

Final Drainage Report
for
WindingWalk Filing 2
at
Meridian Ranch



EL PASO COUNTY, COLORADO

July 2018

Prepared For:

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PCD Project No. SF-18-XXX

SF-18-022



CERTIFICATIONS

Design Engineer's Statement:

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

Thomas A. Kerby, P.E. #31429

Date

Owner/Developer's Statement:

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

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

Date

El Paso County:

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

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

Date

**WindingWalk Filing 2 at Meridian Ranch
Preliminary Drainage Plan**

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EXECUTIVE SUMMARY

The purpose of the following Final Drainage Report (FDR) is to present the changes to the drainage patterns as a result WindingWalk Filing 2 at Meridian Ranch due to development. Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM) (1994 version) and portions of the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version).

This report includes the planning information from the recently approved WindingWalk PDR, WindingWalk Filing 1 FDR and revised Sketch Plan for Meridian Ranch. The revised Sketch Plan was approved by the Board of County Commissioners in March 2018. The WindingWalk PDR and the WindingWalk Filing 1 FDR were approved by the El Paso County Planning and Community Development Department in June 2018.

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.” The recently approved Sketch Plan for Meridian Ranch removed the eighty percent of historic rate condition allowing developed flows to be released downstream of Meridian Ranch at historic flow rates.

Another significant change from previously approved drainage reports submitted to El Paso County concerning development associated within Meridian Ranch is the adopted changes to the drainage criteria. El Paso County by Resolution 15-042 adopted Chapter 6 of the 2014 version of the City of Colorado Springs Drainage Criteria Manual (COSDCM). Chapter 6 addresses the hydrologic calculations and includes an updated hydrograph to be used with storm drainage runoff. The county also adopted 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 conventional multi-stage concept. This report includes hydrologic models from HEC-HMS for the historic, interim and future conditions for the 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr design storm frequencies. The interim and the future conditions include detention facilities sized and modeled such that *“frequent and infrequent inflows are released at rates approximating undeveloped conditions”*

WindingWalk Filing 2 at Meridian Ranch encompasses 25± acres with 60 single family residential lots located in Section 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

WindingWalk Filing 2 at Meridian Ranch is located within two separate drainage basins; Gieck Ranch Basin and Haegler Ranch Basin. The Haegler Basin is a studied Basin and received final approval from El Paso County. The Gieck Ranch Basin has been studied, but has not received final approval from El Paso County.

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

INTRODUCTION

Purpose

The purpose of the following Final Drainage Report (FDR) is to present proposed changes to the drainage patterns as a result of the development of WindingWalk Filing 2 at Meridian Ranch. The report outlines the proposed drainage mitigation based on calculated developed flows in excess of allowable exiting runoff discharge.

Scope

The scope of this report includes:

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

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

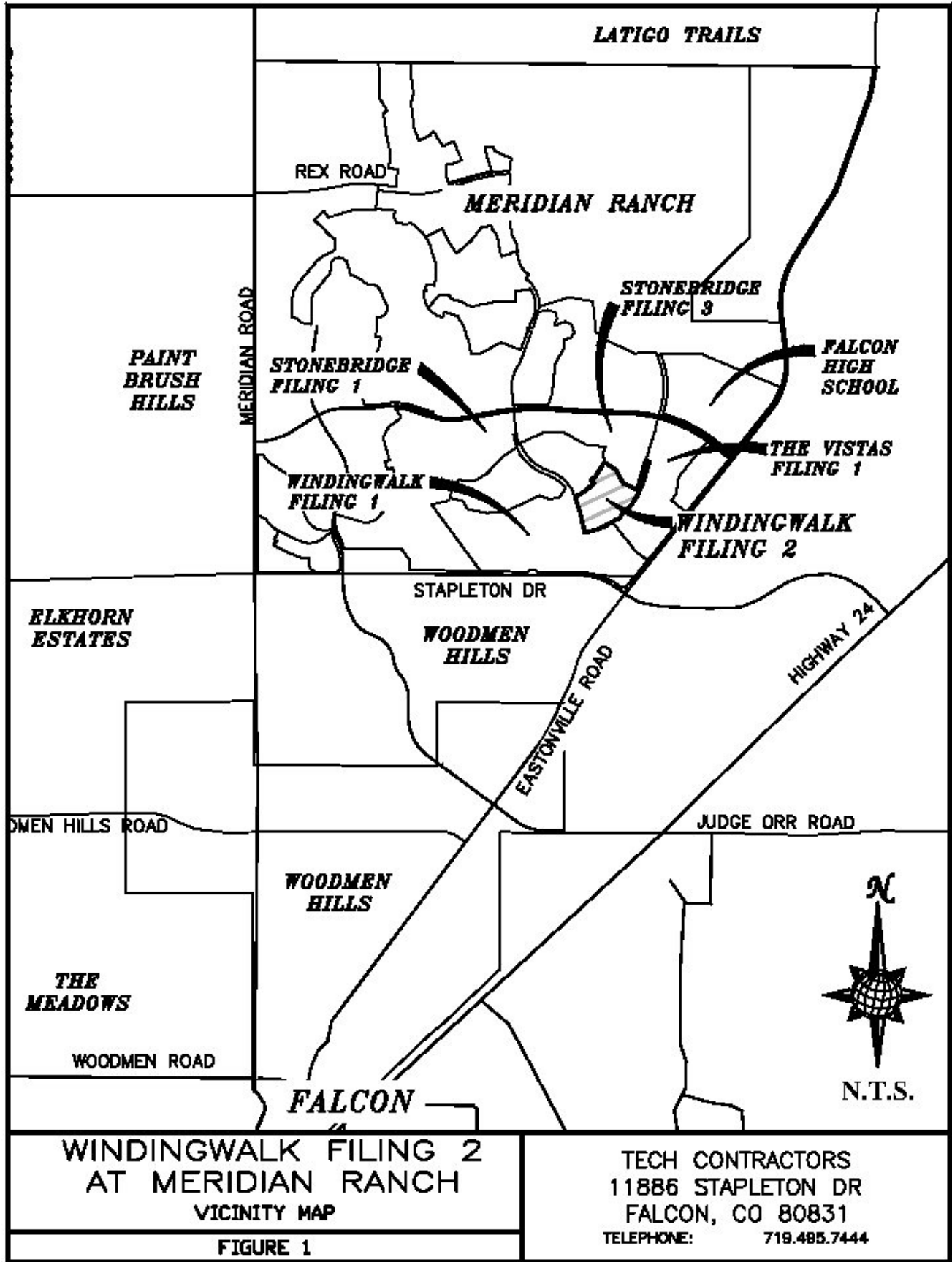
Background

On November 16, 2000 the El Paso County Board of County Commissioners approved the rezoning of the Meridian Ranch project (PUD-00-010) from A-35 to PUD with several conditions. Condition number seven stated in part that “drainage plans shall release and/or retain at approximately eighty percent (80%) of historic rates.” The recently approved Sketch Plan for Meridian Ranch removed the eighty percent of historic rate condition allowing developed flows to be released downstream of Meridian Ranch at historic flow rates.

Development has occurred downstream of Meridian Ranch since the time of the original approvals with drainage facilities designed and constructed of sufficient size to safely convey the historic flow rates off of Meridian Ranch further downstream. The 4-Way Ranch development located adjacent and downstream of Meridian Ranch has processed a Letter of Map Revision (LOMR) and constructed storm drainage improvements downstream of the existing Pond E outlets. The LOMR was processed and the improvements constructed assuming historic flow rates from Meridian Ranch using the original El Paso County DCM. Storm drain improvements near the intersection of Stapleton Drive and Eastonville have also been designed and constructed to convey the historic flow rates from Meridian Ranch. The design of these improvements and the downstream system anticipated 87 CFS to be collected

WINDINGWALK FILING 2 AT MERIDIAN RANCH

Figure 1: Vicinity Map



near outlet of the future Pond H from Meridian Ranch. The design of Pond H has yielded a 100-year flow rate of 60 CFS, well below the anticipated 87 CFS figure.

Current estimates show the design discharge Pond E to 4-Way are near or below 90% of historic flow rates for the 100-year discharge at full buildout and the 5-year discharge at or slightly above historic.

Another significant change from previously approved drainage reports submitted to El Paso County concerning development associated within Meridian Ranch is the adopted changes to the drainage criteria. El Paso County by Resolution 15-042 adopted Chapter 6 of the 2014 version of the City of Colorado Springs Drainage Criteria Manual (COSDCM). Chapter 6 addresses the hydrologic calculations and includes an updated hydrograph to be used with storm drainage runoff. The new hydrograph results in lower historic values for runoff rates and higher developed values given the same input values. The county adopted 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 conventional multi-stage concept. By providing an Excess Urban Runoff Volume (EURV) along with the required Water Quality Capture Volume in the lower portion of the facility storage (WQCV), *frequent and infrequent inflows are released at rates approximating undeveloped conditions.*” This report includes hydrologic models from HEC-HMS for the historic, interim and future conditions for the 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr design storm frequencies. The interim and the future conditions include detention facilities sized and modeled such that “*frequent and infrequent inflows are released at rates approximating undeveloped conditions*”

EXISTING CONDITIONS

General Location

The WindingWalk Filing 2 at Meridian Ranch project encompasses 25± acres, consists of 60 single family residential lots and is located in Sections 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

Land Use

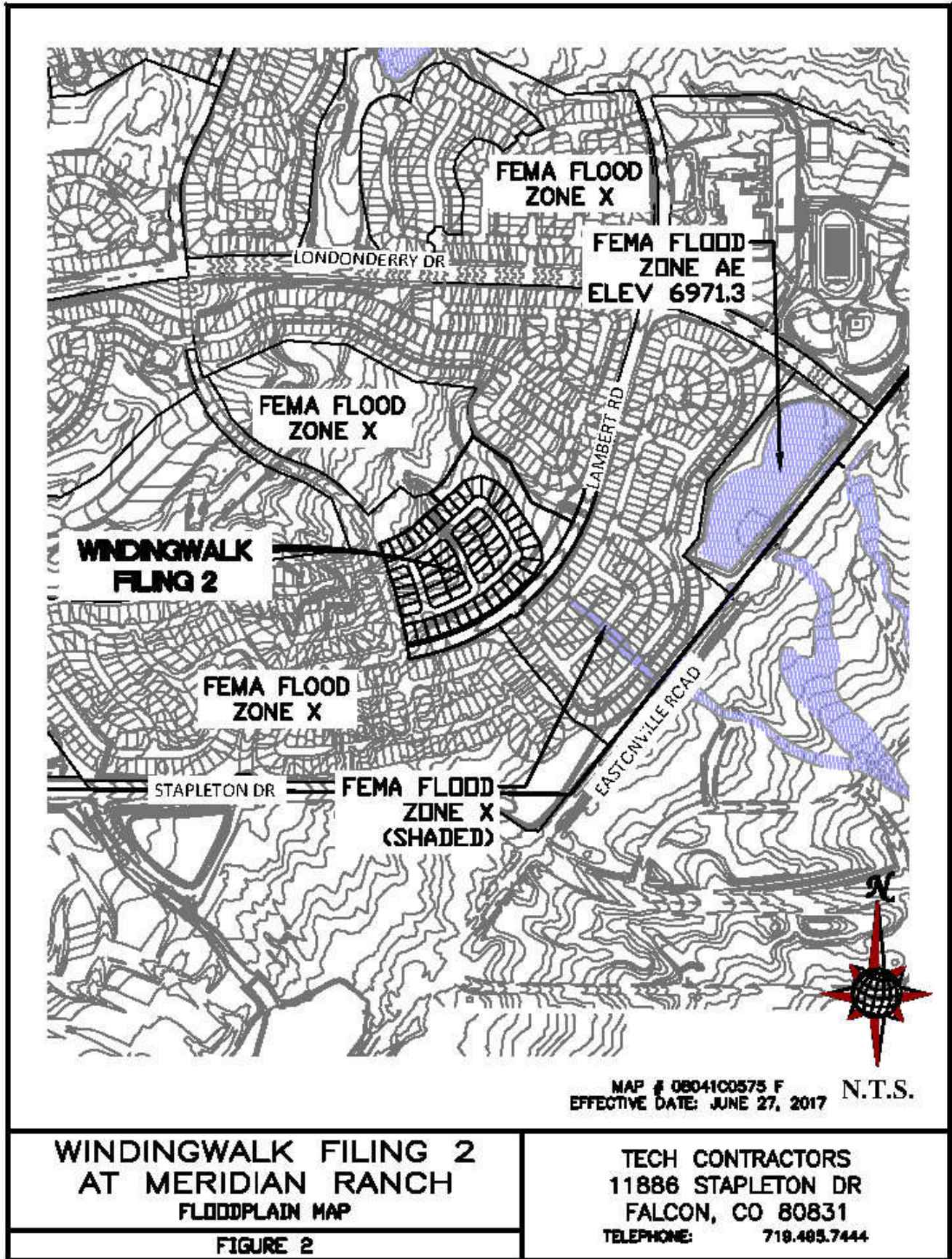
Ranching has historically dominated the area surrounding Meridian Ranch; however, urbanization has occurred in the general vicinity. The areas of urbanization include Latigo Trails to the north, to the south is the Woodmen Hills Subdivision, Four Way Ranch to the east, and to the northwest is the Paint Brush Hills subdivision.

Climate

Mild summers and winter, light precipitation; high evaporation and moderately high wind velocities characterize the climate of the study area. The average annual monthly temperature is 48.4 F with an average monthly low of 30.3 F in the winter and an average monthly high of 68.1 F in the summer. Two years in ten will have maximum temperature higher than 98 F and a minimum temperature lower than -16 F. Precipitation averages 15.73” annually, with

WINDINGWALK FILING 2 AT MERIDIAN RANCH

Figure 2: FEMA Floodplain Map



80% of this occurring during the months of April through September. The average annual Class A pan evaporation is 45 inches. (Soil Survey of El Paso County Area, Colorado).

Topography and Floodplains

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

The Flood Insurance Rate Maps (FIRM No. 08041C0575-F dated 3/17/1997) indicates that the project is outside of any designated flood plain. Letter of Map Revision (LOMR), Case No. 14-08-1121P was approved by FEMA on November 6, 2014 with an effective date of March 24, 2015. Please see Figure 2: WindingWalk Filing 2 at Meridian Ranch 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 in the Hydrological 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. This soil is suited to habitat for open land and rangeland wildlife. The main limitation of this soil for urban development is frost-action potential.

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

Note: (#) indicates Soil Conservation Survey soil classification number. See Figure 3 WindingWalk Filing 2 at Meridian Ranch – 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 within the Gieck Ranch and the Haegler Ranch Basins and accepts flow from areas north of the project site within portions of Meridian Ranch.

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

WINDINGWALK FILING 2 AT MERIDIAN RANCH

Figure 3: Soils Map



Update the interim scenario to also reflect the Enclaves development. With Winding Walk Fil 2 and the concurrent Enclaves, Meridian Ranch development in Haegler Ranch will be built out. Update the narrative and the maps to note as such.

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

The second scenario, the interim conditions scenario is the existing conditions with the addition of WindingWalk Filing 2 in the developed condition. This condition was analyzed to ensure that historic conditions at given design points along Eastonville Road and Stapleton Drive were maintained after WindingWalk Filing 2 are completed.

The final scenario analyzes the future build out conditions for the entirety of Meridian Ranch to ensure the storm drain facilities located at the discharge points of the project are able to properly convey the historic peak flow rates as the storm drainage exits the project.

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

Table 1: SCS Runoff Curve Numbers

Condition	CN		
Residential Lots (5 acre)	63	School	80
Residential Lots (2.5 acre)	66	Parks/Open Space	62
Residential Lots (1 acre)	68	Commercial	85
Residential Lots (1/2 acre)	70	Roadways	98
Residential Lots (1/3 acre)	72	Graded	67
Residential Lots (1/4 acre)	75	Golf Course	62
Residential Lots (1/5 acre)	78	Latigo Undeveloped	65
Residential Lots (1/6 acre)	80	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. Full Spectrum analyzes the storm water runoff for the 2-year, 5-year, 10-year, 25-year, 50-year and the 100-year design storms in order ensure the analysis

Revise. With Winding Walk Fil 2 and the concurrent Enclaves, Meridian Ranch development in Haegler Ranch will be built out. Update the narrative and the maps to note as such.

more accurately project the conditions of post development. El Paso County adopted portions of the City's 2014 DCM by resolution in January 2015; the County resolution adopted Chapter 6 (Hydrology) and Section 3.2.1 of Chapter 13 (Full Spectrum Detention) for projects outside of the City of Colorado Springs establishing a 1 year review period to analyze the impacts of the Full Spectrum Design on the storm drainage analysis of projects. This report has incorporated the use of full spectrum in the analysis of the interim and future conditions.

The idea behind full spectrum detention is to release the developed runoff flows to at or below those of the pre-developed condition. The design of Pond H and control structure meets or exceeds the intent and spirit of the concept.

