EPC STORMWATER REVIEW COMMENTS IN ORANGE BOXES WITH BLACK TEXT

Preliminary Drainage Report

for

Rolling Hills Ranch North

at

Meridian Ranch

EL PASO COUNTY, COLORADO

September 2023

Prepared For:

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

Prepared By:
Tech Contractors
11910 Tourmaline Drive, Suite 130
Falcon, CO 80831
719.495.7444

PCD Project No. PUDSP 235

CERTIFICATIONS

Design Engineer's Statement:

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

Thomas A. Kerby, P.E. #31429

Owner/Developer's Statement:

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

_______________________________________ _______________

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

El Paso County:

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

_______________________________________ _______________

Joshua Palmer, P.E. Date
County Engineer / ECM Administrator

Rolling Hills Ranch North PUD
Preliminary Drainage Report

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EXECUTIVE SUMMARY

The purpose of the following Preliminary Drainage Report (PDR) is to present the changes to the drainage patterns as a result the Rolling Hills Ranch North Preliminary Plan (RHRN). 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) as amended by the El Paso County Engineering Criteria Manual (ECM).

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 August 24, 2021. 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, 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"*

RHRN encompasses 149± 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 North 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.

Define the interim conditions, is the completion of Rolling Hills Ranch North only interim or is it future. Please remove interim or clearly define what that condition would be.

Removed references to the interim condition.

INTRODUCTION

Purpose

The purpose of the following Preliminary Drainage Report/Final Drainage Report (PDR) is to present proposed changes to the drainage patterns as a result of the development of RHRN. 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 as amended by the El Paso County Engineering Criteria Manual (ECM).

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 eighty 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.

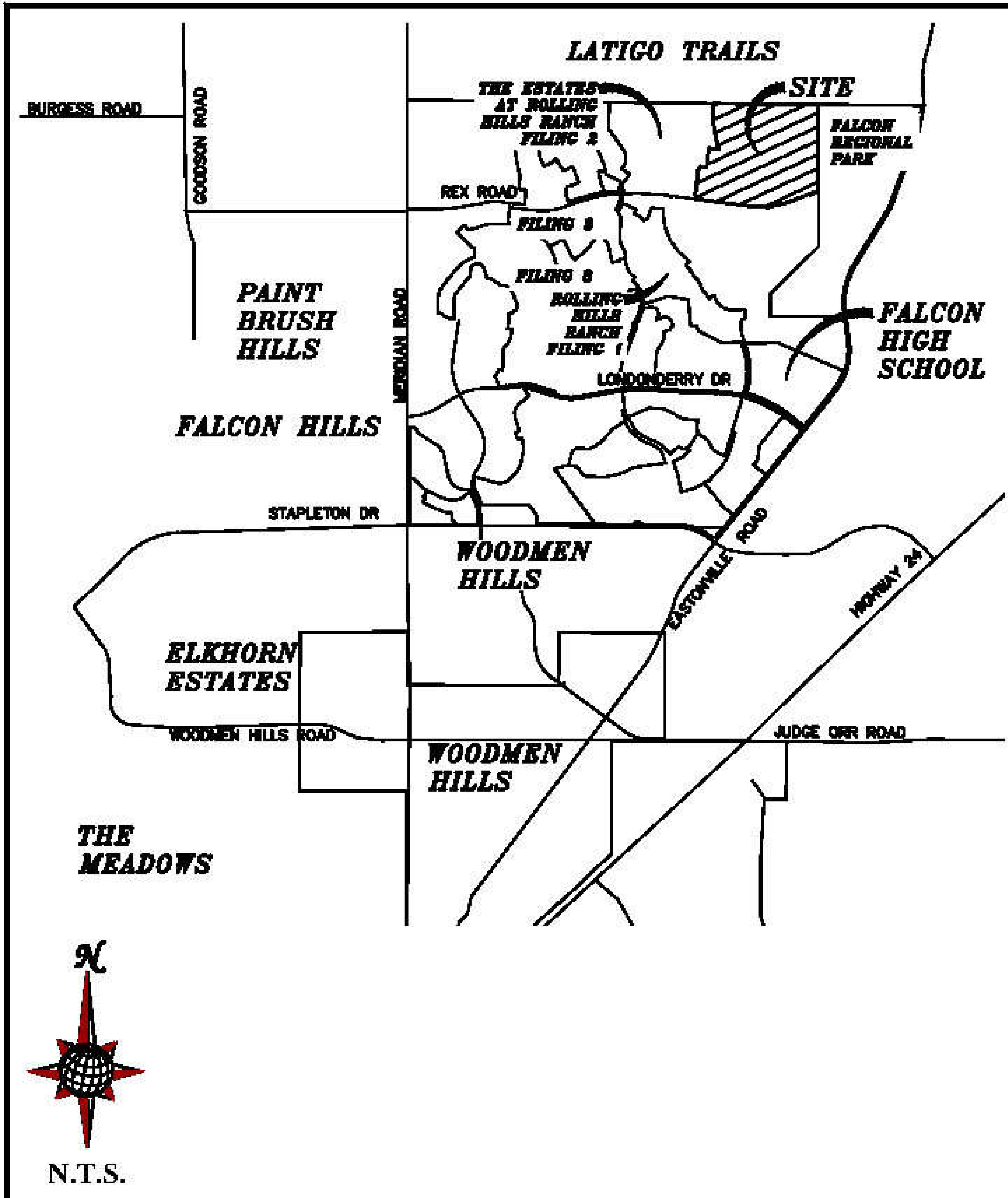
The Sketch Plan Amendment (SKP-17-001) was processed and approved in 2018 by the El Paso County Board of County Commissioners by resolution 18-104 for Meridian Ranch. The resolution eliminated the required restriction of 80% of historic peak flow rates mentioned above. The detention pond proposed with 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 sports fields, trails, dog park 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 replaced with the Eastonville Road construction proposed by El Paso County.

and Sanctuary Filing 1

Revised

Figure 1: Vicinity Map



ROLLING HILLS RANCH NORTH PUD VICINITY MAP	TECH CONTRACTORS 11886 STAPLETON DR FALCON, CO 80831 TELEPHONE: 719.495.7444
FIGURE 1	

Current calculations show the current design discharge of the existing Pond G to the Falcon Regional Park to be below historic flow rates at full build out for the full spectrum of design storms.

EXISTING CONDITIONS

General Location

Rolling Hills Ranch North PUD project encompasses 149± 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.

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 and west are completed subdivisions within the Meridian Ranch development, and east are located the future developments of 4 Way Ranch and Grandview Reserve. There are no existing utilities found on the project site.

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 (approximately 60% vegetative cover) 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. There are no trees or brush located on the project site.

The Flood Insurance Rate Maps (FIRM No. 08041C0552G dated 12/07/2018) indicates that the project is outside of any designated flood plain. Please see Figure 2: Rolling Hills Ranch North PUD 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 Stapleton series. This series is categorized as a Hydrological Soil Group B.

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.

Figure 2: FEMA Floodplain Map

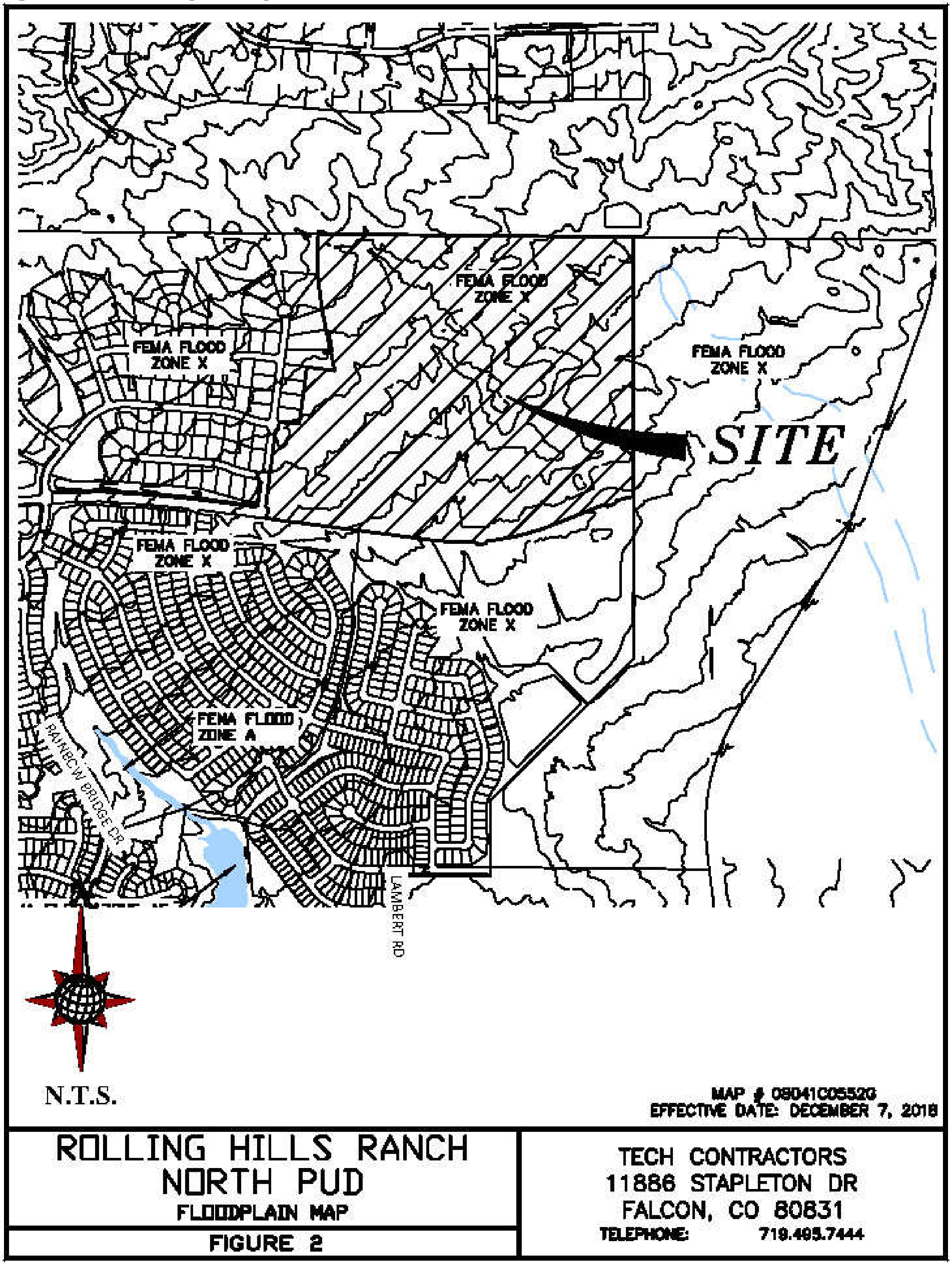
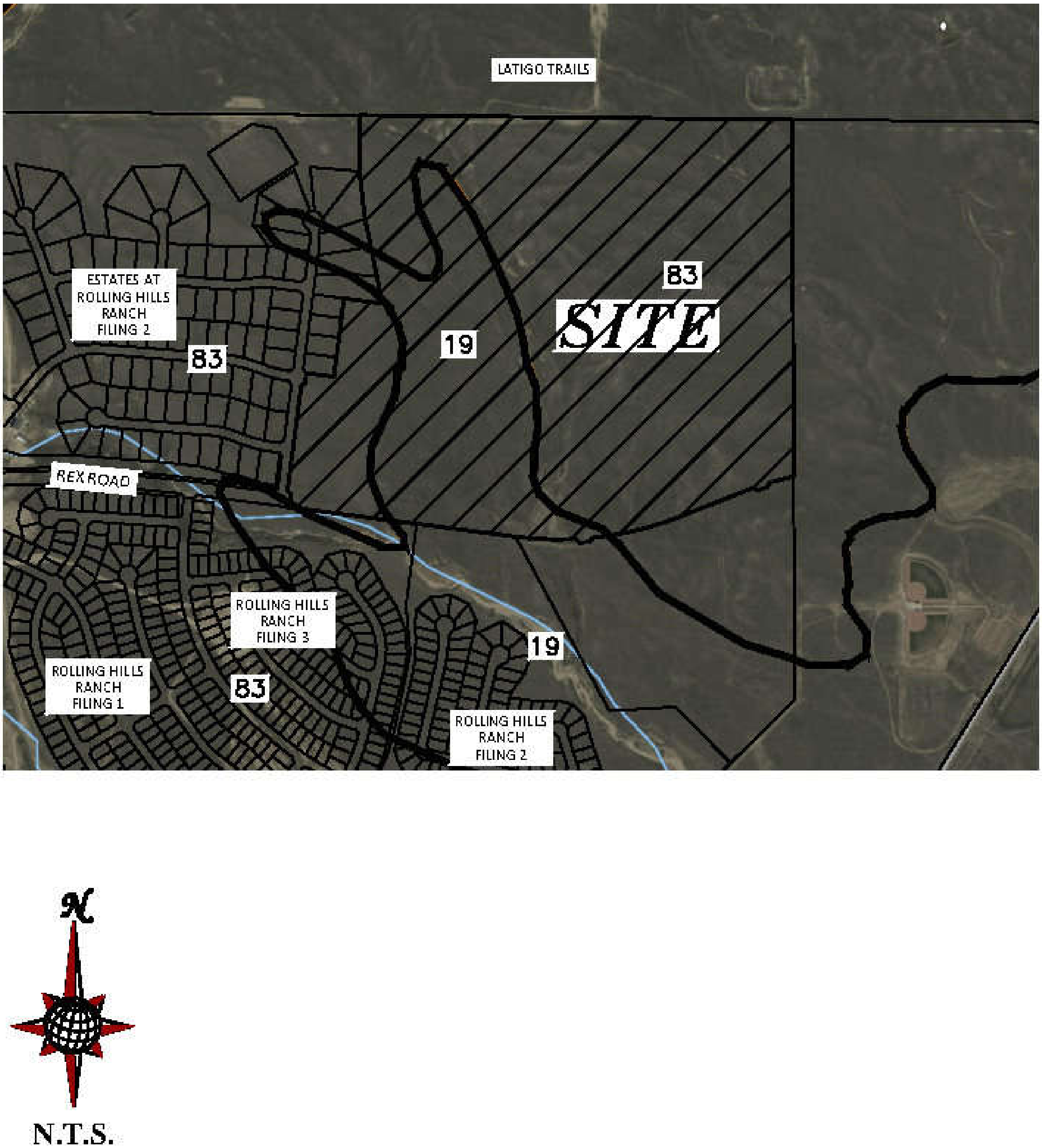


Figure 3: Soils Map



ROLLING HILLS RANCH NORTH PUD

SOILS MAP

FIGURE 3

TECH CONTRACTORS
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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.

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

This soil is used mainly for grazing livestock, for wildlife habitat and for home sites. The main limitation of this soil for urban development is a hazard of flooding in some areas.
Note: (#) indicates Soil Conservation Survey soil classification number. See Figure 3 Rolling Hills Ranch North PUD – 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 the adjacent Latigo Trails development.

Two 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 analyzes the build out conditions for the entirety of the project to ensure the storm drain and future detention facilities located at the discharge point downstream of this project are able to properly attenuate the full spectrum of developed peak flow rates to historic peak flow rates as the storm water exits the Meridian Ranch project onto the adjacent Falcon Regional Park.

The interim scenario was not analyzed as this project completes the development within Meridian Ranch.

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. The SCS hydrology calculations can be found in Appendix A.

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 one-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. The existing design of Pond G and the outlet control structure will meet or exceed the intent and spirit of the concept.

Removed references to the interim condition.

Define the interim conditions, is the completion of Rolling Hills Ranch North only interim or is it future. Please remove interim or clearly define what that condition would be. Above the text states there will not be an interim condition.

Table 2: Detention Pond Summary:

POND G				
	PEAK INFLOW	PEAK OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	FT
FUTURE CONDITIONS				
2-YEAR STORM	44	5.2	5.7	7026.8
5-YEAR STORM	101	19	8.9	7027.5
10-YEAR STORM	183	50	11.5	7028.0
50-YEAR STORM	477	288	20.0	7029.4
100-YEAR STORM	653	443	24.8	7030.1

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 proposed storm drain networks to the Pond G detention facility.

The Pond G detention facility has been adequately sized such that the developed flows detained and released will approximate the historic flow rates for the various design storm events for the future as the storm flow exits Meridian Ranch onto the Falcon Regional Park.

Figure 4: Meridian Ranch SCS Calculations – Historic Conditions Map and Figure 5: Meridian Ranch SCS Calculations – Future Conditions Map depict the historic and future general drainage patterns for Rolling Hills Ranch North.

The purpose of this report is to show that the development of Rolling Hills Ranch North will not adversely impact the existing drainage facilities adjacent to and downstream of the developed area and the existing Pond G is properly sized for all anticipated future development.

SCS Calculations

Historic Drainage - SCS Calculation Method

Following is a tabulation of the surface drainage characteristics under Existing Conditions using the SCS calculation method. Please refer to Figure 4 - Meridian Ranch SCS Calculations - Historic Basin Map.

Table 3: Historic Drainage Basins – SCS

HISTORIC SCS (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	80	52	12	3.8	0.5
OS06-G02	0.1313	77	52	11	3.7	0.5
OS05	0.0578	39	26	5.6	1.8	0.2
OS05-G01	0.0578	38	25	5.5	1.7	0.2
HG01	0.0547	32	21	4.7	1.5	0.2

HISTORIC SCS (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)
G01	0.1125	70	46	10	3.2	0.5
G01-G02	0.1125	68	46	9.9	3.2	0.5
HG02	0.0906	45	30	6.7	2.3	0.4
G02	0.3344	191	127	27	9.0	1.3
G02-G03	0.3344	190	125	27	9.0	1.3
HG03	0.1828	77	51	12	4.3	0.7
OS07	0.0328	25	17	4.5	1.7	0.3
OS07-G03	0.0328	24	17	4.3	1.7	0.3
G03	0.5500	291	192	42	15	2.3
G03-G04	0.5500	281	189	42	14	2.3
OS09	0.1547	91	63	19	8.3	1.9
OS09-G04	0.1547	90	62	18	8.3	1.9
HG04	0.0891	40	26	5.9	2.1	0.3
HG05	0.1125	49	32	7.4	2.6	0.4
OS08	0.0406	35	25	7.7	3.4	0.7
OS08-G04	0.0406	34	24	7.4	3.4	0.7
G04	0.9469	493	332	76	28	4.7
G04-G05	0.9469	488	318	76	27	4.7
HG06A	0.1375	49	32	7.6	2.9	0.5
G05	1.0844	536	350	84	30	5.2
G05-G06	1.0844	520	348	83	30	5.2
HG06B	0.1031	33	22	5.3	2.0	0.4
G06	1.1875	551	369	88	32	5.5
HG14	0.2297	79	52	12	4.7	0.8
HG13	0.0844	54	37	9.5	3.8	0.7
G07	0.0844	54	37	9.5	3.8	0.7
G07-G08	0.0844	53	36	9.4	3.7	0.6
G16	0.3141	117	77	19	7.4	1.4

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 5 - Meridian Ranch SCS Calculations – Future Basins Map

Table 4: Future Drainage Basins-SCS

FUTURE SCS (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	0.52
G1a	0.1313	80	52	12	3.8	0.52
G1a-G2	0.1313	79	52	11	3.7	0.52
OS05	0.0578	39	26	5.6	1.8	0.23
OS05-G1	0.0578	39	25	5.5	1.7	0.23
FG01	0.0538	31	22	7.0	3.4	0.92
FG01-G1	0.0538	31	22	7.0	3.4	0.92
G1	0.1116	61	41	11	4.9	1.1
G1-G2	0.1116	61	41	11	4.8	1.1
FG02	0.0391	32	22	6.4	2.7	0.48
G2	0.2820	167	112	27	10	1.9
G2-G3	0.2820	162	109	27	10	1.9

FUTURE SCS (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)
FG03	0.0203	24	17	5.9	3.0	0.84
FG04	0.0172	22	16	5.8	3.1	0.90
G3	0.3195	184	122	31	12	2.4
FG06	0.0675	56	40	12	5.8	1.3
FG05	0.0580	45	33	12	6.7	2.4
OS07ab	0.0170	12	7.9	1.8	0.5	0.07
OS07ab-POND F	0.0170	12	7.6	1.7	0.5	0.07
POND F IN	0.4620	292	199	53	23	5.0
POND F	0.4620	177	121	16	8.0	2.1
POND F-G7	0.4620	177	120	16	8.0	2.1
OS07c	0.0296	19	12	2.7	0.9	0.12
OS07c-G4	0.0296	18	12	2.7	0.9	0.12
FG21a	0.0095	5.9	4.0	1.0	0.4	0.06
G4	0.0391	24	16	3.5	1.2	0.17
G4-G7	0.0391	23	16	3.5	1.2	0.17
FG21b	0.0150	21	16	6.5	3.9	1.7
G7	0.5161	194	131	18	8.9	2.3
G7-G8	0.5161	194	130	18	8.9	2.3
FG22	0.1354	121	88	32	17	5.4
OS08a	0.0251	16	11	2.3	0.7	0.10
OS08-G8	0.0251	16	10	2.3	0.7	0.10
FG23a	0.0216	21	15	5.2	2.7	0.84
OS07d	0.0034	2.5	1.6	0.36	0.11	0.01
OS07d-G8	0.0034	2.4	1.6	0.35	0.11	0.01
G8	0.7016	276	176	46	24	7.7
G8-G10	0.7016	275	175	45	24	7.6
FG24b	0.0589	52	39	16	10	4.3
FG24a	0.0348	24	16	4.5	2.0	0.37
OS08b	0.0165	9.5	6.3	1.4	0.45	0.07
OS08b-G9a	0.0165	9.4	6.0	1.4	0.45	0.07
OS09a	0.0093	5.3	3.5	0.76	0.25	0.04
OS09a-G9a	0.0093	5.2	3.4	0.75	0.25	0.04
G9a	0.1195	87	61	21	12	4.7
G9a-G9b	0.1195	85	60	20	12	4.6
FG24c	0.0291	37	28	13	7.9	3.7
FG24d	0.0258	39	30	13	8.1	3.7
G9b	0.1744	132	97	37	22	9.2
REX RD WQCV	0.1744	132	96	38	22	9.0
G9b-G10	0.1744	131	96	37	21	8.8
FG23b	0.0236	17	11	2.7	0.9	0.13
G10	0.8996	391	242	83	45	15
G10-G11	0.8996	389	240	81	43	15
FG23c	0.0109	9.2	6.5	1.9	0.84	0.16
G11	0.9105	392	245	83	44	15
FG25	0.1084	111	84	36	22	9.9
FG28	0.0184	15	10	3.0	1.2	0.19
POND G IN-WEST	1.0373	484	330	115	61	22
FG27	0.0679	98	79	42	30	18
FG26	0.0567	58	44	19	12	5.6
G13	0.0567	58	44	19	12	5.6
G13-POND G	0.0567	57	43	19	12	5.6
POND G IN-EAST	0.1246	153	121	60	41	23
POND G	1.1619	443	288	50	19	5.2
G12	1.1619	443	288	50	19	5.2
G12-G06	1.1619	443	286	50	19	5.2
FG29	0.0983	60	39	8.9	2.9	0.42
FG32	0.0402	17	11	2.6	0.9	0.15
FG32-G06	0.0402	17	11	2.6	0.9	0.15
G06	1.3004	474	305	53	20	5.5

FUTURE SCS (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)
OS09b	0.0435	19	12	2.8	1.0	0.17
OS09b-G14	0.0435	18	12	2.8	1.0	0.17
FG34	0.0275	18	12	3.1	1.3	0.22
G14	0.0710	32	21	5.0	1.9	0.34
G14-G15	0.0710	32	21	4.9	1.9	0.34
FG35	0.0293	24	16	4.5	1.7	0.26
G15	0.1003	43	28	6.7	2.6	0.52
G15-G16	0.1003	43	28	6.7	2.6	0.51
FG37	0.0746	46	31	7.5	2.7	0.43
FG36	0.0299	17	12	3.0	1.2	0.20
G15a	0.0299	17	12	3.0	1.2	0.20
G15a-G16	0.0299	17	11	2.9	1.1	0.20
G16	0.2048	99	63	14	5	1.0

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

Rational Calculations

The Rational Hydrologic Calculation Method was used to estimate the total runoff from the 5-year and the 100-year design storm and thus establish the storm drainage system design. Using the rational calculation methodology outlined in the Hydrology Section (Ch 6) of the COSDCM coupled with the El Paso County EPCDCM an effective storm drainage design for the Rolling Hills Ranch North PUD has been designed. The storm drainage facilities have been designed such that minor storms 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 rational hydrology calculations can be found in Appendix B.

The site is located within the Gieck Ranch Drainage Basin. The storm drain runoff will be collected by a series of inlets and storm drain pipe then conveyed through the project and discharge into an existing natural drainage course continuing into existing Pond G that is properly sized to safely convey the storm water flows away from the project without damaging adjacent property.

Paragraph revised to provide more clarity. Systems A & C are routed through a WQ facility prior to discharge upstream of Pond G. System B discharges directly into Pond G. WQ or exclusions will be applied for areas discharging to the east through the regional park

Rational Narrative

The following is a detailed narrative of the storm drainage system located in Rolling Hills Ranch North PUD. These storm drainage systems 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. The discharge point is located upstream of a Regional Detention Facility with WQCV incorporated into the design and construction. Please refer to Figure 6 – Rolling Hills Ranch North Rational Drainage Maps

verify the section of channel the project discharges to is Waters of the State prior to WQ treatment. It appears that the channel through Rolling Hills Ranch North may not be Water of the State and there is a WQ facility to treat the water prior to discharging to waters of the state south of Rex Road and ultimately pond G. Verify if that is an accurate interpretation and add clarifying text to address the intention of the water quality pond and if I.7.1.C.5 is a necessary. If the segment of the channel is not Waters of the State and the WQ facility provide WQ treatment prior to discharge I.7.1.C.5 would not apply. If I.7.1.C.5 does apply, please explicitly state what portions of RHRN discharge to waters of the state prior to treatment.

Explain in the narrative how WQ is being addressed for all of these basins. Possible exclusions include I.7.1.B.7 (land disturbance to undeveloped land that will remain undeveloped) and/or I.7.1.C.1 (which allows for 20% not to exceed 1 acre of the applicable development site area to not be captured).

Storm Drain System A

- Basin A01 (5.4 acres, Q_5= 4.7 CFS, Q_{100} = 15 CFS) contains lots along Galeros Drive and Toroweap Way. The surface runoff will sheet flow off of the lots and be directed to the streets and directed to a forced sump inlet located at I01. All of the 5-year flow (Q_5= 4.7 CFS), and most of the 100-year flow (Q_{100} = 14 CFS) is captured and conveyed downstream via an 18" RCP to manholes J01, J02, and J03 where it will be combined with flow captured by inlet I02. The remaining flow (Q_{100} = 1.2 CFS) continuing downstream to Inlet I08.

- Basin A02 (3.0 acres, Q_5= 3.8 CFS, Q_{100} = 11 CFS) contains lots along Galeros Drive, Bright Angel Dr. and Esplanade Dr. The surface runoff will sheet flow off of the lots and be directed to the streets and directed to a forced sump inlet located at I02. All of the 5-year flow (Q_5= 3.8 CFS), and most of the 100-year flow (Q_{100} = 9.9 CFS) is captured and conveyed downstream via an 18" RCP to manhole J03 where it will be combined with flow captured by inlet I01. The remaining flow (Q_{100} = 0.6 CFS) continuing downstream to Inlet I06.

- The pipe flow from inlets I01 & I02 combine at manhole J03 for a total flow of Q_5= 7.6 CFS and Q_{100} = 21 CFS and conveyed downstream to manhole J08 via a 24" RCP.

