
I17	C05	0.58	0.6	1.8	EX 5 ' SUMP	0.6	1.8	EX 18 " RCP
I18	C06	1.03	1.0	6.0	EX 5 ' SUMP	1.0	6.0	EX 18 " RCP
J13						11	32	EX 36 " RCP
CB1	C07	0.88	0.9	2.5	EX Type C	0.9	2.5	EX 18 " RCP
J14						11	34	EX 36 " RCP
I19	D01	6.87	6.8	19	PR 15 ' FORCED SUMP	6.8	14	PR 18 " RCP
J15						6.8	14	PR 24 " RCP
DP2	D02	3.83	3.8	16				
I20	D03	3.84	7.3	21	PR 20 ' FORCED SUMP	7.3	17	PR 18 " RCP
J16						14	30	PR 30 " RCP
DP3	D04	5.30	5.0	17				
I21	D05	2.00	6.9	24	PR 15 ' FORCED SUMP	6.9	14	PR 18 " RCP
J17						20	41	PR 30 " RCP
I22	D06	3.20	3.2	9.0	PR 15 ' FLOW-BY	2.6	6.2	PR 18 " RCP
I23	D07	6.59	6.1	17	PR 10 ' FORCED SUMP	6.1	9.9	PR 18 " RCP
J18						9.1	17	PR 24 " RCP
I24	D08	1.64	1.8	11	PR 10 ' FORCED SUMP	1.8	9.9	PR 18 " RCP
J19						29	66	PR 42 " RCP
CB2	D09	1.63	1.2	3.4	EX Type C	1.2	3.4	EX 18 " RCP
I25	D10	0.81	0.9	2.9	EX 10 ' SUMP	2.1	6.4	EX 18 " RCP
ES1	D11	4.16	2.4	6.9	EX 18 " FES	2.4	6.9	EX 18 " RCP
I26	D12	2.67	2.4	16	EX 20 ' SUMP	4.3	19	EX 24 " RCP
J20						29	71	EX 42 " RCP

LEGEND

- D11 — BASIN DESIGNATION
- 4.2 | 0.27 / 0.46 — SUB-WATERSHED DESIGNATION; MINOR/MAJOR STORM COEFFICIENT; BASIN AREA IN ACRES
- DP2 — 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)