Table 2: Detention Pond Summary:

POND H						
	PEAK INFLOW	PEAK OUTFLOW	TOTAL INFLOW	TOTAL OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	AC-FT	AC-FT	FT
INTERIM CONDITIONS						
5-YEAR STORM	21	1.9	3.6	1.9	2.4	6971.6
10-YEAR STORM	35	5.1	5.6	3.6	3.2	6971.9
25-YEAR STORM	61	13	9.0	6.5	4.5	6972.4
50-YEAR STORM	86	23	12.3	9.6	5.7	6972.8
100-YEAR STORM	115	42	16.1	13.3	7.0	6973.2
FUTURE CONDITIONS						
5-YEAR STORM	34	3.0	4.5	2.6	2.8	6971.7
10-YEAR STORM	53	7.8	6.7	4.6	3.6	6972.1
25-YEAR STORM	87	18	10.5	7.9	5.1	6972.6
50-YEAR STORM	117	32	13.9	11.2	6.5	6973.1
100-YEAR STORM	152	57	18.0	15.2	7.7	6973.4

POND E						
	PEAK INFLOW	PEAK OUTFLOW	TOTAL INFLOW	TOTAL OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	AC-FT	AC-FT	FT
INTERIM CONDITIONS						
5-YEAR STORM	107	12	23.8	9.8	15.6	6971.1
10-YEAR STORM	165	24	37.4	19.4	21.1	6971.7
25-YEAR STORM	265	58	60.5	38.6	27.5	6972.3
50-YEAR STORM	361	115	83.5	60.4	33.2	6972.8
100-YEAR STORM	471	193	111.1	87.1	39.1	6973.3
FUTURE CONDITIONS						
5-YEAR STORM	126	16	29.0	13.1	17.9	6971.4
10-YEAR STORM	198	30	43.9	24.6	23.0	6971.9
25-YEAR STORM	321	81	69.4	47.1	30.1	6972.5
50-YEAR STORM	435	151	94.1	70.8	36.2	6973.1
100-YEAR STORM	609	240	123.4	99.4	42.2	6973.6

DRAINAGE CALCULATIONS

SCS General Overview

The project is located within portions of the Gieck Ranch and the Haegler Ranch Basins. Storm water runoff will be conveyed across the site overland and within storm drain networks to the detention ponds and existing drainage swales. Temporary sedimentation ponds were constructed during the WindingWalk grading operations within the boundaries of this project and the Enclaves project. The sedimentation ponds installed within the boundaries of WindingWalk Filing 2 will be removed with this construction. The temporary ponds located within the Enclave PUD will be removed during the development of that project.

The facilities have been adequately sized such that the developed flows will be detained and released at or below the historic flow rates for the various design storm events as outlined in the El Paso County DCM and those sections of the City of Colorado Springs DCM-1 adopted by the El Paso County Board of County Commissioners. Existing facilities located downstream of the proposed development have been designed and/or constructed to accept the given release flow rates from Meridian Ranch. Those existing facilities have been reviewed sufficiently to verify the capacity to convey the storm flow rates from Meridian Ranch (see WindingWalk Filing 1 Final Drainage Report).

Those portions of the site tributary to the Haegler Ranch Basin (SCS FH1) will be directed to and released to the existing Pond H detention. Pond H will be utilized as a combination sedimentation/detention pond until such time as the tributary areas establish sufficient ground cover or development in the area is complete.

The portion of the site tributary to the proposed Pond H located within the Haegler Ranch Basin, the pond was sized using the new criteria hydrologic methods and with a release rate approximating the historic peak flow rates for the full spectrum of storm events. Pond H was identified by the Haegler Ranch DBPS as a regional detention facility, the developer has applied for credits as a part of the final plat stage for WindingWalk Filing 1 as a result of constructing the pond. The analysis shows the pond releasing the developed peak flows below the historic flow rates for the full spectrum of design storms and below 90 percent of the 100-year historic flow rate for that location. Additionally, the release rate of the 2-year storm event has been calculated to be 2.5 CFS. The existing storm drain pipe accepting flow from the proposed Pond H is designed to accept a higher flow rate than the Historic rate of flow and the rate of flow that will be discharge from the pond during the 100-yr storm event.

That portion of the site (SCS FG18) located within the Gieck Ranch Basin, tributary to Pond E was designed using the old criteria hydrologic methods and with a release rate approximating 80% of the historic peak flow rates for the 5-year and the 100-year storm events. The analysis shows the pond releasing the developed peak flows below the historic flow rates for the full spectrum of design storms using the newly adopted unit hydrograph from the City DCM-1.

Figure 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 WindingWalk and the Enclave portion of Meridian Ranch.

The purpose of this report is to show that the development of the WindingWalk Filing 1 at Meridian Ranch will not adversely impact the existing drainage facilities adjacent to and downstream of the developed area and the proposed Ponds E & H are properly sized for the anticipated future development of the Enclaves PUD located within the northern reaches of Basins FH1 and FG18.

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							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
HG07	0.0984	47	31	18	7.1	2.4	0.4
HG07-G11	0.0984	47	31	18	7.0	2.4	0.4
HG08	0.1328	73	48	28	11	3.6	0.5
G11	0.2312	115	75	44	17	5.7	0.9
G11-G12	0.2312	114	75	44	17	5.6	0.9
HG09	0.1781	73	48	29	11	4.1	0.7
G12	0.4093	187	122	72	28	9.7	1.6
G12-H08	0.4093	183	121	71	28	9.7	1.6
HG10	0.1375	39	26	16	6.5	2.6	0.5
H08	0.5468	216	142	85	34	12	2.1
HG11	0.2047	77	51	30	12	4.5	0.8
H09	0.2047	77	51	30	12	4.5	0.8
HH01	0.0984	65	43	25	9.4	3	0.4
H12	0.0984	65	43	25	9.4	3	0.4
HG12	0.1297	57	38	22	8.7	3.1	0.5
H10	0.1297	57	38	22	8.7	3.1	0.5

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

Interim Drainage - SCS Calculation Method

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

Table 4: Interim Drainage Basins-SCS

INTERIM CONDITIONS							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG08A	0.075	117	91	67	42	27	14
FG08A-G05	0.075	111	86	65	41	27	14
FG08B	0.063	87	67	50	31	20	10
FG08B-G05	0.063	85	66	49	30	20	10
FG11	0.0625	76	59	45	29	19	10
FG09	0.0484	49	36	26	15	8.4	3.3
FG09-G05	0.0484	48	36	25	14	8.2	3.3
HG10	0.0467	29	20	12	5.3	2.1	0.4
G05	0.2956	344	261	190	115	72	36

INTERIM CONDITIONS							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG13	0.0661	44	31	20	10	4.9	1.4
FG12	0.0328	51	40	31	20	14	7.9
POND D	0.3945	107	70	34	15	8.6	2.7
POND D-G17	0.3945	107	69	34	15	8.6	2.7
HG15	0.0297	13	8.8	5.4	2.2	0.9	0.2
FG15a	0.0156	28	22	17	11	7.3	4.0
G17	0.4398	119	77	38	17	9.3	4.3
G17-G18	0.4398	119	77	38	17	9.3	4.0
FG16	0.0773	127	98	74	47	31	16
G18	0.5171	167	126	93	59	38	20
G18-POND E	0.5171	161	121	89	56	37	20
HG30	0.1844	50	33	20	8.4	3.3	0.7
FG30-PONDHS	0.1844	50	33	20	8.4	3.3	0.7
FG31	0.0922	118	92	71	46	31	18
POND HS	0.2766	102	62	40	27	19	10
FG17a	0.0694	108	84	63	40	26	14
FG17a-POND E	0.0694	106	82	61	39	26	14
FG18	0.0644	56	42	30	17	10.4	4.6
FG18-POND E	0.0644	56	42	30	17	10.4	4.5
FG19	0.0527	85	67	51	33	23	13.3
FG17c	0.0313	32	22	15	6.7	2.9	0.5
FG17b	0.0214	40	31	24	16	11	6.2
POND E	1.0329	199	119	61	24	12	5.5
H08		173	107	54	19	8.3	3.3
H09		25	12	7.3	5.3	3.4	2.2
FH01	0.1348	120	91	66	39	24	11.0
POND H	0.1348	47	26	15	6.0	2.3	1.1
FH02	0.0091	11	8.0	5.6	3.2	1.9	0.7
FH03	0.0081	14	11	8.3	5.5	3.8	2.2
H12	0.152	50	28	16	9.2	6.2	3.1

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

Future Drainage - SCS Calculation Method

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

Table 5: Future Drainage Basins-SCS

FUTURE CONDITIONS							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG08A	0.0750	117	91	67	42	27	14
FG08A-G05	0.0750	111	86	65	41	27	14
FG10	0.0669	46	34	24	14	8.3	3.6
FG08B	0.0630	87	67	50	31	20	10
FG08B-G05	0.0630	85	66	49	30	20	10
FG11	0.0625	76	59	45	29	19	10
FG09	0.0484	49	36	26	15	8.4	3.3
FG09-G05	0.0484	48	36	25	14	8.2	3.3
G05	0.3158	342	262	192	117	75	38
FG13	0.0661	44	31	20	10	4.9	1.4
FG14	0.0331	42	32	24	15	10	5.2
FG12	0.0328	51	40	31	20	14	7.9
POND D	0.4478	131	89	51	19	12	4.5
POND D-G17	0.4478	131	89	51	19	12	4.5
FG15	0.1017	95	71	51	29	18	7.5
G17a	0.1017	95	71	51	29	18	7.5

FUTURE CONDITIONS							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG15a	0.0156	28	22	17	11	7.3	4.0
G17	0.5651	184	121	72	40	23	11
G17-G18	0.5651	184	121	72	40	23	11
FG16	0.0773	127	98	74	47	31	16
G18	0.6424	235	177	127	77	49	24
G18-POND E	0.6424	233	176	126	77	48	24
FG31	0.0922	118	92	71	46	31	18
FG30	0.0400	76	60	46	31	21	12
FG30-PONDHS	0.0400	74	59	45	29	20	11
POND HS	0.1322	156	107	60	37	27	15
FG17a	0.0694	102	79	58	36	23	12
FG17a-POND E	0.0694	100	77	57	36	23	12
FG18	0.0644	57	43	31	18	11	4.8
FG18-POND E	0.0644	57	42	30	18	11	4.7
FG19	0.0527	85	67	51	33	23	13
FG17c	0.0313	32	22	15	6.7	2.9	0.5
FG17b	0.0214	40	31	24	16	11	6.2
POND E	1.0138	240	151	81	30	16	6.6
H08		204	136	73	24	12	4.2
H09		36	16	8.4	6.0	4.2	2.4
FH01	0.1344	152	117	87	53	34	17
POND H	0.1344	57	32	18	7.8	3.0	1.2
FH02	0.0091	11	8.0	5.6	3.2	1.9	0.7
FH03	0.0081	14	11	8.3	5.5	3.8	2.2
H12	0.1516	62	35	20	10	6.3	3.5

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 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 WindingWalk Filing 2 has been designed. The storm drainage facility has been designed such that the minor storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not overtop the curbs. The storm drainage facility has been designed such that the major storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not exceed the right-of-way widths for residential streets and the hydraulic grade line will be more than one foot below the surface.

The eastern portion of WindingWalk Filing 2 is located within the Gieck Ranch Drainage Basin, the western portion is located within Haegler Ranch Drainage Basin. The project will discharge the collected surface flow from the project into existing downstream facilities properly sized to safely convey the storm water flows away from the project without damaging adjacent property.

Rational hydrologic calculations were performed for the entire PUD area and hydraulic calculations are provided for the storm drain impacted by WindingWalk Filing 2 only. The portion located within the Gieck Basin will be collected by a series of inlets and storm drain pipe then conveyed through an existing storm drain system constructed as a part of the Vistas Filing 1 and discharged into the existing Pond E.

The Haegler Ranch portion consists of an existing backbone storm drain system along Rainbow Bridge Dr ranging in size from 24” to 48” that collects runoff from laterals and inlets, conveying the collected flow southerly and discharging the storm water into Pond H located near northwest of the intersection of Stapleton Drive and Eastonville Road. The storm water (58 CFS) will be released into an existing storm drainage system at rates below the historic flow rates and significantly below the anticipated design flow (87 CFS) when the system was designed and constructed.

Hydraulic analyses were completed on the storm drain systems proposed within WindingWalk Filing 2. The hydraulic calculations can be found at the end of the Rational Calculation Appendix. An analyses showing the existing facilities are sized adequately to accept, convey and discharge the design flow without adversely affecting downstream properties can be found in the Final Drainage Report for WindingWalk Filing 1.

Rational Narrative

The following is a detailed narrative of the storm drainage system located within the WindingWalk Filing 2. The description organized by subbasins in the Haegler Ranch portion of WindingWalk and ending with the Gilk Ranch Basin.

Update. Some of the subbasins in the narrative are a part of the Enclave at Stonebridge 4.

Haegler Ranch

- Basin H01 (1.0 acres, $Q_5 = 1.5$ CFS, $Q_{100} = 3.5$ CFS) contains lots fronting along the future Granite Ridge Dr and Meridian Mills Tr, the surface runoff will sheet flow off of the residential lots and be conveyed via curb and gutter to DP05.
- Basin H02 (3.5 acres, $Q_5 = 6.1$ CFS, $Q_{100} = 13$ CFS) contains lots along the future Meridian Mills Tr and the east side of Rainbow Bridge Dr, the surface runoff will sheet flow off of the residential lots and is combined with the surface flow from DP05 then is conveyed to an existing 20’ Type R forced sump inlet located at I20. Most of the flow is captured by this inlet ($Q_5 = 7.4$ CFS, $Q_{100} = 15$ CFS) is conveyed via an 18” RCP to J22, J23, and J24 where it will combine with the pipe flow from I23. The remaining surface runoff ($Q_{100} = 1.3$ CFS) continues along the curb and gutter southerly along Rainbow Bridge toward I23.
- Basin H03 (3.0 acres, $Q_5 = 5.8$ CFS, $Q_{100} = 12$ CFS) contains lots from Stonebridge Filing 1 on Stone Valley Dr and the west side of Rainbow Bridge Dr, the surface runoff will sheet flow off of the residential lots and be conveyed via curb and gutter to DP06.
- Basin H04 (2.4 acres, $Q_5 = 4.8$ CFS, $Q_{100} = 10$ CFS) contains lots along the east side of future Marble Canyon Way and the wesr side of Rainbow Bridge Dr, the surface runoff will sheet flow off of the residential lots and is combined with the surface flow from DP06 then is conveyed to a future 20’ Type R forced sump inlet located at I21. The flow captured by this inlet ($Q_5 = 9.0$ CFS, $Q_{100} = 19$ CFS) is conveyed via a future 24” RCP to J25A and I22.

Remove. This appears to be regarding the Enclaves filing and not relevant to this filing.

- Basin H05 (2.0 acres, $Q_5 = 3.5$ CFS, $Q_{100} = 7.9$ CFS) contains lots along future Marble Canyon Way. The surface runoff will sheet flow off of the residential lots and be conveyed to a future 10' Type R sump inlet located at I12. All of the flow is captured by this inlet and is combined with the upstream flow from I21 ($Q_5 = 9$ CFS, $Q_{100} = 25$ CFS) and conveyed via a 24" RCP downstream to manholes J25B and J26
- During the interim condition, prior to the construction of the Enclaves, the surface runoff from Basins H03 and H04 will be directed to a temporary sedimentation pond constructed during the grading operations associated with the WindingWalk Grading Permit. A temporary PVC riser will be replaced with another temporary CMP riser and connected to the storm drain system to be constructed with WindingWalk Filing 2. The temporary pond will be removed during the construction of the improvements for the Enclaves and the CMP riser will be replaced with the future 10' Type R sump inlet at I22.
- Basin H06 (2.5 acres, $Q_5 = 4.3$ CFS, $Q_{100} = 9.9$ CFS) contains lots along the east side of future Meridian Mills Tr, the surface runoff will sheet flow off of the residential lots and be conveyed via curb and gutter to DP07.
- Basin H07 (3.1 acres, $Q_5 = 6.3$ CFS, $Q_{100} = 14$ CFS) contains lots along the west side of future Meridian Mills Tr and the east side of Rainbow Bridge Dr, the surface runoff will sheet flow off of the residential lots and is combined with the surface flow from DP07 then is conveyed to an existing 15' Type R forced sump inlet located at I23. Most of the flow is captured by this inlet ($Q_5 = 8.4$ CFS, $Q_{100} = 15$ CFS) is conveyed via a 24" RCP to J24 where it will combine with the pipe flow from I20 ($Q_5 = 12$ CFS, $Q_{100} = 29$ CFS) and conveyed via a 24" RCP downstream to manholes J26. The remaining surface runoff ($Q_{100} = 5.0$ CFS) continues along the curb and gutter southerly along Rainbow Bridge toward I25.
- The pipe flow conveyed to Junction J26 from J25B and J24 is combined at J26 for a total flow of $Q_5 = 20$ CFS, $Q_{100} = 51$ CFS conveyed via a 30" RCP downstream to manhole J27.
- Basin H08 (4.4 acres, $Q_5 = 4.6$ CFS, $Q_{100} = 12$ CFS) contains the rear lots and an open space of the future Enclaves. The surface runoff will sheet flow off of the residential lots and be directed to a swale in the open space then to a Type C inlet (CB03). All of the flow is captured by this inlet ($Q_5 = 4.6$ CFS, $Q_{100} = 12$ CFS) and is conveyed via an existing 18" to J27.
- Basin H09 (2.8 acres, $Q_5 = 3.1$ CFS, $Q_{100} = 8.0$ CFS) contains the rear lots of the future Enclaves and a park with WindingWalk Filing 1. The surface runoff will sheet flow off of the residential lots and be directed to a swale in the park then to a Type C inlet (CB04). All of the flow is captured by this inlet ($Q_5 = 3.1$ CFS, $Q_{100} = 8.0$ CFS) and is conveyed via an existing 18" to J27.