- Basin OS1 (4.1 acres, Q_5= 3.0 CFS, Q_{100} = 11 CFS) contains rear portions of the lots on the east side of existing Estate Ridge Dr located within the Estates at Rolling Hills Ranch Filing 2. The surface runoff will sheet flow off of the open space and be directed toward Basin A03.

- Basin A03 (3.2 acres, Q_5= 2.8 CFS, Q_{100} = 8.8 CFS) contains lots along the west side of Galeros Drive. The surface runoff will combine with the flow from OS1 and sheet flow off of the lots and be directed to the street for a total flow of (Q_5= 5.4 CFS, Q_{100} = 18 CFS) and conveyed to a flow-by inlet located at I03. Most of the flow (Q_5= 4.5 CFS, Q_{100} = 13 CFS) is captured and conveyed downstream via an 18" RCP to manholes J04 and J05 where it will be combined with flow captured by inlet I04. The remaining surface flow (Q_5= 0.9 CFS, Q_{100} = 5.9 CFS) continues downstream to Inlet I04

- Basin A04 (3.4 acres, Q_5= 3.1 CFS, Q_{100} = 10 CFS) contains lots along Bright Angel Dr. and Esplanade Dr. The surface runoff will sheet flow off of the lots and be directed to the streets and directed to a forced sump inlet located at I04. The flow will combine with the flow-by from inlet I03 for a total flow of Q_5= 3.5 CFS and Q_{100} = 14 CFS. All of the flow is captured and conveyed downstream via an 18" RCP to manhole J05 where it will be combined with flow captured by inlet I03.

- The pipe flow from inlets I03 & I04 combine at manhole J05 for a total flow of Q_5= 7.8 CFS and Q_{100} = 26 CFS and conveyed downstream to manhole J06 via a 24" RCP.

- Basin OS2 (5.3 acres, Q_5= 6.4 CFS, Q_{100} = 16 CFS) contains lots on the east side of along the east side of existing Estate Ridge Dr located within the Estates at Rolling

Hills Ranch Filing 2. The surface runoff will sheet flow off of the lots onto to the streets and directed to an existing flow-by inlet located at the northeast corner of Estate Ridge Dr. and Sunrise Ridge Dr. Most of the flow (Q_5= 5.2 CFS, Q_{100} = 11 CFS) is captured and conveyed downstream via an existing 18" RCP to an existing manhole constructed with the Estates at Rolling Hills Ranch Filing 2. The captured flows are slightly higher than the original approved FDR for the Estates at Rolling Hills Ranch Filing 2, however the increase within the main storm drain as it continues southerly along Estate Ridge Dr is an insignificant increase of less than 1% of the total 100-year flow rate. The slight increase will have no adverse impact to the existing storm drain system. The remaining surface flow (Q_5= 1.2 CFS, Q_{100} = 4.7 CFS) continues downstream to Inlet I05.

- Basin A05 (5.8 acres, Q_5= 5.4 CFS, Q_{100} = 16 CFS) contains lots along Sunrise Ridge Dr., Bright Angel Dr., and Esplanade Dr. The surface runoff will sheet flow off of the lots and be directed to the streets and directed to a forced sump inlet located at I05. The flow will combine with the flow-by from inlet ExI01 for a total flow of Q_5= 5.4 CFS and Q_{100} = 17 CFS. All of the 5-year flow (Q_5= 5.4 CFS), and almost all of the 100-year flow (Q_{100} = 17 CFS) is captured and conveyed downstream via a 24" RCP to manhole J06 where it will be combined with flow from manhole J05. The remaining flow (Q_{100} = 0.2 CFS) continues downstream to Inlet I06.

- The pipe flow from inlet I05 and manhole J05 combine at manhole J06 for a total flow of Q_5= 12 CFS and Q_{100} = 40 CFS and conveyed downstream to manholes J07A, J07B & J09 via a 30" RCP.

- Basin A06 (4.1 acres, Q_5= 4.8 CFS, Q_{100} = 13 CFS) contains lots along Sunrise Ridge Dr., Galeros Dr., Bright Angel Dr., and Esplanade Dr. The surface runoff will sheet flow off of the lots and be directed to the streets and directed to a forced sump inlet located at I06. The flow will combine with the flow-by from inlets I02 & I05 for a total flow of Q_5= 4.8 CFS and Q_{100} = 14 CFS. All of the 5-year flow (Q_5= 4.8 CFS), and most of the 100-year flow (Q_{100} = 9.9 CFS) is captured and conveyed downstream via an 18" RCP to manhole J08 where it will be combined with flow from manhole J03. The remaining flow (Q_{100} = 4.0 CFS) continues downstream to Inlet I08.

J08?
Revised

- The pipe flow from inlet I06 and manhole J03 combine at manhole J06 for a total flow of Q_5= 12 CFS and Q_{100} = 30 CFS and conveyed downstream to manhole J09 via a 30" RCP.

- The pipe flow from manholes J07B & J08 combine at manhole J09 for a total flow of Q_5= 22 CFS and Q_{100} = 63 CFS and conveyed downstream to manholes J11 via a 42" RCP.

- Basin A07 (3.6 acres, Q_5= 4.4 CFS, Q_{100} = 11 CFS) contains lots along the east side of Cardenas Drive. The surface runoff will sheet flow off of the lots to the street and conveyed to a forced sump inlet located at I07. All of the 5-year flow (Q_5= 4.4 CFS), and most of the 100-year flow (Q_{100} = 9.9 CFS) is captured and conveyed downstream

Please identify that the natural drainage course leading to DP2 was accounted for this sites developed flow and that it was analyzed and constructed with the early grading operations. Please also add to basin OS5 as well.

via an 18" RCP to manho 1.2 CFS) continues downstream to

Revised

- Basin OS04 (39 acres, Q_5= 11 CFS, Q_{100} = 64 CFS) contains open space within Rolling Hills Ranch North PUD and historic flow rates from Latigo Trails north of the project. The surface runoff will sheet flow off toward a natural drainage course and directed to an end section located at DP2 upstream of I08 and Sunrise Ridge Dr.

- Basin A08 (5.7 acres, Q_5= 5.5 CFS, Q_{100} = 15 CFS) contains lots along Sunrise Ridge Dr. and Galeros Dr. and Cardenas Dr. The surface runoff will sheet flow off of the lots to the streets and directed to a sump inlet located at I08. The flow will combine with the flow-by from inlets I01, I06, & I07 for a total flow at the inlet of Q_5= 5.5 CFS and Q_{100} = 19 CFS. All of the 5-year flow (Q_5= 5.5 CFS), and most of the 100-year flow (Q_{100} = 17 CFS) is captured, combined with upstream offsite Basin OS04. The total flow (Q_5= 16 CFS, Q_{100} = 75 CFS) conveyed to manhole J11 via a proposed 48" RCP where it will be combined with flow from manholes J09 &J10. The remaining surface flow (Q_{100} = 8.7 CFS) crosses the centerline to Inlet I09.

- The pipe flow from inlet I08 and manholes J09 & J10 combine at manhole J11 for a total flow of Q_5= 38 CFS and Q_{100} = 139 CFS and conveyed downstream to inlet I09 via a 48" RCP.

- Basin A09 (0.24 acres, Q_5= 1.0 CFS, Q_{100} = 1.8 CFS) contains area along the south side of Sunrise Ridge Dr. The surface runoff will sheet flow on to the streets and directed to a sump inlet located at I09. The flow will combine with the flow-by from inlet I08 for a total flow at the inlet of Q_5= 1.0 CFS and Q_{100} = 3.1 CFS. All of the flow is captured, combined with upstream flow from manhole J11. The total flow (Q_5= 39 CFS, Q_{100} = 141 CFS) is conveyed to end section ES01 via a proposed 48" RCP where it will be discharged to a natural drainage course and directed downstream toward Rex Rd. to exit the site.

<u>Storm Drain System B</u>

- Basin B01 (6.4 acres, Q_5= 7.3 CFS, Q_{100} = 19 CFS) contains lots fronting on Chalk Cliffs Dr., Lava Falls Dr. and Shelter Creek Dr. The surface runoff will sheet flow off lots to the streets and be directed to a forced sump inlet located at I10 All of the 5-year flow (Q_5= 7.3 CFS), and most of the 100-year flow (Q_{100} = 14 CFS) is captured and conveyed downstream via a 24" RCP to manholes J12 & J13 where it will be combined with flow from inlet I11. The remaining flow (Q_{100} = 5.1 CFS) continues downstream to Inlet I11.

- Basin B02 (6.2 acres, Q_5= 7.5 CFS, Q_{100} = 19 CFS) contains lots fronting along Sunset Ridge Dr., Lava Falls Dr., and Shelter Creek Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to a forced sump inlet located at I11. The flow will combine with the flow-by from inlet I10 for a total flow at the inlet of Q_5= 7.5 CFS and Q_{100} = 22 CFS. All of the 5-year flow is captured by the inlet (Q_5= 7.5 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 17 CFS) with the remaining flow (Q_{100} = 4.5 CFS) continuing downstream to Inlet I12. The captured flow is conveyed downstream via an 18" RCP to manhole J13.

- The pipe flow from inlets I10 & I11 combine at manhole J13 for a total flow of Q_5= 14 CFS and Q_{100} = 30 CFS and conveyed downstream to manhole J14 via a 30" RCP.

- Basin B03 (4.6 acres, Q_5= 5.6 CFS, Q_{100} = 14 CFS) contains lots fronting along Sunset Ridge Dr., Crystal Falls Dr., and Shelter Creek Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to a forced sump inlet located at I12. The flow will combine with the flow-by from inlet I11 for a total flow at the inlet of Q_5= 5.6 CFS and Q_{100} = 16 CFS. All of the flow is captured by the inlet. The captured flow is conveyed downstream via an 18" RCP to manhole J14.

- The pipe flow from inlet I12 and manhole J13 combine for a total flow of Q_5= 19 CFS and Q_{100} = 44 CFS and conveyed downstream to manhole J15 via a 30" RCP.

- Basin B04 (9.5 acres, Q_5= 10 CFS, Q_{100} = 26 CFS) contains lots fronting along House Rock Dr., Crystal Falls Dr., and Shelter Creek Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to a proposed forced sump inlet located at I13. All of the 5-year flow is captured by this inlet (Q_5= 10 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 17 CFS) with the remaining flow (Q_{100} = 9.0 CFS) continuing downstream to Inlet EI02. The captured flow is conveyed downstream via a 24" RCP to manhole J15.

- The pipe flow from inlet I13 and manhole J14 combine for a total flow of Q_5= 29 CFS and Q_{100} = 60 CFS and conveyed downstream to manhole EJ01 via a 36" RCP.

- Basin B05 (3.0 acres, Q_5= 3.6 CFS, Q_{100} = 9.2 CFS) contains lots fronting along the House Rock Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to an existing inlet located at EI02. The flow will combine with the flow-by from inlet I13 for a total flow at the inlet of Q_5= 3.6 CFS and Q_{100} = 17 CFS. All of the flow is captured by the inlet. The captured flow is conveyed downstream via an 18" RCP to manhole EJ01.

- Basin B06 (6.6 acres, Q_5= 6.5 CFS, Q_{100} = 16 CFS) contains lots fronting along Chalk Cliffs Dr. and Shelter Creek Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to a sump inlet located at EI03. All of the flow is captured by the inlet. The captured flow is conveyed downstream via an 18" RCP to manhole EJ01.

- The total pipe flow conveyed to manhole EJ01 is Q_5= 38 CFS, Q_{100} = 90 CFS and is conveyed via a 42" RCP downstream through the Sanctuary Filing 1 subdivision and ultimately to the existing Detention Pond G. The approved Final Drainage Report for the Sanctuary Filing 1 shows the design flows at Rex Road within the stormdrain pipe to be Q_5= 38 CFS, Q_{100} = 93 CFS. The proposed flows with this PUD are less than or equal to the flows shown in the approved FDR for the Sanctuary Filing 1, therefore this project has no adverse impacts to the existing downstream stormdrain system.

<u>Storm Drain System C</u>

- Basin C01 (7.1 acres, Q_5= 7.3 CFS, Q_{100} = 20 CFS) contains lots fronting on Sunrise Ridge Dr., Redwall Dr., Temple Butte Dr. Bright Angel Dr., and Horn Hill Dr. The surface runoff will sheet flow off lots to the streets and be directed to a forced sump inlet located at I18. All of the 5-year flow (Q_5= 7.3 CFS), and most of the 100-year flow (Q_{100} = 14 CFS) is captured and conveyed downstream via an 18" RCP to manholes J21, J22, J23, & J24 where it will be combined with flow from inlet I19. The remaining flow (Q_{100} = 6.9 CFS) continues downstream to Inlet I19.

- Basin C02 (7.1 acres, Q_5= 7.4 CFS, Q_{100} = 21 CFS) contains lots fronting along Sunrise Ridge Dr., Tapeats Dr., Bright Angel Dr., and Horn Hill Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow will be directed downstream to a sump inlet located at I19. The flow will combine with the flow-by from inlet I18 for a total flow at the inlet of Q_5= 7.4 CFS and Q_{100} = 23 CFS. All of the 5-year flow is captured by the inlet (Q_5= 7.4 CFS) and most of the 100-yr storm flow is captured (Q_{100} = 17 CFS) with the remaining flow (Q_{100} = 6.4 CFS) crossing the centerline to Inlet I20. The captured flow is conveyed downstream via an 24" RCP to manhole J24.

the EGP final drainage report indicated a capacity of 190 cfs for the 54" pipe. Please verify that the existing RCP and the downstream is adequate for any increase in flows.

- The pipe flow from inlets I19 and manhole 23 combine at ma[illegible] of Q_5= 14 CFS and Q_{100} = 29 CFS and conveyed downstrea[illegible] 30" RCP.

- Basin C03 (4.4 acres, Q_5= 4.1 CFS, Q_{100} = 11 CFS) contains lo[illegible] Dr., Galeros Dr., and Horn Hill Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street, where the flow [illegible] to a sump inlet located at I20. The flow will combine wit[illegible] for a total flow at the inlet of Q_5= 4.1 CFS and Q_{100} = 1[illegible] captured by the inlet. The captured flow is combined with [illegible] (Q_5= 18 CFS, Q_{100} = 46 CFS) and is conveyed downstream [illegible] ES0[illegible]

Flow within the pipe that is released by the WQ structure is 159 CFS, below the pipe capacity of 190 CFS. Hydraulics will be provided at FDR.

Surface flow as calculated by Rational Method

- Basin OS05 (6.6 acres, Q_5= 4.4 CFS, Q_{100} = 17 CFS) contains the rear portions of lots bounded by along Sunrise Ridge Dr., Galeros Dr., House Rock Dr., and Rex Rd. The surface runoff will sheet flow off of the residential lots and opens space and be directed to the natural drainage course, where the flow will combine with flow from ES01 and ES02 for a total flow of Q_5= 64 CFS and Q_{100} = 202 CFS. The flow is captured by a water quality pond constructed with the Rolling Hills Ranch North grading operations and then conveyed downstream via a 54" RCP where it will be discharged to a natural drainage course and directed downstream to the existing Detention Pond G. Existing Pond G was designed and constructed with this area anticipated to drain and be detained within it. Pond G also contains a water quality component.

These lots still require treatment to satisfy WQ requirements. Runoff reduction or some other form of treatment will be required - calculations to support those statements will be required as well. Verify exhibits are in the appendices, Appendix D is currently the soils report.

There is a block of lots that the rear yards will sheet flow to a grass lined swale and across the subdivision boundary into the Regional Park. At least 20 percent of the upstream imperviousness (rooftops and patios/decks) within the catchment must be disconnected from the storm drainage system and drain though a pervious area (rear yard lawns and planting bed) 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, is discharged via roof downspouts and drains across the rear yard pervious areas equaling more than 10 percent of the rooftop area. Please see Appendix D for information and exhibits.

DETENTION POND

Exhibits and runoff reduction calculations have been added and will be provided with the Final Drainage Report.

Existing Pond G Detention Storage Criteria

Existing Detention Pond G was constructed with grading operations associated with the Rough Grading Plans for Rolling Hills Ranch at Meridian Ranch in anticipation of the future development of the final phases of the Meridian Ranch Development 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 and the Sanctuary Filing 1. The pond is owned and maintained by the Meridian Service Metropolitan District (MSMD) and a maintenance agreement between the MSMD and El Paso County was recorded with the Rolling Hills Ranch Filing 1 final plat.

Engineer must confirm in the Drainage Report that the existing PBMPs that the site is tributary to are functioning as intended.

Added statement here.

Pond G and the existing Pond F 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. A permanent concrete control structure handles the full build out of the Meridian Ranch tributary areas and reduces the developed flows to approximately the historic peak flow rates for the full spectrum of design storms.

The existing concrete control structure the outlet of Pond G attenuates 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 feature, a rectangular slotted orifice located on the front and a grated top to reduce the developed peak flow rates. Table 2 (pg. 8) provides summary data for the various design storms of the development for all areas tributary to Pond G including Rolling Hills Ranch North PUD. Pond G was designed and constructed to receive and discharge the anticipated future developed flows and therefore there are no proposed changes to the existing pond or outlet structure.

Downstream Analysis

The outlet (DP G12) for the Existing Detention Pond G is located west of the Falcon Regional Park, upstream of Eastonville Rd (DP G06). At full buildout the discharge from Pond G will be 443 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 536 CFS. The calculated 100-year developed flow rate will be 83% of the historic flow rate. The developed peak flow rate for the full spectrum of design storms are calculated to be below or near that of the corresponding historic peak flow rates. See Table 5

Will the completion of this Rolling Hills Ranch North be full buildout? Please define

Added statement at end of paragraph on following page.

for a complete comparative list of the peak flow rates for the key design points impacted by the development of Rolling Hills Ranch North PUD.

Table 5: Key Design Point Comparison – Future SCS Model

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)	PEAK DISCHARGE Q_2 (CFS)
G12 - POND G OUTLET REGIONAL PARK (G05 - HISTORIC)	Historic	536	350	84	30	5.2
	Future	443	288	50	19	5.2
	% of Historic	83%	82%	60%	64%	100%
G06 - EASTONVILLE ROAD[1]	Historic	551	369	88	32	5.5
	Future	474	305	53.3	20	5.5
	% of Historic	86%	83%	60%	64%	100%

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

DRAINAGE FEES

The proposed development falls in the Gieck Ranch Drainage Basin. The entire development occupies 148.87 acres of residential development of which 78.16 acres are residential development and 24.25 acres are designated as right-of-way, the remainder is open space.

The following is the imperviousness calculation:

	Acres	Assumed Imperviousness	Impervious Acres
Open Space	46.46	3%	1.39
Right-of-way	24.25	90%	21.82
Residential Lots	78.16	40% (441 Lots)	31.26
Total	148.87		54.47 = 36.80% imperv.

GIECK RANCH FEES:

Drainage Fees: There are no drainage fees for this basin.

Bridge Fees: There are no bridge fees for this basin.

CONCLUSION

The rational and SCS based hydrologic calculation methods were used to estimate the historic and developed runoff values to determine the impact of this project on surrounding property. The resulting calculations were used to estimate the hydraulic impact on the existing and proposed facilities. Finally, the model storms were analyzed to simulate the impacts of storm events of various return periods on the existing detention pond and downstream facilities. Based on the aforementioned design parameters the development of the project will not adversely affect downstream properties.

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 increasing the amount of pervious area within the right-of-way. With the rights-of-way within Meridian Ranch at 60 ft. instead of the normal 50 ft., the amount of pervious area per lineal foot is tripled from 5' wide to 15' wide.

The project has over forty acres of open space, accounting for over 31% 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.

Please provide clarifying text to clearly discuss if Pond G (detention pond) and/or the WQ only pond provide the treatment for the project area or subsections of the project area. It appears that the eastern half of the project drains directly to pond G but the western half appears to be treated by the existing WQ pond prior to discharging to waters of the state and Pond G. Please add this discussion to clarify what and how treatment is achieved. Previously it was stated the I.7.1.C.5 would be used to treat the WQCV but it looks like the runoff from the project may not travel through waters of the state. If the runoff will travel through waters of the state, clarify where the projects reaches waters of the state prior to treatment.

Step 2: Stabilize Drainageways

Some of the storm drains within the drainage course that bisects the projec to infiltrate and to reduce the velocity project.

Provided clarifying text.
Will not use I.7.1.C.5, but instead will rely on Runoff Reduction. Supporting calculations and exhibits added to Appendix D

Step 3: Provide Water Quality Capture Volume (WQCV)

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

Pond G? Yes

An existing water quality pond is also located within the project area adjacent to Rex Rd and designed to accommodate the volume and settle the suspended solids found in the stormwater prior to being discharged downstream of Rex Rd.

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

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

For the detention pond and WQ ponds, engineer must confirm that the existing PBMPs were designed to accept the contributing flows and are functioning as intended.

Detention Pond

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

Water Quality Facility

A water quality facility is located on the south boundary of the project at Rex Rd. Runoff will be collected by the proposed storm drainage system and diverted the water quality facility in order to allow for suspended solids to settle from the stormwater prior to being discharge downstream of Rex Rd.

Please state what filing and EPC Project number the ponds were constructed under and clearly identify if any additional work will be required for the ponds to accommodate this project

Silt Fence

Silt fence or straw wattles will be place along downstream Added listurbed areas. This will prevent suspended sediment from leaving the site during infrastructure construction. The perimeter control is to remain in place until vegetation is reestablished.

Erosion Bales

Erosion bales will be placed ten (10) feet from the inlets of all culverts during construction to reduce the accumulation of sediment within culverts. 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 2021. Prepared by Tech Contractors.

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

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

10. Final Drainage Report for Rolling Hills Ranch Standalone Grading at Meridian Ranch. March 2020. Prepared by Tech Contractors.

11. Final Drainage Report for the Sanctuary Filing 1 at Meridian Ranch. August 2022. Prepared by Tech Contractors.

Appendices

Appendix A - HEC-HMS Data

Input Data

Rolling Hills Ranch North PDR

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	43.0
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)		
FUTURE				
OS05	37	0.0578	61.0	15.2
OS06	84	0.1313	61.0	18.7
OS07ab	11	0.0170	61.0	13.9
OS07c	19	0.0296	61.0	17.4
OS07d	2	0.0034	61.0	13.1
OS08a	16	0.0251	61.0	16.7
OS08b	11	0.0165	61.0	20.3
OS09a	6	0.0093	61.0	20.9
OS09b	28	0.0435	61.0	24.3
FG01	34	0.0538	66.4	33.8
FG02	25	0.0391	64.6	16.1
FG03	13	0.0203	68.0	11.6
FG04	11	0.0172	68.0	7.6
FG05	37	0.0580	70.1	28.4
FG06	43	0.0675	66.1	18.4
FG21a	6	0.0095	62.6	21.4
FG21b	10	0.0150	73.1	12.7
FG22	87	0.1354	69.0	20.3
FG23a	14	0.0216	68.6	18.0
FG23b	15	0.0236	61.8	15.0
FG23c	7	0.0109	65.2	12.1
FG24a	22	0.0348	64.3	21.9
FG24b	38	0.0589	73.4	14.5
FG24c	19	0.0291	75.0	14.7
FG24d	17	0.0262	76.4	13.9
FG25	69	0.1084	74.1	23.8
FG26	36	0.0570	78.0	25.5
FG27	43	0.0679	83.3	22.1
FG28	12	0.0184	64.1	14.8
FG29	63	0.0983	61.2	19.1
FG32	26	0.0402	80.0	23.9
FG34	18	0.0275	62.7	22.1
FG35	19	0.0293	66.4	14.2
FG36	19	0.0299	67.3	24.2
FG37	48	0.0746	61.0	20.2

COMPOSITE 'C' FACTORS

PROJECT:	Rolling Hills Ranch North PDR														Date	8/22/2023	
BASIN DESIGNATION	AREA (AC.)														AREA (MI^2)	COMPOSITE 'C' FACTOR	PERCENT IMPERV.
	UNDEV	LATIGO UNDEV.	2.5 AC	1 DU/AC	2 DU/AC	3 DU/AC	4 DU/AC	5 DU/AC	8 DU/AC or more	STREETS	SCHOOL, CLUB HSE, REC CTR	OPEN SPACE PARKS	COMM.	TOTAL			
FUTURE																	
OS05	37													37	0.0578	**61.0**	**0.0%**
OS06	84													84	0.1313	**61.0**	**0.0%**
OS07ab	11													11	0.0170	**61.0**	**0.0%**
OS07c	19													19	0.0296	**61.0**	**0.0%**
OS07d	2.2													2.2	0.0034	**61.0**	**0.0%**
OS08a	16													16	0.0251	**61.0**	**0.0%**
OS08b	11													11	0.0165	**61.0**	**0.0%**
OS09a	5.9													5.9	0.0093	**61.0**	**0.0%**
OS09b	28													28	0.0435	**61.0**	**0.0%**
FG01	13			19									2.1	34	0.0538	**66.4**	**16.9%**
FG02	12			13										25	0.0391	**64.6**	**10.4%**
FG03				13										13	0.0203	**68.0**	**20.0%**
FG04				11										11	0.0172	**68.0**	**20.0%**
FG05	1.5			33						3.0				37	0.0580	**70.1**	**25.7%**
FG06	15			27						0.9		0.5		43	0.0675	**66.1**	**14.4%**
FG21a	4.7			1.4										6.1	0.0095	**62.6**	**4.6%**
FG21b					3.8							2.5	3.3	9.6	0.0150	**73.1**	**43.1%**
FG22	17			16	48					2.1		0.9	3.3	87	0.1354	**69.0**	**23.4%**
FG23a	3.1				2.8	5.0				0.6		2.3		14	0.0216	**68.6**	**20.6%**
FG23b	14						0.9							15	0.0236	**61.8**	**2.4%**
FG23c	4.9						2.1							7.0	0.0109	**65.2**	**12.0%**
FG24a	18						2.3	2.4						22	0.0348	**64.3**	**8.8%**
FG24b	0.2			4.1	2.7	11.3	14	5.7				0.1		38	0.0589	**73.4**	**34.0%**
FG24c							19							19	0.0291	**75.0**	**40.0%**
FG24d	5.5						5.7			4.8		0.8		17	0.0262	**76.4**	**42.3%**
FG25						9.3	57	0.9				2.6		69	0.1084	**74.1**	**37.3%**
FG26								36		0.4		0.5		36	0.0570	**78.0**	**43.1%**
FG27	2.5							1.7	35	2.8		1.7		43	0.0679	**83.3**	**56.2%**
FG28							1.7		0.1			10		12	0.0184	**64.1**	**8.0%**
FG29	62						0.7							63	0.0983	**61.2**	**0.4%**
FG32											26			26	0.0402	**80.0**	**52.0%**
FG34	16							1.8						18	0.0275	**62.7**	**4.4%**
FG35	15							1.2		2.2				19	0.0293	**66.4**	**14.3%**
FG36	16									3.2				19	0.0299	**67.3**	**16.9%**
FG37	48													48	0.0746	**61.0**	**0.0%**