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

FIGURE 4

No.	Revisions	Date	Init.	Appr.	Date
1					
2					
3					
4					

TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.2457

MERIDIAN RANCH

ROLLING HILLS RANCH FILING 2
AT MERIDIAN RANCH
RATIONAL MAPS

Drawn by CJT
Checked by TAK
Date MAR 2020
Scale AS SHOWN
SHEET 1

PCD PROJECT NO. EGP-XX-XXX

LEGEND

- D11 — BASIN DESIGNATION
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DP2	D02	3.83	3.8	16				
I20	D03	3.84	7.3	21	PR 20 ' FORCED SUMP	7.3	17	PR 18 " RCP
J16						14	30	PR 30 " RCP
DP3	D04	5.30	5.0	17				
I21	D05	2.00	6.9	24	PR 15 ' FORCED SUMP	6.9	14	PR 18 " RCP
J17						20	41	PR 30 " RCP
I22	D06	3.20	3.2	9.0	PR 15 ' FLOW-BY	2.6	6.2	PR 18 " RCP
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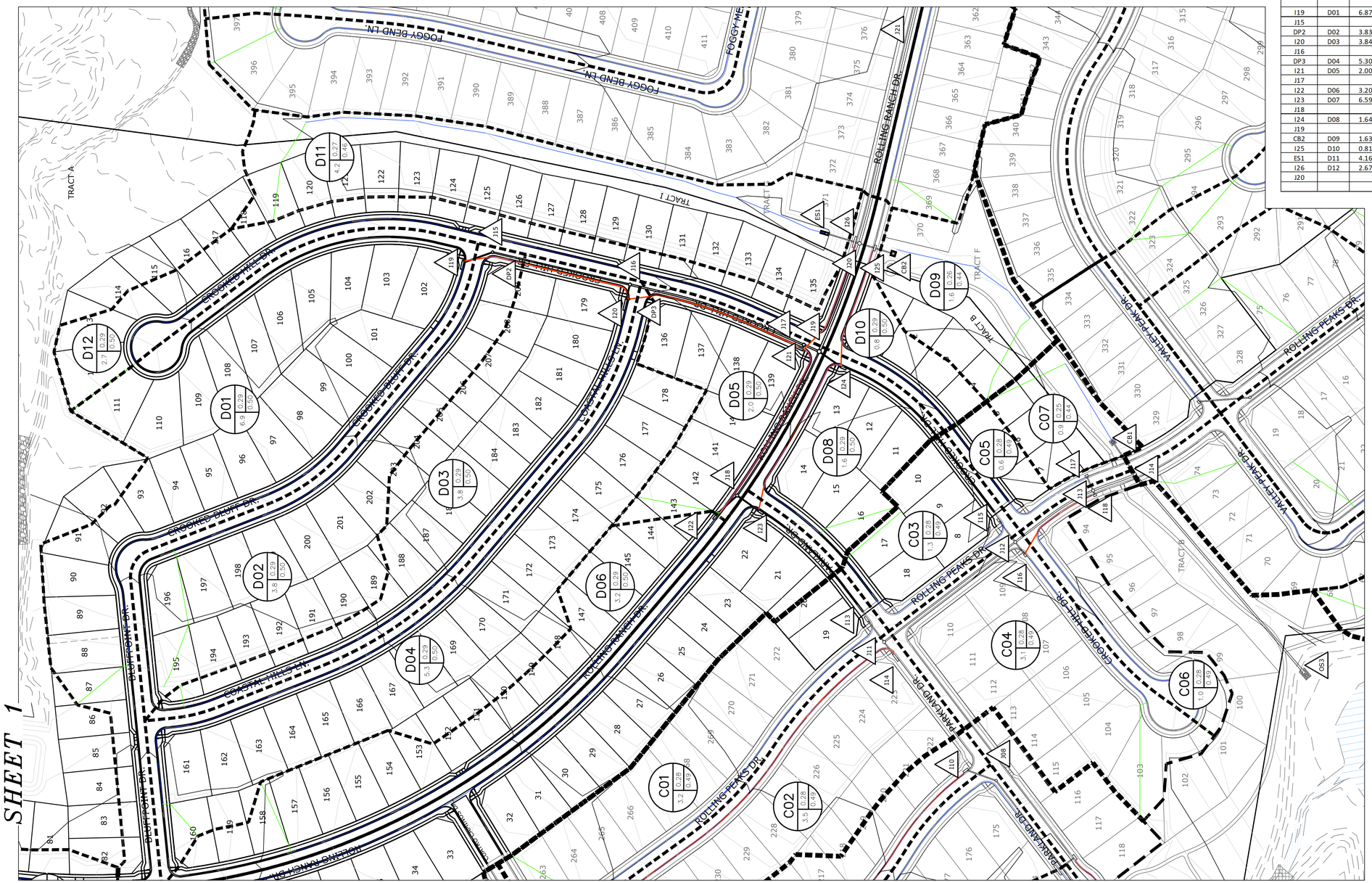
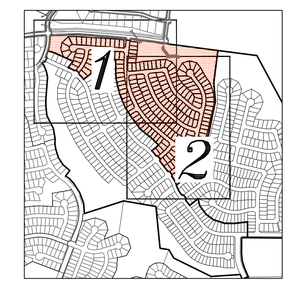


SHEET 1



INDEX MAP

N.T.S.