- The pipe flow conveyed to Junction J27 from J26, CB03 and CB04 is combined at J27 for a total flow of $Q_5 = 25$ CFS, $Q_{100} = 69$ CFS conveyed via a 42" RCP downstream to manhole J28.
- Basin H10 (5.0 acres, $Q_5 = 8.2$ CFS, $Q_{100} = 18$ CFS) contains lots along the north side of WindingWalk Dr. The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 10' Type R forced sump inlet located at I24. Most of the flow is captured by this inlet ($Q_5 = 8.2$ CFS, $Q_{100} = 11$ CFS) is conveyed via an 18" RCP to J28 where it will combine with the pipe flow from I25 and J27. The remaining surface runoff ($Q_{100} = 7.0$ CFS) continues along the curb and gutter southerly along Rainbow Bridge toward I29.
- Basin H11 (2.0 acres, $Q_5 = 3.8$ CFS, $Q_{100} = 11$ CFS) contains the lots in the future Enclaves and proposed WindingWalk Filing 2 along with the east side of Rainbow Bridge Dr. The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 10' Type R forced sump inlet located at I25. Most of the flow captured by this inlet ($Q_5 = 3.8$ CFS, $Q_{100} = 11$ CFS) is conveyed via an 18" RCP to J28 where it will combine with the pipe flow from I25 and J27. The remaining surface runoff ($Q_{100} = 0.3$ CFS) continues along the curb and gutter southerly along Rainbow Bridge toward I28.
- The pipe flow conveyed to Junction J28 from J27, I24 and I25 is combined for a total flow of $Q_5 = 33$ CFS, $Q_{100} = 89$ CFS conveyed via a 42" RCP downstream to manhole J29.
- Basin H12 (4.9 acres, $Q_5 = 6.9$ CFS, $Q_{100} = 16$ CFS) contains lots along the north side of Winding Glen Ln. and lots along the south side of WindingWalk Dr. The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 5' Type R sump inlet located at I26. Most of the flow is captured by this inlet ($Q_5 = 6.9$ CFS, $Q_{100} = 11$ CFS) is conveyed via an 18" RCP to I27. The remaining surface runoff ($Q_{100} = 4.6$ CFS) crosses the centerline toward I27.
- Basin H13 (1.3 acres, $Q_5 = 2.1$ CFS, $Q_{100} = 4.7$ CFS) contains lots along the south and east side of Winding Glen Ln. The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 10' Type R sump inlet located at I27. All of the flow is captured by this inlet ($Q_5 = 2.1$ CFS, $Q_{100} = 8.7$ CFS) is conveyed via a 24" RCP to J29.
- The pipe flow conveyed from I26 and I27 is combined for a total flow of $Q_5 = 7.2$ CFS, $Q_{100} = 20$ CFS and conveyed via a 24" RCP downstream to manhole J29 where it will combine with the pipe flow from J28. The combined total flow of $Q_5 = 33$ CFS, $Q_{100} = 106$ CFS is conveyed via a 42" RCP downstream to manhole J30 where it will combine with the pipe flow from I28. Should both inlets (I26 & I27) at this location become clogged, the side yard is able to safely convey the total Q_{100} flow of 20 CFS through the rear yard toward Rainbow Bridge Dr.

- Basin H14 (1.5 acres, $Q_5 = 2.7$ CFS, $Q_{100} = 6.2$ CFS) contains lots along the south side of proposed WindingWalk Dr., east side of proposed Picket Fence Way and north side of proposed Morning Creek Ln within WindingWalk Filing 2. The surface runoff will sheet flow off of the residential lots and be conveyed via curb and gutter to DP08.
- Basin H15 (1.9 acres, $Q_5 = 3.4$ CFS, $Q_{100} = 7.9$ CFS) contains lots along the west side of proposed Picket Fence Way, south side of proposed WindingWalk Dr., north side of proposed Morning Creek Ln. within WindingWalk Filing 2 and the east side of Rainbow Bridge Dr. The surface runoff will sheet flow off of the residential lots and is combined with the surface flow from DP08, then is conveyed to an existing 15' Type R forced sump inlet located at I28. All of the flow is captured by this inlet ($Q_5 = 5.8$ CFS, $Q_{100} = 13$ CFS) is conveyed via an 18" RCP to J30 where it will combine with the pipe flow from J29 ($Q_5 = 36$ CFS, $Q_{100} = 116$ CFS) and conveyed via a 42" RCP downstream to manhole J31.
- The pipe flow conveyed downstream along Rainbow Bridge and Morning Breeze Way where it will combine with surrounding areas from WindingWalk Filing 1 for a total pipe flow ($Q_5 = 62$ CFS, $Q_{100} = 193$ CFS) is conveyed via a 54" RCP to OS3 located in Pond H.
- Basin H22 (3.0 acres, $Q_5 = 5.7$ CFS, $Q_{100} = 12$ CFS) contains lots along the east side of Rainbow Bridge Dr, the south side of proposed Morning Creek Ln. and the north side of the proposed extension of Lambert Rd within WindingWalk Filing 2. The surface runoff will sheet flow off of the future residential lots and be conveyed to a proposed 5' Type R sump inlet located at I35. All of the flow is captured by this inlet ($Q_5 = 5.7$ CFS, $Q_{100} = 12$ CFS) is conveyed via an 18" RCP to I36.
- Basin H23 (1.0 acres, $Q_5 = 3.0$ CFS, $Q_{100} = 5.7$ CFS) contains street landscape along the south side of the proposed extension Lambert Rd within WindingWalk Filing 2. The surface runoff will sheet flow off of the landscape tract and be conveyed to a proposed 5' Type R sump inlet located at I36. All of the flow is captured by this inlet, combines with the flow from I35 ($Q_5 = 5.7$ CFS, $Q_{100} = 16$ CFS) and is conveyed via a 24" RCP to OS4. The flows from OS4 ($Q_5 = 11$ CFS, $Q_{100} = 24$ CFS) will be conveyed via open channel flow to Pond H.

Gieck Ranch

- During the interim condition, prior to the construction of the Enclaves, the surface runoff from Basins G01, G02, and G03 will be directed to a temporary sedimentation pond constructed during the grading operations associated with the WindingWalk Grading Permit. The temporary pond will be removed during the construction of the improvements for the Enclaves and will be replaced with the future 10' Type R sump inlets at I40 and I41.

- The combined flow from G01, G02, G03, E02, and E03 follow the existing swale constructed with Stonebridge Filing 3 to a proposed XX” concrete end section at DP13 for a total flow of $Q_5 = 19$ CFS, $Q_{100} = 48$ CFS for the respective design storms.
- Basin G04 (1.6 acres, $Q_5 = 2.9$ CFS, $Q_{100} = 6.6$ CFS) contains lots fronting along the west side of Quiet Walk Ln within the proposed WindingWalk Filing 2, the surface runoff will sheet flow off of the residential lots and be conveyed via curb and gutter to DP11.
- Basin G05 (3.4 acres, $Q_5 = 8.3$ CFS, $Q_{100} = 19$ CFS) contains lots fronting along the east side of Quiet Walk Ln, south side of WindingWalk Dr, the west side of Winding Bend Ln and the north side of Morning Creek Ln, all within the proposed WindingWalk Filing 2, the surface runoff will sheet flow off of the residential lots and is combined with the surface flow from DP11 then is conveyed to a proposed 10’ Type R sump inlet located at I42. Most of the flow is captured by this inlet ($Q_5 = 8.3$ CFS, $Q_{100} = 18$ CFS) is conveyed via a proposed RCP to I43 where it will combine with the pipe flow from I42. The remaining surface runoff ($Q_{100} = 1.2$ CFS) crosses the centerline toward I43.
- Basin G06 (3.5 acres, $Q_5 = 4.7$ CFS, $Q_{100} = 11$ CFS) contains lots fronting along the north side of WindingWalk Dr, the east side of Winding Bend Ln and the south side of Morning Creek Ln, all within the proposed WindingWalk Filing 2, the surface runoff will sheet flow off of the residential lots and is combined with the surface flow from I42 at a proposed 10’ Type R sump inlet located at I43. All of the flow captured by this inlet is conveyed via a proposed RCP to a proposed storm drain located within the proposed extension of Lambert Rd where it will combine with flow from the existing swale constructed with Stonebridge Filing 3 at DP13 and surface runoff from I44.
- Basin E04 (3.9 acres, $Q_5 = 8.4$ CFS, $Q_{100} = 17$ CFS) contains rear lots and open space along the west side of the proposed extension of Lambert Rd all within the proposed WindingWalk Filing 2, the surface runoff will sheet flow onto the street and is conveyed to a proposed 10’ Type R sump inlet located at I44. All of the flow captured by this inlet is combined with the flow from DP13 and proposed inlets I42 and I43 at J39 and is conveyed via an RCP to I45.
- Basin E05 (1.7 acres, $Q_5 = 3.6$ CFS, $Q_{100} = 7.5$ CFS) contains right-of-way along the east side of the proposed extension of Lambert Rd within WindingWalk Filing 2, the surface runoff will sheet flow onto the street and is conveyed to a proposed 10’ Type R sump inlet located at I44. All of the flow captured by this inlet is combined with the flow from J39 for a total flow of $Q_5 = 29$ CFS, $Q_{100} = 69$ CFS where the flow will continue downstream through an existing storm drain system constructed with the Vistas Filing 1 to the existing Pond E.

DETENTION PONDS

Pond H Detention Storage Criteria

Categorically state whether or not there are required improvements to Pond H as part of the Winding Walk Fil 2. Similar statement should be provided in the Enclaves drainage report. Same comment applies to Pond E.

Detention Pond H was constructed as a part of the WindingWalk grading in anticipation of the future development of the WindingWalk Filings 1 & 2 and the Enclave PUDs in accordance with the approved Sketch Plan. The pond is located within the Haegler Ranch Drainage Basin in the southeastern corner of Meridian Ranch near the intersection of Eastonville Road and Stapleton Drive. The pond is owned and maintained by the Meridian Service Metropolitan District (MSMD). A maintenance agreement between the Meridian Service Metropolitan District and El Paso County will be recorded with the El Paso County Clerk and Recorder with the WindingWalk Filing 1 Final Plat. Pond H is identified in the Haegler Ranch Drainage Basin Planning Study as Sub-Regional Detention pond (SR-01).

The Haegler Ranch DBPS hydrologic analysis shows the historic 100-year flow rate in this area to be at 90 CFS, this report shows the 100-year historic flow rate at the proposed location of the detention pond at 65 CFS. The DBPS estimated the detention pond size to be approximately 10 ac-ft, whereas the WindingWalk Filing 1 FDR report showed the final design of the sub-regional detention pond (SR-01) to be 7.7 ac-ft. Given the parameters set forth in the approved Haegler Ranch Drainage Basin Planning Study and the calculations from this report, the final design of the storm drainage facilities, including Pond H are in substantial conformance with the approved DBPS.

The SCS calculation method was used with the aid of the Army Corp HEC-HMS computer program to determine inflow and outflow from the detention pond to ensure the excess runoff as a result of the grading and the future development will not adversely impact drainage patterns downstream of the project.

The pond is designed to accommodate the developed final inflow from WindingWalk Filings 1 and 2 at Meridian Ranch and the Enclaves at Stonebridge Filing 4. Permanent concrete control structures has been designed to handle full build out of the tributary area and reduce the developed flows to at or below the historic full spectrum peak flow rates.

A WQCV analysis for Pond H was also performed based on proposed future development of the proposed tributary area to the pond; this analysis shows that Pond H will require 0.5 ac-ft of storage for first flush water quality for all the areas tributary to the pond. The control structure at DP H12 is proposed to consist of a 6" water quality control riser with a trash grate having a top elevation of 6970.0 to achieve the required 0.5 ac-ft of storage.

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

A concrete control structure is proposed for the outlet of Pond H. The structure will attenuate the peak developed flow rates to historic peak rates or less 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 will consist of a water quality control standpipe, a rectangular slotted orifice located on the front and a grated top to reduce the developed peak flow rates. Table 7 provides summary data for the various design storms in both the interim condition resulting from the development associated with WindingWalk Filings 1 and 2 and the future development of the Enclaves.

Table 6: Pond H Summary Data

POND H						
	PEAK INFLOW	PEAK OUTFLOW	TOTAL INFLOW	TOTAL OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	AC-FT	AC-FT	FT
INTERIM CONDITIONS						
5-YEAR STORM	21	1.9	3.6	1.9	2.4	6971.6
10-YEAR STORM	35	5.1	5.6	3.6	3.2	6971.9
25-YEAR STORM	61	13	9.0	6.5	4.5	6972.4
50-YEAR STORM	86	23	12.3	9.6	5.7	6972.8
100-YEAR STORM	115	42	16.1	13.3	7.0	6973.2
FUTURE CONDITIONS						
5-YEAR STORM	34	3.0	4.5	2.6	2.8	6971.7
10-YEAR STORM	53	7.8	6.7	4.6	3.6	6972.1
25-YEAR STORM	87	18	10.5	7.9	5.1	6972.6
50-YEAR STORM	117	32	13.9	11.2	6.5	6973.1
				15.2	7.7	6973.4

If interim is based on Winding Walk Fil 1 & 2 and Enclaves then Meridian Ranch development within the Haegler Ranch basin is builtout so interim is equal to future condition. Why is there a discrepancy?

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

The SCS calculation method was used to determine inflow and outflow from the detention pond to ensure the developed runoff does not overcharge the pond and the discharges do not adversely impact drainage patterns downstream of Eastonville Road. Storm drainage runoff will enter the pond from upstream development via an existing pipe network and overland from existing rear lots of the Vistas Filing 1 at Meridian Ranch. The ultimate future build-out design of the tributary areas was analyzed to insure the sizing of the pond would be adequate after development of Meridian Ranch is complete. This SCS calculation can be found in the appendix.

An analysis of the SCS calculations show that with the proposed permanent concrete control structures, installed with the operations associated with the WindingWalk Grading significantly reduce the developed flow rates to peak rates at or below the historic rates at

Eastonville Road. Temporary CMP control structures installed at the time of the original pond construction with the Meridian Ranch Filing 11 grading operations were replaced with the permanent concrete control structures with the grading operations for WindingWalk and the Enclaves.

A water quality capture volume (WQCV) was added to the required storage volume for the final build out condition. The purpose of the WQCV is to allow particulates to settle out and accumulate over time to improve water quality and to maintain full volume for detention during the life of the facility for a major storm event. The WQCV of 1.6 ac-ft. was added to the detention of the minor storm and half (0.8 ac-ft.) was added to the detention volume of the major storm. This was accomplished with respect to the HEC-HMS computer run by providing a starting detention volume of 1.6 ft. for the 5-year storm and 0.8 ft. for the 100-year storm. The resulting storage elevations remain well below the emergency spillway elevation. See Appendix B for more information.

Table 7: Existing Pond E Summary Data

POND E						
	PEAK INFLOW	PEAK OUTFLOW	TOTAL INFLOW	TOTAL OUTFLOW	PEAK STORAGE	PEAK ELEVATION
	CFS	CFS	AC-FT	AC-FT	AC-FT	FT
INTERIM CONDITIONS						
5-YEAR STORM	107	12	23.8	9.8	15.6	6971.1
10-YEAR STORM	165	24	37.4	19.4	21.1	6971.7
25-YEAR STORM	265	58	60.5	38.6	27.5	6972.3
50-YEAR STORM	361	115	83.5	60.4	33.2	6972.8
100-YEAR STORM	471	193	111.1	87.1	39.1	6973.3
FUTURE CONDITIONS						
5-YEAR STORM	126	16	29.0	13.1	17.9	6971.4
10-YEAR STORM	198	30	43.9	24.6	23.0	6971.9
25-YEAR STORM	321	81	69.4	47.1	30.1	6972.5
50-YEAR STORM	435	151	94.1	70.8	36.2	6973.1
100-YEAR STORM	609	240	123.4	99.4	42.2	6973.6

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

Downstream Analysis

The outlets (DP H08 & H09) for Pond E located along Eastonville Road upstream of 4-Way Ranch Filing 1 were analyzed in detail with the approved 2018 MDDP associated with the most recent Meridian Ranch Sketch Plan Amendment. The information can be found in Appendix D of the approved 2018 Meridian Ranch MDDP. Below you will find a summary table proving release rates of flow for each Pond E outlet.

The outlet (DP H12) for Pond H is located northwest of the intersection of Eastonville Road and Stapleton Drive and upstream of 4-Way Ranch Filing 1. Pond H will discharge 58 CFS during the 100-yr storm event into an existing sedimentation/detention pond constructed with a concrete sedimentation control structure and connected to a 4' x 2' RCB installed with the construction of Stapleton Drive. The plans set, prepared by URS in 2007, indicates the anticipated flow conveyed by the storm drain to be 87 CFS. A quick analysis indicates the 58 CFS will travel through the box culvert at an average velocity of 9 FPS under normal flow.