LAG TIME

SCS Calculations

PROJECT: **Rolling Hills Ranch North PDR** DATE: 8/31/2023

SUBBASIN DATA			INITIAL/OVERLAND TIME (T_i)						TRAVEL TIME (T_t)					TOTAL	FINAL
BASIN DESIGNATION	P_2	AREA (SQ MI)	LENGTH (FT)	ΔH	SLOPE %	OVERLAND CONVEYANCE TYPE	n	T_i (Min.)*	LENGTH (FT)	ΔH	TRAVEL CONVEYANCE TYPE	VEL (FPS)	T_t (Min.)**	T_i+T_t (Min.)	T_{lag} (min)
OS05	1.88	0.058	200	10	5.0%	GP	0.15	15.4	2100	115	G	3.5	10.0	25.4	**15.2**
OS06	1.88	0.131	200	9	4.5%	GP	0.15	16.1	2840	125	G	3.1	15.0	31.1	**18.7**
OS07	1.88	0.033	200	6	3.0%	GP	0.15	18.9	1080	35	G	2.7	6.7	25.6	**15.4**
OS08	1.88	0.041	300	26	8.7%	GP	0.15	17.1	1535	50	G	2.7	9.5	26.6	**15.9**
OS09	1.88	0.153	200	4	2.0%	GP	0.15	22.3	3525	75	G	2.2	26.9	49.1	**29.5**
HG01	1.88	0.055	300	11.0	3.7%	GP	0.15	24.2	1495	56	G	2.9	8.6	32.7	**19.6**
HG02	1.88	0.091	300	10.0	3.3%	GP	0.15	25.1	2755	87	G	2.7	17.2	42.3	**25.4**
HG03	1.88	0.183	300	8.0	2.7%	GP	0.15	27.4	4270	115	G	2.5	28.9	56.3	**33.8**
HG04	1.88	0.089	300	8.0	2.7%	GP	0.15	27.4	4205	120	N	3.0	23.7	51.1	**30.7**
HG05	1.88	0.113	300	9.0	3.0%	GP	0.15	26.2	4085	117	G	2.5	26.8	53.0	**31.8**
HG06A	1.88	0.138	725	20.0	2.8%	GP	0.15	54.8	2750	64	N	2.7	17.2	72.0	**43.2**
HG06B	1.88	0.103	955	27.0	2.8%	GP	0.15	67.7	1750	22	N	2.0	14.9	82.6	**49.5**
HG07	1.88	0.098	540	38.0	7.0%	GP	0.15	29.8	2550	68	G	2.4	17.4	47.1	**28.3**
HG08	1.88	0.133	315	24.0	7.6%	GP	0.15	18.7	2800	72	G	2.4	19.4	38.1	**22.9**
HG09	1.88	0.178	415	20.0	4.8%	GP	0.15	28.1	4240	96	G	2.3	31.3	59.4	**35.6**
HG10	1.88	0.138	1015	30.0	3.0%	GP	0.15	69.8	4190	86	G	2.1	32.5	102.3	**61.4**
HG11	1.88	0.205	415	22.0	5.3%	GP	0.15	27.0	5718	142	G	2.4	40.3	67.3	**40.4**
HG12	1.88	0.130	316	20.0	6.3%	GP	0.15	20.2	4870	130	G	2.5	33.1	53.4	**32.0**
HG13	1.88	0.084	745	27.0	3.6%	GP	0.15	50.2	3225	90	G	2.5	21.5	71.7	**43.0**
HG14	1.88	0.230	550	14.0	2.5%	GP	0.15	45.4	3650	68	G	2.0	29.7	75.1	**45.1**
HG15	1.88	0.256	710	16.0	2.3%	GP	0.15	58.5	7310	142	N	2.4	50.0	108.4	**65.1**
HG18	1.88	0.033	300	54.0	18.0%	GP	0.15	12.8	1380	28	G	2.1	10.8	23.5	**14.1**
HG19	1.88	0.005	140	16.0	11.4%	GP	0.15	8.3	330	14	G	3.1	1.8	10.1	**6.1**
HG20	1.88	0.002	150	12.0	8.0%	GP	0.15	10.2	220	8	G	2.9	1.3	11.4	**6.9**
HG21	1.88	0.022	170	6.0	3.5%	GP	0.15	15.6	1250	44	G	2.8	7.4	23.0	**13.8**
							FUTURE								
TOTALS	1.88	0.000	FROM APPROVED MERIDIAN RANCH FILING MDDP, JAN 2018											25.4	**15.2**
FUTURE	1.88	0.000												31.1	**18.7**
OS05	1.88	0.058	285	19.0	6.7%	GP	0.15	18.3	950	45	G	3.3	4.8	23.1	**13.9**
OS06	1.88	0.131	270	18.0	6.7%	GP	0.15	17.5	1620	40	G	2.4	11.5	28.9	**17.4**
OS07ab	1.88	0.017	250	10.0	4.0%	GP	0.15	20.2	185	2	N	1.8	1.7	21.9	**13.1**
OS07c	1.88	0.030	275	11.0	4.0%	GP	0.15	21.8	1000	24	N	2.7	6.1	27.9	**16.7**
OS07d	1.88	0.003	420	20.0	4.8%	GP	0.15	28.5	830	18	N	2.6	5.4	33.8	**20.3**
OS08a	1.88	0.025	455	18.0	4.0%	GP	0.15	32.7	385	12	N	3.1	2.1	34.8	**20.9**
OS08b	1.88	0.017	495	29.0	5.9%	GP	0.15	29.9	1725	41	N	2.7	10.7	40.6	**24.3**
OS09a	1.88	0.009	FROM APPROVED MERIDIAN RANCH FILING MDDP, JAN 2018											56.4	**33.8**
OS09b	1.88	0.043												26.9	**16.1**
FG01	1.88	0.054												19.3	**11.6**
FG02	1.88	0.039												12.6	**7.6**
FG03	1.88	0.020	300	8.0	2.7%	GP	0.15	27.4	3690	88	P	3.1	19.9	47.4	**28.4**
FG04	1.88	0.017	220	20.0	9.1%	GP	0.15	13.1	2250	46	G	2.1	17.5	30.6	**18.4**
FG05	1.88	0.058	FROM APPROVED ESTATES AT ROLLING HILLS RANCH GRADING FDR, MAR 2020											35.6	**21.4**
FG06	1.88	0.068	145	6.0	4.1%	GP	0.15	12.9	1255	36	G	2.5	8.2	21.1	**12.7**
FG21a	1.88	0.010	FROM RATIONAL CALCULATIONS ESTATES AT ROLLING HILLS RANCH FILING 2											33.9	**20.3**
FG21b	1.88	0.015	185	9.0	4.9%	GD	0.24	21.3	1685	45	P	3.3	8.6	29.9	**18.0**
FG22	1.88	0.135	180	13.0	7.2%	GP	0.15	12.2	1795	32	N	2.3	12.8	25.0	**15.0**
FG23a	1.88	0.022	200	11.0	5.5%	GP	0.15	14.8	770	15	N	2.4	5.3	20.1	**12.1**
FG23b	1.88	0.024	350	22.0	6.3%	GP	0.15	22.0	2355	57	N	2.7	14.4	36.4	**21.9**
FG23c	1.88	0.011	325	16.0	4.9%	F	0.05	9.5	2350	42	P	2.7	14.7	24.2	**14.5**
FG24a	1.88	0.035	70	3.0	4.3%	GD	0.24	10.3	2075	31	P	2.4	14.1	24.5	**14.7**
FG24b	1.88	0.059	50	1.0	2.0%	GD	0.24	10.7	2065	39	P	2.7	12.5	23.2	**13.9**
FG24c	1.88	0.029	FROM RATIONAL CALCULATIONS ROLLING HILLS RANCH FILING 3											39.7	**23.8**
FG24d	1.88	0.026	145	2.0	1.4%	GD	0.24	29.1	2430	55	P	3.0	13.5	42.5	**25.5**
FG25	1.88	0.108	100	4.0	4.0%	GD	0.24	14.1	2935	34	P	2.2	22.7	36.8	**22.1**
FG26	1.88	0.057	100	2.0	2.0%	GD	0.24	18.6	340	6	L	0.9	6.1	24.7	**14.8**
FG27	1.88	0.068	255	14.0	5.5%	GP	0.15	18.0	1890	32	N	2.3	13.8	31.9	**19.1**
FG28	1.88	0.018	280	4.0	1.4%	GP	0.15	33.3	1345	40	P	3.4	6.5	39.8	**23.9**
FG29	1.88	0.098	305	22.0	7.2%	GP	0.15	18.7	2850	64	N	2.6	18.1	36.8	**22.1**
FG32	1.88	0.040	165	8.0	4.8%	GP	0.15	13.4	1450	26	N	2.3	10.3	23.7	**14.2**
FG34	1.88	0.028	305	7.0	2.3%	GP	0.15	29.5	1670	36	N	2.6	10.8	40.4	**24.2**
FG35	1.88	0.029	305	15.0	4.9%	GP	0.15	21.8	1790	37	N	2.5	11.9	33.6	**20.2**

TYPE OF SURFACE		n
SMOOTH SURFACES (conc, asph, gravel, bare soil, etc)	S	0.0110
FALLOW (no cover)	F	0.0500
CULTIVATED SOILS (<20% cover)	CL	0.0600
CULTIVATED SOILS (>20% cover)	CG	0.1700
GRASS (Short prairie grass)	GP	0.1500
GRASS (Dense grass)	GD	0.2400
GRASS (Bermuda grass)	GB	0.4100
RANGE (Natural)	R	0.1300
WOODS (Light Underbrush)	WL	0.4000
WOODS (Dense Underbrush)	WD	0.8000

Notes: * $T_i = 0.42\,(n \cdot L)^{0.8}/(P_2)^{0.5} \cdot S^{0.4}$ (min)

** $T_t = L/60 \cdot V$ (min)

TYPE OF SURFACE	
HEAVY MEADOW	H
TILLAGE/FIELD	T
RIPRAP (not buried)	R
SHORT PASTURE AND LAWNS	L
NEARLY BARE GROUND	B
GRASSED WATERWAY	G
NATURAL SANDY CHANNEL	N
PAVED AREAS	P

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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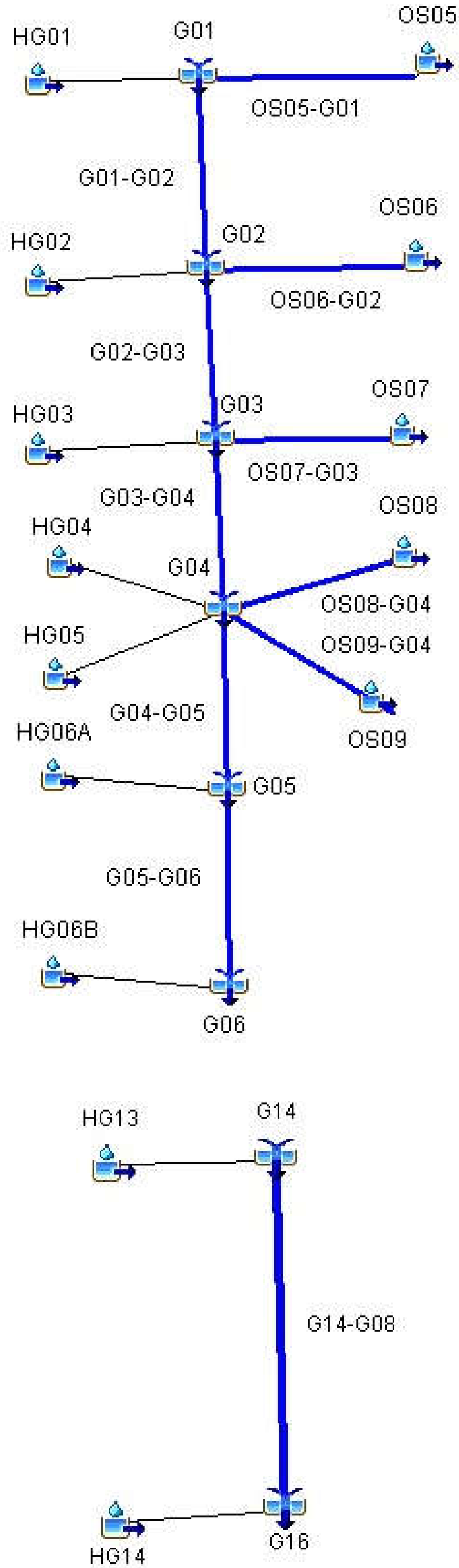
HISTORIC CONDITIONS



HISTORIC SCS (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
OS06	0.1313	80	01Jul2015, 12:12	9.3
OS06-G02	0.1313	77	01Jul2015, 12:24	9.2
OS05	0.0578	39	01Jul2015, 12:12	4.1
OS05-G01	0.0578	38	01Jul2015, 12:12	4.1
HG01	0.0547	32	01Jul2015, 12:12	3.9
G01	0.1125	70	01Jul2015, 12:12	7.9
G01-G02	0.1125	68	01Jul2015, 12:24	7.8
HG02	0.0906	45	01Jul2015, 12:24	6.4
G02	0.3344	191	01Jul2015, 12:24	23
G02-G03	0.3344	190	01Jul2015, 12:30	23
HG03	0.1828	77	01Jul2015, 12:30	13
OS07	0.0328	25	01Jul2015, 12:12	2.6
OS07-G03	0.0328	24	01Jul2015, 12:30	2.5
G03	0.5500	291	01Jul2015, 12:30	38
G03-G04	0.5500	281	01Jul2015, 12:30	38
OS09	0.1547	91	01Jul2015, 12:24	13
OS09-G04	0.1547	90	01Jul2015, 12:30	13
HG04	0.0891	40	01Jul2015, 12:30	6.3
HG05	0.1125	49	01Jul2015, 12:30	7.9
OS08	0.0406	35	01Jul2015, 12:12	3.6
OS08-G04	0.0406	34	01Jul2015, 12:30	3.5
G04	0.9469	493	01Jul2015, 12:30	69
G04-G05	0.9469	488	01Jul2015, 12:36	68
HG06A	0.1375	49	01Jul2015, 12:42	9.6
G05	1.0844	536	01Jul2015, 12:36	78
G05-G06	1.0844	520	01Jul2015, 12:36	78
HG06B	0.1031	33	01Jul2015, 12:48	7.2
G06	1.1875	551	01Jul2015, 12:42	85
HG14	0.2297	79	01Jul2015, 12:42	16
HG13	0.0844	54	01Jul2015, 12:18	6.6
G07	0.0844	54	01Jul2015, 12:18	6.6
G07-G08	0.0844	53	01Jul2015, 12:18	6.6
G16	0.3141	117	01Jul2015, 12:30	23

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

HISTORIC SCS (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
OS06	0.1313	52	01Jul2015, 12:12	6.5
OS06-G02	0.1313	52	01Jul2015, 12:24	6.4
OS05	0.0578	26	01Jul2015, 12:12	2.9
OS05-G01	0.0578	25	01Jul2015, 12:18	2.9
HG01	0.0547	21	01Jul2015, 12:18	2.7
G01	0.1125	46	01Jul2015, 12:18	5.6
G01-G02	0.1125	46	01Jul2015, 12:24	5.5
HG02	0.0906	30	01Jul2015, 12:24	4.5
G02	0.3344	127	01Jul2015, 12:24	16
G02-G03	0.3344	125	01Jul2015, 12:30	16
HG03	0.1828	51	01Jul2015, 12:30	9.1
OS07	0.0328	17	01Jul2015, 12:12	1.9
OS07-G03	0.0328	17	01Jul2015, 12:30	1.8
G03	0.5500	192	01Jul2015, 12:30	27
G03-G04	0.5500	189	01Jul2015, 12:36	27
OS09	0.1547	63	01Jul2015, 12:24	9.6
OS09-G04	0.1547	62	01Jul2015, 12:36	9.4
HG04	0.0891	26	01Jul2015, 12:30	4.4
HG05	0.1125	32	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	332	01Jul2015, 12:36	49
G04-G05	0.9469	318	01Jul2015, 12:42	48
HG06A	0.1375	32	01Jul2015, 12:42	6.7
G05	1.0844	350	01Jul2015, 12:42	55
G05-G06	1.0844	348	01Jul2015, 12:42	55
HG06B	0.1031	22	01Jul2015, 12:54	5.0
G06	1.1875	369	01Jul2015, 12:42	60
HG14	0.2297	52	01Jul2015, 12:48	11
HG13	0.0844	37	01Jul2015, 12:18	4.7
G07	0.0844	37	01Jul2015, 12:18	4.7
G07-G08	0.0844	36	01Jul2015, 12:24	4.7
G16	0.3141	77	01Jul2015, 12:30	16

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

HISTORIC SCS (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	11	01Jul2015, 12:30	2.1
OS05	0.0578	5.6	01Jul2015, 12:12	1.0
OS05-G01	0.0578	5.5	01Jul2015, 12:24	0.94
HG01	0.0547	4.7	01Jul2015, 12:18	0.90
G01	0.1125	10	01Jul2015, 12:24	1.9
G01-G02	0.1125	10	01Jul2015, 12:36	1.8
HG02	0.0906	6.7	01Jul2015, 12:30	1.5
G02	0.3344	27	01Jul2015, 12:36	5.4
G02-G03	0.3344	27	01Jul2015, 12:48	5.3
HG03	0.1828	12	01Jul2015, 12:42	3.0
OS07	0.0328	4.5	01Jul2015, 12:12	0.66
OS07-G03	0.0328	4.3	01Jul2015, 12:48	0.66
G03	0.5500	42	01Jul2015, 12:48	8.9
G03-G04	0.5500	42	01Jul2015, 12:54	8.8
OS09	0.1547	19	01Jul2015, 12:30	3.6
OS09-G04	0.1547	18	01Jul2015, 12:42	3.5
HG04	0.0891	5.9	01Jul2015, 12:36	1.5
HG05	0.1125	7.4	01Jul2015, 12:36	1.8
OS08	0.0406	7.7	01Jul2015, 12:12	1.0
OS08-G04	0.0406	7.4	01Jul2015, 12:48	1.0
G04	0.9469	76	01Jul2015, 12:54	17
G04-G05	0.9469	76	01Jul2015, 12:54	16
HG06A	0.1375	7.6	01Jul2015, 12:54	2.2
G05	1.0844	84	01Jul2015, 12:54	19
G05-G06	1.0844	83	01Jul2015, 13:00	19
HG06B	0.1031	5.3	01Jul2015, 13:00	1.7
G06	1.1875	88	01Jul2015, 13:00	20
HG14	0.2297	12	01Jul2015, 12:54	3.7
HG13	0.0844	9.5	01Jul2015, 12:18	1.7
G07	0.0844	9.5	01Jul2015, 12:18	1.7
G07-G08	0.0844	9.4	01Jul2015, 12:30	1.7
G16	0.3141	19	01Jul2015, 12:36	5.4

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

HISTORIC SCS (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
OS06	0.1313	3.8	01Jul2015, 12:24	1.1
OS06-G02	0.1313	3.7	01Jul2015, 12:42	1.1
OS05	0.0578	1.8	01Jul2015, 12:18	0.49
OS05-G01	0.0578	1.7	01Jul2015, 12:30	0.48
HG01	0.0547	1.5	01Jul2015, 12:24	0.46
G01	0.1125	3.2	01Jul2015, 12:30	1.0
G01-G02	0.1125	3.2	01Jul2015, 12:48	0.92
HG02	0.0906	2.3	01Jul2015, 12:36	0.8
G02	0.3344	9.0	01Jul2015, 12:42	2.8
G02-G03	0.3344	9.0	01Jul2015, 13:00	2.7
HG03	0.1828	4.3	01Jul2015, 12:48	1.6
OS07	0.0328	1.7	01Jul2015, 12:18	0.36
OS07-G03	0.0328	1.7	01Jul2015, 13:00	0.35
G03	0.5500	15	01Jul2015, 13:00	4.6
G03-G04	0.5500	14	01Jul2015, 13:12	4.5
OS09	0.1547	8.3	01Jul2015, 12:36	2.1
OS09-G04	0.1547	8.3	01Jul2015, 12:48	2.0
HG04	0.0891	2.1	01Jul2015, 12:42	0.75
HG05	0.1125	2.6	01Jul2015, 12:42	0.94
OS08	0.0406	3.4	01Jul2015, 12:12	0.58
OS08-G04	0.0406	3.4	01Jul2015, 13:00	0.58
G04	0.9469	28	01Jul2015, 13:12	8.7
G04-G05	0.9469	27	01Jul2015, 13:18	8.6
HG06A	0.1375	2.9	01Jul2015, 13:00	1.1
G05	1.0844	30	01Jul2015, 13:18	9.8
G05-G06	1.0844	30	01Jul2015, 13:24	9.6
HG06B	0.1031	2.0	01Jul2015, 13:12	0.85
G06	1.1875	32	01Jul2015, 13:24	10
HG14	0.2297	4.7	01Jul2015, 13:06	1.9
HG13	0.0844	3.8	01Jul2015, 12:24	0.92
G07	0.0844	3.8	01Jul2015, 12:24	0.92
G07-G08	0.0844	3.7	01Jul2015, 12:36	0.90
G16	0.3141	7.4	01Jul2015, 12:54	2.8

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HISTORIC SCS (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
OS06	0.1313	0.52	01Jul2015, 13:30	0.34
OS06-G02	0.1313	0.52	01Jul2015, 14:00	0.32
OS05	0.0578	0.23	01Jul2015, 13:24	0.15
OS05-G01	0.0578	0.23	01Jul2015, 13:42	0.15
HG01	0.0547	0.22	01Jul2015, 13:36	0.14
G01	0.1125	0.45	01Jul2015, 13:36	0.29
G01-G02	0.1125	0.45	01Jul2015, 14:06	0.27
HG02	0.0906	0.36	01Jul2015, 13:42	0.23
G02	0.3344	1.3	01Jul2015, 14:00	0.83
G02-G03	0.3344	1.3	01Jul2015, 14:30	0.77
HG03	0.1828	0.72	01Jul2015, 13:54	0.48
OS07	0.0328	0.26	01Jul2015, 12:54	0.13
OS07-G03	0.0328	0.26	01Jul2015, 14:12	0.11
G03	0.5500	2.3	01Jul2015, 14:24	1.4
G03-G04	0.5500	2.3	01Jul2015, 14:42	1.3
OS09	0.1547	1.9	01Jul2015, 12:54	0.81
OS09-G04	0.1547	1.9	01Jul2015, 13:18	0.78
HG04	0.0891	0.34	01Jul2015, 13:48	0.23
HG05	0.1125	0.43	01Jul2015, 13:54	0.29
OS08	0.0406	0.72	01Jul2015, 12:24	0.24
OS08-G04	0.0406	0.72	01Jul2015, 13:36	0.23
G04	0.9469	4.7	01Jul2015, 14:36	2.8
G04-G05	0.9469	4.7	01Jul2015, 14:48	2.8
HG06A	0.1375	0.51	01Jul2015, 14:12	0.34
G05	1.0844	5.2	01Jul2015, 14:48	3.1
G05-G06	1.0844	5.2	01Jul2015, 15:00	3.0
HG06B	0.1031	0.37	01Jul2015, 14:24	0.26
G06	1.1875	5.5	01Jul2015, 15:00	3.3
HG14	0.2297	0.84	01Jul2015, 14:18	0.57
HG13	0.0844	0.65	01Jul2015, 13:00	0.33
G07	0.0844	0.65	01Jul2015, 13:00	0.33
G07-G08	0.0844	0.64	01Jul2015, 13:18	0.32
G16	0.3141	1.4	01Jul2015, 13:54	0.89

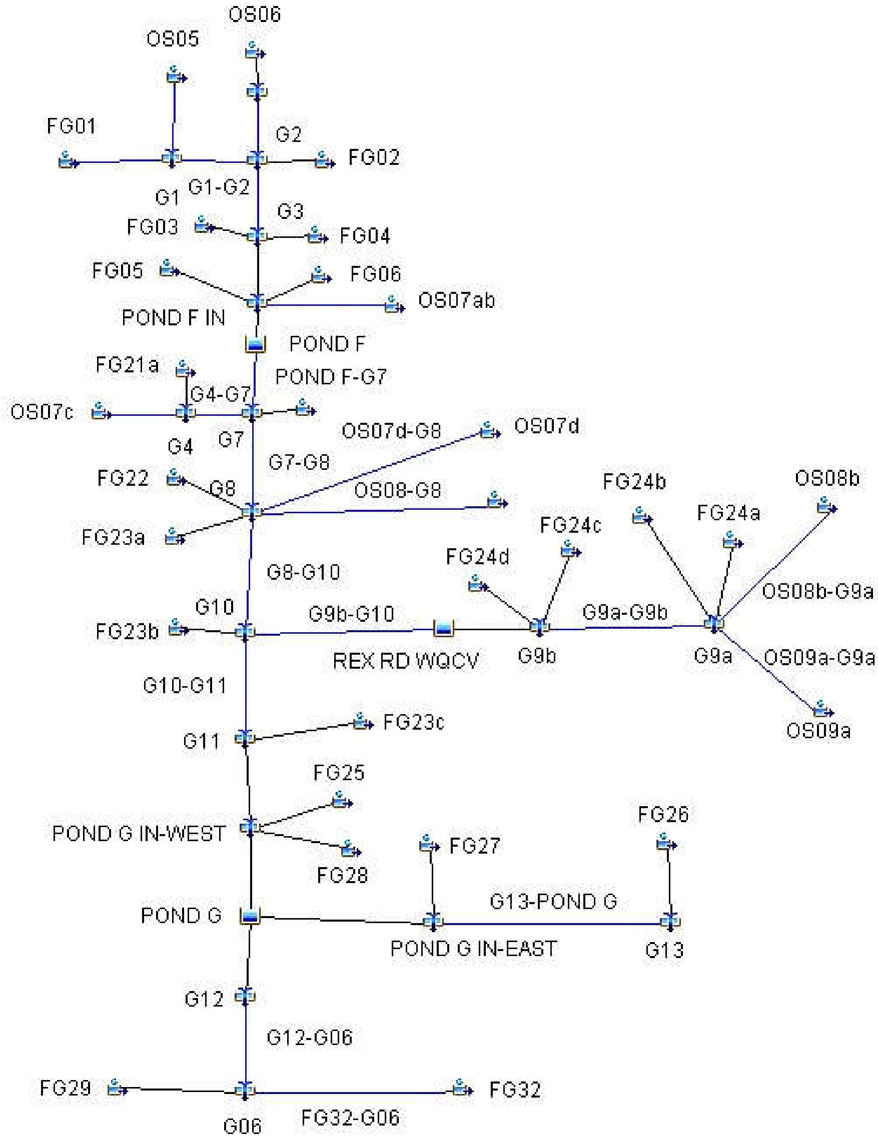
FUTURE SCS (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
OS06	0.1313	80	01Jul2015, 12:12	9.3
G1a	0.1313	80	01Jul2015, 12:12	9.3
G1a-G2	0.1313	79	01Jul2015, 12:18	9.2
OS05	0.0578	39	01Jul2015, 12:12	4.1
OS05-G1	0.0578	39	01Jul2015, 12:12	4.1
FG01	0.0538	31	01Jul2015, 12:30	4.9
FG01-G1	0.0538	31	01Jul2015, 12:30	4.9
G1	0.1116	61	01Jul2015, 12:18	9.0
G1-G2	0.1116	61	01Jul2015, 12:18	9.0
FG02	0.0391	32	01Jul2015, 12:12	3.3
G2	0.2820	167	01Jul2015, 12:18	21
G2-G3	0.2820	162	01Jul2015, 12:18	21
FG03	0.0203	24	01Jul2015, 12:06	2.0
FG04	0.0172	22	01Jul2015, 12:00	1.7
G3	0.3195	184	01Jul2015, 12:18	25
FG06	0.0675	56	01Jul2015, 12:12	6.1
FG05	0.0580	45	01Jul2015, 12:24	6.1
OS07ab	0.0170	12	01Jul2015, 12:06	1.2
OS07ab-POND F	0.0170	12	01Jul2015, 12:18	1.2
POND F IN	0.4620	292	01Jul2015, 12:18	38
POND F	0.4620	177	01Jul2015, 12:42	36
POND F-G7	0.4620	177	01Jul2015, 12:42	36
OS07c	0.0296	19	01Jul2015, 12:12	2.1
OS07c-G4	0.0296	18	01Jul2015, 12:18	2.1
FG21a	0.0095	5.9	01Jul2015, 12:18	0.7
G4	0.0391	24	01Jul2015, 12:18	2.8
G4-G7	0.0391	23	01Jul2015, 12:18	2.8
FG21b	0.0150	21	01Jul2015, 12:06	1.8
G7	0.5161	194	01Jul2015, 12:42	40
G7-G8	0.5161	194	01Jul2015, 12:42	40
FG22	0.1354	121	01Jul2015, 12:12	14
OS08a	0.0251	16	01Jul2015, 12:12	1.8
OS08-G8	0.0251	16	01Jul2015, 12:18	1.8
FG23a	0.0216	21	01Jul2015, 12:12	2.2
OS07d	0.0034	2.5	01Jul2015, 12:06	0.2
OS07d-G8	0.0034	2.4	01Jul2015, 12:12	0.2
G8	0.7016	276	01Jul2015, 12:30	58
G8-G10	0.7016	275	01Jul2015, 12:36	58
FG24b	0.0589	52	01Jul2015, 12:24	7.1
FG24a	0.0348	24	01Jul2015, 12:18	2.9
OS08b	0.0165	9.5	01Jul2015, 12:18	1.2
OS08b-G9a	0.0165	9.4	01Jul2015, 12:30	1.1
OS09a	0.0093	5.3	01Jul2015, 12:18	0.7
OS09a-G9a	0.0093	5.2	01Jul2015, 12:30	0.6
G9a	0.1195	87	01Jul2015, 12:24	12