SHEET 1

FIGURE 4

No.	Revisions	Date	Init.	Appr.	Date
1		-			
2		-			
3		-			
4		-			

TECH CONTRACTORS
11886 STAPLETON DRIVE
FALCON, CO 80831
TELEPHONE: 719.495.7444
FAX: 719.495.2457

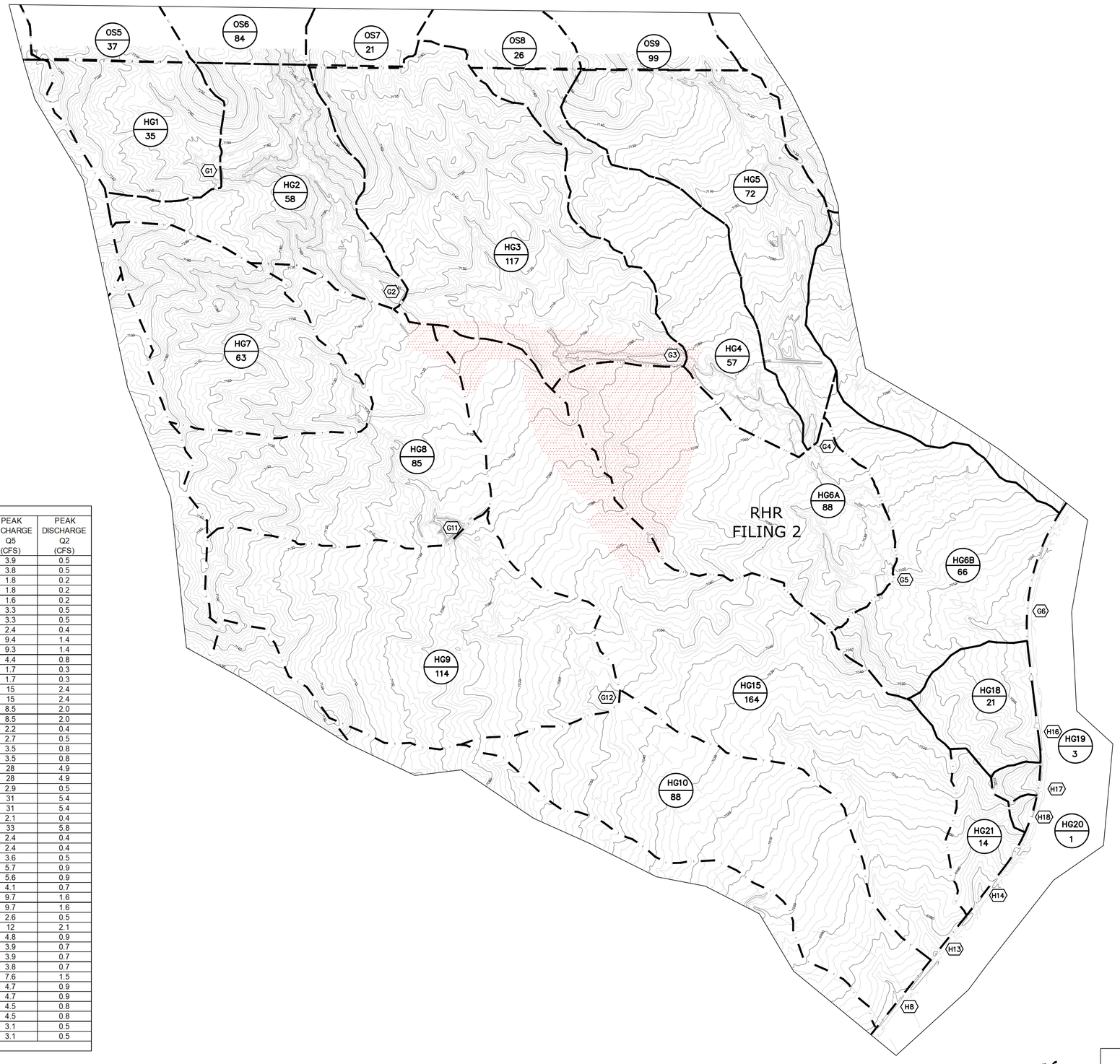
MERIDIAN RANCH

ROLLING HILLS RANCH FLING 2
AT MERIDIAN RANCH
RATIONAL MAPS

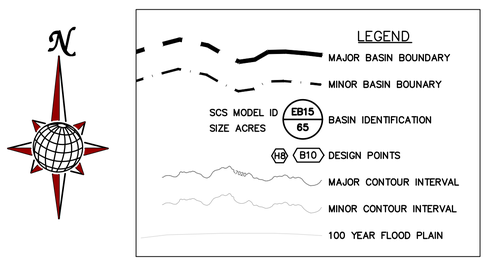
Drawn by CJT
Checked by TAK
Scale AS SHOWN
Date MAR 2023
SHEET 2

PCD PROJECT NO. EGP-XX-XXX

ROLLING HILL RANCH FILING 3
MERIDIAN RANCH



HISTORIC MDDP (Full Spectrum)						
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	81	53	12	3.9	0.5
OS06-G02	0.1313	79	52	12	3.8	0.5
OS05	0.0578	40	26	5.9	1.8	0.2
OS05-G01	0.0578	38	26	5.7	1.8	0.2
HG01	0.0547	33	21	4.8	1.6	0.2
G01	0.1125	71	47	10	3.3	0.5
G01-G02	0.1125	70	47	10	3.3	0.5
HG02	0.0906	46	30	6.9	2.4	0.4
G02	0.3344	194	129	28	9.4	1.4
G02-G03	0.3344	192	127	28	9.3	1.4
HG03	0.1828	79	51	12	4.4	0.8
OS07	0.0328	25	17	4.6	1.7	0.3
OS07-G03	0.0328	24	17	4.4	1.7	0.3
G03	0.5500	295	195	44	15	2.4
G03-G04	0.5500	286	192	43	15	2.4