Table 8: Key Design Point Comparison - SCS

KEY DESIGN POINT FLOW RATES					
EVENT	HISTORIC	INTERIM		FUTURE	
	PEAK FLOW (CFS)	PEAK FLOW (CFS)	PERCENT OF HISTORIC	PEAK FLOW (CFS)	PERCENT OF HISTORIC
DETENTION POND H (Windingwalk)					
STAPLETON DR/EASTONVILLE ROAD (H12)					
5-YEAR	3.0	2.3	77%	3.0	100%
10-YEAR	9.4	6.0	64%	7.8	83%
25-YEAR	25	15	58%	18	71%
50-YEAR	43	26	60%	32	74%
100-YEAR	65	47	72%	57	87%
DETENTION POND E (FILING 11A)					
EASTONVILLE ROAD (H08)					
5-YEAR	12.1	8.3	69%	12	97%
10-YEAR	34	19	56%	24	72%
25-YEAR	85	54	63%	73	86%
50-YEAR	142	107	75%	136	95%
100-YEAR	216	173	80%	204	95%
EASTONVILLE ROAD (H09)					
5-YEAR	4.5	3.4	76%	4.2	93%
10-YEAR	12	5.3	44%	6.0	50%
25-YEAR	30	7.3	24%	8.4	28%
50-YEAR	51	12	23%	16	31%
100-YEAR	77	25	32%	36	47%

The original 4-Way Ranch calculations show the anticipated flow from Meridian Ranch to be approximately 100 CFS, the Stapleton Drive Improvement Plans show an discharge of 110 CFS from the above mentioned RCB storm drain. The calculations show the discharge from Pond H to be 58 CFS and the discharge from the RCB storm drain to be 63 CFS with a discharge velocity of 8 FPS. The storm drain discharges into an existing natural broad bottomed swale and the swale conveys the flow downstream at an average non-erosive velocity of 3.2 FPS for the 100-yr event.

In the event Pond H should overtop the embankment and run through the emergency spillway, the overflow would be conveyed safely down the embankment toward the existing box inlet located north of Stapleton Drive. After a portion of the flow is captured by the inlet the remainder will enter Stapleton Drive and cross both Stapleton Drive and Eastonville Road to the southeast side of the intersection and continue downstream in the existing natural channel.

EROSION CONTROL DESIGN

General Concept

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

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

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

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

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

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

Four Step Process

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

Step 1: Employ Runoff Reduction Practices

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

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

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

Step 2: Stabilize Drainageways

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

Step 3: Provide Water Quality Capture Volume (WQCV)

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

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

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

Temporary Sedimentation Pond

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

Detention Pond

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

Silt Fence

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

Erosion Bales

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

Miscellaneous

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

DRAINAGE FEES

The proposed WindingWalk Filing 2 development is located within two major drainage basins; the Gieck Ranch and the Haegler Ranch Drainage Basins. Of the 25.09 acres of WindingWalk Filing 2, 17.73 acres fall within the Gieck Ranch Basin and 7.36 acres is located within the Haegler Ranch Basin. The Gieck Ranch portion includes 11.40 acres of residential development and 5.18 acres are designated as right-of-way, and 4.41 acres as landscape tract. The portion within the Haegler Ranch includes 4.41 acres of residential development and 2.63 acres designated as right-of-way, and 0.32 acres landscape tract. See the calculation below.

The following is the imperviousness calculation:

GIECK RANCH

	<u>Acres</u>	<u>Assumed Imperviousness</u>	<u>Impervious Acres</u>
Right-of-way	5.18	85%	4.4
Residential Lots	11.40	52% (73 Lots)	5.9
Landscape Tract	4.41	5%	0.2
Total	17.73		10.5 = 59.2% imp.

The Gieck Ranch Drainage Basin is an un-studied basin and has no fees associated with it.

HAEGLER RANCH

	<u>Acres</u>	<u>Assumed Imperviousness</u>	<u>Impervious Acres</u>
Right-of-way	2.63	85%	1.92
Residential Lots	4.41	52% (73 Lots)	2.29
Landscape Tract	0.32	5%	0.02
Total	7.36		4.23 = 57.5% imp.

The proposed Pond H is identified in the approved Haegler Basin Planning Study as Sub-regional Detention Pond SR-01 and is reimbursable to developer after construction. The estimated cost of construction of the pond found in the approved May 2009 planning study is \$430,217. By applying the Denver Area Consumer Price Index to the original 2009 estimate, the estimated cost of the pond in 2018 will be \$521,423.

Description	Quantity	Unit Cost	Cost
Earthwork	28,000 CY	\$ 5.00	\$ 140,000.00
Permanent Seeding & Mulch	5.7 AC	\$ 1030.00	\$ 5871.00
42" RCP	62 LF	\$ 134.00	\$ 8,308.00
Rip-Rap	286 CY	\$ 98.00	\$ 28,028.00
Concrete Outlet Structure	1 EA	\$ 10,000.00	\$ 10,000.00
15% Engineering	1 EA	\$ 27,750.00	\$ 28,750.00
Total			\$ 220,957.00

Staff recommends removing this section or condensing the information given. The itemized cost estimate for Pond H is not relevant to this drainage report since Pond H is located and is being constructed with Winding Walk Fil 1

Final credit will be based on the lower of the actual construction costs or the DBPS cost estimate brought forward per the DCM. The estimated cost of construction of the detention pond can be found above, based upon the estimate above the drainage reimbursement credit will be approximately \$220,500. Upon completion of the construction, the developer shall submit a certification from a Colorado Profession Engineer stating the facilities have been constructed in accordance with the approved plans along with the records of the actual construction cost. At the time of this report, the final determination of credits has yet to be accepted nor approved; should credits remain available they will be applied to the Drainage Basin Fee calculation below.

Haegler Ranch

Drainage Basin Fees: $7.36 \text{ ac} * \$ 9,676 / \text{Ac} * 0.575 \text{ Imp Area} = \$ 40,949.00$

Bridge Fees: $7.36 \text{ ac} * \$ 1,428 / \text{Ac} * 0.575 \text{ Imp Area} = \$ 6,043.00$

REFERENCES

1. “City of Colorado Springs/El Paso County Drainage Criteria Manual” September 1987, Revised November 1991, Revised October 1994.
2. Chapter 6, Hydrology and Chapter 11, Storage, Section 3.2.1 of the “City of Colorado Springs Drainage Criteria Manual” May 2014.
3. “Volume 2, El Paso County/City of Colorado Springs Drainage Criteria Manual-Stormwater Quality Policies, Procedures and Best Management Practices” November 1, 2002.
4. Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas. Federal Emergency Management Agency, Revised March 17, 1997.
5. Soils Survey of El Paso County area, Natural Resources Conservation Services of Colorado.
6. Master Development Drainage Plan Meridian Ranch. August 2000. Prepared by URS Corp.
7. Revision to Master Development Drainage Plan Meridian Ranch. May 2015. Prepared by Tech Contractors.
8. Master Development Drainage Plan Latigo Trails. October 2001. Prepared by URS Corp.
9. Final Drainage Report for Meridian Ranch Filing 1. November 2001. Prepared by URS Corp.
10. Preliminary Drainage Plan for Meridian Ranch Phase II. September 2003. Prepared by URS.
11. Final Drainage Plan for The Trails Filing No.7. March 2005. Prepared by URS.
12. Final Drainage Report for Meridian Ranch Filing 3. August 2011. Prepared by Tech Contractors.
13. Preliminary and Final Drainage Report for Meridian Ranch Filing 7. June 2012. Prepared by Tech Contractors.
14. Final Drainage Report for Meridian Ranch Estates Filing 2. July 2013. Prepared by Tech Contractors.
15. Final Drainage Report for Meridian Ranch Filing 11A. March 2014. Prepared by Tech Contractors.

16. Preliminary and Final Drainage Report for Meridian Ranch Filing 8. December 2014. Prepared by Tech Contractors.
17. Preliminary and Final Drainage Report for Meridian Ranch Filing 4B. April 2014. Prepared by Tech Contractors.
18. Final Drainage Report for Stonebridge Filing 1 at Meridian Ranch. June 2014. Prepared by Tech Contractors.
19. Final Drainage Report for Meridian Ranch Filing 9. May 2015. Prepared by Tech Contractors.
20. Revision to Master Development Drainage Plan Meridian Ranch. July 2015. Prepared by Tech Contractors.
21. Final Drainage Report for Meridian Ranch Estates Filing 3. October 2015. Prepared by Tech Contractors.
22. Final Drainage Report for the Vistas Filing 1 at Meridian Ranch. July 2016. Prepared by Tech Contractors.
23. Final Drainage Report for Stonebridge Filing 2 at Meridian Ranch. September 2016. Prepared by Tech Contractors.
24. Final Drainage Report for Stonebridge Filing 3 at Meridian Ranch. April 2017. Prepared by Tech Contractors.
25. Revision to Master Development Drainage Plan Meridian Ranch. November 2017. Prepared by Tech Contractors.
26. Final Drainage Report for WindingWalk Filing 1 at Meridian Ranch. May 2018. Prepared by Tech Contractors.

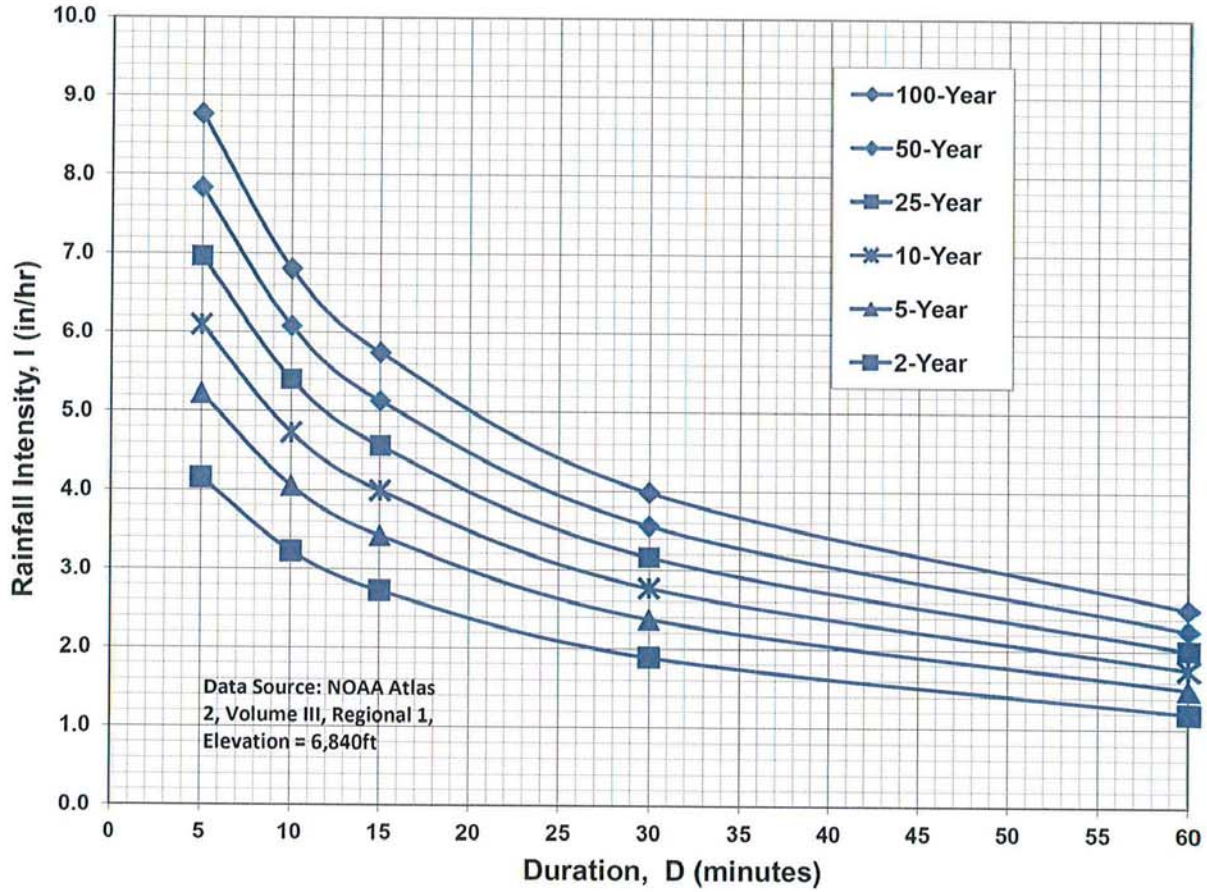
Appendices

Appendix A – Rational Calculations

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries													
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													
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: **Windingwalk Filing 2**

6/27/2018

BASIN		AREA (AC.)					COMPOSITE FACTOR		Percent Impervious		
LABEL	DEV.	UNDEV	6 DU/AC	STREETS	REC CENTER	OPEN SPACE PARKS/GC	TOTAL	5-year		100-year	
H01	The Enclave		1.0				1.0	0.40	0.55	52.0%	
H02			1.9	0.7			0.9	3.5	0.45	0.59	47.9%
H03			1.2		0.7	0.5	0.5	3.0	0.54	0.66	55.7%
H04			1.8		0.4		0.2	2.4	0.46	0.60	55.3%
H05			2.0					2.0	0.40	0.55	52.0%
H06			2.5					2.5	0.40	0.55	52.0%
H07			2.4		0.5		0.3	3.1	0.46	0.60	54.9%
H08			1.5				2.9	4.4	0.29	0.46	19.1%
H09			1.1				1.7	2.8	0.30	0.46	21.4%
H10	Windingwalk		3.6	0.8		0.6	5.0	0.46	0.59	53.8%	
H11			1.4	0.4			0.2	2.0	0.48	0.61	56.0%
H12			4.9					4.9	0.40	0.55	52.0%
H13			1.3					1.3	0.40	0.55	52.0%
H14			1.5					1.5	0.40	0.55	52.0%
H15			1.9					1.9	0.40	0.55	52.0%
H16			2.3		1.1		0.7	4.1	0.50	0.63	55.4%
H17			2.4		0.7		0.4	3.4	0.48	0.61	56.0%
H18			6.0					6.0	0.40	0.55	52.0%
H19			3.8					3.8	0.40	0.55	52.0%
H20			4.6					4.6	0.40	0.55	52.0%
H21			4.0					4.0	0.40	0.55	52.0%
H22			1.8		0.8		0.4	3.0	0.51	0.64	58.5%
H23			0.0		0.7		0.3	1.0	0.67	0.77	66.6%
H24			2.0				1.2	3.3	0.34	0.49	33.2%
H25			3.7				7.6	11.3	0.29	0.45	18.3%
H26			2.7				0.9	3.6	0.36	0.51	39.0%
H27			0.3				1.9	2.2	0.26	0.43	9.0%
H28					1.5		0.2	1.7	0.83	0.90	89.4%
G01	TE		2.7				2.7	0.40	0.55	52.0%	
G02			4.4				4.4	0.40	0.55	52.0%	
G03			1.2					1.2	0.40	0.55	52.0%
G04	WW		1.6				1.6	0.40	0.55	52.0%	
G05			3.4				3.4	0.40	0.55	52.0%	
G06			3.5					3.5	0.40	0.55	52.0%
E02	S3		7.2			10.9	18.1	0.30	0.46	21.8%	
E03			2.1			4.2	6.3	0.29	0.45	18.4%	
E04	WW		1.9	1.1		0.9	3.9	0.51	0.64	55.1%	
E05					0.8		1.0	1.7	0.53	0.65	45.3%
E06	The Vistas Filing 1		5.1	0.3		0.1	5.4	0.42	0.56	53.7%	
E07			4.9					4.9	0.40	0.55	52.0%
E08			1.2					1.2	0.40	0.55	52.0%
E09			2.9					2.9	0.40	0.55	52.0%
E10			4.9					4.9	0.40	0.55	52.0%
E11			3.0					3.0	0.40	0.55	52.0%
E12			2.6					2.6	0.40	0.55	52.0%
E13			3.2					3.2	0.40	0.55	52.0%
E14			1.9				2.3	4.2	0.31	0.47	24.9%
E15					1.1		0.6	1.7	0.65	0.75	62.9%
E16			0.6		0.9			1.5	0.71	0.81	82.1%
Composite:								0.429	0.55	42.9%	