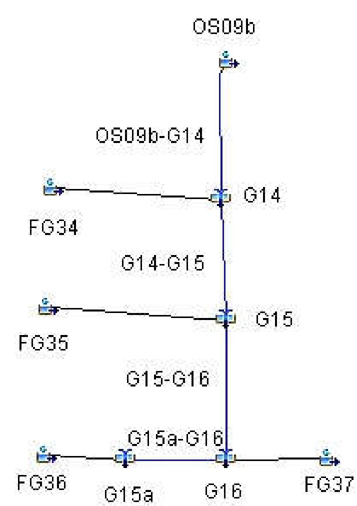
Highlighted green rows reference key design points (Typical all charts this section)

FUTURE SCS (100-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	TIME OF PEAK	TOTAL VOLUME Q100 (AC. FT.)
G9a-G9b	0.1195	85	01Jul2015, 12:24	12
FG24c	0.0291	37	01Jul2015, 12:12	3.7
FG24d	0.0258	39	01Jul2015, 12:06	3.2
G9b	0.1744	132	01Jul2015, 12:12	19
REX RD WQCV	0.1744	132	01Jul2015, 12:18	19
G9b-G10	0.1744	131	01Jul2015, 12:18	19
FG23b	0.0236	17	01Jul2015, 12:12	1.7
G10	0.8996	391	01Jul2015, 12:30	78
G10-G11	0.8996	389	01Jul2015, 12:36	78
FG23c	0.0109	9.2	01Jul2015, 12:12	0.94
G11	0.9105	392	01Jul2015, 12:36	78
FG25	0.1084	111	01Jul2015, 12:18	13
FG28	0.0184	15	01Jul2015, 12:12	1.5
POND G IN-WEST	1.0373	484	01Jul2015, 12:30	93
FG27	0.0679	98	01Jul2015, 12:12	11
FG26	0.0567	58	01Jul2015, 12:18	7.2
G13	0.0567	58	01Jul2015, 12:18	7.2
G13-POND G	0.0567	57	01Jul2015, 12:24	7.2
POND G IN-EAST	0.1246	153	01Jul2015, 12:18	19
POND G	1.1619	443	01Jul2015, 12:54	102
G12	1.1619	443	01Jul2015, 12:54	102
G12-G06	1.1619	443	01Jul2015, 12:54	101
FG29	0.0983	60	01Jul2015, 12:12	7.0
FG32	0.0402	17	01Jul2015, 12:30	2.8
FG32-G06	0.0402	17	01Jul2015, 12:30	2.8
G06	1.3004	474	01Jul2015, 12:54	111
OS09b	0.0435	19	01Jul2015, 12:30	3.1
OS09b-G14	0.0435	18	01Jul2015, 12:36	3.0
FG34	0.0275	18	01Jul2015, 12:18	2.2
G14	0.0710	32	01Jul2015, 12:24	5.2
G14-G15	0.0710	32	01Jul2015, 12:30	5.1
FG35	0.0293	24	01Jul2015, 12:06	2.4
G15	0.1003	43	01Jul2015, 12:24	7.5
G15-G16	0.1003	43	01Jul2015, 12:30	7.4
FG37	0.0746	46	01Jul2015, 12:18	5.6
FG36	0.0299	17	01Jul2015, 12:18	2.3
G15a	0.0299	17	01Jul2015, 12:18	2.3
G15a-G16	0.0299	17	01Jul2015, 12:24	2.3
G16	0.2048	99	01Jul2015, 12:24	15

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

FUTURE CONDITIONS





FUTURE SCS (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
OS06	0.1313	52	01Jul2015, 12:12	6.5
G1a	0.1313	52	01Jul2015, 12:12	6.5
G1a-G2	0.1313	52	01Jul2015, 12:18	6.5
OS05	0.0578	26	01Jul2015, 12:12	2.9
OS05-G1	0.0578	25	01Jul2015, 12:12	2.9
FG01	0.0538	22	01Jul2015, 12:30	3.6
FG01-G1	0.0538	22	01Jul2015, 12:30	3.6
G1	0.1116	41	01Jul2015, 12:18	6.4
G1-G2	0.1116	41	01Jul2015, 12:18	6.4
FG02	0.0391	22	01Jul2015, 12:12	2.4
G2	0.2820	112	01Jul2015, 12:18	15
G2-G3	0.2820	109	01Jul2015, 12:24	15
FG03	0.0203	17	01Jul2015, 12:06	1.5
FG04	0.0172	16	01Jul2015, 12:00	1.3
G3	0.3195	122	01Jul2015, 12:18	18
FG06	0.0675	40	01Jul2015, 12:12	4.4
FG05	0.0580	33	01Jul2015, 12:24	4.6
OS07ab	0.0170	7.9	01Jul2015, 12:12	0.9
OS07ab-POND F	0.0170	7.6	01Jul2015, 12:24	0.8
POND F IN	0.4620	199	01Jul2015, 12:18	28
POND F	0.4620	121	01Jul2015, 12:42	26
POND F-G7	0.4620	120	01Jul2015, 12:48	26
OS07c	0.0296	12	01Jul2015, 12:12	1.5
OS07c-G4	0.0296	12	01Jul2015, 12:18	1.5
FG21a	0.0095	4.0	01Jul2015, 12:18	0.5
G4	0.0391	16	01Jul2015, 12:18	2.0
G4-G7	0.0391	16	01Jul2015, 12:24	2.0
FG21b	0.0150	16	01Jul2015, 12:06	1.4
G7	0.5161	131	01Jul2015, 12:48	29
G7-G8	0.5161	130	01Jul2015, 12:48	29
FG22	0.1354	88	01Jul2015, 12:12	10
OS08a	0.0251	11	01Jul2015, 12:12	1.3
OS08-G8	0.0251	10	01Jul2015, 12:18	1.2
FG23a	0.0216	15	01Jul2015, 12:12	1.6
OS07d	0.0034	1.6	01Jul2015, 12:06	0.2
OS07d-G8	0.0034	1.6	01Jul2015, 12:18	0.2
G8	0.7016	176	01Jul2015, 12:42	42
G8-G10	0.7016	175	01Jul2015, 12:48	42
FG24b	0.0589	39	01Jul2015, 12:24	5.4
FG24a	0.0348	16	01Jul2015, 12:18	2.1
OS08b	0.0165	6.3	01Jul2015, 12:18	0.8
OS08b-G9a	0.0165	6.0	01Jul2015, 12:36	0.8
OS09a	0.0093	3.5	01Jul2015, 12:18	0.5
OS09a-G9a	0.0093	3.4	01Jul2015, 12:30	0.5
G9a	0.1195	61	01Jul2015, 12:24	8.7

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

FUTURE SCS (50-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q50 (CFS)	TIME OF PEAK	TOTAL VOLUME Q50 (AC. FT.)
G9a-G9b	0.1195	60	01Jul2015, 12:30	8.7
FG24c	0.0291	28	01Jul2015, 12:12	2.9
FG24d	0.0258	30	01Jul2015, 12:06	2.5
G9b	0.1744	97	01Jul2015, 12:12	14
REX RD WQCV	0.1744	96	01Jul2015, 12:18	14
G9b-G10	0.1744	96	01Jul2015, 12:18	14
FG23b	0.0236	11	01Jul2015, 12:12	1.2
G10	0.8996	242	01Jul2015, 12:42	57
G10-G11	0.8996	240	01Jul2015, 12:24	56
FG23c	0.0109	6.5	01Jul2015, 12:12	0.7
G11	0.9105	245	01Jul2015, 12:24	57
FG25	0.1084	84	01Jul2015, 12:18	10
FG28	0.0184	10	01Jul2015, 12:12	1.1
POND G IN-WEST	1.0373	330	01Jul2015, 12:24	69
FG27	0.0679	79	01Jul2015, 12:12	9.1
FG26	0.0567	44	01Jul2015, 12:18	5.6
G13	0.0567	44	01Jul2015, 12:18	5.6
G13-POND G	0.0567	43	01Jul2015, 12:24	5.5
POND G IN-EAST	0.1246	121	01Jul2015, 12:18	15
POND G	1.1619	288	01Jul2015, 13:00	74
G12	1.1619	288	01Jul2015, 13:00	74
G12-G06	1.1619	286	01Jul2015, 13:06	73
FG29	0.0983	39	01Jul2015, 12:18	5.0
FG32	0.0402	11	01Jul2015, 12:30	2.0
FG32-G06	0.0402	11	01Jul2015, 12:36	2.0
G06	1.3004	305	01Jul2015, 13:00	80
OS09b	0.0435	12	01Jul2015, 12:30	2.2
OS09b-G14	0.0435	12	01Jul2015, 12:36	2.1
FG34	0.0275	12	01Jul2015, 12:18	1.6
G14	0.0710	21	01Jul2015, 12:24	3.7
G14-G15	0.0710	21	01Jul2015, 12:36	3.6
FG35	0.0293	16	01Jul2015, 12:12	1.7
G15	0.1003	28	01Jul2015, 12:30	5.3
G15-G16	0.1003	28	01Jul2015, 12:36	5.3
FG37	0.0746	31	01Jul2015, 12:18	4.0
FG36	0.0299	12	01Jul2015, 12:18	1.6
G15a	0.0299	12	01Jul2015, 12:18	1.6
G15a-G16	0.0299	11	01Jul2015, 12:24	1.6
G16	0.2048	63	01Jul2015, 12:24	11

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

FUTURE SCS (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
OS06	0.1313	12	01Jul2015, 12:18	2.2
G1a	0.1313	12	01Jul2015, 12:18	2.2
G1a-G2	0.1313	11	01Jul2015, 12:24	2.1
OS05	0.0578	5.6	01Jul2015, 12:12	1.0
OS05-G1	0.0578	5.5	01Jul2015, 12:18	1.0
FG01	0.0538	7.0	01Jul2015, 12:36	1.4
FG01-G1	0.0538	7.0	01Jul2015, 12:36	1.4
G1	0.1116	11	01Jul2015, 12:24	2.3
G1-G2	0.1116	11	01Jul2015, 12:30	2.3
FG02	0.0391	6.4	01Jul2015, 12:12	0.9
G2	0.2820	27	01Jul2015, 12:24	5.4
G2-G3	0.2820	27	01Jul2015, 12:30	5.3
FG03	0.0203	5.9	01Jul2015, 12:06	0.6
FG04	0.0172	5.8	01Jul2015, 12:06	0.5
G3	0.3195	31	01Jul2015, 12:30	6.4
FG06	0.0675	12	01Jul2015, 12:18	1.7
FG05	0.0580	12	01Jul2015, 12:24	2.0
OS07ab	0.0170	1.8	01Jul2015, 12:12	0.3
OS07ab-POND F	0.0170	1.7	01Jul2015, 12:30	0.3
POND F IN	0.4620	53	01Jul2015, 12:30	10
POND F	0.4620	16	01Jul2015, 13:48	9.0
POND F-G7	0.4620	16	01Jul2015, 13:54	8.9
OS07c	0.0296	2.7	01Jul2015, 12:18	0.5
OS07c-G4	0.0296	2.7	01Jul2015, 12:30	0.5
FG21a	0.0095	1.0	01Jul2015, 12:24	0.2
G4	0.0391	3.5	01Jul2015, 12:30	0.7
G4-G7	0.0391	3.5	01Jul2015, 12:30	0.7
FG21b	0.0150	6.5	01Jul2015, 12:06	0.6
G7	0.5161	18	01Jul2015, 13:36	10
G7-G8	0.5161	18	01Jul2015, 13:42	10
FG22	0.1354	32	01Jul2015, 12:18	4.3
OS08a	0.0251	2.3	01Jul2015, 12:18	0.4
OS08-G8	0.0251	2.3	01Jul2015, 12:24	0.4
FG23a	0.0216	5.2	01Jul2015, 12:12	0.7
OS07d	0.0034	0.4	01Jul2015, 12:12	0.1
OS07d-G8	0.0034	0.4	01Jul2015, 12:24	0.1
G8	0.7016	46	01Jul2015, 12:18	16
G8-G10	0.7016	45	01Jul2015, 12:24	15
FG24b	0.0589	16	01Jul2015, 12:24	2.5
FG24a	0.0348	4.5	01Jul2015, 12:18	0.8
OS08b	0.0165	1.4	01Jul2015, 12:18	0.3
OS08b-G9a	0.0165	1.4	01Jul2015, 12:42	0.3
OS09a	0.0093	0.8	01Jul2015, 12:24	0.2
OS09a-G9a	0.0093	0.8	01Jul2015, 12:42	0.2
G9a	0.1195	21	01Jul2015, 12:24	3.6

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

FUTURE SCS (10-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q10 (CFS)	TIME OF PEAK	TOTAL VOLUME Q10 (AC. FT.)
G9a-G9b	0.1195	20	01Jul2015, 12:30	3.6
FG24c	0.0291	13	01Jul2015, 12:12	1.3
FG24d	0.0258	13	01Jul2015, 12:06	1.2
G9b	0.1744	37	01Jul2015, 12:18	6.1
REX RD WQCV	0.1744	38	01Jul2015, 12:18	6.0
G9b-G10	0.1744	37	01Jul2015, 12:18	6.0
FG23b	0.0236	2.7	01Jul2015, 12:12	0.4
G10	0.8996	83	01Jul2015, 12:24	22
G10-G11	0.8996	81	01Jul2015, 12:30	21
FG23c	0.0109	1.9	01Jul2015, 12:12	0.3
G11	0.9105	83	01Jul2015, 12:30	22
FG25	0.1084	36	01Jul2015, 12:18	4.7
FG28	0.0184	3.0	01Jul2015, 12:12	0.4
POND G IN-WEST	1.0373	115	01Jul2015, 12:30	27
FG27	0.0679	42	01Jul2015, 12:18	4.9
FG26	0.0567	19	01Jul2015, 12:18	2.6
G13	0.0567	19	01Jul2015, 12:18	2.6
G13-POND G	0.0567	19	01Jul2015, 12:24	2.6
POND G IN-EAST	0.1246	60	01Jul2015, 12:18	7.5
POND G	1.1619	50	01Jul2015, 13:54	26
G12	1.1619	50	01Jul2015, 13:54	26
G12-G06	1.1619	50	01Jul2015, 14:00	26
FG29	0.0983	8.9	01Jul2015, 12:18	1.7
FG32	0.0402	2.6	01Jul2015, 12:36	0.66
FG32-G06	0.0402	2.6	01Jul2015, 12:42	0.65
G06	1.3004	53	01Jul2015, 14:00	28
OS09b	0.0435	2.8	01Jul2015, 12:36	0.71
OS09b-G14	0.0435	2.8	01Jul2015, 12:48	0.70
FG34	0.0275	3.1	01Jul2015, 12:24	0.56
G14	0.0710	5.0	01Jul2015, 12:30	1.3
G14-G15	0.0710	4.9	01Jul2015, 12:48	1.2
FG35	0.0293	4.5	01Jul2015, 12:12	0.61
G15	0.1003	6.7	01Jul2015, 12:42	1.8
G15-G16	0.1003	6.7	01Jul2015, 12:54	1.8
FG37	0.0746	7.5	01Jul2015, 12:18	1.4
FG36	0.0299	3.0	01Jul2015, 12:24	0.57
G15a	0.0299	3.0	01Jul2015, 12:24	0.57
G15a-G16	0.0299	2.9	01Jul2015, 12:36	0.56
G16	0.2048	14	01Jul2015, 12:24	3.7

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

FUTURE SCS (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	3.7	01Jul2015, 12:36	1.1
OS05	0.0578	1.8	01Jul2015, 12:18	0.49
OS05-G1	0.0578	1.7	01Jul2015, 12:24	0.49
FG01	0.0538	3.4	01Jul2015, 12:36	0.81
FG01-G1	0.0538	3.4	01Jul2015, 12:36	0.81
G1	0.1116	4.9	01Jul2015, 12:36	1.3
G1-G2	0.1116	4.8	01Jul2015, 12:36	1.3
FG02	0.0391	2.7	01Jul2015, 12:18	0.50
G2	0.2820	10	01Jul2015, 12:30	2.9
G2-G3	0.2820	10	01Jul2015, 12:42	2.9
FG03	0.0203	3.0	01Jul2015, 12:06	0.36
FG04	0.0172	3.1	01Jul2015, 12:06	0.31
G3	0.3195	12	01Jul2015, 12:42	3.5
FG06	0.0675	5.8	01Jul2015, 12:18	1.0
FG05	0.0580	6.7	01Jul2015, 12:30	1.2
OS07ab	0.0170	0.5	01Jul2015, 12:18	0.15
OS07ab-POND F	0.0170	0.5	01Jul2015, 12:42	0.14
POND F IN	0.4620	23	01Jul2015, 12:36	5.9
POND F	0.4620	8.0	01Jul2015, 14:18	4.8
POND F-G7	0.4620	8.0	01Jul2015, 14:24	4.8
OS07c	0.0296	0.9	01Jul2015, 12:24	0.25
OS07c-G4	0.0296	0.9	01Jul2015, 12:36	0.24
FG21a	0.0095	0.4	01Jul2015, 12:24	0.10
G4	0.0391	1.2	01Jul2015, 12:36	0.34
G4-G7	0.0391	1.2	01Jul2015, 12:42	0.34
FG21b	0.0150	3.9	01Jul2015, 12:06	0.40
G7	0.5161	8.9	01Jul2015, 14:18	5.5
G7-G8	0.5161	8.9	01Jul2015, 14:18	5.5
FG22	0.1354	17	01Jul2015, 12:18	2.6
OS08a	0.0251	0.7	01Jul2015, 12:24	0.21
OS08-G8	0.0251	0.7	01Jul2015, 12:30	0.21
FG23a	0.0216	2.7	01Jul2015, 12:18	0.40
OS07d	0.0034	0.1	01Jul2015, 12:18	0.03
OS07d-G8	0.0034	0.1	01Jul2015, 12:30	0.03
G8	0.7016	24	01Jul2015, 12:18	8.7
G8-G10	0.7016	24	01Jul2015, 12:30	8.5
FG24b	0.0589	10	01Jul2015, 12:24	1.6
FG24a	0.0348	2.0	01Jul2015, 12:24	0.43
OS08b	0.0165	0.5	01Jul2015, 12:24	0.14
OS08b-G9a	0.0165	0.5	01Jul2015, 13:00	0.13
OS09a	0.0093	0.3	01Jul2015, 12:30	0.08
OS09a-G9a	0.0093	0.3	01Jul2015, 13:00	0.07
G9a	0.1195	12	01Jul2015, 12:24	2.2

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

FUTURE SCS (5-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q5 (CFS)	TIME OF PEAK	TOTAL VOLUME Q5 (AC. FT.)
G9a-G9b	0.1195	12	01Jul2015, 12:30	2.2
FG24c	0.0291	7.9	01Jul2015, 12:12	0.90
FG24d	0.0258	8.1	01Jul2015, 12:06	0.77
G9b	0.1744	22	01Jul2015, 12:18	3.9
REX RD WQCV	0.1744	22	01Jul2015, 12:18	3.8
G9b-G10	0.1744	21	01Jul2015, 12:24	3.8
FG23b	0.0236	0.91	01Jul2015, 12:18	0.22
G10	0.8996	45	01Jul2015, 12:30	12
G10-G11	0.8996	43	01Jul2015, 12:36	12
FG23c	0.0109	0.84	01Jul2015, 12:18	0.15
G11	0.9105	44	01Jul2015, 12:36	13
FG25	0.1084	22	01Jul2015, 12:18	3.1
FG28	0.0184	1.2	01Jul2015, 12:12	0.22
POND G IN-WEST	1.0373	61	01Jul2015, 12:36	16
FG27	0.0679	30	01Jul2015, 12:18	3.5
FG26	0.0567	12	01Jul2015, 12:24	1.7
G13	0.0567	12	01Jul2015, 12:24	1.7
G13-POND G	0.0567	12	01Jul2015, 12:24	1.7
POND G IN-EAST	0.1246	41	01Jul2015, 12:18	5.3
POND G	1.1619	19	01Jul2015, 15:48	14
G12	1.1619	19	01Jul2015, 15:48	14
G12-G06	1.1619	19	01Jul2015, 15:54	14
FG29	0.0983	2.9	01Jul2015, 12:24	0.86
FG32	0.0402	0.9	01Jul2015, 12:48	0.34
FG32-G06	0.0402	0.9	01Jul2015, 12:54	0.33
G06	1.3004	20	01Jul2015, 15:48	15
OS09b	0.0435	1.0	01Jul2015, 12:48	0.36
OS09b-G14	0.0435	1.0	01Jul2015, 13:00	0.36
FG34	0.0275	1.3	01Jul2015, 12:24	0.31
G14	0.0710	1.9	01Jul2015, 12:48	0.66
G14-G15	0.0710	1.9	01Jul2015, 13:06	0.64
FG35	0.0293	1.7	01Jul2015, 12:12	0.34
G15	0.1003	2.6	01Jul2015, 13:00	0.98
G15-G16	0.1003	2.6	01Jul2015, 13:12	0.95
FG37	0.0746	2.7	01Jul2015, 12:24	0.72
FG36	0.0299	1.2	01Jul2015, 12:30	0.31
G15a	0.0299	1.2	01Jul2015, 12:30	0.31
G15a-G16	0.0299	1.1	01Jul2015, 12:42	0.30
G16	0.2048	5.1	01Jul2015, 13:06	2.0

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

FUTURE SCS (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
OS06	0.1313	0.5	01Jul2015, 13:30	0.34
G1a	0.1313	0.5	01Jul2015, 13:30	0.34
G1a-G2	0.1313	0.5	01Jul2015, 13:48	0.33
OS05	0.0578	0.2	01Jul2015, 13:24	0.15
OS05-G1	0.0578	0.2	01Jul2015, 13:30	0.15
FG01	0.0538	0.9	01Jul2015, 12:48	0.35
FG01-G1	0.0538	0.9	01Jul2015, 12:48	0.35
G1	0.1116	1.1	01Jul2015, 12:54	0.50
G1-G2	0.1116	1.1	01Jul2015, 13:00	0.49
FG02	0.0391	0.5	01Jul2015, 12:30	0.20
G2	0.2820	1.9	01Jul2015, 13:18	1.0
G2-G3	0.2820	1.9	01Jul2015, 13:30	0.99
FG03	0.0203	0.8	01Jul2015, 12:12	0.16
FG04	0.0172	0.9	01Jul2015, 12:06	0.14
G3	0.3195	2.4	01Jul2015, 13:24	1.3
FG06	0.0675	1.3	01Jul2015, 12:24	0.42
FG05	0.0580	2.4	01Jul2015, 12:30	0.59
OS07ab	0.0170	0.1	01Jul2015, 13:18	0.04
OS07ab-POND F	0.0170	0.1	01Jul2015, 14:06	0.04
POND F IN	0.4620	5.0	01Jul2015, 12:48	2.4
POND F	0.4620	2.1	01Jul2015, 17:54	1.5
POND F-G7	0.4620	2.1	01Jul2015, 18:06	1.5
OS07c	0.0296	0.1	01Jul2015, 13:30	0.08
OS07c-G4	0.0296	0.1	01Jul2015, 13:54	0.07
FG21a	0.0095	0.1	01Jul2015, 13:06	0.03
G4	0.0391	0.2	01Jul2015, 13:42	0.11
G4-G7	0.0391	0.2	01Jul2015, 13:48	0.11
FG21b	0.0150	1.7	01Jul2015, 12:12	0.21
G7	0.5161	2.3	01Jul2015, 17:48	1.8
G7-G8	0.5161	2.3	01Jul2015, 17:54	1.8
FG22	0.1354	5.4	01Jul2015, 12:24	1.2
OS08a	0.0251	0.1	01Jul2015, 13:30	0.07
OS08-G8	0.0251	0.1	01Jul2015, 13:36	0.06
FG23a	0.0216	0.8	01Jul2015, 12:18	0.19
OS07d	0.0034	0.01	01Jul2015, 13:18	0.01
OS07d-G8	0.0034	0.01	01Jul2015, 13:36	0.01
G8	0.7016	7.7	01Jul2015, 12:18	3.3
G8-G10	0.7016	7.6	01Jul2015, 12:42	3.1
FG24b	0.0589	4.3	01Jul2015, 12:30	0.85
FG24a	0.0348	0.4	01Jul2015, 12:48	0.17
OS08b	0.0165	0.1	01Jul2015, 13:36	0.04
OS08b-G9a	0.0165	0.1	01Jul2015, 14:24	0.04
OS09a	0.0093	0.04	01Jul2015, 13:36	0.02
OS09a-G9a	0.0093	0.04	01Jul2015, 14:24	0.02
G9a	0.1195	4.7	01Jul2015, 12:30	1.1