OS09	0.1547	92	64	19	8.5	2.0
OS09-G04	0.1547	91	63	19	8.5	2.0
HG04	0.0891	40	27	6.1	2.2	0.4
HG05	0.1125	50	33	7.6	2.7	0.5
OS08	0.0406	36	25	7.9	3.5	0.8
OS08-G04	0.0406	34	24	7.6	3.5	0.8
G04	0.9469	502	336	78	28	4.9
G04-G05	0.9469	496	322	78	28	4.9
HG06A	0.1375	50	33	7.8	2.9	0.5
G05	1.0844	544	355	86	31	5.4
G05-G06	1.0844	530	353	86	31	5.4
HG06B	0.1031	34	22	5.4	2.1	0.4
G06	1.1875	561	375	91	33	5.8
HG07	0.0984	47	31	7.1	2.4	0.4
HG07-G11	0.0984	47	31	7.0	2.4	0.4
HG08	0.1328	73	48	11	3.6	0.5
G11	0.2312	115	75	17	5.7	0.9
G11-G12	0.2312	114	75	17	5.6	0.9
HG09	0.1781	73	48	11	4.1	0.7
G12	0.4093	187	122	28	9.7	1.6
G12-H08	0.4093	183	121	28	9.7	1.6
HG10	0.1375	39	26	6.5	2.6	0.5
H08	0.5468	216	142	34	12	2.1
HG14	0.2297	81	53	13	4.8	0.9
HG13	0.0844	55	37	9.8	3.9	0.7
G07	0.0844	55	37	9.8	3.9	0.7
G07-G08	0.0844	54	37	9.7	3.8	0.7
G08	0.3141	119	78	20	7.6	1.5
HG15	0.2563	70	46	12	4.7	0.9
H13	0.2563	70	46	12	4.7	0.9
HG11	0.2047	77	51	12	4.5	0.8
H09	0.2047	77	51	12	4.5	0.8
HG12	0.1297	57	38	8.7	3.1	0.5
H10	0.1297	57	38	8.7	3.1	0.5