TIME OF CONCENTRATION

SCS Calculations

PROJECT: **Windingwalk Filing 2**

DATE: 6/27/2018

BASIN DESIGNATION	C _s	AREA (AC)	TIME OF CONCENTRATION						TOTAL (T _i +T _t (Min.))	T _c Check (Urbanized Basins)		FINAL T _c (min)				
			INIT./OVERLAND TIME (T _i)			TRAVEL TIME (T _t)				L (FT)	T _c = (L/180) + 10					
			LENGTH (FT)	ΔH	SLOPE %	LENGTH (FT)	ΔH	SLOPE %					CONVEYANCE	VEL. (FPS)		
CONVEYANCE TYPE	COEF.	T _i (Min.)**	T _t (Min.)**	TYPE	COEF.	T _t (Min.)**										
H01	0.40	1.0	100	2.0	2.0%	10.2	370	14	3.8%	P	20	3.9	1.6	470.00	12.6	11.8
H02	0.45	3.5	100	2.0	2.0%	9.4	520	16	3.1%	P	20	3.5	2.5	620.00	13.4	11.9
H03	0.54	3.0	100	2.0	2.0%	8.1	850	13	1.5%	P	20	2.5	5.7	950.00	15.3	13.9
H04	0.46	2.4	15	0.3	2.0%	5.0	707	18	2.5%	P	20	3.2	3.7	722.00	14.0	8.7
H05	0.40	2.0	15	0.3	2.0%	5.0	606	9	1.5%	P	20	2.4	4.1	621.00	13.5	9.1
H06	0.40	2.5	15	0.3	2.0%	5.0	800	23	2.9%	P	20	3.4	3.9	815.00	14.5	8.9
H07	0.46	3.1	25	0.5	2.0%	5.0	764	22	2.9%	P	20	3.4	3.8	789.00	14.4	8.8
H08	0.29	4.4	100	6.0	6.0%	8.1	800	23	2.9%	B	10	1.7	7.9	900.00	15.0	15.0
H09	0.30	2.8	100	2.0	2.0%	11.6	455	8	1.8%	B	10	1.3	5.7	555.00	13.1	13.1
H10	0.46	5.0	100	2.0	2.0%	9.3	840	17	2.0%	P	20	2.8	4.9	940.00	15.2	14.2
H11	0.48	2.0	40	0.8	2.0%	5.7	810	14	1.7%	P	20	2.6	5.1	850.00	14.7	10.8
H12	0.40	4.9	100	2.0	2.0%	10.2	210	4	1.9%	L	7	1.0	3.6			
H13	0.40	1.3	40	0.8	2.0%	6.4	503	13	1.8%	P	20	2.7	4.3	871.00	14.8	14.8
H14	0.40	1.5	30	0.6	2.0%	5.6	703	13	2.6%	P	20	3.2	2.6	743.00	14.1	10.8
H15	0.40	1.9	15	0.3	2.0%	5.0	467	11	2.4%	P	20	3.1	2.5	533.00	13.0	8.2
H16	0.50	4.1	100	2.0	2.0%	8.7	720	13	1.8%	P	20	2.7	4.5	482.00	12.7	7.5
H17	0.48	3.4	100	2.0	2.0%	9.0	645	13	2.0%	P	20	2.8	3.8	820.00	14.6	13.2
H18	0.40	6.0	100	2.0	2.0%	10.2	140	3	2.1%	L	7	1.0	2.3	745.00	14.1	12.8
H19	0.40	3.8	100	2.0	2.0%	10.2	830	16	1.9%	P	20	2.8	5.0	845.00	14.7	14.7
H20	0.40	4.6	100	2.0	2.0%	10.2	185	4	2.0%	L	7	1.0	3.1	930.00	15.2	15.2
H21	0.40	4.0	100	2.0	2.0%	10.2	120	2	1.7%	P	20	2.6	0.8			
H22	0.51	3.0	40	0.8	2.0%	5.4	1730	34	2.0%	P	20	2.8	10.3	405.00	12.3	12.3
H23	0.67	1.0	35	0.7	2.0%	5.0	1093	13	1.2%	P	20	2.2	8.4	1830.00	20.2	20.2
H24	0.34	3.3	100	2.0	2.0%	11.1	540	8	1.5%	P	20	2.4	3.7	1133.00	16.3	13.8
H25	0.29	11.3	100	9.0	9.0%	7.1	765	23	3.0%	G	15	2.6	4.9	575.00	13.2	8.7
H26	0.36	3.6	100	2.0	2.0%	10.8	600	17	2.8%	B	10	1.7	5.9	865.00	14.8	14.8
H27	0.26	2.2	100	8.0	8.0%	7.7	85	4	4.7%	L	7	1.5	0.9	700.00	13.9	13.1
H28	0.83	1.7	13	0.3	2.0%	5.0	635	15	2.4%	P	20	3.1	3.4	820.00	14.6	14.6
							1010	22	2.2%	G	15	2.2	7.6	1110.00	16.2	15.3
							909	19	2.1%	P	20	2.9	5.2	921.50	15.1	10.2

BASIN DESIGNATION	C _s	AREA (AC)	INIT./OVERLAND TIME (T _i)				TRAVEL TIME (T _t)					TOTAL		FINAL T _c (min)			
			LENGTH (FT)	ΔH	SLOPE %	T _i (Min.)*	LENGTH (FT)	ΔH	SLOPE %	CONVEYANCE		VEL. (FPS)	T _t (Min.)**		T _i +T _t (Min.)		
										TYPE	COEF.						
G01	0.40	2.7	15	0.3	2.0%	5.0	870	26	3.0%	P	20	3.5	4.2	9.2	885.00	14.9	9.2
G02	0.40	4.4	100	2.0	2.0%	10.2	1115	28	2.5%	P	20	3.2	5.9	16.0	1215.00	16.8	16.0
G03	0.40	1.2	40	0.8	2.0%	6.4	352	5	1.4%	P	20	2.4	2.5	8.9	392.00	12.2	8.9
G04	0.40	1.6	30	0.6	2.0%	5.6	556	14	2.5%	P	20	3.2	2.9	8.5	586.00	13.3	8.5
G05	0.40	3.4	25	0.5	2.0%	5.1	745	14	1.9%	P	20	2.7	4.5	9.6	770.00	14.3	9.6
G06	0.40	3.5	100	2.0	2.0%	10.2	1100	16	1.5%	P	20	2.4	7.6	17.8	1200.00	16.7	16.7
E02	0.30	18.1	100	2.0	2.0%	11.6	2242	63	2.8%	L	7	1.2	31.8	43.4			43.4
E03	0.29	6.3	100	2.0	2.0%	11.7	710	32	4.5%	L	7	1.5	8.0	19.7			19.7
E04	0.51	3.9	100	8.0	8.0%	5.4	695	13	1.9%	P	20	2.7	4.2	9.6	795.00	14.4	9.6
E05	0.53	1.7												11.2	765.00	14.3	11.2
E06	0.42	5.4												13.7	695.00	13.9	13.7
E07	0.40	4.9												15.8	885.00	14.9	14.9
E08	0.40	1.2												15.2	850.00	14.7	14.7
E09	0.40	2.9												16.2	680.00	13.8	13.8
E10	0.40	4.9												20.2	1230.00	16.8	16.8
E11	0.40	3.0												15.0	640.00	13.6	13.6
E12	0.40	2.6												13.9	755.00	14.2	13.9
E13	0.40	3.2												23.1	1880.00	20.4	20.4
E14	0.31	4.2												27.3			27.3
E15	0.65	1.7	10	0.3	2.5%	5.0	530	11	2.1%	L	7	1.0	8.8	13.8	540.00	13.0	13.0
E16	0.71	1.5	25	0.5	2.0%	5.0	464	10	2.2%	L	7	1.0	7.5	12.5	489.00	12.7	12.5

FROM APPROVED VISTAS FILING | FINAL DRAINAGE REPORT

Notes:
 $* T_i = \frac{L}{S^{0.33}}$
 $* T_i = 0.395 (1.1 - C_5)^{0.5}$
 $V = C_v S_w^{0.5}$
 $** T_t = L \times V$

TYPE OF SURFACE	C _v
HEAVY MEADOW	2.5
TILLAGE/FIELD	5
RIPRAP (not buried)	6.5
SHORT PASTURE AND LAWNS	7
NEARLY BARE GROUND	10
GRASSED WATERWAY	15
PAVED AREAS	20

**STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
SURFACE ROUTING**

PROJECT: **Windingwalk Filing 2**

Date: 6/27/2018

DESIGN POINT	BASIN	AREA (AC)	DIRECT RUNOFF						TOTAL RUNOFF						OVERLAND TRAVEL TIME											
			I (in./hr.)		COEFF. ©		CA		α		Sum Tc (min.)		I (in./hr.)		CA		α		DESTINATION	CONVEYANCE TYPE	COEFFICIENT C _v	SLOPE %	VEL. (FPS)	LENGTH (FT)	TRAVEL TIME (H)	
			(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)								
DP05	H01	1.0	11.8	3.88	6.52	0.40	0.55	0.40	0.54	0.54	3.5	3.5	12.8	3.75	6.30	1.97	2.58	1.5	3.5	P	20.0	1.20%	2.2	140	1.1	
I20	H02	3.5	11.9	3.87	6.49	0.45	0.59	1.57	2.04	6.1	13	13	12.8	3.75	6.30	1.97	2.58	7.4	16	P	20.0	3.10%	3.5	650	3.1	
DP06	H03	3.0	13.9	3.64	6.11	0.54	0.66	1.60	1.96	5.8	12	12	17.0	3.34	5.60	2.70	3.38	5.8	12	P	20.0	2.75%	3.3	618	3.1	
I21	H04	2.4	8.7	4.34	7.29	0.46	0.60	1.10	1.42	4.8	10	10	17.0	3.34	5.60	2.70	3.38	9.0	19							
I22	H05	2.0	9.1	4.26	7.16	0.40	0.55	0.81	1.11	3.5	7.9	7.9						3.5	7.9							
DP07	H06	2.5	8.9	4.30	7.22	0.40	0.55	1.01	1.37	4.3	9.9	9.9						4.3	9.9	P	20.0	1.00%	2.0	152	1.3	
I23	H07	3.1	8.8	4.33	7.27	0.46	0.60	1.45	1.87	6.3	14	14	15.9	3.43	5.76	2.46	3.46	8.4	20	P	20.0	3.30%	3.6	520	2.4	
CB03	H08	4.4	15.0	3.52	5.91	0.29	0.46	1.30	2.01	4.6	12	12						4.6	12							
CB04	H09	2.8	13.1	3.73	6.26	0.30	0.46	0.84	1.28	3.1	8.0	8.0						3.1	8.0							
I24	H10	5.0	14.2	3.60	6.04	0.46	0.59	2.29	2.96	8.2	18	18						8.2	18	P	20.0	2.50%	3.2	523	2.8	
I25	H11	2.0	10.8	4.01	6.73	0.48	0.61	1.95	1.21	3.8	8.1	8.1	18.3	3.22	5.41	0.95	2.08	6.9	11							
I26	H12	4.9	14.8	3.54	5.94	0.40	0.55	1.95	2.66	6.9	16	16	14.9	3.53	5.92	0.51	1.47	6.9	16	P	20.0	2.00%	2.8	15	0.1	
I27	H13	1.3	10.8	4.02	6.75	0.40	0.55	0.51	0.70	2.1	4.7	4.7	14.9	3.53	5.92	0.51	1.47	2.1	4.7							
DP08	H14	1.5	8.2	4.43	7.44	0.40	0.55	0.61	0.83	2.7	6.2	6.2	9.5	4.21	7.07	1.37	1.86	2.7	6.2	P	20.0	1.20%	2.2	170	1.3	
I28	H15	1.9	7.5	4.55	7.65	0.40	0.55	0.75	1.03	3.4	7.9	7.9	9.5	4.21	7.07	1.37	1.86	5.8	13							
I29	H16	4.1	13.2	3.71	6.23	0.50	0.63	2.07	2.60	7.7	16	16	17.0	3.33	5.60	2.07	3.75	7.7	21	P	20.0	1.20%	2.2	600	4.6	
I30	H17	3.4	12.8	3.76	6.31	0.48	0.61	1.65	2.10	6.2	13	13	14.5	3.57	6.00	2.40	3.63	6.2	13	P	20.0	2.30%	3.0	300	1.6	
I31	H18	6.0	14.7	3.55	5.88	0.40	0.55	2.40	3.27	8.5	19	19	14.5	3.57	6.00	2.40	3.63	8.6	22	P	20.0	1.00%	2.0	410	3.4	
I32	H19	3.8	15.2	3.50	5.86	0.40	0.55	1.53	2.09	5.4	12	12	17.9	3.26	5.47	1.84	2.98	5.4	12	P	20.0	1.00%	2.0	308	2.6	
I33	H20	4.6	12.3	3.82	6.42	0.40	0.55	1.84	2.50	7.0	16	16	17.9	3.26	5.47	1.84	2.98	7.0	16	P	20.0	2.00%	2.8	15	0.1	
I34	H21	4.0	20.2	3.08	5.16	0.40	0.55	1.60	2.19	4.9	11	11	20.2	3.08	5.16	1.64	3.34	5.0	17							
I35	H22	3.0	13.8	3.65	6.13	0.51	0.64	1.55	1.93	5.7	12	12	21.6	2.98	5.00	1.55	2.30	5.7	12							
I36	H23	1.0	8.7	4.34	7.28	0.67	0.77	0.69	0.79	3.0	5.7	5.7	9.5	4.21	7.07	1.37	1.86	3.0	5.7							
O34	H24	3.3	14.8	3.54	5.94	0.34	0.49	1.11	1.62	3.9	10	10	21.8	2.96	4.97	3.71	4.78	11	24	POND	G	15.0	1.20%	1.6	425	4.3
DP09	H25	11.3	13.1	3.73	6.26	0.29	0.45	3.30	5.13	12	32	32						12	32							
EI37a	H26	3.6	14.6	3.57	5.99	0.36	0.51	1.29	1.83	4.6	11	11	18.1	3.24	5.44	1.32	2.25	4.6	12	EI37b	P	20.0	2.10%	2.9	53	0.3
EI37b													18.4	3.22	5.40	0.29	0.74	0.9	4.0	EI38	P	20.0	2.10%	2.9	909	5.2
DP09	H27	2.2	15.3	3.49	5.86	0.26	0.43	0.58	0.95	2.0	5.6	5.6	23.6	2.84	4.77	2.01	3.06	5.7	15							
EI38	H28	1.7	10.2	4.09	6.87	0.83	0.90	1.39	1.51	5.7	10	10	23.6	2.84	4.77	1.39	1.65	5.7	10	EI39	P	20.0	2.20%	3.0	126	0.7
EI39													24.3	2.80	4.69	0.47	0.68	1.3	3.2							
DP10	G01	2.7	9.2	4.26	7.14	0.40	0.55	1.08	1.47	4.6	11	11						4.6	11	P	20.0	0.90%	1.9	143	1.3	
G02	G02	4.4	16.0	3.42	5.74	0.40	0.55	1.74	2.38	6.0	14	14	16.0	3.42	5.74	2.82	3.85	9.7	22	P	20.0	2.00%	2.8	15	0.1	
G03	G03	1.2	8.9	4.30	7.23	0.40	0.55	0.49	0.66	2.1	4.8	4.8	16.1	3.41	5.73	0.49	1.42	2.1	8.1							
DP11	G04	1.6	8.5	4.37	7.34	0.40	0.55	0.65	0.89	2.9	6.6	6.6						2.9	6.6	P	20.0	1.00%	2.0	216	1.8	
G05	G05	3.4	9.6	4.19	7.03	0.40	0.55	1.37	1.87	5.7	13	13	10.3	4.08	6.86	2.02	2.76	8.3	19	P	20.0	2.00%	2.8	15	0.1	
G06	G06	3.5	16.7	3.36	5.65	0.40	0.55	1.41	1.92	4.7	11	11	16.7	3.36	5.65	1.41	2.10	4.7	12							
E02	E02	18.1	43.4	1.93	3.23	0.30	0.46	5.48	8.38	11	27	27	43.4	1.93	3.23	8.92	12.89	17	42	DP13	G	15.0	4.50%	3.2	693	3.6
DP13	E03	6.3	19.7	3.11	5.22	0.29	0.45	1.83	2.84	5.7	15	15	47.1	1.81	3.03	10.75	15.73	19	48	I44	G	15.0	1.00%	1.5	50	0.6
E04	E04	3.9	9.6	4.18	7.03	0.51	0.64	2.00	2.49	8.4	17	17	8.4	17				8.4	17							
E05	E05	1.7	11.2	3.96	6.64	0.53	0.65	0.91	1.12	3.6	7.5	7.5	11.2	3.96	6.64	0.91	1.12	3.6	7.5							

DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF							OVERLAND TRAVEL TIME											
	BASIN	AREA (AC)	Tc (Min.)	I (in./hr.)		COEFF. ©		CA		Q		Sum Tc (min.)	I (in./hr.)		CA		Q		DESTINATION	CONVEYANCE TYPE	COEFFICIENT C _v	SLOPE %	VEL. (FPS)	LENGTH (FT)	TRAVEL TIME T _t	
				(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)		(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)								
E104	E06	5.4	13.7	3.66	6.14	0.42	0.56	2.29	3.05	8.4	19								E105	P	20.0	0.63%	1.6	315	3.3	
E105	E07	4.9	14.9	3.53	5.92	0.40	0.55	1.95	2.66	6.9	16	17.0	3.33	5.59	1.95	2.82	6.9	16	E107	P	20.0	0.68%	1.6	294	3.0	
E107	E08	1.2	14.7	3.55	5.96	0.40	0.55	0.49	0.67	1.8	4.0	25.5	2.72	4.57	0.86	1.65	2.3	7.5								
DPI	E09	2.9	13.8	3.65	6.12	0.40	0.55	1.17	1.60	4.3	9.8								E106	P	20.0	0.73%	1.7	1235	12.1	
E106	E10	4.9	16.8	3.35	5.62	0.40	0.55	1.95	2.66	6.5	15	21.8	2.96	4.97	3.12	4.25	9.2	21								
DP2	E11	3.0	13.6	3.67	6.17	0.40	0.55	1.19	1.62	4.4	10								E106	P	20.0	0.91%	1.9	770	6.7	
E106	E12	2.6	13.9	3.64	6.11	0.40	0.55	1.04	1.41	3.8	8.6	16.7	3.36	5.64	2.23	3.04	7.5	17								
E106	E13	3.2	20.4	3.06	5.13	0.40	0.55	1.27	1.73	3.9	8.9	21.8	2.96	4.97	5.35	7.29	16	36	E107	P	20.0	2.00%	2.8	15	0.1	
E107	E14	4.2	27.3	2.62	4.40	0.31	0.47	1.31	1.97	3.4	8.7	25.5	2.72	4.57	2.13	4.47	5.8	20								
H10																										