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

FUTURE SCS (2-YEAR)				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q2 (CFS)	TIME OF PEAK	TOTAL VOLUME Q2 (AC. FT.)
G9a-G9b	0.1195	4.6	01Jul2015, 12:36	1.1
FG24c	0.0291	3.7	01Jul2015, 12:12	0.49
FG24d	0.0258	3.7	01Jul2015, 12:06	0.42
G9b	0.1744	9.2	01Jul2015, 12:18	2.0
REX RD WQCV	0.1744	9.0	01Jul2015, 12:24	1.9
G9b-G10	0.1744	8.8	01Jul2015, 12:30	1.9
FG23b	0.0236	0.1	01Jul2015, 13:06	0.07
G10	0.8996	15	01Jul2015, 12:42	5.1
G10-G11	0.8996	15	01Jul2015, 12:48	5.0
FG23c	0.0109	0.2	01Jul2015, 12:24	0.06
G11	0.9105	15	01Jul2015, 12:48	5.0
FG25	0.1084	9.9	01Jul2015, 12:24	1.7
FG28	0.0184	0.2	01Jul2015, 12:36	0.09
POND G IN-WEST	1.0373	22	01Jul2015, 12:48	6.8
FG27	0.0679	18	01Jul2015, 12:18	2.2
FG26	0.0567	5.6	01Jul2015, 12:24	0.95
G13	0.0567	5.6	01Jul2015, 12:24	0.95
G13-POND G	0.0567	5.6	01Jul2015, 12:30	0.94
POND G IN-EAST	0.1246	23	01Jul2015, 12:18	3.2
POND G	1.1619	5.2	02Jul2015, 00:00	4.6
G12	1.1619	5.2	02Jul2015, 00:00	4.6
G12-G06	1.1619	5.2	02Jul2015, 00:00	4.4
FG29	0.0983	0.4	01Jul2015, 13:30	0.27
FG32	0.0402	0.2	01Jul2015, 13:54	0.10
FG32-G06	0.0402	0.2	01Jul2015, 14:06	0.10
G06	1.3004	5.5	01Jul2015, 23:48	4.8
OS09b	0.0435	0.2	01Jul2015, 13:54	0.11
OS09b-G14	0.0435	0.2	01Jul2015, 14:12	0.11
FG34	0.0275	0.2	01Jul2015, 13:00	0.11
G14	0.0710	0.3	01Jul2015, 13:48	0.22
G14-G15	0.0710	0.3	01Jul2015, 14:12	0.20
FG35	0.0293	0.3	01Jul2015, 12:48	0.12
G15	0.1003	0.5	01Jul2015, 14:06	0.33
G15-G16	0.1003	0.5	01Jul2015, 14:30	0.31
FG37	0.0746	0.4	01Jul2015, 13:12	0.24
FG36	0.0299	0.2	01Jul2015, 13:12	0.11
G15a	0.0299	0.2	01Jul2015, 13:12	0.11
G15a-G16	0.0299	0.2	01Jul2015, 13:30	0.10
G16	0.2048	1.0	01Jul2015, 14:18	0.66

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

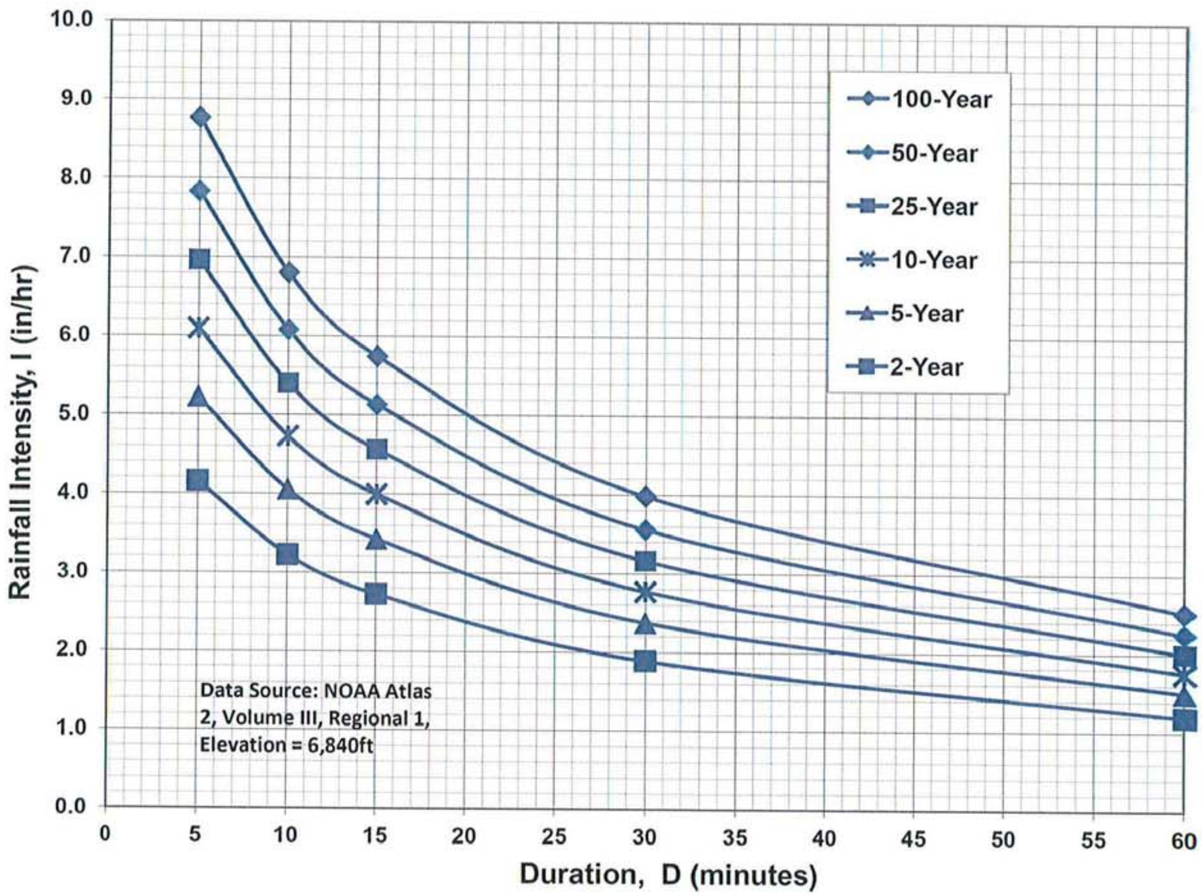
Appendix B – Rational Calculations

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 North PDR** 8/31/2023

BASIN DESIGNATION	AREA (AC.)										COMPOSITE FACTOR		Percent Impervious
	UNDEV	1 DU/AC	2 DU/AC	3 DU/AC	4 DU/AC	5 DU/AC	STREETS	OPEN SPACE PARKS/GC LAWNS	COMM	TOTAL	5-year	100-year	
OS1		4.1								4.1	**0.20**	**0.44**	**20.0%**
OS2	1.5	1.2	0.3				0.5	0.7	1.3	5.3	**0.39**	**0.57**	**37.6%**
OS3	2.3				2.8		4.0	0.8		9.9	**0.49**	**0.65**	**51.9%**
OS4	34				2.3	2.4				39	**0.12**	**0.38**	**5.1%**
OS5	4.0				1.3	1.4				6.6	**0.18**	**0.42**	**16.7%**
A01				5.4						5.4	**0.25**	**0.47**	**30.0%**
A02					3.0					3.0	**0.30**	**0.50**	**40.0%**
A03				3.2						3.2	**0.25**	**0.47**	**30.0%**
A04			0.4	2.9						3.4	**0.25**	**0.47**	**29.3%**
A05			2.2		3.5			0.1		5.8	**0.27**	**0.48**	**33.9%**
A06					4.1					4.1	**0.30**	**0.50**	**40.0%**
A07						3.6				3.6	**0.35**	**0.53**	**43.0%**
A08	0.2				3.4	2.1				5.7	**0.31**	**0.51**	**39.9%**
A09							0.2			0.24	**0.90**	**0.96**	**100.0%**
B01						6.4				6.4	**0.35**	**0.53**	**43.0%**
B02						6.2				6.2	**0.35**	**0.53**	**43.0%**
B03						4.6				4.6	**0.35**	**0.53**	**43.0%**
B04						9.5				9.5	**0.35**	**0.53**	**43.0%**
B05						3.0				3.0	**0.35**	**0.53**	**43.0%**
B06						6.6				6.6	**0.35**	**0.53**	**43.0%**
C01					7.1					7.1	**0.30**	**0.50**	**40.0%**
C02					7.1					7.1	**0.30**	**0.50**	**40.0%**
C03					4.4					4.4	**0.30**	**0.50**	**40.0%**
										153.9		**Composite:**	**30.2%**
TOTAL	42.0	5.2	3.0	11.5	39.0	45.7	4.7	1.5	1.3	153.9	**0.27**	**0.48**	**30.2%**

PROJECT: **Rolling Hills Ranch North PDR** DATE: 8/31/2023

TIME OF CONCENTRATION																	
SUBBASIN DATA			INIT./OVERLAND TIME (T_i)				TRAVEL TIME (T_t)							TOTAL	Tc Check (Urbanized Basins)		FINAL T_c
BASIN DESIGNATION	C_5	AREA (AC)	LENGTH (FT)	ΔH	SLOPE %	Ti (Min.)*	LENGTH (FT)	ΔH	SLOPE %	CONVEYANCE TYPE	CONVEYANCE COEF.	VEL (FPS)	Tt (Min.)**	Ti+Tt (Min.)	L (FT)	Tc = (L/180) + 10	(min)
OS1	0.20	4	335	16.0	4.8%	17.9	230	4	1.7%	L	7	0.9	4.2	22.1	565.00	13.1	**13.1**
OS2	0.39	5	405	16.0	4.0%	16.6	1400	37	2.6%	P	20	3.3	7.2	23.8	1805.00	20.0	**20.0**
OS3	0.49	10	50	1.0	2.0%	6.3	2070	40	1.9%	P	20	2.8	12.5	18.8	2120.00	21.8	**18.8**
OS4	0.12	39	420	20.0	4.8%	21.9	3270	73	2.2%	G	15	2.2	24.3	46.2	3690.00	30.5	**30.5**
OS5	0.18	7	195	11.0	5.6%	13.2	615	26	4.2%	G	15	3.1	3.3	16.5	810.00	14.5	**14.5**
A01	0.25	5	145	5.5	3.8%	12.0	855	19.5	2.3%	P	20	3.0	4.7	16.8	1000.00	15.6	**15.6**
A02	0.30	3	25	0.5	2.0%	5.8	680	14.0	2.1%	P	20	2.9	3.9	9.8	705.00	13.9	**9.8**
A03	0.25	3	150	8.0	5.3%	10.9	705	16.5	2.3%	P	20	3.1	3.8	14.8	855.00	14.8	**14.8**
A04	0.25	3	220	7.0	3.2%	15.8	390	10.5	2.7%	P	20	3.3	2.0	17.8	610.00	13.4	**13.4**
A05	0.27	6	330	10.0	3.0%	19.1	675	16.0	2.4%	P	20	3.1	3.7	22.8	1005.00	15.6	**15.6**
A06	0.30	4	25	0.5	2.0%	5.8	830	12.0	1.4%	P	20	2.4	5.8	11.6	855.00	14.8	**11.6**
A07	0.35	4	75	1.5	2.0%	9.5	1095	26.0	2.4%	P	20	3.1	5.9	15.4	1170.00	16.5	**15.4**
A08	0.31	6	145	4.0	2.8%	12.4	1625	33.0	2.0%	P	20	2.9	9.5	21.9	1770.00	19.8	**19.8**
A09	0.90	0	15	0.3	2.0%	5.0	165	1.0	0.6%	P	20	1.6	1.8	6.8	180.00	11.0	**6.8**
B01	0.35	6	140	3.5	2.5%	12.0	1180	28.0	2.4%	P	20	3.1	6.4	18.4	1320.00	17.3	**17.3**
B02	0.35	6	235	9.0	3.8%	13.5	800	21.0	2.6%	P	20	3.2	4.1	17.6	1035.00	15.8	**15.8**
B03	0.35	5	75	1.5	2.0%	9.5	990	23.5	2.4%	P	20	3.1	5.4	14.8	1065.00	15.9	**14.8**
B04	0.35	9	200	4.0	2.0%	15.4	1540	30.0	1.9%	P	20	2.8	9.2	24.6	1740.00	19.7	**19.7**
B05	0.35	3	45	1.0	2.2%	7.1	1545	34.0	2.2%	P	20	3.0	8.7	15.7	1590.00	18.8	**15.7**
B06	0.35	7	125	2.5	2.0%	12.2	2430	54.0	2.2%	P	20	3.0	13.6	25.8	2555.00	24.2	**24.2**
C01	0.30	7	75	1.5	2.0%	10.1	960	17.0	1.8%	P	20	2.7	6.0	16.1	1035.00	15.8	**15.8**
C02	0.30	7	225	6.0	2.7%	15.9	760	10.0	1.3%	P	20	2.3	5.5	21.4	985.00	15.5	**15.5**
C03	0.30	4	140	5.0	3.6%	11.4	1740	25.5	1.5%	P	20	2.4	12.0	23.3	1880.00	20.4	**20.4**

Notes:

$$* T_i = \frac{0.395\,(1.1 - C_5)L^{0.5}}{S^{0.33}}$$

$V = C_V S_W^{0.5}$ ** Tt = L x 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 North PDR** Date: 8/31/2023

DESIGN POINT	DIRECT RUNOFF											TOTAL RUNOFF							OVERLAND TRAVEL TIME						
	BASIN	AREA (AC)	Tc (Min.)	I (in./ hr.) (5 YR)	I (in./ hr.) (100 YR)	COEFF. © (5 YR)	COEFF. © (100 YR)	CA (5 YR)	CA (100 YR)	Q (5 YR)	Q (100 YR)	Sum Tc (min.)	I (in./ hr.) (5 YR)	I (in./ hr.) (100 YR)	CA (5 YR)	CA (100 YR)	Q (5 YR)	Q (100 YR)	DESTINATION DP	CONVEYANCE TYPE	COEFFICIENT Cv	SLOPE %	VEL. (FPS)	LENGTH (FT)	TRAVEL TIME Tt
DEVELOPED																									
I01	A01	5.4	15.6	3.47	5.82	0.25	0.47	1.36	2.55	4.7	15						4.7	15	I08	P	20.0	1.74%	2.6	1090	6.9
I02	A02	3.0	9.8	4.16	6.99	0.30	0.50	0.90	1.51	3.8	11						3.8	11	I05	P	20.0	1.50%	2.4	335	2.3
DP1	OS1	4.1	13.1	3.72	6.24	0.20	0.44	0.81	1.79	3.0	11						3.0	11	I03	P	20.0	2.35%	3.1	680	3.7
I03	A03	3.2	14.8	3.55	5.95	0.25	0.47	0.79	1.48	2.8	8.8	16.8	3.35	5.62	1.60	3.27	5.4	18	I04	P	20.0	2.30%	3.0	305	1.7
I04	A04	3.4	13.4	3.69	6.20	0.25	0.47	0.83	1.59	3.1	10	18.5	3.21	5.38	1.09	2.63	3.5	14	I05	P	20.0	2.30%	3.0	260	1.4
EI01	OS2	5.3	20.0	3.09	5.18	0.39	0.57	2.08	3.02	6.4	16						6.4	16	I05	P	20.0	2.04%	2.9	735	4.3
I05	A05	5.8	15.6	3.46	5.81	0.27	0.48	1.56	2.81	5.4	16	24.3	2.80	4.69	1.94	3.71	5.4	17	I06	P	20.0	1.22%	2.2	615	4.6
I06	A06	4.1	11.6	3.91	6.56	0.30	0.50	1.23	2.04	4.8	13	12.0	3.85	6.46	1.23	2.16	4.8	14	I08	P	20.0	1.00%	2.0	220	1.8
I07	A07	3.6	15.4	3.48	5.85	0.35	0.53	1.25	1.90	4.4	11						4.4	11	I08	P	20.0	2.25%	3.0	355	2.0
DP2	OS4	38.8	30.5	2.46	4.12	0.12	0.38	4.61	14.71	11.3	61						11	61							
I08	A08	5.7	19.8	3.10	5.21	0.31	0.51	1.76	2.86	5.5	15	22.4	2.92	4.90	1.76	3.90	5.5	19	I09	P	20.0	0.50%	1.4	15	0.2
I09	A09	0.2	6.8	4.72	7.92	0.90	0.96	0.22	0.23	1.0	1.8	22.6	2.90	4.88	0.22	0.64	1.0	3.1							
I10	B01	6.4	17.3	3.30	5.55	0.35	0.53	2.22	3.37	7.3	19						7.3	19	I11	P	20.0	0.92%	1.9	325	2.8
I11	B02	6.2	15.8	3.45	5.79	0.35	0.53	2.18	3.30	7.5	19	20.2	3.08	5.17	2.18	4.22	7.5	22	I12	P	20.0	1.27%	2.3	315	2.3
I12	B03	4.6	14.8	3.54	5.94	0.35	0.53	1.59	2.42	5.6	14	22.5	2.91	4.89	1.59	3.29	5.6	16							
I13	B04	9.5	19.7	3.11	5.23	0.35	0.53	3.32	5.03	10	26				3.32	5.03	10	26	I14	P	20.0	1.29%	2.3	155	1.1
EI02	B05	3.0	15.7	3.45	5.79	0.35	0.53	1.05	1.60	3.6	9.2	20.8	3.03	5.09	1.05	3.32	3.6	17							
EI03	B06	6.6	24.2	2.80	4.71	0.35	0.53	2.31	3.50	6.5	16				2.31	3.50	6.5	16							
I18	C01	7.1	15.8	3.45	5.79	0.30	0.50	2.12	3.54	7.3	20						7.3	20	ECB	G	15.0	1.43%	1.8	665	6.2
I19	C02	7.1	15.5	3.47	5.83	0.30	0.50	2.12	3.54	7.4	21	21.9	2.95	4.95	2.12	4.73	7.4	23	I20	P	20.0	0.50%	1.4	15	0.2
I20	C03	4.4	20.4	3.06	5.13	0.30	0.50	1.33	2.22	4.1	11	22.1	2.94	4.93	1.33	3.51	4.1	17							
EI04	OS3	9.86	18.8	3.18	5.34	0.49	0.65	4.82	6.37	15.3	34						15	34							
ES01												30.6	2.45	4.11	15.97	34.38	39	141	DP3	G	15.0	3.75%	2.9	640	3.7
ES02												22.1	2.94	4.93	6.01	9.30	18	46	DP3	G	15.0	5.82%	3.6	275	1.3
DP3	OS5	6.6	14.5	3.57	6.00	0.18	0.42	1.23	2.80	4.4	17	34.3	2.28	3.83	28.03	52.85	64	202							

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STORM DRAINAGE SYSTEM DESIGN
INLET CALCULATIONS

PROJECT: **Rolling Hills Ranch North PDR** Date: 8/31/2023

								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	PR	SUMP[1]	2.0%		15.6	4.7	15	4.7	14	1.36	2.336	-	1.2	-	0.21	0.47	0.47		
I02	A02	10	PR	SUMP[1]	2.0%		9.8	3.8	11	3.8	9.9	0.90	1.422	-	0.6	-	0.09	0.47	0.47		
I03	A03	20	PR	FLOW-BY	2.0%	1.0%	16.8	5.4	18	4.5	13	1.35	2.234	0.9	5.9	0.25	1.04	0.36	0.51	13.5	21.5
I04	A04	20	PR	SUMP[1]	2.0%		18.5	3.5	14	3.5	14	1.09	2.629	-	-	-	-	0.47	0.47		
EI01	OS2	20	PR	FLOW-BY	2.0%	1.0%	20.0	6.4	16	5.2	11	1.69	2.119	1.2	4.7	0.38	0.90	0.37	0.49	14.5	20.2
I05	A05	20	PR	SUMP[1]	2.0%		24.3	5.4	17	5.4	17	1.94	3.676	-	0.2	-	0.03	0.47	0.47		
I06	A06	10	PR	SUMP[1]	2.0%		12.0	4.8	14	4.8	9.9	1.25	1.538	-	4.0	-	0.62	0.47	0.47		
I07	A07	10	PR	SUMP[1]	2.0%		15.4	4.4	11	4.4	9.9	1.25	1.700	-	1.2	-	0.20	0.47	0.47		
I08	A08	15	PR	SUMP	2.0%		22.4	5.5	19	5.5	17	1.88	3.487	-	2.0	-	0.41	0.50	0.55		
I09	A09	10	PR	SUMP	2.0%		22.6	1.0	3.1	1.0	3.1	0.35	0.644	-	-	-	-	0.50	0.70		
I10	B01	15	PR	SUMP[1]	2.0%		17.3	7.3	19	7.3	14	2.22	2.451	-	5.1	-	0.92	0.47	0.47		
I11	B02	20	PR	SUMP[1]	2.0%		20.2	7.5	22	7.5	17	2.44	3.339	-	4.5	-	0.88	0.47	0.47		
I12	B03	20	PR	SUMP[1]	2.0%		22.5	5.6	16	5.6	16	1.94	3.292	-	-	-	-	0.47	0.47		
I13	B04	20	PR	SUMP[1]	2.0%		19.7	10	26	10	17	3.32	3.300	-	9.0	-	1.73	0.47	0.47		
EI02	B05	15	EX	SUMP	2.0%		20.8	3.6	17	3.6	17	1.20	3.323	-	-	-	-	0.50	0.55		
EI03	B06	15	EX	SUMP	2.0%		24.2	6.5	16	6.5	16	2.31	3.500	-	-	-	-	0.50	0.70		
I18	C01	15	PR	SUMP[1]	2.0%		15.8	7.3	20	7.3	14	2.12	2.349	-	6.9	-	1.19	0.47	0.47		
I19	C02	15	PR	SUMP	2.0%		21.9	7.4	23	7.4	17	2.50	3.446	-	6.4	-	1.28	0.50	0.55		
I20	C03	15	PR	SUMP	2.0%		22.1	4.1	17	4.1	17	1.39	3.508	-	-	-	-	0.50	0.70		

[1] Forced sump at intersection

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
PIPE ROUTING

PROJECT: **Rolling Hills Ranch North PDR** Date: 8/31/2023

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW							SYSTEM FLOW							TRAVEL TIME						
			I (in./ hr.)		CA		Q			I (in./ hr.)		CA		Q								
		Tc (Min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	Sum Tc (min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	**(5 YR)**	**(100 YR)**	PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)*	TRAVEL TIME Tt
I01	A01	15.6	3.47	5.82	1.36	2.34	4.7	14						**4.7**	**14**	18	0.013	J01	0.93%	54	5.7	0.2
J01									15.7	3.45	5.79	1.36	2.34	**4.7**	**14**	18	0.013	J02	2.61%	157	9.6	0.3
J02									16.0	3.43	5.75	1.36	2.34	**4.6**	**13**	18	0.013	J03	2.89%	277	10	0.5
I02	A02	9.8	4.16	6.99	0.90	1.42	3.8	9.9						**3.8**	**9.9**	18	0.013	J03	1.92%	26	8.3	0.1
J03									16.4	3.38	5.68	2.26	3.76	**7.6**	**21**	24	0.013	J08	1.42%	353	8.6	0.7
I03	A03	16.8	3.35	5.62	1.35	2.23	4.5	13						**4.5**	**13**	18	0.013	J04	2.12%	26	8.7	0.0
J04									16.9	3.34	5.61	1.35	2.23	**4.5**	**13**	18	0.013	J05	2.60%	267	9.6	0.5
I04	A04	18.5	3.21	5.38	1.09	2.63	3.5	14						**3.5**	**14**	18	0.013	J05	1.92%	26	8.3	0.1
J05									18.6	3.20	5.37	2.44	4.86	**7.8**	**26**	24	0.013	J06	2.07%	275	10	0.4
I05	A05	24.3	2.80	4.69	1.94	3.68	5.4	17						**5.4**	**17**	24	0.013	J06	8.33%	6	21	0.0
J06									24.3	2.80	4.69	4.38	8.54	**12**	**40**	30	0.013	J07	0.98%	41	8.3	0.1
J07A									24.4	2.79	4.68	4.38	8.54	**12**	**40**	30	0.013	J09	1.85%	163	11.4	0.2
J07B									24.6	2.78	4.66	4.38	8.54	**12**	**40**	30	0.013	J09	1.03%	398	8.5	0.8
I06	A06	12.0	3.85	6.46	1.25	1.54	4.8	9.9						**4.8**	**9.9**	24	0.013	J08	8.33%	6	21	0.0
J08									17.1	3.32	5.58	3.51	5.30	**12**	**30**	30	0.013	J09	1.54%	26	10	0.0
J09									25.4	2.73	4.58	7.88	13.83	**22**	**63**	42	0.013	J11	0.72%	221	8.9	0.4
I07	A07	15.4	3.48	5.85	1.25	1.70	4.4	9.9						**4.4**	**9.9**	18	0.013	J10	0.96%	52	5.8	0.1
J10									15.5	3.47	5.82	1.25	1.70	**4.3**	**9.9**	18	0.013	J11	2.30%	313	9.0	0.6
DP2	OS4	30.5	2.46	4.12	4.61	14.71	11	61						**11**	**61**	48	0.013	I08	1.03%	52	12	0.1
I08	A08	22.4	2.92	4.90	1.88	3.49	5.5	17	30.6	2.45	4.12	6.48	18.20	**16**	**75**	48	0.013	J11	1.58%	6	14	0.0
J11									30.6	2.45	4.12	15.62	33.73	**38**	**139**	48	0.013	I09	1.13%	26	12	0.0
I09	A09	22.6	2.90	4.88	0.35	0.64	1.0	3.1	30.6	2.45	4.11	15.97	34.38	**39**	**141**	48	0.013	ES01	1.02%	88	12	0.1

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW							SYSTEM FLOW							TRAVEL TIME						
			I (in./ hr.)		CA		Q			I (in./ hr.)		CA		Q								
		Tc (Min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	Sum Tc (min.)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	**(5 YR)**	**(100 YR)**	PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)*	TRAVEL TIME Tt
I10	B01	17.3	3.30	5.55	2.22	2.45	7.3	14						**7.3**	**14**	24	0.013	J12	1.78%	53	9.6	0.1
J12									17.4	3.30	5.53	2.22	2.45	**7.3**	**14**	24	0.013	J13	1.12%	258	7.6	0.6
I11	B02	20.2	3.08	5.17	2.44	3.34	7.5	17						**7.5**	**17**	18	0.013	J13	1.00%	25	6.0	0.1
J13									20.2	3.07	5.16	4.66	5.79	**14**	**30**	30	0.013	J14	1.36%	295	9.8	0.5
I12	B03	22.5	2.91	4.89	1.94	3.29	5.6	16						**5.6**	**16**	18	0.013	J14	1.00%	25	6.0	0.1
J14									22.6	2.91	4.88	6.60	9.08	**19**	**44**	30	0.013	J15	3.46%	316	16	0.3
I13	B04	19.7	3.11	5.23	3.32	3.30	10.3	17						**10**	**17**	24	0.013	J15	1.00%	26	7.2	0.1
J15									22.9	2.89	4.85	9.92	12.38	**29**	**60**	36	0.013	EJ01	1.61%	165	12	0.2
EI02	B05	20.8	3.03	5.09	1.20	3.32	3.6	17						**3.6**	**17**	18	0.013	EJ01	4.28%	5	12	0.0
EI03	B06	24.2	2.80	4.71	2.31	3.50	6.5	16						**6.5**	**16**	18	0.013	EJ01	0.81%	25	5.4	0.1
EJ01									24.3	2.80	4.70	13.43	19.20	**38**	**90**	42	0.013	Sancturary	0.79%	138	9.3	0.2
I18	C01	15.8	3.45	5.79	2.12	2.35	7.3	14						**7.3**	**14**	18	0.013	J21	0.96%	52	5.8	0.1
J21									15.9	3.43	5.76	2.12	2.35	**7.3**	**14**	18	0.013	J22	1.82%	318	8.0	0.7
J22									16.6	3.37	5.66	2.12	2.35	**7.2**	**13**	24	0.013	J23	0.76%	231	6.3	0.6
J23									17.2	3.32	5.57	2.12	2.35	**7.0**	**13**	24	0.013	J23	1.57%	86	9.0	0.2
I19	C02	21.9	2.95	4.95	2.50	3.45	7.4	17						**7.4**	**17**	24	0.013	J23	8.33%	6	21	0.0
J24									21.9	2.95	4.95	4.62	5.80	**14**	**29**	30	0.013	I20	1.92%	26	12	0.0
I20	C03	22.1	2.94	4.93	1.39	3.51	4.1	17	22.1	2.94	4.93	6.01	9.30	**18**	**46**	30	0.013	ES02	1.90%	158	12	0.2
Ex05	ExB09	21.7	2.96	4.97	1.38	3.50	4.1	17						**4.1**	**17**	18	0.013	ExJ09	4.26%	25	12.3	0.0
EI01	OS2	20.0	3.09	5.18	1.69	2.12	5.2	11						**5.2**	**11**	18	0.013	ExJ09	1.01%	45	6.0	0.1
ExJ09									33.2	2.33	3.91	13.99	30.52	**33**	**119**	18	0.013	ExJ11	2.61%	157	9.6	0.3