HISTORICAL CONDITIONS - SCS MAP

GRAPHIC SCALE

100 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

EXHIBIT 5

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ROLLING HILL RANCH FILING 3
MERIDIAN RANCH

INTERIM MDDP (Full Spectrum)						
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	12	3.8	0.0
G1a	0.1313	80	52	12	3.8	0.0
G1a-G2	0.1313	79	52	11	3.6	0.0
OS05	0.0578	39	26	5.6	1.8	0.0
OS05-G1	0.0578	39	25	5.5	1.7	0.0
FG01	0.0531	31	22	6.9	3.3	0.0
FG01-G1	0.0531	31	22	6.9	3.3	0.0
G1	0.1109	61	41	11	4.8	0.0
G1-G2	0.1109	60	41	11	4.8	0.0
FG02	0.0391	32	22	6.2	2.6	0.0
G2	0.2813	166	112	27	10	0.1
G2-G3	0.2813	163	108	27	10	0.1
FG03	0.0203	24	17	5.9	3.0	0.0
FG04	0.0172	22	16	5.8	3.1	0.0
G3	0.3188	184	123	31	12	0.1
G3-POND F	0.3188	183	121	31	12	0.1
FG06	0.0677	51	36	11	5.3	0.1
OS07a-POND F	0.0170	13	9.1	2.3	0.9	0.0
POND F IN	0.4615	291	198	54	23	0.3
POND F	0.4615	178	121	16	8.1	0.0
POND F-G7	0.4615	177	121	16	8.1	0.0
OS07b	0.0156	15	10	2.6	1.0	0.0
OS07b-G4	0.0156	14	10	2.5	0.9	0.0
FG21a	0.0095	6.1	4.2	1.1	0.4	0.0
G4	0.0251	20	14	3.6	1.4	0.0
OS08-G8	0.0397	34	23	7.3	3.4	0.0
FG23a	0.0216	21	15	5.4	2.8	0.0
G8	0.7026	262	171	46	24	0.3
G8-G10	0.7026	261	170	46	23	0.3
OS09	0.1527	90	62	18	8.2	0.1
OS09-G9	0.1527	88	62	18	8.1	0.1
FG24	0.1394	63	42	9.9	3.7	0.0
G9	0.2921	150	102	28	12	0.1
G9-G10	0.2921	149	101	28	12	0.1
FG23b	0.0359	21	14	3.3	1.2	0.0
G10	1.0306	414	262	65	29	0.4
G10-G11	1.0306	413	258	65	29	0.4
FG23c	0.0081	6.5	4.6	1.5	0.7	0.0
G11	1.0387	416	259	66	29	0.4
FG25	0.1086	112	85	36	22	1.2
FG28	0.0681	38	26	6.8	2.7	0.0
POND G IN	1.2154	509	327	96	45	1.2
POND G	1.2154	383	229	35	14	0.3
G12	1.2154	383	229	35	14	0.3
G12-G06	1.2154	383	229	35	14	0.2
FG29	0.0997	60	39	8.7	2.8	0.0
FG32	0.0402	29	19	4.2	1.3	0.0
FG32-G06	0.0402	28	19	4.1	1.3	0.0
G06	1.3553	403	241	37	15	0.2
FG10A	0.0806	103	77	32	20	0.7
FG08A	0.0750	116	90	41	27	2.6
FG08A-G05	0.0750	110	86	41	27	2.4
FG08B	0.0630	86	67	31	20	1.9
FG08B-G05	0.0630	84	65	29	19	1.8
FG11	0.0625	75	59	28	19	2.2
FG09	0.0484	48	36	14	8.3	0.3
FG09-G05	0.0484	48	36	14	8.0	0.3
FG10B	0.0416	42	31	12	7.0	0.2
G05	0.3711	455	347	153	95	7.3
FG13	0.0534	34	24	7.5	3.6	0.0
FG12	0.0328	50	40	20	14	2.1
POND D IN	0.4573	531	405	177	111	9.0
POND D	0.4573	134	90	18	11	1.1
POND D-G17	0.4573	133	90	18	11	1.1
FG15	0.0103	15	12	5.8	3.9	0.5
FG15-G17A	0.0103	15	12	5.8	3.9	0.5
G17A	0.4676	136	92	18	11	1.1
FG14	0.1000	98	74	32	20	1.3
G17	0.5676	201	134	42	25	1.8
G17-G18	0.5676	199	134	42	25	1.8
FG16	0.0791	133	104	50	34	4.5
G18-POND E	0.6467	247	177	77	50	5.1
FG31	0.0922	116	92	45	31	4.7
FG30	0.0389	30	20	4.3	1.3	0.0
FG30-PONDHS	0.0389	28	19	4.2	1.2	0.0
POND HS	0.1311	112	63	28	19	3.6
FG17a	0.0694	101	78	35	23	2.0
FG17a-POND E	0.0694	99	76	35	23	2.0
FG18	0.0644	56	42	18	11	0.6
FG18-POND E	0.0644	56	42	17	11	0.6
FG19	0.0527	84	66	33	23	3.8
FG17c	0.0313	31	22	6.5	2.9	0.0
FG17b	0.0214	39	31	16	11	1.6
POND E IN	1.0170	556	424	190	122	15
POND E	1.0170	231	141	26	13	2.0
H08	1.0170	198	127	20	9.1	1.2
H09	0.0000	33	14	5.5	3.7	0.8