TYPE OF SURFACE	C _v
HEAVY MEADOW	H
TILLAGE/FIELD	T
RIPRAP (not buried)	R
SHORT PASTURE AND LAWNS	L
NEARLY BARE GROUND	B
GRASSSED WATERWAY	G
PAVED AREAS	P
	20

**STORM DRAINAGE SYSTEM DESIGN
INLET CALCULATIONS**

PROJECT: **Windingwalk Filing 2**

Date: **6/27/2018**

DP	Inlet size L(i)	Proposed or Existing	INLET TYPE	CROSS SLOPE	STREET SLOPE	T _c	Q _{Total}			Q _{Capture}				Q _{Flowby}				DEPTH (max)		SPREAD	
							Q ₅ (cfs)	Q ₁₀₀ (cfs)	Q ₁₀₀ (cfs)	Q ₅ (cfs)	Q ₁₀₀ (cfs)	C _{Aeqv.} (5-yr)	C _{Aeqv.} (100-yr)	Q ₅ (cfs)	Q ₁₀₀ (cfs)	C _{Aeqv.} (5-yr)	C _{Aeqv.} (100-yr)	Q ₅ (cfs)	Q ₁₀₀ (ft)	Q ₅ (cfs)	Q ₁₀₀ (ft)
I20	15	PROP	SUMP ¹	2.0%		12.8	7.4	16	7.4	15	1.97	2.37	-	1.3	-	0.21	0.50	0.50			
I21	20	PROP	SUMP ¹	2.0%		17.0	9.0	19	9.0	19	2.70	3.38	-	-	-	-	0.50	0.50			
I22	10	PROP	SUMP	2.0%		9.1	3.5	7.9	3.5	7.9	0.81	1.11	-	-	-	-	0.50	1.00			
I23	15	PROP	SUMP ¹	2.0%		15.9	8.4	20	8.4	15	2.46	2.59	-	5.0	-	0.87	0.50	0.50			
CB03	Type C	PROP	SUMP	2.0%		15.0	4.6	12	4.6	12	1.30	2.01	-	-	-	-	0.40	0.59			
CB04	Type C	PROP	SUMP	2.0%		13.1	3.1	8.0	3.1	8.0	0.84	1.28	-	-	-	-	0.32	0.50			
I24	10	PROP	SUMP ¹	2.0%		14.2	8.2	18	8.2	11	2.29	1.81	-	7.0	-	1.15	0.50	0.50			
I25	10	PROP	SUMP ¹	2.0%		18.3	3.8	11	3.8	11	1.18	2.02	-	0.3	-	0.06	0.50	0.50			
I26	5	PROP	SUMP	2.0%		14.8	6.9	16	6.9	11	1.95	1.89	-	4.6	-	0.77	0.50	0.70			
I27	10	PROP	SUMP	2.0%		14.9	2.1	8.7	2.1	8.7	0.58	1.47	-	-	-	-	0.50	0.70			
I28	15	PROP	SUMP ¹	2.0%		9.5	5.8	13	5.8	13	1.37	1.86	-	-	-	-	0.50	0.50			
I29	20	PROP	SUMP ¹	2.0%		17.0	7.7	21	7.7	19	2.31	3.39	-	2.1	-	0.37	0.50	0.50			
I30	10	PROP	SUMP ¹	2.0%		12.8	6.2	13	6.2	11	1.65	1.73	-	2.3	-	0.37	0.50	0.50			
I31	20	PROP	SUMP ¹	2.0%		14.5	8.6	22	8.6	19	2.40	3.16	-	2.9	-	0.48	0.50	0.50			
I32	10	PROP	SUMP	2.0%		15.2	5.4	12	5.4	11	1.53	1.86	-	1.3	-	0.23	0.50	0.50			
I33	5	PROP	SUMP	2.0%		17.9	7.0	16	6.9	11	2.12	2.05	0.1	5.1	0.04	0.93	0.50	0.70			
I34	10	PROP	SUMP	2.0%		20.2	5.0	17	5.0	17	1.64	3.34	-	-	-	-	0.50	0.70			
I35	5	PROP	SUMP	2.0%		21.6	5.7	12	5.7	12	1.90	2.37	-	-	-	-	0.50	1.00			
I36	5	PROP	SUMP	2.0%		8.7	3.0	5.7	3.0	5.7	0.69	0.79	-	-	-	-	0.50	1.00			
I40	10	PROP	SUMP	2.0%		16.0	9.7	22	9.7	18	2.82	3.09	-	4.3	-	0.76	0.50	0.70			
I41	10	PROP	SUMP	2.0%		16.1	2.1	8.1	2.1	8.1	0.61	1.42	-	-	-	-	0.50	0.70			
I42	10	PROP	SUMP	2.0%		10.3	8.3	19	8.3	18	2.02	2.59	-	1.2	-	0.17	0.50	0.70			
I43	10	PROP	SUMP	2.0%		16.7	4.7	12	4.7	12	1.41	2.10	-	-	-	-	0.50	0.70			
I44	10	PROP	SUMP	2.0%		9.6	8.4	17	8.4	17	2.00	2.49	-	-	-	-	0.50	0.70			
I45	10	PROP	SUMP	2.0%		11.2	3.6	7.5	3.6	7.5	0.91	1.12	-	-	-	-	0.50	0.70			
E104	10	EXIST	SUMP	2.0%		13.7	8.4	19	8.4	18	2.29	2.89	-	1.0	-	0.16	0.50	0.70			
E105	10	EXIST	SUMP ¹	2.0%		17.0	6.9	16	6.9	16	2.07	2.82	-	-	-	-	0.50	0.70			
E106	20	EXIST	SUMP	2.0%		21.8	16	36	16	31	4.71	6.20	-	5.4	-	1.09	0.50	0.70			
E107	15	EXIST	SUMP	2.0%		25.5	5.8	20	5.8	20	2.13	4.47	-	-	-	-	0.50	0.80			

¹ Forced sump at intersection

**STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
PIPE ROUTING**

PROJECT: **Windingwalk Filing 2**

Date: **6/27/2018**

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW						SYSTEM FLOW						TRAVEL TIME												
		Tc (Min.)		I (in./hr.)		CA		Sum Tc (min.)	I (in./hr.)		CA		PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)	TRAVEL TIME (hr)							
		(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)		(5 YR)	(100 YR)	(5 YR)	(100 YR)														
H20	H02	12.8	3.75	6.30	1.97	2.37	7.4	15				13.0	3.73	6.27	1.97	2.37	7.4	15	18	0.013	J22	1.00%	65	6.0	0.2	
J22												13.5	3.68	6.18	1.97	2.37	7.2	15	18	0.013	J23	3.69%	330	11.4	0.5	
J23												16.0	3.43	5.75	4.43	4.96	8.4	15	24	0.013	J24	3.82%	234	11.6	0.3	
J24	H07	15.9	3.43	5.76	2.46	2.59	8.4	15				17.4	3.30	5.54	2.70	3.38	9.0	19	24	0.013	J25A	1.03%	183	7.3	0.4	
J25A												17.4	3.30	5.54	2.70	3.38	8.9	19	24	0.013	J25B	4.97%	178	16	0.2	
J25B												18.0	3.25	5.45	3.52	4.49	11	25	24	0.013	J26	1.00%	100	7	0.2	
J26												18.2	3.23	5.42	7.94	9.45	26	51	30	0.013	J27	4.13%	216	17	0.2	
CB03	H08	15.0	3.52	5.91	1.30	2.01	4.6	12				18.4	3.21	5.39	10.08	12.74	32	69	42	0.013	J28	3.10%	158	18	0.1	
CB04	H09	13.1	3.73	6.26	0.84	1.28	3.1	8.0				18.9	3.17	5.33	14.92	21.79	47	116	42	0.013	J31	1.95%	169	15	0.2	
J27												19.1	3.16	5.30	17.22	25.17	6.2	11	18	0.013	J32	2.45%	249	14	0.3	
J28	H10	14.2	3.60	6.04	2.29	1.81	8.2	11				19.4	3.13	5.26	18.87	26.90	59	142	48	0.013	J33	3.06%	303	20	0.3	
J29												19.7	3.11	5.22	21.27	30.06	66	157	48	0.013	J34	1.04%	48	12	0.1	
J30												19.7	3.11	5.22	21.27	30.06	66	157	48	0.013	J35	2.55%	387	18	0.4	
J31	H16	17.0	3.33	5.60	2.31	3.39	7.7	19				20.1	3.08	5.18	24.92	33.97	77	176	48	0.013	J35	1.62%	312	9	0.6	
J32												20.1	3.08	5.18	24.92	33.97	77	176	48	0.013	J35	9.90%	24	19	0.0	
J33												20.1	3.08	5.18	26.56	37.31	82	193	48	0.013	OS3	3.05%	5	20	0.0	
J34												20.1	3.08	5.18	26.56	37.31	82	193	48	0.013	OS3	1.01%	248	12	0.4	
J35												21.7	2.97	4.98	2.59	3.16	7.7	16	24	0.013	OS4	1.06%	52	7	0.1	
J36												21.7	2.97	4.98	2.59	3.16	7.7	16	24	0.013	OS4	1.06%	52	7	0.1	
G02																										
G03																										
J33												16.4	3.39	5.68	3.44	4.51	12	26	24	0.013	OS5	1.00%	114	7	0.3	

UPSTREAM DESIGN POINT	UPSTREAM BASIN	INLET FLOW						SYSTEM FLOW						TRAVEL TIME							
		Tc (Min.)	I (in./hr.)		ca		q	Sum Tc (min.)	I (in./hr.)		ca		q		PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS) (Estimate)*	TRAVEL TIME (H)
			(5 YR)	(100 YR)	(5 YR)	(100 YR)			(5 YR)	(100 YR)	(5 YR)	(100 YR)	(5 YR)	(100 YR)							
I42	G05	10.3	4.08	6.86	2.02	2.59	8.3	18						18	0.013	I43	6.65%	35	15	0.0	
I43	G06	16.7	3.36	5.65	1.41	2.10	4.7	12	16.7	3.36	5.65	3.44	4.68	12	0.013	J37	2.71%	188	12	0.3	
J37									16.9	3.34	5.61	3.44	4.68	11	0.013	J38	1.02%	490	8	1.0	
J38									17.9	3.26	5.47	3.44	4.68	11	0.013	J39	1.38%	123	10	0.2	
DP13	E03	47.1	1.81	3.03	10.75	15.73	19	48	47.1	1.81	3.03	10.75	15.73	19	0.013	I44	1.21%	33	12	0.0	
I44	E04	9.6	4.18	7.03	2.00	2.49	8.4	17	47.1	1.80	3.03	12.75	18.22	23	0.013	J39	1.07%	14	11	0.0	
J39									47.1	1.80	3.03	16.19	22.90	29	0.013	I45	1.04%	34	7	0.1	
I45	E05	11.2	3.96	6.64	0.91	1.12	3.6	7.5	47.2	1.80	3.02	17.10	24.03	31	0.013	E104	2.01%	165	15	0.2	
E104	E06	13.7	3.66	6.14	2.29	2.89	8.4	18	47.4	1.80	3.01	19.39	26.92	35	0.013	E104	1.00%	296	10	0.5	
E105	E07	17.0	3.33	5.59	2.07	2.82	6.9	16						6.9	0.013	E104	3.70%	23	11	0.0	
E104									47.9	1.78	2.99	21.46	29.74	38	0.013	E106	1.10%	226	11	0.3	
E106	E10 & E12	21.8	2.96	4.97	4.71	6.20	14	31						14	0.013	E105	1.00%	25	7	0.1	
E107	E08 & E14	25.5	2.72	4.57	2.13	4.47	5.8	20						5.8	0.013	E105	5.40%	5	17	0.0	
E105									25.5	2.72	4.57	6.84	10.67	19	0.013	E106	1.80%	56	13	0.1	
E106									48.2	1.77	2.97	28.30	40.41	50	0.013	OS2	1.50%	165	14	0.2	

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

**STORM DRAINAGE SYSTEM DESIGN
HYDRAULICS**

PROJECT: **Windingwalk Filing 2**

Date: **6/27/2018**

Label	Upstrm Node	Dnstrm Node	Inlet CA (acres)	Inlet Tc (min)	Inlet Flow (ft ³ /s)	System CA (acres)	System Flow Time (min)	System Intensity (in/hr)	Length (ft)	Section Size (in)	Slope (%)	Capacity (Full Flow) (ft ³ /s)	System Flow (ft ³ /s)	Velocity (ft/s)	Elevation Ground (Upstrm) (ft)	Hydraulic Grade Line (Upstrm) (ft)	Invert (Upstrm) (ft)	Elevation Ground (Dnstrm) (ft)	Hydraulic Grade Line (Dnstrm) (ft)	Invert (Dnstrm) (ft)
P48	J20	J22	2.37	12.8	15	2.37	12.8	6.31	65	18	1.00%	11	15	9	7057.79	7055.9	7053.25	7057.29	7054.6	7052.60
P49	J22	J23	2.37			2.37	12.9	6.29	330	18	3.70%	20	15	12.1	7057.29	7054.0	7052.60	7044.71	7041.9	7040.45
P50	J23	J24	2.37			2.37	13.4	6.20	32	18	3.80%	21	15	12	7044.71	7041.9	7040.45	7036.79	7033.1	7031.50
P51	J23	J24	2.59	15.9	15	2.59	15.9	5.76	32	24	1.40%	24	15	4.8	7036.38	7033.4	7031.35	7036.79	7033.3	7031.00
P52	J24	J26	4.96			4.96	16.0	5.75	105	24	2.90%	39	29	12	7036.79	7032.8	7031.00	7034.44	7030.1	7027.95
P53	J21	J25A	3.38	17.0	19	3.38	17.0	5.60	183	24	1.00%	23	19	8.1	7056.10	7052.7	7051.20	7054.38	7050.8	7049.20
P54	J25A	J22	3.38			3.38	17.4	5.54	344	24	3.30%	41	19	12	7054.38	7050.8	7049.20	7045.74	7039.9	7037.80
P55	J22	J25B	1.11	9.1	8	4.49	17.9	5.47	178	24	5.00%	50	25	13.0	7045.74	7039.6	7037.80	7035.00	7031.9	7028.95
P56	J25B	J26				4.49	18.1	5.44	100	24	1.00%	23	25	8	7035.00	7031.5	7028.95	7034.44	7030.3	7027.95
P57	J26	J27	9.45			9.45	18.3	5.41	216	30	4.10%	83	52	16	7034.44	7029.8	7027.45	7024.54	7020.0	7018.55
P58	CB03	J27	2.01	15.0	12	2.01	15.0	5.91	71	18	1.00%	10	12	6.8	7023.00	7021.9	7020.25	7024.54	7021.0	7019.55
P59	CB04	J27	1.28	13.1	8	1.28	13.1	6.25	51	18	1.40%	12	8	6	7023.00	7021.4	7020.25	7024.54	7021.0	7019.55
P60	J27	J28	12.74			12.74	18.5	5.38	158	42	3.10%	177	69	14	7024.54	7020.2	7017.55	7020.13	7015.7	7012.65
P61	J24	J28	1.81	14.2	11	1.81	14.2	6.05	53	18	1.00%	11	11	6.3	7019.71	7017.3	7015.20	7020.13	7016.7	7014.65
P62	J25	J28	2.02	18.3	11	2.02	18.3	5.41	33	18	1.70%	14	11	6	7019.71	7017.1	7015.20	7020.13	7016.7	7014.65
P63	J28	J29	16.57			16.57	18.7	5.35	264	42	3.40%	186	89	16	7020.13	7015.6	7012.65	7011.65	7006.9	7003.60
P64	J26	J27	1.89	14.8	11	1.89	14.8	5.95	35	18	4.20%	22	21	9.7	7017.49	7014.3	7012.65	7017.49	7012.4	7011.50
P65	J27	J29	1.47	14.9	9	3.36	14.9	5.93	192	24	3.10%	40	20	10	7017.49	7012.6	7011.00	7011.65	7006.3	7005.10
P66	J29	J30	19.93			19.93	19.0	5.32	90	42	1.80%	134	107	13	7011.65	7006.74	7003.60	7009.38	7005.4	7002.00
P67	J28	J30	1.86	9.5	13	1.86	9.5	7.06	33	18	1.40%	12	13	7	7008.96	7007.5	7004.45	7009.38	7007.0	7004.00
P68	J30	J31	21.79			21.79	19.1	5.30	169	42	2.00%	141	116	14.8	7009.38	7005.2	7002.00	7006.72	7001.2	6998.70
P69	J29	J31	3.39	17.0	19	3.39	17.0	5.60	28	24	5.90%	55	19	7	7006.86	7003.4	7001.85	7006.72	7003.1	7000.20
P70	J31	J32	25.18			25.18	19.3	5.28	249	48	1.40%	172	134	13.9	7006.72	7001.7	6998.20	7003.17	6996.3	6994.65
P71	J30	J32	1.73	12.8	11	1.73	12.8	6.31	45	18	2.40%	16	11	6.2	7002.77	7000.2	6996.25	7003.17	6996.7	6997.15
P72	J32	J33	26.91			26.91	19.6	5.24	303	48	3.10%	251	142	17	7003.17	6998.2	6994.65	6993.93	6990.2	6985.40
P73	J31	J33	3.16	14.5	19	3.16	14.5	6.00	25	24	6.80%	59	19	6.1	6994.14	6992.1	6989.10	6993.93	6990.2	6987.40
P74	J33	J34	30.07			30.07	19.9	5.20	48	48	3.10%	254	158	12.5	6993.93	6990.0	6985.40	6994.04	6989.4	6983.90
P75	J34	J35	30.07			30.07	19.9	5.19	387	48	2.60%	230	157	14.9	6994.04	6987.6	6983.90	6984.19	6980.3	6974.00
P76	J32	J35	1.86	15.2	11	1.86	15.2	5.88	312	24	1.60%	29	11	5.1	6986.06	6982.2	6981.05	6984.19	6980.3	6976.00
P77	J33	J35	2.05	17.9	11	2.05	17.9	5.47	24	18	9.90%	33	11	8.2	6984.42	6980.2	6978.90	6984.19	6979.0	6976.50
P78	J35	J34	33.98			33.98	20.4	5.14	5	54	3.00%	343	176	11.1	6984.19	6978.8	6973.50	6984.42	6978.7	6973.35
P79	J34	OS3	3.34	20.2	17	3.34	20.4	5.14	209	54	0.60%	158	193	12.2	6984.42	6978.5	6973.00	6977.00	6976.5	6972.00
P80	I40	I41	3.09	16.0	18	3.09	16.0	5.75	35	18	1.00%	10	18	10.1	7033.44	7031.1	7028.90	7033.44	7030.1	7028.55
P81	I41	J36	1.42	16.1	8	4.51	16.1	5.73	193	24	2.60%	37	26	10.1	7033.44	7029.8	7028.05	7028.50	7026.0	7023.00
P82	J36	OS5	4.51			4.51	16.4	5.68	114	24	1.00%	23	26	8.2	7028.50	7025.3	7023.00	7025.00	7023.8	7021.80
P83	I42	I43	2.59	10.3	18	2.59	10.3	6.86	35	18	6.70%	27	18	12.7	7006.70	7002.2	7000.70	7006.70	6999.4	6998.35
P84	I43	J37	2.1	16.7	12	4.69	16.7	5.64	188	24	2.70%	37	27	12.0	7006.70	6999.7	6997.85	6997.36	6994.0	6992.75
P85	J37	J38	2.82			4.69	17.0	5.60	490	30	1.00%	41	26	8.9	6997.36	6994.0	6992.25	6992.38	6989.0	6987.25
P86	J38	J39	4.69			4.69	17.9	5.47	124	30	1.40%	48	26	8.1	6992.38	6989.0	6987.25	6991.41	6988.0	6985.55
P87	DP13	I44	15.73	47.1	48	15.73	47.1	3.03	33	42	1.20%	110	48	8.8	6991.80	6987.3	6985.10	6991.47	6987.0	6984.70
P88	I44	J39	2.49	9.6	18	18.22	47.2	3.02	14	42	1.00%	105	56	7.4	6991.47	6987.0	6984.70	6991.41	6987.3	6984.55
P89	J39	I45	22.91			22.91	47.2	3.02	34	42	1.00%	103	70	9.8	6991.41	6987.2	6984.55	6991.47	6987.0	6984.20
P90	I45	E104	1.12	11.2	8	24.03	47.3	3.02	165	42	2.00%	142	73	12.8	6991.47	6986.9	6984.20	6991.47	6987.0	6984.90
P91	E104	E104	2.89	13.7	18	26.92	47.5	3.01	296	42	1.00%	100	82	10.8	6987.67	6983.5	6980.90	6985.47	6981.4	6977.95
P92	E105	E104	2.82	17.0	16	2.82	17.0	5.60	24	18	3.60%	20	16	9.0	6985.37	6982.5	6980.80	6985.47	6982.0	6979.95
P93	E104	E106				29.74	47.9	2.98	226	42	1.10%	105	89	10.6	6985.47	6982.5	6980.80	6985.47	6982.0	6979.50
P94	E106	E105	6.2	21.8	31	6.20	21.8	4.97	25	24	1.00%	23	31	9.9	6983.27	6980.7	6978.25	6983.04	6980.2	6978.00
P95	E107	E105	4.47	25.5	21	4.47	25.5	4.57	5	24	5.30%	52	21	6.6	6983.27	6980.2	6978.25	6983.04	6980.2	6978.00
P96	E105	E106				10.67	25.5	4.57	56	36	1.80%	90	49	7.1	6983.04	6979.5	6977.00	6983.66	6979.4	6976.00
P97	E106	EOS2	40.41			40.41	48.3	2.97	165	48	1.50%	177	121	12.6	6983.66	6978.3	6975.00	6978.00	6976.5	6972.50
P98	I35	I36	2.37	21.6	12	2.37	21.6	4.99	53	18	1.00%	11	12	6.9	6998.91	6995.9	6994.40	6998.91	6995.2	6993.85
P99	I36	OS4	0.79	8.7	6	3.16	21.7	4.98	52	24	1.10%	23	16	5.5	6998.91	6994.8	6993.35	6996.00	6994.8	6992.80