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

Appendix C - Detention Pond Information

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond G-FUTURE CONDITIONS (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.=	7030.1
100 year storage vol.=	24.4
100 year discharge=	443
5 year storage elev.=	7027.5
5 year storage vol.=	8.8
5 year discharge=	19
WQCV storage elev.=	7025.2
WQCV storage vol.=	0.9
1/2 WQCV storage elev.=	7024.8
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)		
Circular	Orifice 1a:	V			1.75	Area =	0.017	Elev to cl =	7023.50
Circular	Orifice 1b:	V			1.75	Area =	0.017	Elev to cl =	7024.10
Circular	Orifice 1c:	V			1.75	Area =	0.017	Elev to cl =	7024.80
Rectangular	Orifice 2:	V	8.6	1.04		Area =	8.944	Elev to cl =	7027.62
Rectangular	Orifice 3:	V	2	0.43		Area =	0.860	Elev to cl =	7025.44
Rectangular	Orifice 4:	V	4.1	0.64		Area =	2.624	Elev to cl =	7027.82
Rectangular	Orifice 5:	V	8.6	1.04		Area =	8.944	Elev to cl =	7027.62

Stand Pipe Dimensions

Rec Grate	20	x	8	Elev =	7028.14
Circ. Grate		dia.		Elev =	7028.14

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 vol.=	19.9
50 year storage elev.=	7029.4
50 year discharge=	288
10 year storage vol.=	11.3
10 year storage elev.=	7027.9
10 year discharge=	50
2 year storage vol.=	5.4
2 year storage elev.=	7026.8
2 year discharge=	5.2

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		1a	1b	1c	2	3	4	5	**Rectangular**	1	2	OUTFLOW	FLOW
7023	0	0	0.00	0.0	0.000			-	-	-	-	-	-	-	-	10		-	-
7024	1	2285	0.05	0.0	0.026	-	-	0.06	-	-	-	-	-	-	-	51		0.1	0.06
7025	2	42192	0.97	0.5	0.537	-	-	0.10	0.08	0.04	-	-	-	-	-	111		0.2	0.21
7026	3	127336	2.92	1.9	2.483	-	-	0.13	0.11	0.09	-	3.1	-	-	-	184		3.4	3.44
7026.5	3.5	169390	3.89	3.6	4.180	-	-	0.14	0.12	0.10	-	4.3	-	-	-	224		4.6	4.64
7027	4	211444	4.85	2.2	6.365	-	-	0.15	0.14	0.12	-	5.2	-	-	-	268		5.6	5.59
7027.5	4.5	234356	5.38	4.6	8.814	-	-	0.16	0.15	0.13	6.5	6.0	-	6.5	-	304		19	19.45
7028	5	257267	5.91	5.4	11.745	-	-	0.17	0.16	0.14	22.0	6.6	4.3	22.0	-	337		56	55.51
7028.5	5.5	264583	6.07	5.7	14.541	-	-	0.18	0.17	0.15	40.4	7.2	10.4	40.4	23	373		122	122.30
7029	6	271899	6.24	6.1	17.819	-	-	0.19	0.18	0.16	50.6	7.8	13.7	50.6	86	406		209	209.39
7029.5	6.5	277060	6.36	11.7	20.555	-	-	0.21	0.19	0.17	59.0	8.3	16.4	59.0	171	436		315	314.68
7030	7	282220	6.48	9.4	23.956	-	-	0.21	0.20	0.18	66.4	8.8	18.7	66.4	274	464		435	434.93
7030.5	7.5	287904	6.61	6.5	27.039	-	-	0.21	0.20	0.19	73.1	9.3	20.7	73.1	392	491		491	490.92
7031	8	293587	6.74	6.6	30.565	-	-	0.22	0.21	0.20	79.2	9.8	22.5	79.2	522	516		516	516.22
7031.5	8.5	297735	6.84	6.7	33.762	-	-	0.23	0.22	0.21	84.8	10.2	24.2	84.8	665	540		540	540.33
7032	9	301883	6.93	3.4	37.203	137.9	137.9	0.23	0.23	0.22	90.1	10.6	25.8	90.1	819	563		563	701.30
7032.5	9.5	309236	7.10	7.0	40.729	390.0	390.0	0.24	0.23	0.22	95.1	11.0	27.3	95.1	983	586		586	975.59
7033	10	316589	7.27	3.6	44.320	716.5	716.5	0.25	0.24	0.23	99.9	11.4	28.8	99.9	1,157	607		607	1,323.43

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.

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
		Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

Peak Inflow:	623 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:24
Peak Outflow:	443 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:54
Total Inflow:	111.9 (AC-FT)	Peak Storage:	24.4 (AC-FT)
Total Outflow:	101.9 (AC-FT)	Peak Elevation:	7030.1 (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
		Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

Peak Inflow:	93 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:30
Peak Outflow:	19 (CFS)	Date/Time of Peak Outflow:	01Jul2015, 15:48
Total Inflow:	21.1 (AC-FT)	Peak Storage:	8.8 (AC-FT)
Total Outflow:	13.9 (AC-FT)	Peak Elevation:	7027.5 (FT)

Inserted Runoff Reduction Appendix

Appendix D – Soil Resource Report

E

United States Department of Agriculture

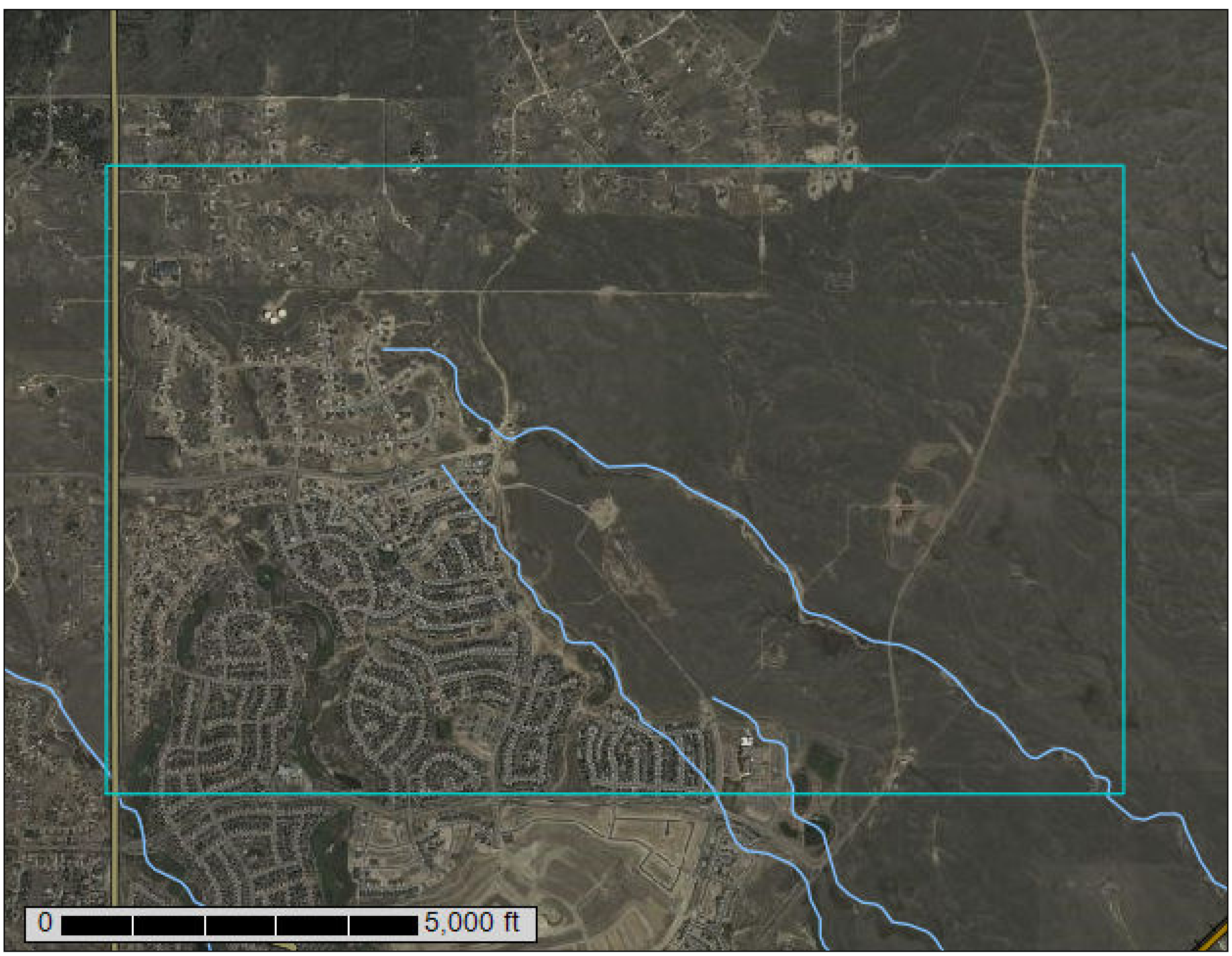
NRCS

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



March 10, 2022

Preface

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

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

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

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

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

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

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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.

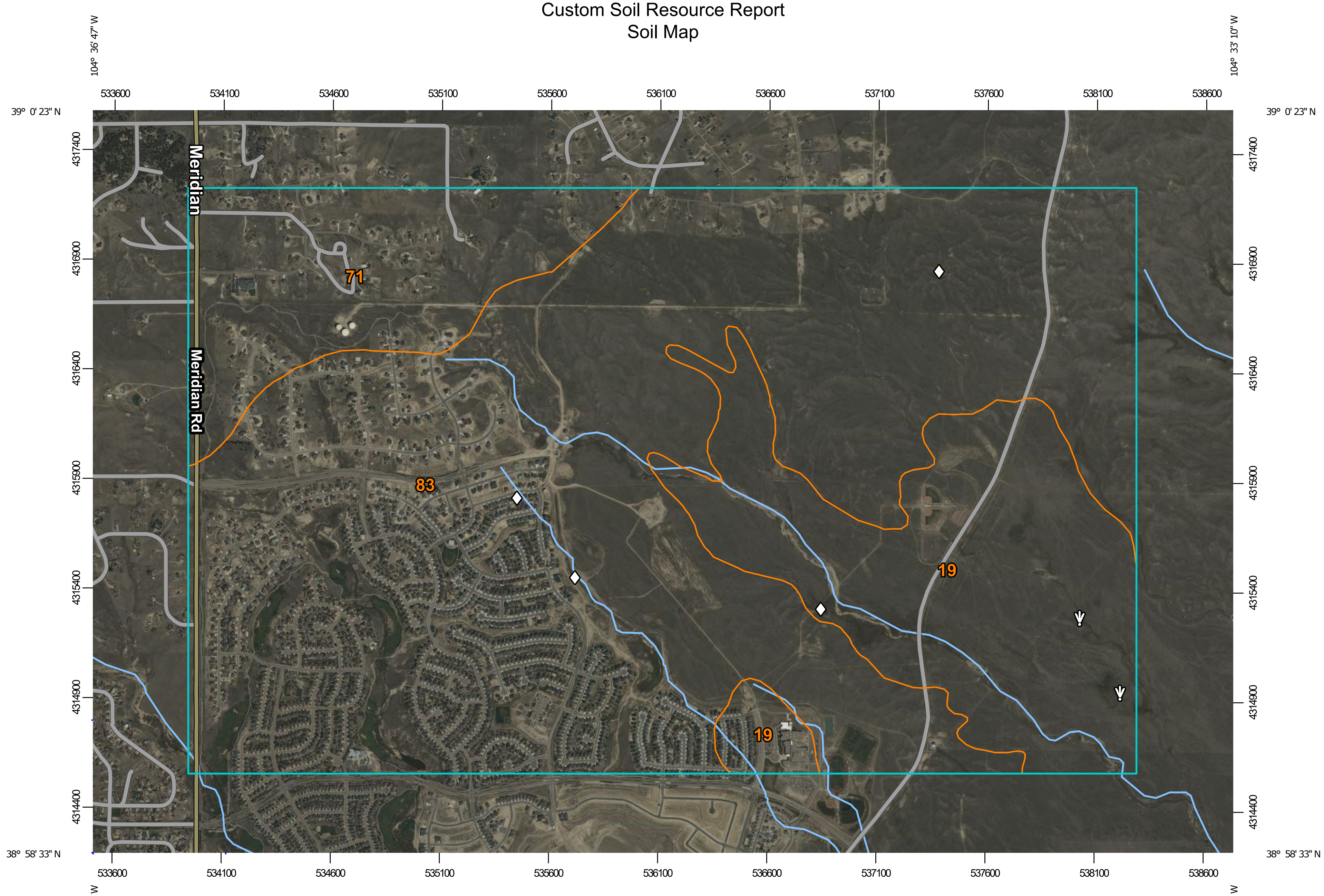
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map



Map Scale: 1:23,900 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 350, 700, 1400, 2100

Feet: 0, 1000, 2000, 4000, 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

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 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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	575.5	20.0%
71	Pring coarse sandy loam, 3 to 8 percent slopes	339.8	11.8%
83	Stapleton sandy loam, 3 to 8 percent slopes	1,964.3	68.2%
Totals for Area of Interest		**2,879.9**	**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: 97 percent
Minor components: 3 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
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 supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Pring

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
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 supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

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: 97 percent
Minor components: 3 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
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 supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

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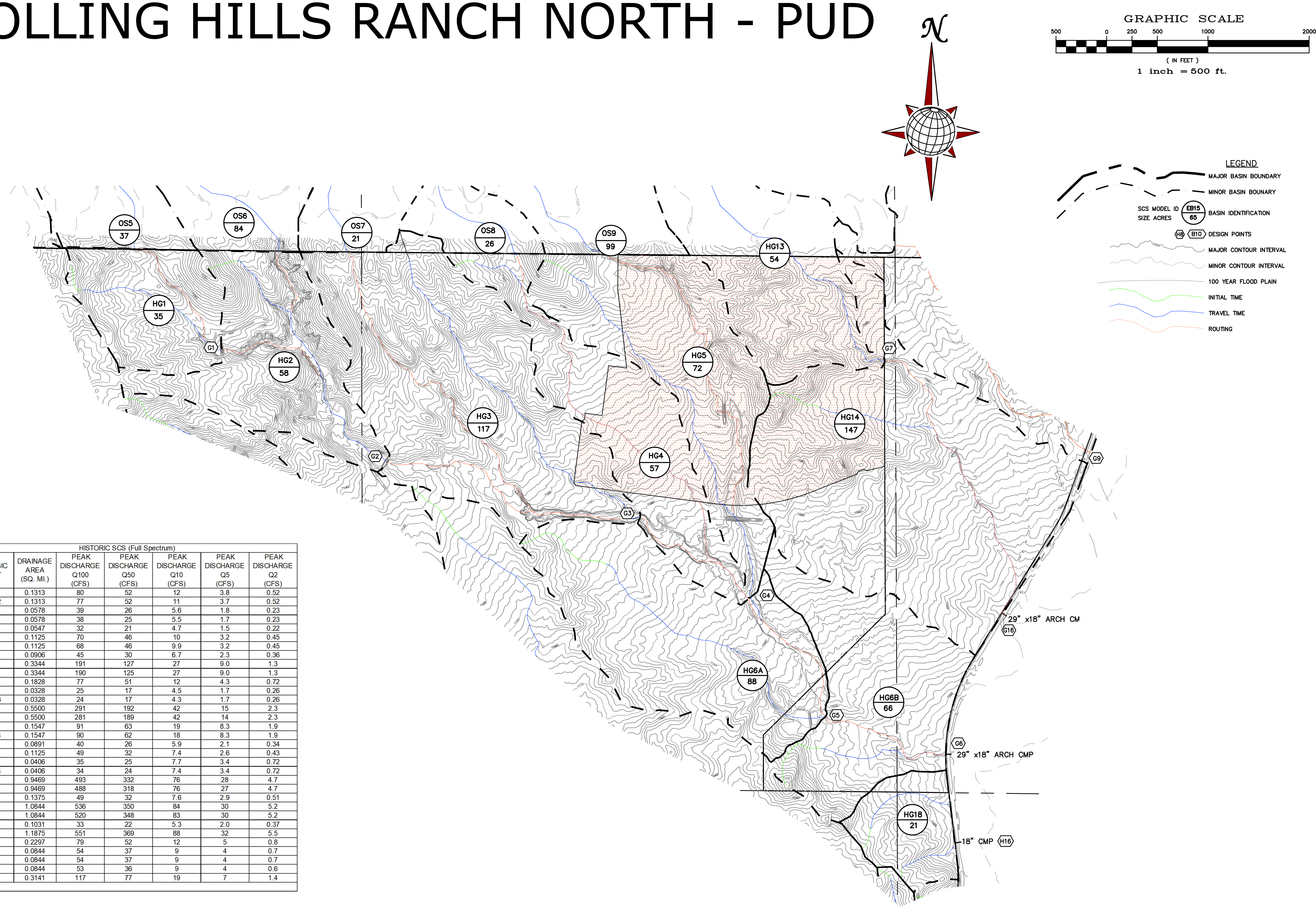
Appendix E – Drainage Maps

We need to know how much of the proposed area of disturbance (not just the impervious surfaces) is treated vs untreated and if there are any exclusions that apply to the untreated areas. So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc.) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#). An accompanying summary table on this map would also be very helpful (example provided):

Added table and site map

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to Pond A (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	4.50	4.50	4.50	-	-	-	
B	1.25	1.25	-	1.25	-	-	
C	6.00	4.00	-	-	-	4.00	ECM App I.7.1.B.5
D	2.50	2.50	1.00	-	0.50	1.00	ECM App I.7.1.B.7
E	3.00	-	3.00	-	-	-	
F	8.25	-	-	-	-	-	
Total	25.50	12.25	8.50	1.25	0.50	5.00	
Comments		*[For each row, the sum of the values in Columns 4-7 must be greater than or equal to the value in Column 3 above.]*	*[Values in this column can be more than Column 3 if over-treating non-disturbed areas of the same land-use.]*	*[See RR calc spreadsheet.]*	*[Total must be <20% of site and <1ac.]*		
		Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)		Total Proposed Disturbed Area Excluded from WQ (ac)		Non-Excluded Area to be Treated (value must ≤ Total Proposed Treated Area) (ac)
		12.25	9.75		5.50		6.75

ROLLING HILLS RANCH NORTH - PUD



HISTORIC SCS (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	80	52	12	3.8	0.52
OS06-G02	0.1313	77	52	11	3.7	0.52
OS05	0.0578	39	26	5.6	1.8	0.23
OS05-G01	0.0578	38	25	5.5	1.7	0.23
HG01	0.0547	32	21	4.7	1.5	0.22
G01	0.1125	70	46	10	3.2	0.45
G01-G02	0.1125	68	46	9.9	3.2	0.45
HG02	0.0906	45	30	6.7	2.3	0.36
G02	0.3344	191	127	27	9.0	1.3
G02-G03	0.3344	190	125	27	9.0	1.3
HG03	0.1828	77	51	12	4.3	0.72
OS07	0.0328	25	17	4.5	1.7	0.26
OS07-G03	0.0328	24	17	4.3	1.7	0.26
G03	0.5500	291	192	42	15	2.3
G03-G04	0.5500	281	189	42	14	2.3
OS09	0.1547	91	63	19	8.3	1.9
OS09-G04	0.1547	90	62	18	8.3	1.9
HG04	0.0891	40	26	5.9	2.1	0.34
HG05	0.1125	49	32	7.4	2.6	0.43
OS08	0.0406	35	25	7.7	3.4	0.72
OS08-G04	0.0406	34	24	7.4	3.4	0.72
G04	0.9469	493	332	76	28	4.7
G04-G05	0.9469	488	318	76	27	4.7
HG06A	0.1375	49	32	7.6	2.9	0.51
G05	1.0844	536	350	84	30	5.2
G05-G06	1.0844	520	348	83	30	5.2
HG06B	0.1031	33	22	5.3	2.0	0.37
G06	1.1875	551	369	88	32	5.5
HG14	0.2297	79	52	12	5	0.8
HG13	0.0844	54	37	9	4	0.7
G07	0.0844	54	37	9	4	0.7
G07-G08	0.0844	53	36	9	4	0.6
G16	0.3141	117	77	19	7	1.4

HISTORIC CONDITIONS - SCS MAP

FIGURE 4

No.	Revisions	Date	Init.	Appr.	Date

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

MERIDIAN RANCH

HISTORIC CONDITIONS - SCS MAP
ROLLING HILLS RANCH NORTH
PUD - PDR

Drawn by TAK
Checked by RG
Date XXX 2023
Scale AS SHOWN
- of -

ROLLING HILLS RANCH NORTH - PUD

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

FUTURE SCS (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	0.5
G1a	0.1313	80	52	12	3.8	0.5
G1a-G2	0.1313	79	52	11	3.7	0.5
OS05	0.0578	39	26	5.6	1.8	0.2
OS05-G1	0.0578	39	25	5.5	1.7	0.2
FG01	0.0538	31	22	7.0	3.4	0.9
FG01-G1	0.0538	31	22	7.0	3.4	0.9
G1	0.1116	61	41	11	4.9	1.1
G1-G2	0.1116	61	41	11	4.8	1.1
FG02	0.0391	32	22	6.4	2.7	0.5
G2	0.2820	167	112	27	10	1.9
G2-G3	0.2820	162	109	27	10	1.9
FG03	0.0203	24	17	5.9	3.0	0.8
FG04	0.0172	22	16	5.8	3.1	0.9
G3	0.3195	184	122	31	12	2.4
FG06	0.0675	56	40	12	5.8	1.3
FG05	0.0580	45	33	12	6.7	2.4
OS07ab	0.0170	12	7.9	1.8	0.5	0.07
OS07ab-POND F	0.0170	12	7.6	1.7	0.5	0.07
POND F IN	0.4620	292	199	53	23	5.0
POND F	0.4620	177	121	16	8.0	2.1
POND F-G7	0.4620	177	120	16	8.0	2.1
OS07c	0.0296	19	12	2.7	0.9	0.12
OS07c-G4	0.0296	18	12	2.7	0.9	0.12
FG21a	0.0095	5.9	4.0	1.0	0.4	0.06
G4	0.0391	24	16	3.5	1.2	0.2
G4-G7	0.0391	23	16	3.5	1.2	0.2
FG21b	0.0150	21	16	6.5	3.9	1.7
G7	0.5161	194	131	18	8.9	2.3
G7-G8	0.5161	194	130	18	8.9	2.3
FG22	0.1354	121	88	32	17	5.4
OS08a	0.0251	16	11	2.3	0.7	0.10
OS08-G8	0.0251	16	10	2.3	0.7	0.10
FG23a	0.0216	21	15	5.2	2.7	0.8
OS07d	0.0034	2.5	1.6	0.4	0.1	0.01
OS07d-G8	0.0034	2.4	1.6	0.4	0.1	0.01
G8	0.7016	276	176	46	24	7.7
G8-G10	0.7016	275	175	45	24	7.6
FG24b	0.0589	52	39	16	10	4.3
FG24a	0.0348	24	16	4.5	2.0	0.4
OS08b	0.0165	9.5	6.3	1.4	0.5	0.07
OS08b-G9a	0.0165	9.4	6.0	1.4	0.5	0.07

	DRAINAGE AREA (SQ. MI.)	PEAK DISCHARGE Q100 (CFS)	PEAK DISCHARGE Q50 (CFS)	PEAK DISCHARGE Q10 (CFS)	PEAK DISCHARGE Q5 (CFS)	PEAK DISCHARGE Q2 (CFS)
OS09a	0.0093	5.3	3.5	0.8	0.3	0.04
OS09a-G9a	0.0093	5.2	3.4	0.8	0.3	0.04
G9a	0.1195	87	61	21	12	4.7
G9a-G9b	0.1195	85	60	20	12	4.6
FG24c	0.0291	37	28	13	7.9	3.7
FG24d	0.0258	39	30	13	8.1	3.7
G9b	0.1744	132	97	37	22	9
REX RD WQCV	0.1744	132	96	38	22	9
G9b-G10	0.1744	131	96	37	21	9
FG23b	0.0236	17	11.4	2.7	0.9	0.13
G10	0.8996	391	242	83	45	15
G10-G11	0.8996	389	240	81	43	15
FG23c	0.0109	9	6.5	1.9	0.8	0.2
G11	0.9105	392	245	83	44	15
FG25	0.1084	111	84	36	22	9.9
FG28	0.0184	15	10	3.0	1.2	0.2
POND G IN-WEST	1.0373	484	330	115	61	22
FG27	0.0679	98	79	42	30	18
FG26	0.0567	58	44	19	12	5.6
G13	0.0567	58	44	19	12	5.6
G13-POND G	0.0567	57	43	19	12	5.6
POND G IN-EAST	0.1246	153	121	60	41	23
POND G	1.1619	443	288	50	19	5.2
G12	1.1619	443	288	50	19	5.2
G12-G06	1.1619	443	286	50	19	5.2
FG29	0.0983	60	39	8.9	2.9	0.4
FG32	0.0402	17	11	3	1	0.2
FG32-G06	0.0402	17	11	3	1	0.2
G06	1.3004	474	305	53	20	5.5
OS09b	0.0435	19	12	3	1	0.2
OS09b-G14	0.0435	18	12	3	1	0.2
FG34	0.0275	18	12	3	1	0.2
G14	0.0710	32	21	5	2	0.3
G14-G15	0.0710	32	21	5	2	0.3
FG35	0.0293	24	16	4	2	0.3
G15	0.1003	43	28	7	3	0.5
G15-G16	0.1003	43	28	7	3	0.5
FG37	0.0746	46	31	7	3	0.4
FG36	0.0299	17	12	3	1	0.2
G15a	0.0299	17	12	3	1	0.2
G15a-G16	0.0299	17	11	3	1	0.2
G16	0.2048	99	63	14	5	1.0

FUTURE CONDITIONS - SCS MAP

FIGURE 5

TECH CONTRACTORS
11910 TOURMALINE DR #130
FALCON, CO 80831
TELEPHONE: 719.495.7444

MERIDIAN RANCH

FUTURE CONDITIONS - SCS MAP
ROLLING HILLS RANCH NORTH
PUD - PDR

No. | Revisions | Date | Init. | Appr. | Date

Drawn by TAK
Checked by
Date XXXX 2022
Scale AS SHOWN
- of -

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

BENCH MARK:

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

ELEVATION = 6874.00

G01 – BASIN DESIGNATION

SUB-WATERSHED DESIGNATION

MINOR/MAJOR STORM COEFFICIENT

BASIN AREA IN ACRES

61 – DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

6130 – EXISTING CONTOUR

6130 – PROPOSED COUNTOUR

PROPOSED STORM SEWER

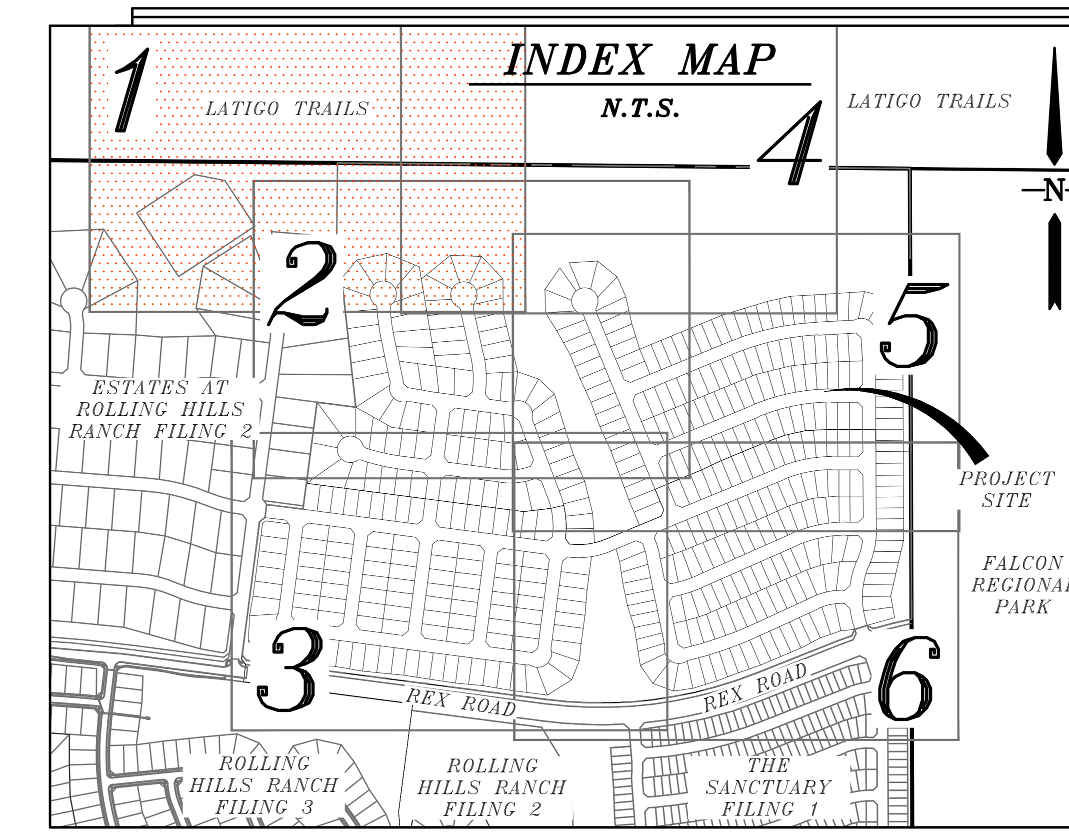
INITIAL OVERLAND TIME (TI)

TRAVEL TIME (Tt)

OVERLAND TIME (To)

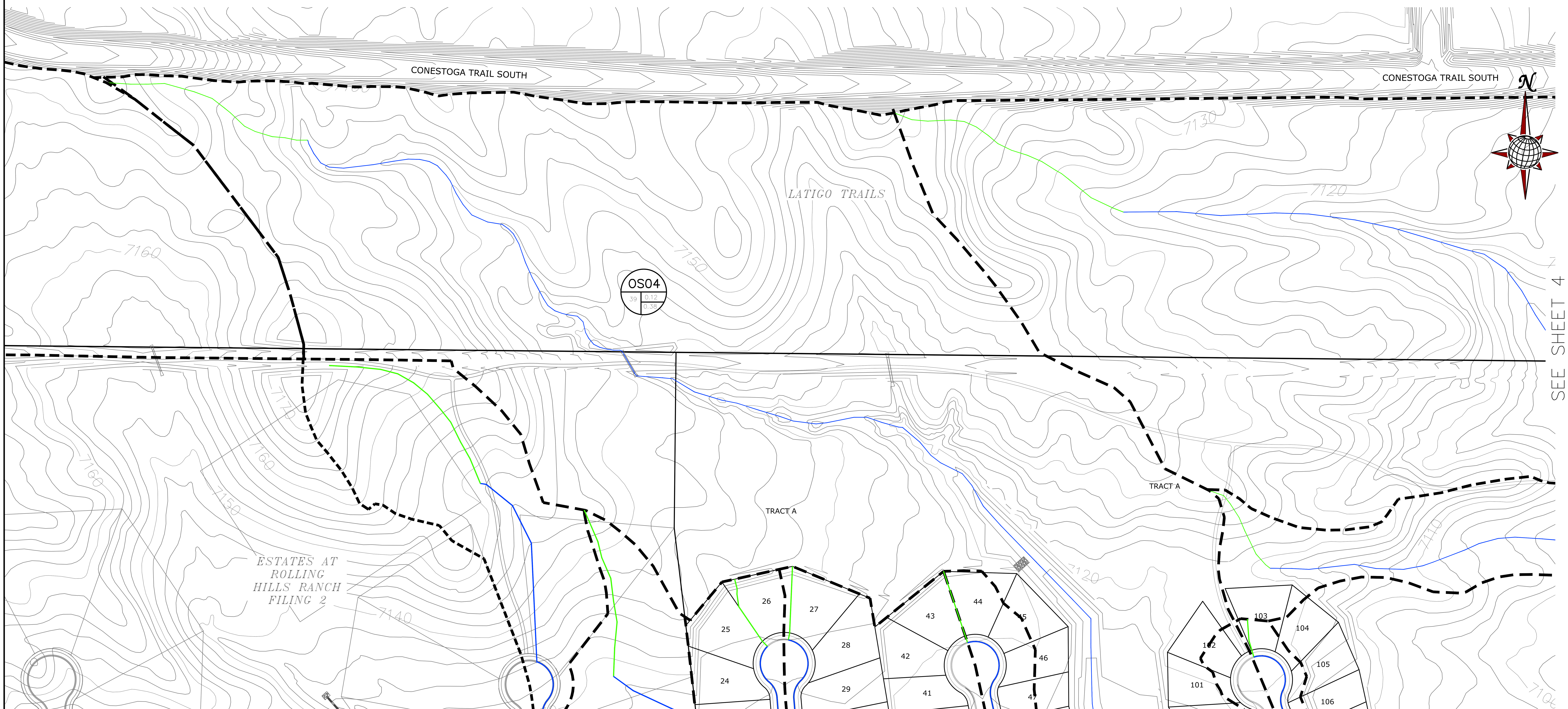
UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I01	A01	5.4	4.7	15	PR 15 ' SUMP	4.7	14	18 " RCP
J01						4.7	14	18 " RCP
J02						4.6	13	18 " RCP
I02	A02	3.0	3.8	11	PR 10 ' SUMP	3.8	9.9	18 " RCP
J03						7.6	21	24 " RCP
I03	A03	7.2	5.4	18	PR 20 ' FLOW-BY	4.5	13	18 " RCP
J04						4.5	13	18 " RCP
I04	A04	3.4	3.5	14	PR 20 ' SUMP	3.5	14	18 " RCP
J05						7.8	26	24 " RCP
I05	A05	11	5.4	17	PR 20 ' SUMP	5.4	17	24 " RCP
J06						12	40	30 " RCP
J07A						12	40	30 " RCP
J07B						12	40	30 " RCP
I06	A06	4.1	4.8	14	PR 10 ' SUMP	4.8	9.9	24 " RCP
J08						12	30	30 " RCP
J09						22	63	42 " RCP
I07	A07	3.6	4.4	11	PR 10 ' SUMP	4.4	9.9	18 " RCP
J10						4.3	9.9	18 " RCP
DP2	OS04	38.8	11.3	61		11	61	48 " RCP
I08	A08	5.7	5.5	19	PR 15 ' SUMP	5.5	17	48 " RCP
J11						38	139	48 " RCP

UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I09	A09	0.2	1.0	3	PR 10 ' SUMP	39.1	141.4	48 " RCP
I10	B01	6.4	7.3	19	PR 15 ' SUMP	7.3	14	24 " RCP
J12						7.33014	14	24 " RCP
I11	B02	6.2	7.5	22	PR 20 ' SUMP	7.5	17	18 " RCP
J13						14.3329	30	30 " RCP
I12	B03	4.6	5.6	16	PR 20 ' SUMP	5.6	16	18 " RCP
J14						19.2081	44	30 " RCP
I13	B04	9.5	10.3	26	PR 20 ' SUMP	10	17	24 " RCP
J15						28.6422	60	36 " RCP
EI02	B05	3.0	3.6	17	EX 15 ' SUMP	3.6	17	18 " RCP
EI03	B06	6.6	6.5	16	EX 15 ' SUMP	6.5	16	18 " RCP
EJ01						37.5969	90	42 " RCP
I18	C01	7.1	7.3	20	PR 15 ' SUMP	7.3	14	18 " RCP
J21						7.29312	14	18 " RCP
J22						7.16369	13	24 " RCP
J23						7.04812	13	24 " RCP
I19	C02	7.1	7.4	23	PR 15 ' SUMP	7.4	17	24 " RCP
J24						13.6467	29	30 " RCP
I20	C03	4.4	4.1	17	PR 15 ' SUMP	17.7	46	24 " RCP
DP3	OS05	6.6	63.9	202				54 " RCP



NOTE:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GNERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.



SEE SHEET 4

SEE SHEET 2

FIGURE 6

No.	Revisions	Date	Init.	Appr.	Date

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

MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANCH NORTH
AT MERIDIAN RANCH

Drawn by TAK
Checked by -
Date SEPT 2023
Scale 1" = 100'

NOTE:

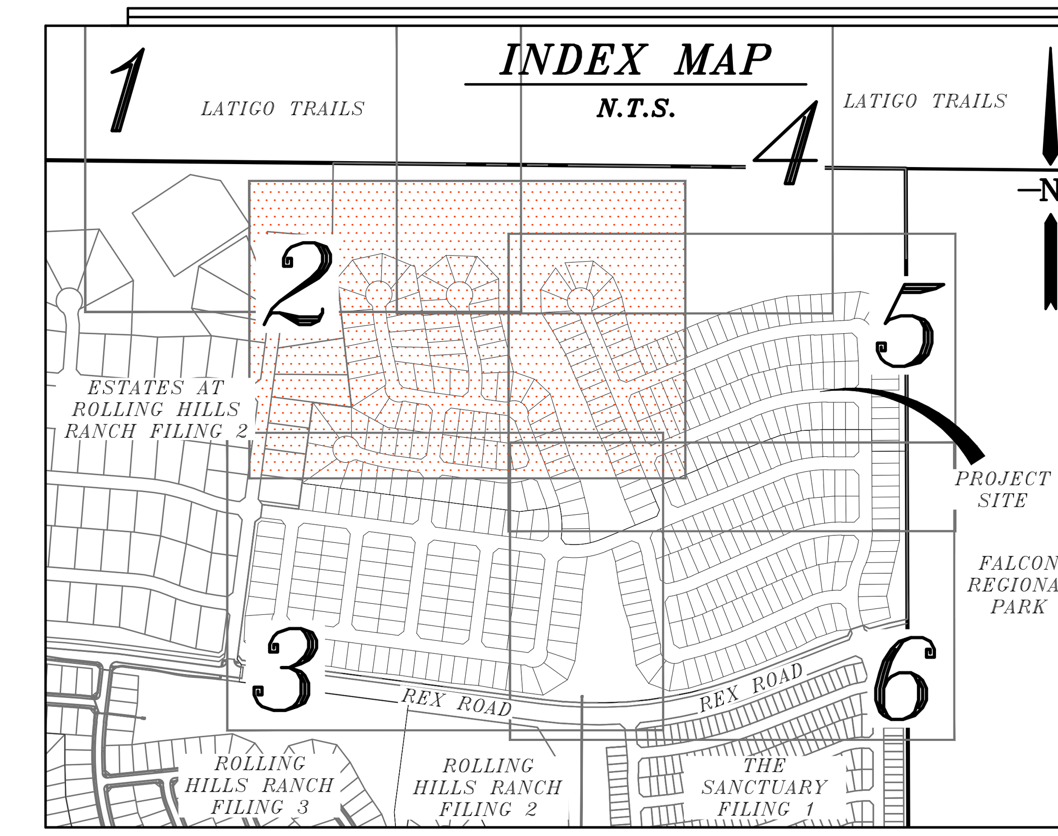
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GNERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

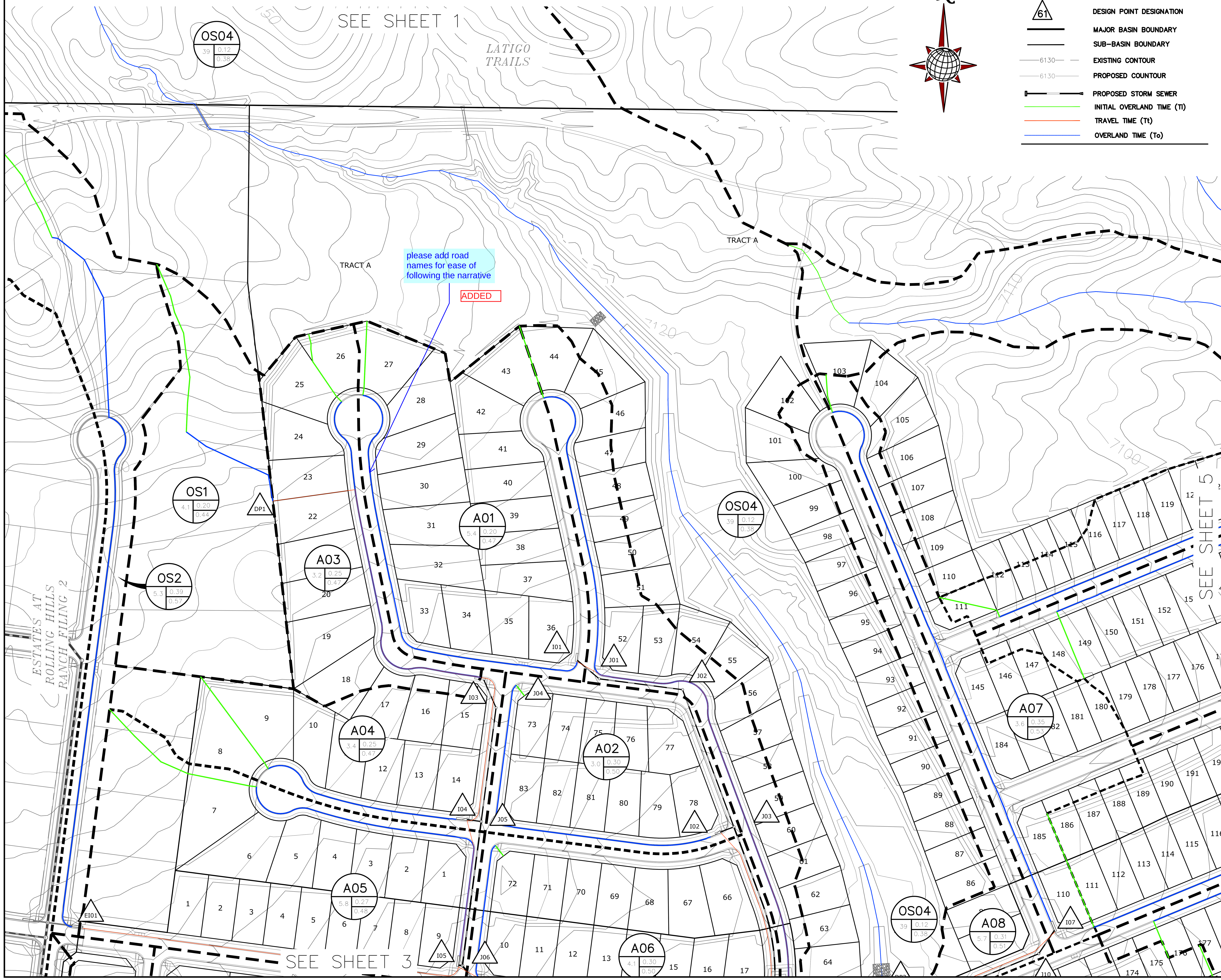
GRAPHIC SCALE

(IN FEET)

1 inch = 100 ft.

BASIN DESIGNATION
SUB-WATERSHED DESIGNATION
MINOR/MAJOR STORM COEFFICIENT
BASIN AREA IN ACRES
DESIGN POINT DESIGNATION
MAJOR BASIN BOUNDARY
SUB-BASIN BOUNDARY
EXISTING CONTOUR
PROPOSED COUNTOUR
PROPOSED STORM SEWER
INITIAL OVERLAND TIME (Ti)
TRAVEL TIME (Tt)
OVERLAND TIME (To)





UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I01	A01	5.4	4.7	15	PR 15 ' SUMP	4.7	14	18 " RCP
J01						4.7	14	18 " RCP
J02						4.6	13	18 " RCP
I02	A02	3.0	3.8	11	PR 10 ' SUMP	3.8	9.9	18 " RCP
J03						7.6	21	24 " RCP
I03	A03	7.2	5.4	18	PR 20 ' FLOW-BY	4.5	13	18 " RCP
J04						4.5	13	18 " RCP
I04	A04	3.4	3.5	14	PR 20 ' SUMP	3.5	14	18 " RCP
J05						7.8	26	24 " RCP
I05	A05	11	5.4	17	PR 20 ' SUMP	5.4	17	24 " RCP
J06						12	40	30 " RCP
J07A						12	40	30 " RCP
J07B						12	40	30 " RCP
I06	A06	4.1	4.8	14	PR 10 ' SUMP	4.8	9.9	24 " RCP
J08						12	30	30 " RCP
J09						22	63	42 " RCP
I07	A07	3.6	4.4	11	PR 10 ' SUMP	4.4	9.9	18 " RCP
J10						4.3	9.9	18 " RCP
DP2	OS04	38.8	11	61		11	61	48 " RCP
I08	A08	5.7	5.5	19	PR 15 ' SUMP	5.5	17	48 " RCP
J11						38	139	48 " RCP
I09	A09	0.2	1.0	3.1	PR 10 ' SUMP	39	141	48 " RCP
I10	B01	6.4	7.3	19	PR 15 ' SUMP	7.3	14	24 " RCP
J12						7.3	14	24 " RCP
I11	B02	6.2	7.5	22	PR 20 ' SUMP	7.5	17	18 " RCP
J13						14	30	30 " RCP
I12	B03	4.6	5.6	16	PR 20 ' SUMP	5.6	16	18 " RCP
J14						19	44	30 " RCP
I13	B04	9.5	10	26	PR 20 ' SUMP	10	17	24 " RCP
J15						29	60	36 " RCP
EI02	B05	3.0	3.6	17	EX 15 ' SUMP	3.6	17	18 " RCP
EI03	B06	6.6	6.5	16	EX 15 ' SUMP	6.5	16	18 " RCP
EJ01						38	90	42 " RCP
I18	C01	7.1	7.3	20	PR 15 ' SUMP	7.3	14	18 " RCP
J21						7.3	14	18 " RCP
J22						7.2	13	24 " RCP
J23						7.0	13	24 " RCP
I19	C02	7.1	7.4	23	PR 15 ' SUMP	7.4	17	24 " RCP
J24						14	29	30 " RCP
I20	C03	4.4	4.1	17	PR 15 ' SUMP	18	46	30 " RCP
DP3	OS05	6.6	64	202				54 " RCP

BENCH MARK:

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

ELEVATION = 6874.00

FIGURE 6

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

MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANCH NORTH
AT MERIDIAN RANCH

No.	Revisions	Date	Init.	Appr.	Date

Drawn by TAK
Checked by -
Date SEPT 2023
Scale 1" = 100'

NOTE:

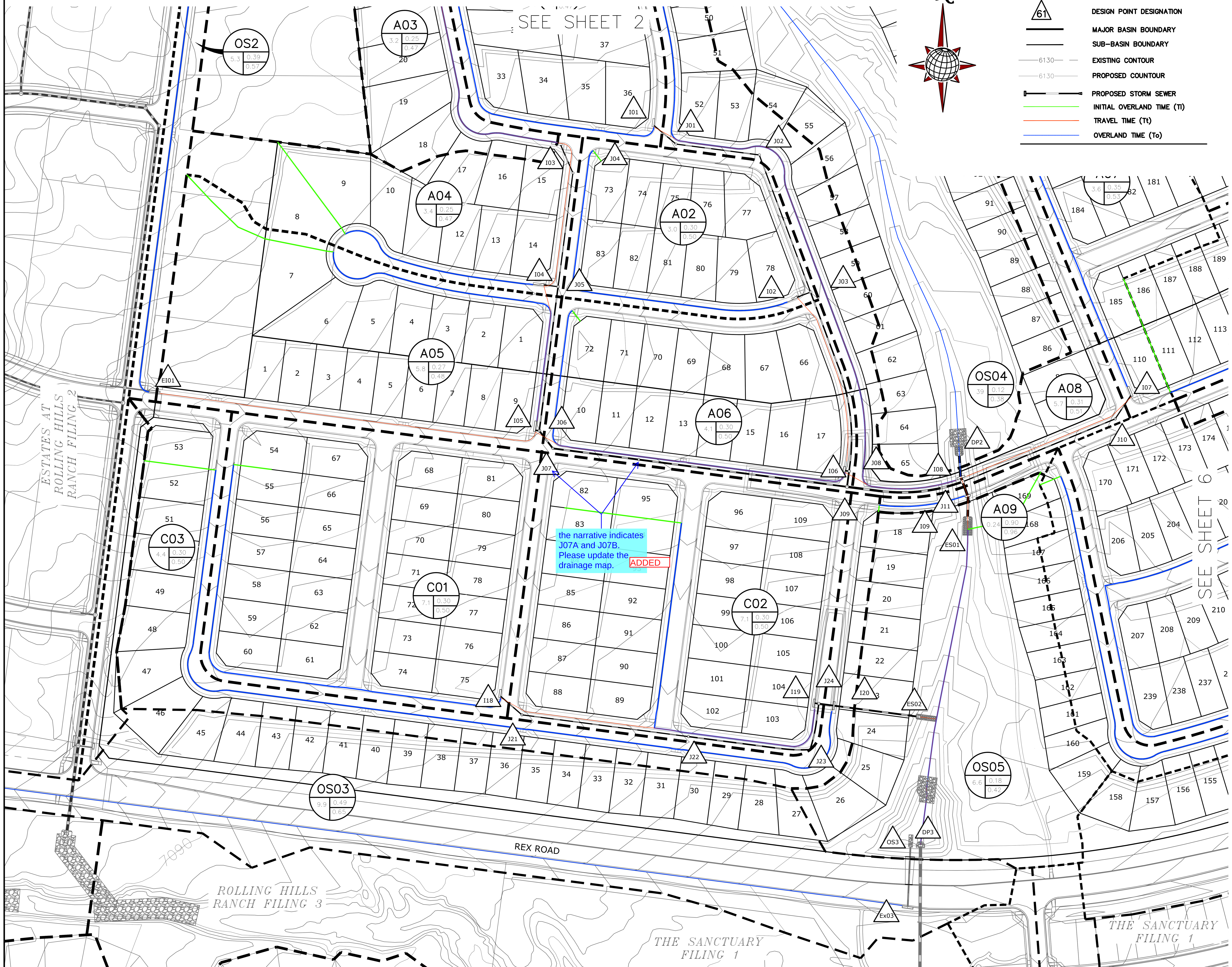
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GNERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.



BASIN DESIGNATION

SUB-WATERSHED DESIGNATION

MINOR/MAJOR STORM COEFFICIENT

BASIN AREA IN ACRES

DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

EXISTING CONTOUR

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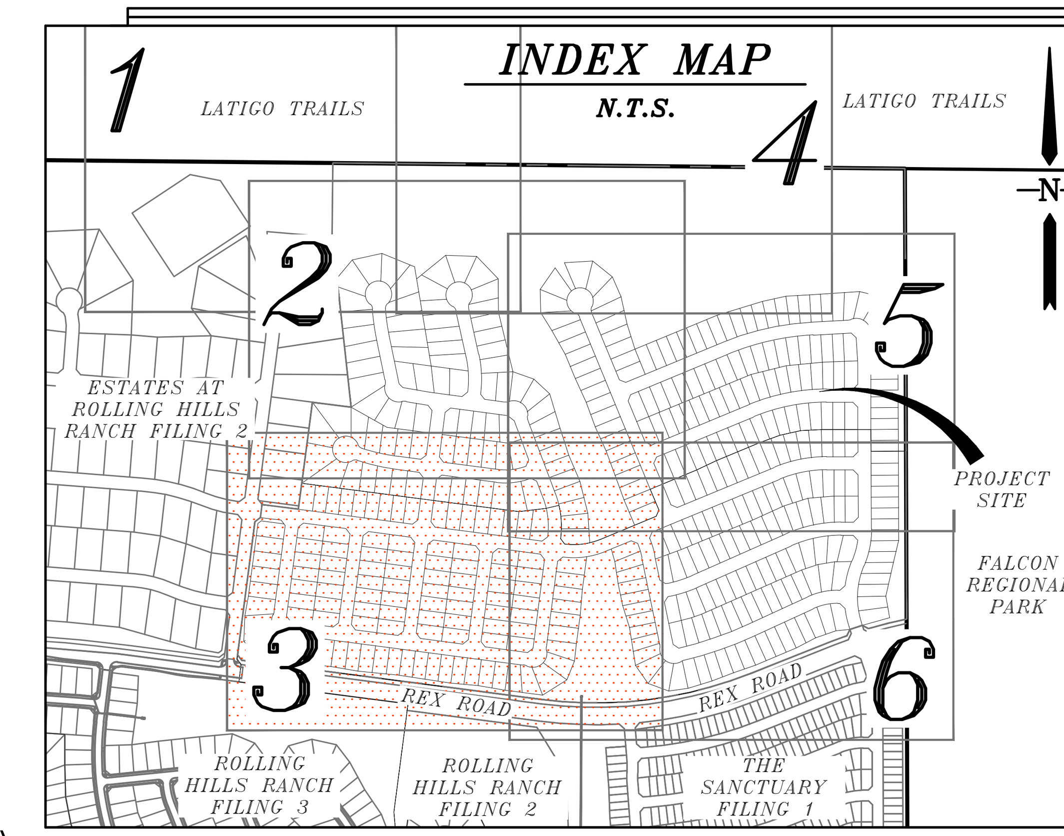
PROPOSED STORM SEWER

INITIAL OVERLAND TIME (Ti)

TRAVEL TIME (Tt)

OVERLAND TIME (To)



UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)	INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I01	A01	5.4	4.7	15	PR 15 'SUMP	4.7	14	18 " RCP
J01						4.7	14	18 " RCP
J02						4.6	13	18 " RCP
I02	A02	3.0	3.8	11	PR 10 'SUMP	3.8	9.9	18 " RCP
J03						7.6	21	24 " RCP
I03	A03	7.2	5.4	18	PR 20 'FLOW-BY	4.5	13	18 " RCP
J04						4.5	13	18 " RCP
I04	A04	3.4	3.5	14	PR 20 'SUMP	3.5	14	18 " RCP
J05						7.8	26	24 " RCP
I05	A05	11	5.4	17	PR 20 'SUMP	5.4	17	24 " RCP
J06						12	40	30 " RCP
J07A						12	40	30 " RCP
J07B						12	40	30 " RCP
I06	A06	4.1	4.8	14	PR 10 'SUMP	4.8	9.9	24 " RCP
J08						12	30	30 " RCP
J09						22	63	42 " RCP
I07	A07	3.6	4.4	11	PR 10 'SUMP	4.4	9.9	18 " RCP
J10						4.3	9.9	18 " RCP
DP2	OS04	38.8	11	61		11	61	48 " RCP
I08	A08	5.7	5.5	19	PR 15 'SUMP	5.5	17	48 " RCP
J11						38	139	48 " RCP
I09	A09	0.2	1.0	3.1	PR 10 'SUMP	39	141	48 " RCP
I10	B01	6.4	7.3	19	PR 15 'SUMP	7.3	14	24 " RCP
J12						7.3	14	24 " RCP
I11	B02	6.2	7.5	22	PR 20 'SUMP	7.5	17	18 " RCP
J13						14	30	30 " RCP
I12	B03	4.6	5.6	16	PR 20 'SUMP	5.6	16	18 " RCP
J14						19	44	30 " RCP
I13	B04	9.5	10	26	PR 20 'SUMP	10	17	24 " RCP
J15						29	60	36 " RCP
EI02	B05	3.0	3.6	17	EX 15 'SUMP	3.6	17	18 " RCP
EI03	B06	6.6	6.5	16	EX 15 'SUMP	6.5	16	18 " RCP
EJ01						38	90	42 " RCP
I18	C01	7.1	7.3	20	PR 15 'SUMP	7.3	14	18 " RCP
J21						7.3	14	18 " RCP
J22						7.2	13	24 " RCP
J23						7.0	13	24 " RCP
I19	C02	7.1	7.4	23	PR 15 'SUMP	7.4	17	24 " RCP
J24						14	29	30 " RCP
I20	C03	4.4	4.1	17	PR 15 'SUMP	18	46	30 " RCP
DP3	OS05	6.6	64	202				54 " RCP