INTERIM CONDITIONS - SCS MAP

GRAPHIC SCALE

100 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

EXHIBIT 6

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ROLLING HILLS RANCH FILING 3
MERIDIAN RANCH

FUTURE MDDP (Full Spectrum)						
	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS06	0.1313	80	52	12	3.8	0.0
G1a	0.1313	80	52	12	3.8	0.0
G1a-G2	0.1313	79	52	11	3.6	0.0
OS05	0.0578	39	26	5.6	1.8	0.0
OS05-G1	0.0578	39	25	5.5	1.7	0.0
FG01	0.0531	31	22	6.9	3.3	0.0
FG01-G1	0.0531	31	22	6.9	3.3	0.0
G1	0.1109	61	41	11	4.8	0.0
G1-G2	0.1109	60	41	11	4.8	0.0
FG02	0.0391	32	22	6.2	2.6	0.0
G2	0.2813	166	112	27	10	0.1
G2-G3	0.2813	163	108	27	10	0.1
FG03	0.0203	24	17	5.9	3.0	0.0
FG04	0.0172	22	16	5.8	3.1	0.0
G3	0.3188	184	123	31	12	0.1
G3-POND F	0.3188	183	121	31	12	0.1
FG06	0.0677	51	36	11	5.3	0.1
FG05	0.0580	45	33	12	6.7	0.2
OS07a	0.0170	14	9.2	2.5	0.9	0.0
OS07a-POND F	0.0170	13	9.1	2.3	0.9	0.0
POND F IN	0.4615	291	198	54	23	0.3
POND F	0.4615	178	121	16	8.1	0.0
POND F-G7	0.4615	177	121	16	8.1	0.0
OS07b-G4	0.0156	14	10	2.5	0.9	0.0
FG21a	0.0095	6.1	4.2	1.1	0.4	0.0
G4	0.0251	20	14	4	1.4	0.0
G4-G7	0.0251	20	13	3.5	1.3	0.0
FG21b	0.0150	21	15	6.4	3.8	0.1
G7	0.5016	190	129	18	8.8	0.1
G7-G8	0.5016	189	128	18	8.8	0.1
FG22	0.1397	119	85	29	15	0.2
OS08	0.0397	35	24	7.5	3.4	0.0
OS08-G8	0.0397	34	23	7.3	3.4	0.0
FG23a	0.0216	21	15	5.2	2.7	0.0
G8	0.7026	271	175	48	25	0.3
G8-G10	0.7026	271	174	47	24	0.3
OS09	0.1527	90	62	18	8.2	0.1
OS09-G9	0.1527	88	62	18	8.2	0.1
FG24	0.1369	101	72	25	13	0.2
G9	0.2896	179	126	38	17	0.2
G9-G10	0.2896	179	125	37	17	0.2
FG23b	0.0305	27	19	6.1	2.8	0.0
G10	1.0227	450	281	81	39	0.5
G10-G11	1.0227	450	279	80	39	0.5
FG23c	0.0122	12	8.7	3.0	1.5	0.0
G11	1.0349	453	281	82	40	0.6