Appendix B – Street Flow Tables

Worksheet for Ramp Full Street Section

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.00500 ft/ft
 Normal Depth 0.75 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+13	-0.25
0+14	-0.75
0+15	-0.59
0+30	-0.29
0+45	-0.59
0+46	-0.75
0+48	-0.25
0+60	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+13, -0.25)	0.030
(0+13, -0.25)	(0+15, -0.59)	0.013
(0+15, -0.59)	(0+45, -0.59)	0.015
(0+45, -0.59)	(0+48, -0.25)	0.013
(0+48, -0.25)	(0+60, 0.00)	0.030
<None>	(0+60, 0.00)	0.030

Options

Current Roughness Weighted Method Pavlovskii's Method
 Open Channel Weighting Method Pavlovskii's Method
 Closed Channel Weighting Method Pavlovskii's Method

Worksheet for Ramp Full Street Section

Results

Discharge		42.54	ft ³ /s
Elevation Range	-0.75 to 0.00 ft		
Flow Area		19.32	ft ²
Wetted Perimeter		60.21	ft
Hydraulic Radius		0.32	ft
Top Width		60.00	ft
Normal Depth		0.75	ft
Critical Depth		0.66	ft
Critical Slope		0.01121	ft/ft
Velocity		2.20	ft/s
Velocity Head		0.08	ft
Specific Energy		0.83	ft
Froude Number		0.68	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	0.66	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01121	ft/ft

Cross Section for Ramp Full Street Section

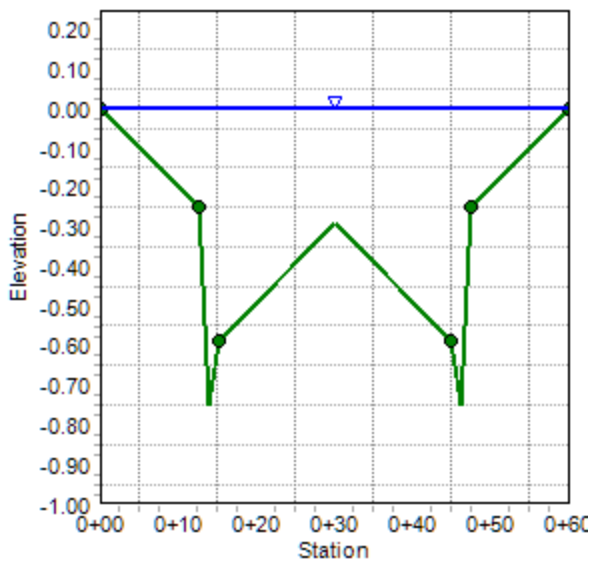
Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 0.00500 ft/ft
Normal Depth 0.75 ft
Discharge 42.54 ft³/s

Cross Section Image



RESIDENTIAL STREET SECTION
RAMP CURB

5-Year Storm Event Maximum Allowable Street Flows (Maximum Flow to Top of Curb)									
Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	19	2.5	7.45	35.2	35.0	9.4	2.5	3.7	17.5
0.0063	21	2.8	7.45	35.2	35.0	11	2.8	3.7	17.5
0.0075	23	3.1	7.45	35.2	35.0	12	3.1	3.7	17.5
0.0088	25	3.4	7.45	35.2	35.0	12	3.3	3.7	17.5
0.0100	27	3.6	7.45	35.2	35.0	13	3.6	3.7	17.5
0.0113	28	3.8	7.45	35.2	35.0	14	3.8	3.7	17.5
0.0125	30	4.0	7.45	35.2	35.0	15	4.0	3.7	17.5
0.0138	31	4.2	7.45	35.2	35.0	16	4.2	3.7	17.5
0.0150	33	4.4	7.45	35.2	35.0	16	4.4	3.7	17.5
0.0163	34	4.6	7.45	35.2	35.0	17	4.5	3.7	17.5
0.0175	35	4.7	7.45	35.2	35.0	18	4.7	3.7	17.5
0.0188	37	4.9	7.45	35.2	35.0	18	4.9	3.7	17.5
0.0200	38	5.1	7.45	35.2	35.0	19	5.0	3.7	17.5
0.0213	39	5.2	7.45	35.2	35.0	19	5.2	3.7	17.5
0.0225	40	5.4	7.45	35.2	35.0	20	5.4	3.7	17.5
0.0238	41	5.5	7.45	35.2	35.0	20	5.5	3.7	17.5
0.0250	42	5.7	7.45	35.2	35.0	21	5.6	3.7	17.5
0.0263	43	5.8	7.45	35.2	35.0	22	5.8	3.7	17.5
0.0275	44	5.9	7.45	35.2	35.0	22	5.9	3.7	17.5
0.0288	45	6.1	7.45	35.2	35.0	23	6.0	3.7	17.5
0.0300	46	6.2	7.45	35.2	35.0	23	6.2	3.7	17.5
0.0313	47	6.3	7.45	35.2	35.0	23	6.3	3.7	17.5
0.0325	48	6.5	7.45	35.2	35.0	24	6.4	3.7	17.5
0.0338	49	6.6	7.45	35.2	35.0	24	6.6	3.7	17.5
0.0350	50	6.7	7.45	35.2	35.0	25	6.7	3.7	17.5
0.0363	51	6.8	7.45	35.2	35.0	25	6.8	3.7	17.5
0.0375	52	6.9	7.45	35.2	35.0	26	6.9	3.7	17.5
0.0388	53	7.1	7.45	35.2	35.0	26	7.0	3.7	17.5
0.0400	53	7.2	7.45	35.2	35.0	27	7.1	3.7	17.5
100-Year Storm Event Maximum Allowable Street Flows (Maximum Flow to Right-of-Way)									
Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	43	2.2	19.32	60.2	60.0	21	2.2	9.7	30
0.0063	48	2.5	19.32	60.2	60.0	24	2.4	9.7	30
0.0075	52	2.7	19.32	60.2	60.0	26	2.7	9.7	30
0.0088	56	2.9	19.32	60.2	60.0	28	2.9	9.7	30
0.0100	60	3.1	19.32	60.2	60.0	30	3.1	9.7	30
0.0113	64	3.3	19.32	60.2	60.0	32	3.3	9.7	30
0.0125	67	3.5	19.32	60.2	60.0	33	3.5	9.7	30
0.0138	71	3.7	19.32	60.2	60.0	35	3.6	9.7	30
0.0150	74	3.8	19.32	60.2	60.0	36	3.8	9.7	30
0.0163	77	4.0	19.32	60.2	60.0	38	3.9	9.7	30
0.0175	80	4.1	19.32	60.2	60.0	39	4.1	9.7	30
0.0188	82	4.3	19.32	60.2	60.0	41	4.2	9.7	30
0.0200	85	4.4	19.32	60.2	60.0	42	4.4	9.7	30
0.0213	88	4.5	19.32	60.2	60.0	43	4.5	9.7	30
0.0225	90	4.7	19.32	60.2	60.0	45	4.6	9.7	30
0.0238	93	4.8	19.32	60.2	60.0	46	4.8	9.7	30
0.0250	95	4.9	19.32	60.2	60.0	47	4.9	9.7	30
0.0263	97	5.0	19.32	60.2	60.0	48	5.0	9.7	30
0.0275	100	5.2	19.32	60.2	60.0	49	5.1	9.7	30
0.0288	102	5.3	19.32	60.2	60.0	50	5.2	9.7	30
0.0300	104	5.4	19.32	60.2	60.0	52	5.3	9.7	30
0.0313	106	5.5	19.32	60.2	60.0	53	5.5	9.7	30
0.0325	108	5.6	19.32	60.2	60.0	54	5.6	9.7	30
0.0338	111	5.7	19.32	60.2	60.0	55	5.7	9.7	30
0.0350	113	5.8	19.32	60.2	60.0	56	5.8	9.7	30
0.0363	115	5.9	19.32	60.2	60.0	57	5.9	9.7	30
0.0375	117	6.0	19.32	60.2	60.0	58	6.0	9.7	30
0.0388	118	6.1	19.32	60.2	60.0	59	6.1	9.7	30
0.0400	120	6.2	19.32	60.2	60.0	60	6.2	9.7	30

Street Flows Ramp Curb
(Maximum Flow to Crown of Roadway)

Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	13	2.2	6.05	35.0	34.8	6.7	2.2	3.0	17.4
0.0063	15	2.5	6.05	35.0	34.8	7.5	2.5	3.0	17.4
0.0075	16	2.7	6.05	35.0	34.8	8.2	2.7	3.0	17.4
0.0088	18	2.9	6.05	35.0	34.8	8.9	2.9	3.0	17.4
0.0100	19	3.1	6.05	35.0	34.8	9.5	3.1	3.0	17.4
0.0113	20	3.3	6.05	35.0	34.8	10	3.3	3.0	17.4
0.0125	21	3.5	6.05	35.0	34.8	11	3.5	3.0	17.4
0.0138	22	3.7	6.05	35.0	34.8	11	3.7	3.0	17.4
0.0150	23	3.8	6.05	35.0	34.8	12	3.8	3.0	17.4
0.0163	24	4.0	6.05	35.0	34.8	12	4.0	3.0	17.4
0.0175	25	4.1	6.05	35.0	34.8	13	4.1	3.0	17.4
0.0188	26	4.3	6.05	35.0	34.8	13	4.3	3.0	17.4
0.0200	27	4.4	6.05	35.0	34.8	13	4.4	3.0	17.4
0.0213	28	4.6	6.05	35.0	34.8	14	4.6	3.0	17.4
0.0225	28	4.7	6.05	35.0	34.8	14	4.7	3.0	17.4
0.0238	29	4.8	6.05	35.0	34.8	15	4.8	3.0	17.4
0.0250	30	5.0	6.05	35.0	34.8	15	5.0	3.0	17.4
0.0263	31	5.1	6.05	35.0	34.8	15	5.1	3.0	17.4
0.0275	31	5.2	6.05	35.0	34.8	16	5.2	3.0	17.4
0.0288	32	5.3	6.05	35.0	34.8	16	5.3	3.0	17.4
0.0300	33	5.4	6.05	35.0	34.8	16	5.4	3.0	17.4
0.0313	34	5.5	6.05	35.0	34.8	17	5.5	3.0	17.4
0.0325	34	5.7	6.05	35.0	34.8	17	5.6	3.0	17.4
0.0338	35	5.8	6.05	35.0	34.8	17	5.8	3.0	17.4
0.0350	35	5.9	6.05	35.0	34.8	18	5.9	3.0	17.4
0.0363	36	6.0	6.05	35.0	34.8	18	6.0	3.0	17.4
0.0375	37	6.1	6.05	35.0	34.8	18	6.1	3.0	17.4
0.0388	37	6.2	6.05	35.0	34.8	19	6.2	3.0	17.4
0.0400	38	6.3	6.05	35.0	34.8	19	6.3	3.0	17.4

Worksheet for Vertical Full Street Section

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.75	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.00
0+13	-0.25
0+13	-0.25
0+13	-0.75
0+15	-0.58
0+30	-0.28
0+45	-0.58
0+47	-0.75
0+47	-0.25
0+48	-0.25
0+60	0.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.00)	(0+13, -0.25)	0.030
(0+13, -0.25)	(0+15, -0.58)	0.013
(0+15, -0.58)	(0+45, -0.58)	0.015
(0+45, -0.58)	(0+48, -0.25)	0.013
(0+48, -0.25)	(0+60, 0.00)	0.030
<None>	(0+60, 0.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for Vertical Full Street Section

Options

Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge		41.33	ft ³ /s
Elevation Range	-0.75 to 0.00 ft		
Flow Area		19.04	ft ²
Wetted Perimeter		61.02	ft
Hydraulic Radius		0.31	ft
Top Width		60.00	ft
Normal Depth		0.75	ft
Critical Depth		0.66	ft
Critical Slope		0.01143	ft/ft
Velocity		2.17	ft/s
Velocity Head		0.07	ft
Specific Energy		0.82	ft
Froude Number		0.68	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	0.66	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01143	ft/ft

Cross Section for Vertical Full Street Section

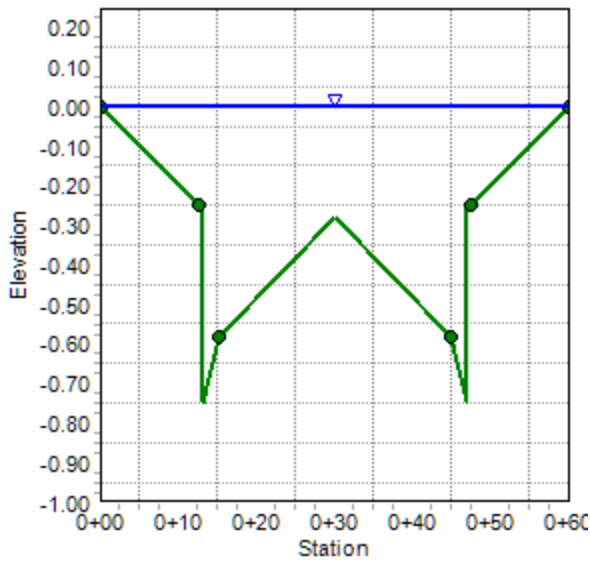
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00500	ft/ft
Normal Depth	0.75	ft
Discharge	41.33	ft ³ /s