BENCH MARK:

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

ELEVATION = 6874.00

FIGURE 6

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

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANCH NORTH
AT MERIDIAN RANCH

No.	Revisions	Date	Init.	Appr.	Date

Drawn by TAK
Checked by -
Date SEPT 2023
Scale 1" = 100'
3 of 6

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

BASIN DESIGNATION

SUB-WATERSHED DESIGNATION

MINOR/MAJOR STORM COEFFICIENT

BASIN AREA IN ACRES

DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

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PROPOSED COUNTOUR

PROPOSED STORM SEWER

INITIAL OVERLAND TIME (Ti)

TRAVEL TIME (Tt)

OVERLAND TIME (To)

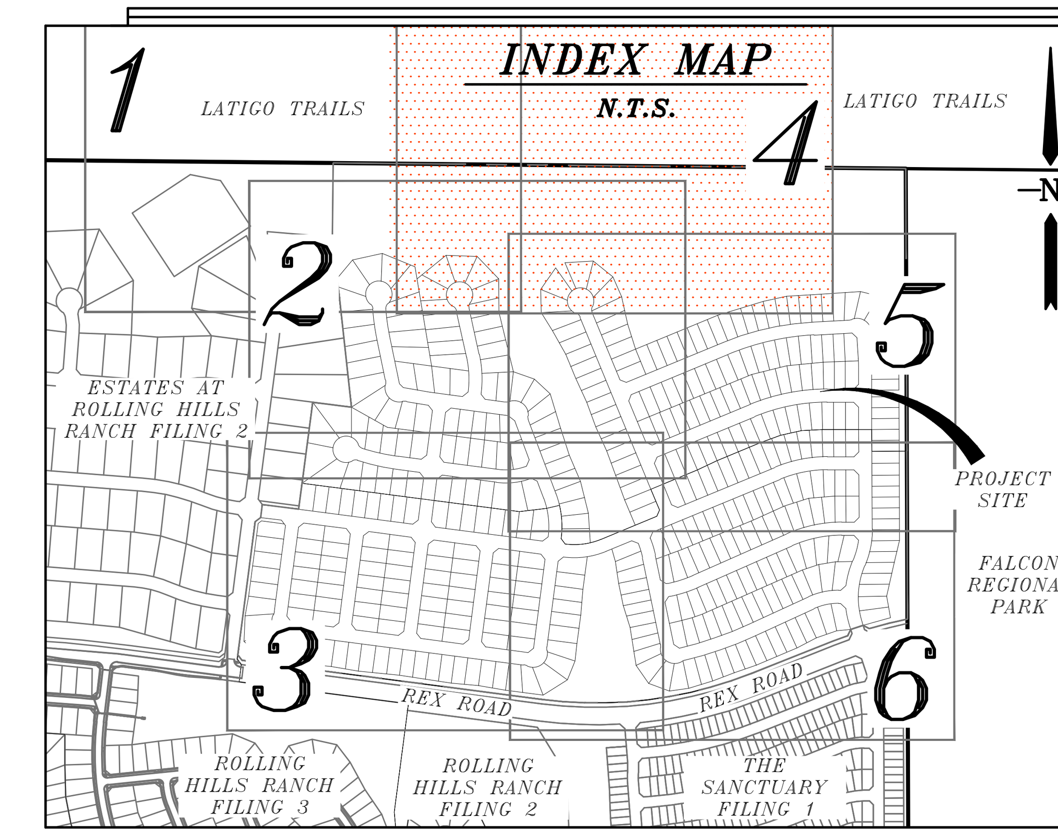
BENCH MARK:

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

ELEVATION = 6874.00

UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)		INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I01	A01	5.4	4.7	15		PR 15 ' SUMP	4.7	14	18 " RCP
J01							4.7	14	18 " RCP
J02							4.6	13	18 " RCP
I02	A02	3.0	3.8	11		PR 10 ' SUMP	3.8	9.9	18 " RCP
J03							7.6	21	24 " RCP
I03	A03	7.2	5.4	18		PR 20 ' FLOW-BY	4.5	13	18 " RCP
J04							4.5	13	18 " RCP
I04	A04	3.4	3.5	14		PR 20 ' SUMP	3.5	14	18 " RCP
J05							7.8	26	24 " RCP
I05	A05	11	5.4	17		PR 20 ' SUMP	5.4	17	24 " RCP
J06							12	40	30 " RCP
J07A							12	40	30 " RCP
J07B							12	40	30 " RCP
I06	A06	4.1	4.8	14		PR 10 ' SUMP	4.8	9.9	24 " RCP
J08							12	30	30 " RCP
J09							22	63	42 " RCP
I07	A07	3.6	4.4	11		PR 10 ' SUMP	4.4	9.9	18 " RCP
J10							4.3	9.9	18 " RCP
DP2	OS04	38.8	11.3	61			11	61	48 " RCP
I08	A08	5.7	5.5	19		PR 15 ' SUMP	5.5	17	48 " RCP
J11							38	139	48 " RCP

UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)		INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I09	A09	0.2	1.0	3		PR 10 ' SUMP	39.1	141.4	48 " RCP
I10	B01	6.4	7.3	19		PR 15 ' SUMP	7.3	14	24 " RCP
J12							7.33014	14	24 " RCP
I11	B02	6.2	7.5	22		PR 20 ' SUMP	7.5	17	18 " RCP
J13							14.3329	30	30 " RCP
I12	B03	4.6	5.6	16		PR 20 ' SUMP	5.6	16	18 " RCP
J14							19.2081	44	30 " RCP
I13	B04	9.5	10.3	26		PR 20 ' SUMP	10	17	24 " RCP
J15							28.6422	60	36 " RCP
EI02	B05	3.0	3.6	17		EX 15 ' SUMP	3.6	17	18 " RCP
EI03	B06	6.6	6.5	16		EX 15 ' SUMP	6.5	16	18 " RCP
EJ01							37.5969	90	42 " RCP
I18	C01	7.1	7.3	20		PR 15 ' SUMP	7.3	14	18 " RCP
J21							7.29312	14	18 " RCP
J22							7.16369	13	24 " RCP
J23							7.04812	13	24 " RCP
I19	C02	7.1	7.4	23		PR 15 ' SUMP	7.4	17	24 " RCP
J24							13.6467	29	30 " RCP
I20	C03	4.4	4.1	17		PR 15 ' SUMP	17.7	46	24 " RCP
DP3	OS05	6.6	63.9	202					54 " RCP



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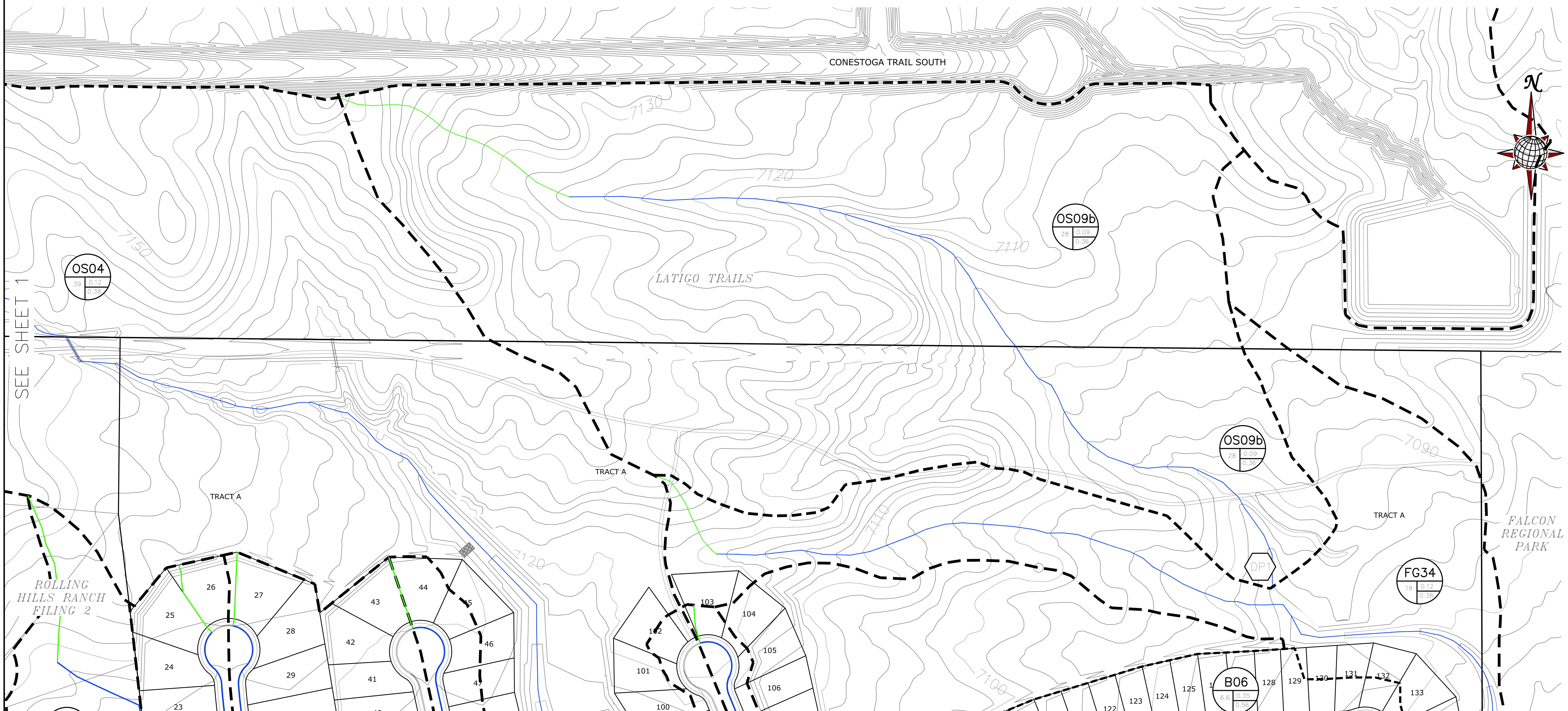

SEE SHEET 5

FIGURE 6

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

MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANCH NORTH AT MERIDIAN RANCH

Drawn by TJK

Checked by -

Date SEPT 2023

Scale 1" = 100'

4 of 6

No. Revisions Date Init. Appr. Date

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

BASIN DESIGNATION
SUB-WATERSHED DESIGNATION
MINOR/MAJOR STORM COEFFICIENT
BASIN AREA IN ACRES
DESIGN POINT DESIGNATION
MAJOR BASIN BOUNDARY
SUB-BASIN BOUNDARY
EXISTING CONTOUR
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I01	A01	5.4	4.7	15		PR 15 ' SUMP	4.7	14	18 " RCP
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J04							4.5	13	18 " RCP
I04	A04	3.4	3.5	14		PR 20 ' SUMP	3.5	14	18 " RCP
J05							7.8	26	24 " RCP
I05	A05	11	5.4	17		PR 20 ' SUMP	5.4	17	24 " RCP
J06							12	40	30 " RCP
J07A							12	40	30 " RCP
J07B							12	40	30 " RCP
I06	A06	4.1	4.8	14		PR 10 ' SUMP	4.8	9.9	24 " RCP
J08							12	30	30 " RCP
J09							22	63	42 " RCP
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UPSTREAM DP	BASIN	AREA (AC)	Q(5) (CFS)	Q(100) (CFS)		INLET	Q(5) (CFS)	Q(100) (CFS)	PIPE
I09	A09	0.2	1.0	3		PR 10 ' SUMP	39.1	141.4	48 " RCP
I10	B01	6.4	7.3	19		PR 15 ' SUMP	7.3	14	24 " RCP
J12							7.33014	14	24 " RCP
I11	B02	6.2	7.5	22		PR 20 ' SUMP	7.5	17	18 " RCP
J13							14.3329	30	30 " RCP
I12	B03	4.6	5.6	16		PR 20 ' SUMP	5.6	16	18 " RCP
J14							19.2081	44	30 " RCP
I13	B04	9.5	10.3	26		PR 20 ' SUMP	10	17	24 " RCP
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EI02	B05	3.0	3.6	17		EX 15 ' SUMP	3.6	17	18 " RCP
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EJ01							37.5969	90	42 " RCP
I18	C01	7.1	7.3	20		PR 15 ' SUMP	7.3	14	18 " RCP
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J22							7.16369	13	24 " RCP
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I19	C02	7.1	7.4	23		PR 15 ' SUMP	7.4	17	24 " RCP
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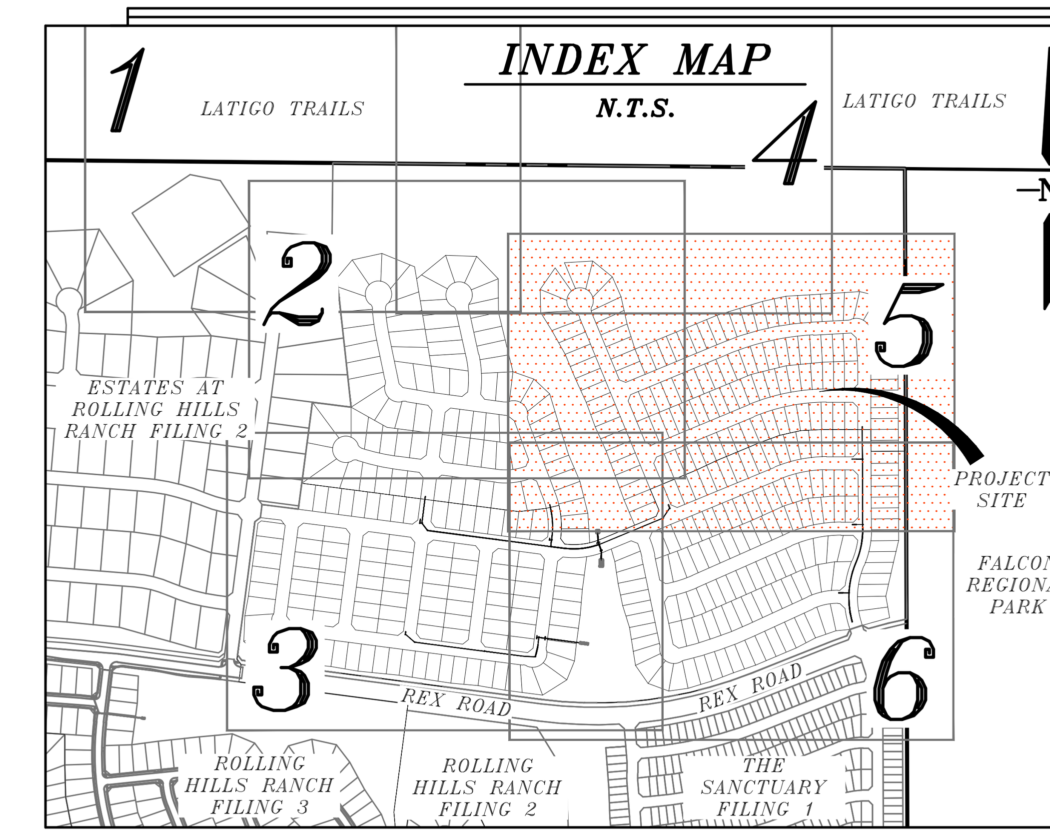
I20	C03	4.4	4.1	17		PR 15 ' SUMP	17.7	46	24 " RCP
DP3	OS05	6.6	63.9	202					54 " RCP



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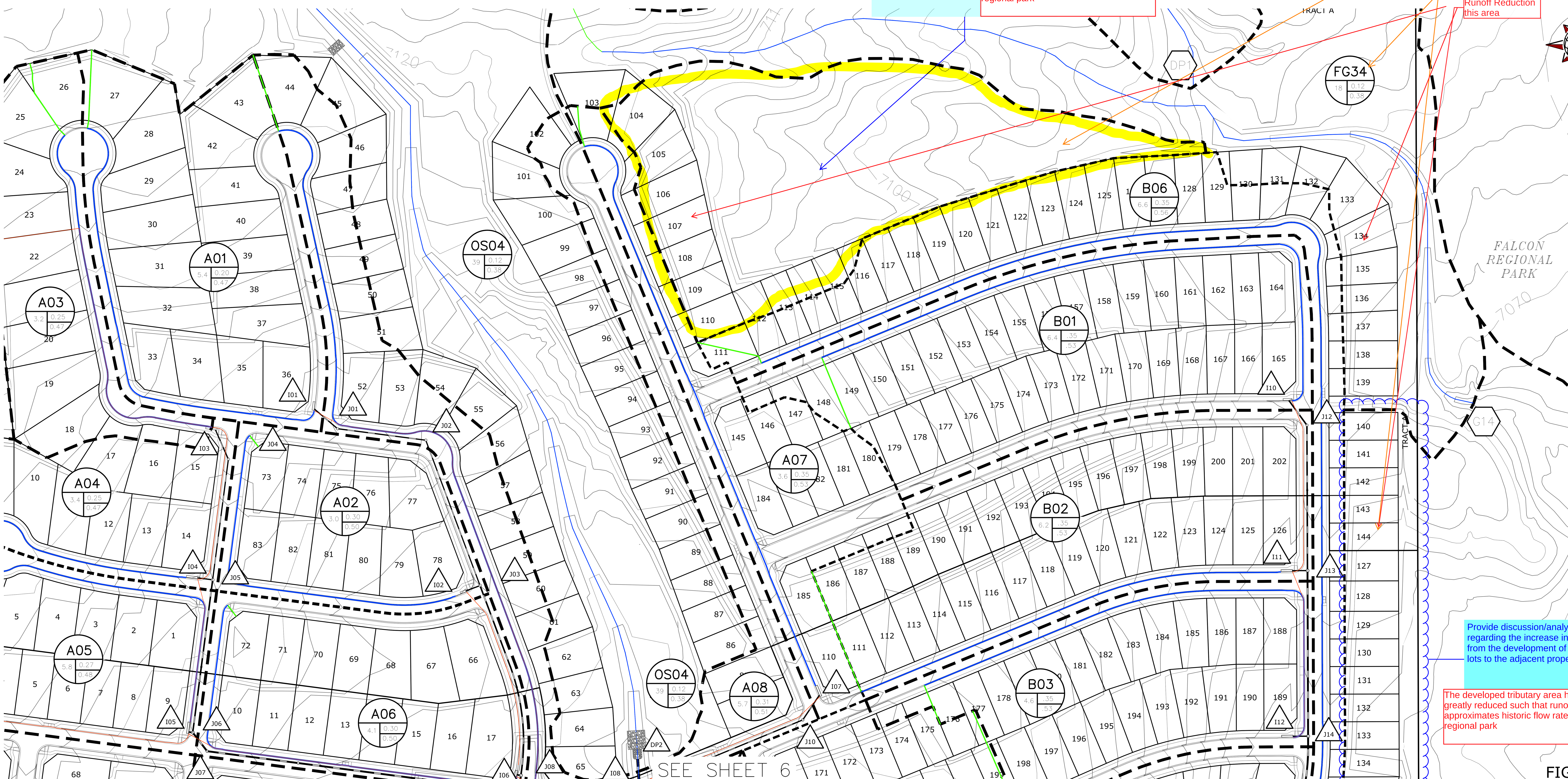
Provide discussion/analysis of this basin as well as basin FG34. Identify whether the channel within basin FG34 was designed to account for the developed flows of the lots in this basin and FG34.

The developed tributary area has been greatly reduced such that runoff approximates historic flow rates onto the regional park

Discussion water quality for this basin.

Runoff Reduction this area



Provide discussion/analysis regarding the increase in flows from the development of these lots to the adjacent property.

The developed tributary area has been greatly reduced such that runoff approximates historic flow rates onto the regional park

FIGURE 6

No.	Revisions	Date	Init.	Appr.	Date

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PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANCH NORTH
AT MERIDIAN RANCH

Drawn by TAK
Checked by -
Date SEPT 2023
Scale 1" = 100'
5 of 6

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

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BENCH MARK:

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

ELEVATION = 6874.00

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

61 — DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

6130 — EXISTING CONTOUR

6130 — PROPOSED CONTOUR

PROPOSED STORM SEWER

INITIAL OVERLAND TIME (Ti)

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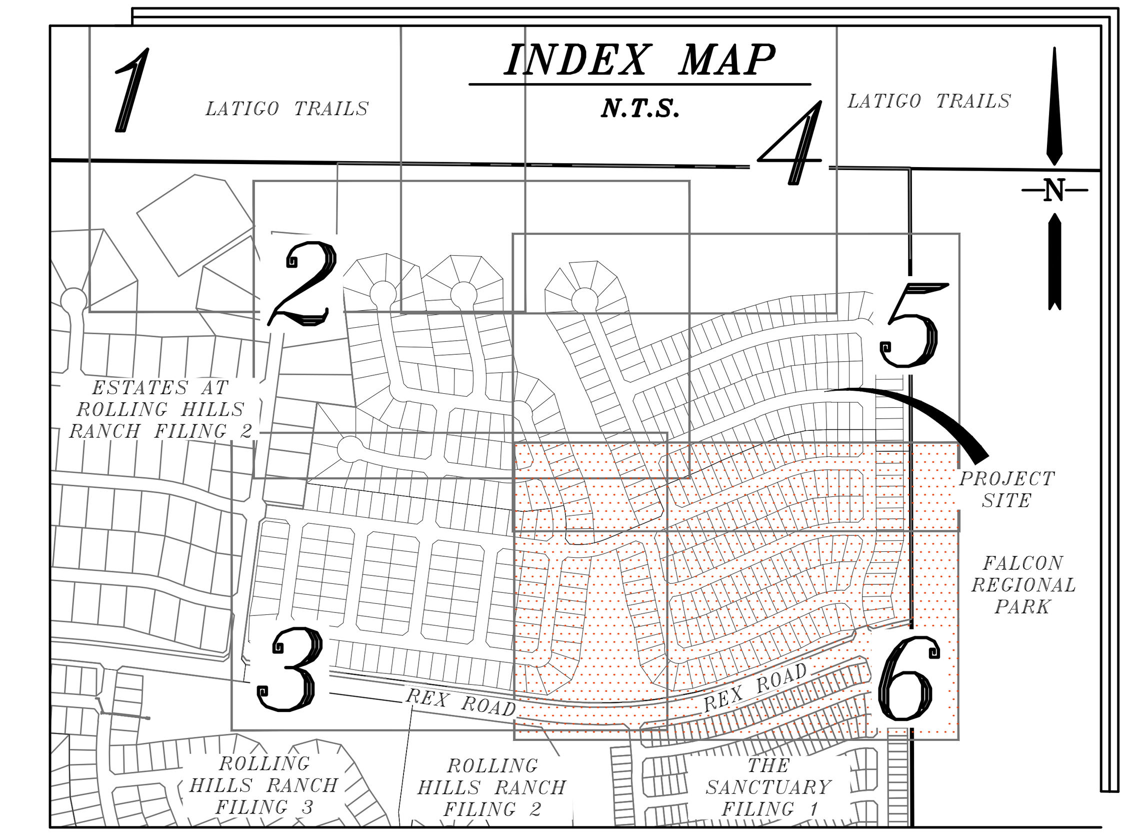
I20	C03	4.4	4.1	17	PR 15 ' SUMP	17.7	46	24 " RCP
DP3	OS05	6.6	63.9	202				54 " RCP

please provide flows for DP ES01 and ES02 in the summary table

ADDED DOWNSTEAM COLUMN TO TABLE FOR ADDITIONAL CLARIFICATION



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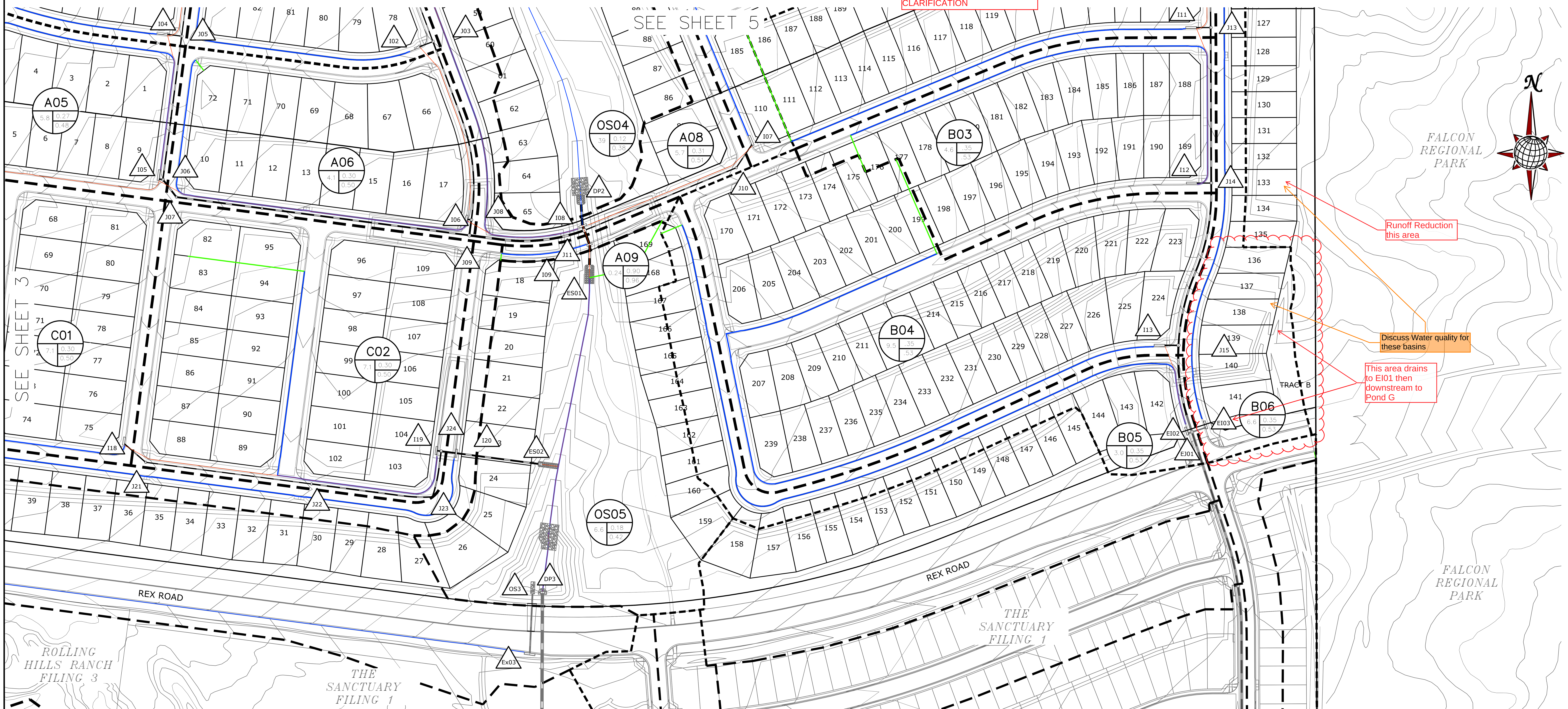

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FIGURE 6