FG25	0.1086	112	85	36	22	1.2
FG26	0.0863	78	58	22	12	0.3
FG26-POND G	0.0863	77	57	22	12	0.3
FG27	0.0500	52	40	17	11	0.7
FG28	0.0245	24	17	5.5	2.7	0.0
POND G IN	1.3043	653	451	149	75	2.0
POND G	1.3043	465	307	51	20	0.8
G12	1.3043	465	307	51	20	0.8
G12-G06	1.3043	464	306	51	20	0.8
FG29	0.0997	60	39	8.7	2.8	0.0
FG32	0.0402	72	57	29	20	3.0
FG32-G06	0.0402	69	54	27	18	3.0
G06	1.4442	493	324	55	22	3.0
FG08A	0.0750	116	90	41	27	2.6
FG08A-G05	0.0750	110	86	41	27	2.4
FG08B	0.0630	86	67	31	20	1.9
FG08B-G05	0.0630	84	65	29	19	1.8
FG09	0.0484	48	36	14	8.3	0.3
FG09-G05	0.0484	48	36	14	8.0	0.3
FG10B	0.0416	42	31	12	7.0	0.2
G05	0.2280	282	215	94	59	4.4
FG10A	0.0806	103	77	32	20	0.7
FG11	0.0625	75	59	28	19	2.2
FG13	0.0534	34	24	7.5	3.6	0.0
FG12	0.0328	50	40	20	14	2.1
POND D IN	0.4573	531	405	177	111	9.0
POND D	0.4573	134	90	18	11	1.1
POND D-G17	0.4573	133	90	18	11	1.1
FG15	0.0103	15	12	5.8	3.9	0.5
FG15-G17A	0.0103	15	12	5.8	3.9	0.5
G17A	0.4676	136	92	18	11	1.1
FG14	0.1000	98	74	32	20	1.3
G17	0.5676	201	134	42	25	1.8
G17-G18	0.5676	199	134	42	25	1.8
FG16	0.0791	133	104	50	34	4.5
G18	0.6467	247	179	78	50	5.2
G18-POND E	0.6467	247	177	77	50	5.1
FG31	0.0922	116	92	45	31	4.7
FG30	0.0389	73	57	29	20	3.1
FG30-PONDHS	0.0389	70	56	27	18	3.0
POND HS	0.1311	153	106	36	26	4.6
FG17a	0.0694	101	78	35	23	2.0
FG17a-POND E	0.0694	99	76	35	23	2.0
FG18	0.0644	56	42	18	11	0.6
FG18-POND E	0.0644	56	42	17	11	0.6
FG19	0.0527	84	66	33	23	3.8
FG17c	0.0313	31	22	6.5	2.9	0.0
FG17b	0.0214	39	31	16	11	1.6
POND E IN	1.0170	618	433	197	126	15
POND E	1.0170	240	149	28	14	2.2
H08	1.0170	204	134	22	10	1.3
H09	0.0000	36	15	5.7	3.8	0.9

GRAPHIC SCALE

100 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

FUTURE CONDITIONS - SCS MAP

(FULL BUILDOUT)

EXHIBIT 7