Cross Section Image



RESIDENTIAL STREET SECTION
VERTICAL CURB

5-Year Storm Event Maximum Allowable Street Flows (Maximum Flow to Top of Curb)									
Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	18	2.5	7.17	35.0	34.0	8.9	2.5	3.6	17
0.0063	20	2.8	7.17	35.0	34.0	9.9	2.8	3.6	17
0.0075	22	3.0	7.17	35.0	34.0	11	3.0	3.6	17
0.0088	23	3.3	7.17	35.0	34.0	12	3.3	3.6	17
0.0100	25	3.5	7.17	35.0	34.0	13	3.5	3.6	17
0.0113	27	3.7	7.17	35.0	34.0	13	3.7	3.6	17
0.0125	28	3.9	7.17	35.0	34.0	14	3.9	3.6	17
0.0138	29	4.1	7.17	35.0	34.0	15	4.1	3.6	17
0.0150	31	4.3	7.17	35.0	34.0	15	4.3	3.6	17
0.0163	32	4.5	7.17	35.0	34.0	16	4.5	3.6	17
0.0175	33	4.6	7.17	35.0	34.0	17	4.6	3.6	17
0.0188	34	4.8	7.17	35.0	34.0	17	4.8	3.6	17
0.0200	36	5.0	7.17	35.0	34.0	18	5.0	3.6	17
0.0213	37	5.1	7.17	35.0	34.0	18	5.1	3.6	17
0.0225	38	5.3	7.17	35.0	34.0	19	5.3	3.6	17
0.0238	39	5.4	7.17	35.0	34.0	19	5.4	3.6	17
0.0250	40	5.5	7.17	35.0	34.0	20	5.5	3.6	17
0.0263	41	5.7	7.17	35.0	34.0	20	5.7	3.6	17
0.0275	42	5.8	7.17	35.0	34.0	21	5.8	3.6	17
0.0288	43	5.9	7.17	35.0	34.0	21	5.9	3.6	17
0.0300	43	6.1	7.17	35.0	34.0	22	6.1	3.6	17
0.0313	44	6.2	7.17	35.0	34.0	22	6.2	3.6	17
0.0325	45	6.3	7.17	35.0	34.0	23	6.3	3.6	17
0.0338	46	6.4	7.17	35.0	34.0	23	6.4	3.6	17
0.0350	47	6.6	7.17	35.0	34.0	23	6.6	3.6	17
0.0363	48	6.7	7.17	35.0	34.0	24	6.7	3.6	17
0.0375	49	6.8	7.17	35.0	34.0	24	6.8	3.6	17
0.0388	49	6.9	7.17	35.0	34.0	25	6.9	3.6	17
0.0400	50	7.0	7.17	35.0	34.0	25	7.0	3.6	17
100-Year Storm Event Maximum Allowable Street Flows (Maximum Flow to Right-of-Way)									
Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	41	2.2	19.04	61.0	60.0	21	2.2	9.5	30
0.0063	46	2.4	19.04	61.0	60.0	23	2.4	9.5	30
0.0075	51	2.7	19.04	61.0	60.0	25	2.7	9.5	30
0.0088	55	2.9	19.04	61.0	60.0	27	2.9	9.5	30
0.0100	58	3.1	19.04	61.0	60.0	29	3.1	9.5	30
0.0113	62	3.3	19.04	61.0	60.0	31	3.2	9.5	30
0.0125	65	3.4	19.04	61.0	60.0	33	3.4	9.5	30
0.0138	69	3.6	19.04	61.0	60.0	34	3.6	9.5	30
0.0150	72	3.8	19.04	61.0	60.0	36	3.8	9.5	30
0.0163	75	3.9	19.04	61.0	60.0	37	3.9	9.5	30
0.0175	77	4.1	19.04	61.0	60.0	39	4.1	9.5	30
0.0188	80	4.2	19.04	61.0	60.0	40	4.2	9.5	30
0.0200	83	4.3	19.04	61.0	60.0	41	4.3	9.5	30
0.0213	85	4.5	19.04	61.0	60.0	42	4.5	9.5	30
0.0225	88	4.6	19.04	61.0	60.0	44	4.6	9.5	30
0.0238	90	4.7	19.04	61.0	60.0	45	4.7	9.5	30
0.0250	92	4.9	19.04	61.0	60.0	46	4.8	9.5	30
0.0263	95	5.0	19.04	61.0	60.0	47	5.0	9.5	30
0.0275	97	5.1	19.04	61.0	60.0	48	5.1	9.5	30
0.0288	99	5.2	19.04	61.0	60.0	49	5.2	9.5	30
0.0300	101	5.3	19.04	61.0	60.0	50	5.3	9.5	30
0.0313	103	5.4	19.04	61.0	60.0	51	5.4	9.5	30
0.0325	105	5.5	19.04	61.0	60.0	52	5.5	9.5	30
0.0338	107	5.6	19.04	61.0	60.0	53	5.6	9.5	30
0.0350	109	5.7	19.04	61.0	60.0	54	5.7	9.5	30
0.0363	111	5.8	19.04	61.0	60.0	55	5.8	9.5	30
0.0375	113	5.9	19.04	61.0	60.0	56	5.9	9.5	30
0.0388	115	6.0	19.04	61.0	60.0	57	6.0	9.5	30
0.0400	117	6.1	19.04	61.0	60.0	58	6.1	9.5	30

Street Flows Vertical Curb
(Maximum Flow to Crown of Roadway)

Channel Slope (ft/ft)	Full Street Width					Half Street Width			
	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Top Width (ft)
0.0050	14	2.2	6.15	35.0	34.0	6.7	2.2	3.0	17
0.0063	15	2.5	6.15	35.0	34.0	7.5	2.5	3.0	17
0.0075	17	2.7	6.15	35.0	34.0	8.2	2.7	3.0	17
0.0088	18	3.0	6.15	35.0	34.0	8.8	2.9	3.0	17
0.0100	19	3.2	6.15	35.0	34.0	9.4	3.1	3.0	17
0.0113	21	3.4	6.15	35.0	34.0	10	3.3	3.0	17
0.0125	22	3.5	6.15	35.0	34.0	11	3.5	3.0	17
0.0138	23	3.7	6.15	35.0	34.0	11	3.7	3.0	17
0.0150	24	3.9	6.15	35.0	34.0	12	3.8	3.0	17
0.0163	25	4.0	6.15	35.0	34.0	12	4.0	3.0	17
0.0175	26	4.2	6.15	35.0	34.0	12	4.1	3.0	17
0.0188	27	4.3	6.15	35.0	34.0	13	4.3	3.0	17
0.0200	28	4.5	6.15	35.0	34.0	13	4.4	3.0	17
0.0213	28	4.6	6.15	35.0	34.0	14	4.6	3.0	17
0.0225	29	4.8	6.15	35.0	34.0	14	4.7	3.0	17
0.0238	30	4.9	6.15	35.0	34.0	15	4.8	3.0	17
0.0250	31	5.0	6.15	35.0	34.0	15	4.9	3.0	17
0.0263	32	5.1	6.15	35.0	34.0	15	5.1	3.0	17
0.0275	32	5.3	6.15	35.0	34.0	16	5.2	3.0	17
0.0288	33	5.4	6.15	35.0	34.0	16	5.3	3.0	17
0.0300	34	5.5	6.15	35.0	34.0	16	5.4	3.0	17
0.0313	34	5.6	6.15	35.0	34.0	17	5.5	3.0	17
0.0325	35	5.7	6.15	35.0	34.0	17	5.6	3.0	17
0.0338	36	5.8	6.15	35.0	34.0	17	5.7	3.0	17
0.0350	36	5.9	6.15	35.0	34.0	18	5.9	3.0	17
0.0363	37	6.0	6.15	35.0	34.0	18	6.0	3.0	17
0.0375	38	6.1	6.15	35.0	34.0	18	6.1	3.0	17
0.0388	38	6.2	6.15	35.0	34.0	19	6.2	3.0	17
0.0400	39	6.3	6.15	35.0	34.0	19	6.3	3.0	17

Appendix C - HEC-HMS Data

Input Data Windingwalk Filing 2

BASIN	AREA		CURVE NO.	PERCENT IMPERV.	LAG TIME (min)	
	(acre)	(mi ²)				
HISTORIC						
HG07	63	0.0984	61.0	0%	28.3	♦♦
HG08	85	0.1328	61.0	0%	22.9	♦♦
HG09	114	0.1781	61.0	0%	35.6	♦♦
HG10	88	0.1375	61.0	0%	61.4	♦♦
HG11	131	0.2047	61.0	0%	40.4	♦♦
HG12	83	0.1297	61.0	0%	32.0	♦♦
HG13	54	0.0844	63.1	7%	21.2	♦♦
HG14	147	0.2297	61.0	0%	45.1	♦♦
HG15	164	0.2563	61.0	0%	65.1	♦♦
HG17	85	0.1328	61.9	2%	29.9	♦♦
HG18	21	0.0328	61.0	0%	14.1	♦♦
HG19	3	0.0047	61.0	0%	6.1	♦♦
HG20	1	0.0016	61.0	0%	6.9	♦♦
HG21	14	0.0219	61.0	0%	13.8	♦♦
HH01	63	0.0984	61.0	0%	16.6	♦♦

BASIN	AREA		CURVE NO.	PERCENT IMPERV.	LAG TIME (min)	
	(acre)	(mi ²)				
INTERIM						
FG08A	48	0.075	76.8	43%	13.3	✓
FG08B	40	0.063	76.7	40%	16.6	✓
FG09	31	0.048	71.7	27%	20.8	♦♦
HG10	30	0.047	63.2	6%	23.1	
FG11	40	0.063	78.2	44%	23.2	●
FG12	21	0.033	80.0	47%	16.1	♦♦
FG13	42	0.066	66.9	14%	29.6	
HG15	19	0.030	62.1	3%	35.0	
FG15a	10	0.016	78.7	44%	11.2	♦
FG16	50	0.077	78.8	45%	13.0	♦
FG17a	44	0.069	76.5	39%	14.4	✓✓
FG17b	14	0.021	79.9	47%	11.4	✓✓
FG17c	20	0.031	65.2	10%	11.8	✓✓
FG18	41	0.064	73.2	28%	29.9	♦
FG19	34	0.053	80.3	48%	15.3	✓✓
FG19a	5	0.008	75.2	36%	16.4	
FG20	7	0.011	92.9	86%	10.1	
FH01	86	0.135	74.3	31%	30.9	
FH02	6	0.009	71.3	25%	14.6	
FH03	5	0.008	80.7	52%	14.4	

BASIN	AREA		CURVE NO.	PERCENT IMPERV.	LAG TIME (min)	
	(acre)	(mi ²)				
FUTURE						
FG08A	48	0.075	76.8	43%	13.3	✓
FG08B	40	0.063	76.7	40%	16.6	✓
FG09	31	0.048	71.7	27%	20.8	♦♦
FG10	43	0.067	72.7	29%	41.8	♦♦
FG11	40	0.063	78.2	44%	23.2	●
FG12	21	0.033	80.0	47%	16.1	♦♦
FG13	42	0.066	66.9	14%	29.6	
FG14	21	0.033	77.5	42%	20.9	
FG15	65	0.102	72.9	30%	25.9	♦♦♦
FG15a	10	0.016	78.7	44%	11.2	♦
FG16	50	0.077	78.8	45%	13.0	♦
FG17a	44	0.069	76.5	39%	14.4	✓✓
FG17b	14	0.021	79.9	47%	11.4	✓✓
FG17c	20	0.031	65.2	10%	11.8	✓✓
FG18	41	0.064	73.5	31%	29.9	♦
FG19	34	0.053	80.3	48%	15.3	✓✓
FG19a	4	0.007	71.4	26%	0.0	
FG20	7	0.011	92.9	86%	10.1	
FH01	86	0.134	76.2	38%	23.4	♦♦♦
FH02	6	0.009	71.3	25%	14.6	♦♦♦
FH03	5	0.008	80.7	52%	14.4	

◇	From Meridian Ranch Drainage Reports (Windingwalk Rational Calcs., September 2017)
♦	From Retrofit Drainage Analysis For Bennett Regional Detention Pond, Jun 2014)
♦♦	From Approved Meridian Ranch MDDP, Aug 2015
◇◇	From Approved Meridian Ranch Final Drainage Reports (Stonebridge Filing 2, Oct 2016)
■	From Estates Filing 2 Final Drainage Report, July 2013
■	From Estates Filing 3 Final Drainage Report, Nov 2015
◇	From Meridian Ranch Filing 11b Approved Final Drainage Report, Nov 2014
◇◇	From Meridian Ranch Filing 3 Approved Final Drainage Report, Aug 2012
●	From Meridian Ranch Filing 7 Approved Final Drainage Report, Aug 2012
♦♦	From Meridian Ranch Filing 8 Approved Final Drainage Report, Feb 2015
✓	From Meridian Ranch Filing 9 Approved Final Drainage Report, July 2015
✓✓	From Stonebridge Filing 3 Approved Final Drainage Report, April 2017
♦♦♦	From Approved Meridian Ranch MDDP, Dec 2017

Add a footnote identify what the green highlight means



NOAA Atlas 14, Volume 6, Version 2
 Location name: Peyton, Colorado, USA
 Latitude: 38.9763°, Longitude: -104.6842°
 Elevation: 7054.14 ft
 Source: ERI Maps
 Source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Benja Peltos, Deborah Math, Sandra Perovich, Ishant Roy, Michael Br. Leument, Carl Typpalik,
 Dale Ulrich, Michael Yelka, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.239 (0.190-0.301)	0.281 (0.232-0.367)	0.381 (0.302-0.482)	0.480 (0.383-0.606)	0.576 (0.442-0.764)	0.670 (0.501-0.899)	0.770 (0.588-1.06)	0.878 (0.688-1.23)	1.02 (0.800-1.48)	1.14 (0.787-1.66)
10-min	0.349 (0.278-0.441)	0.426 (0.339-0.539)	0.558 (0.443-0.706)	0.674 (0.532-0.867)	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 (0.988-2.16)	1.67 (1.08-2.44)
15-min	0.426 (0.340-0.538)	0.518 (0.413-0.660)	0.680 (0.540-0.861)	0.822 (0.648-1.04)	1.03 (0.789-1.39)	1.20 (0.885-1.61)	1.37 (0.989-1.89)	1.58 (1.08-2.20)	1.82 (1.22-2.64)	2.03 (1.31-2.97)
30-min	0.598 (0.466-0.769)	0.741 (0.580-0.939)	0.969 (0.768-1.23)	1.17 (0.923-1.48)	1.46 (1.12-1.94)	1.70 (1.27-2.26)	1.93 (1.41-2.60)	2.21 (1.53-3.12)	2.56 (1.72-3.73)	2.87 (1.89-4.20)
60-min	0.778 (0.620-0.982)	0.934 (0.744-1.16)	1.21 (0.982-1.54)	1.47 (1.16-1.86)	1.84 (1.42-2.46)	2.16 (1.62-2.81)	2.50 (1.81-3.44)	2.87 (1.89-4.06)	3.38 (2.26-4.91)	3.90 (2.48-5.56)
2-hr	0.948 (0.762-1.18)	1.13 (0.905-1.41)	1.48 (1.16-1.89)	1.78 (1.40-2.22)	2.23 (1.73-2.86)	2.62 (1.98-3.51)	3.03 (2.23-4.18)	3.52 (2.47-4.88)	4.19 (2.82-6.04)	4.73 (3.09-6.87)
3-hr	1.04 (0.839-1.28)	1.22 (0.986-1.52)	1.67 (1.26-1.86)	1.90 (1.51-2.36)	2.41 (1.90-3.21)	2.86 (2.18-3.83)	3.36 (2.47-4.58)	3.90 (2.75-5.47)	4.68 (3.16-6.75)	5.33 (3.50-7.71)
6-hr	1.21 (0.980-1.48)	1.48 (1.14-1.73)	1.78 (1.44-2.21)	2.18 (1.74-2.88)	2.76 (2.19-3.86)	3.29 (2.58-4.38)	3.88 (2.88-5.28)	4.53 (3.23-6.34)	5.48 (3.76-7.88)	6.28 (4.17-8.04)
12-hr	1.38 (1.14-1.70)	1.62 (1.23-1.98)	2.08 (1.68-2.58)	2.48 (2.02-3.08)	3.16 (2.63-4.14)	3.76 (2.92-4.96)	4.42 (3.31-5.87)	5.16 (3.70-7.14)	6.22 (4.30-8.86)	7.10 (4.76-10.1)
24-hr	1.61 (1.33-1.96)	1.88 (1.56-2.28)	2.38 (1.97-2.92)	2.88 (2.35-3.62)	3.53 (2.91-4.88)	4.27 (3.34-5.68)	4.98 (3.76-6.88)	5.76 (4.17-7.80)	6.87 (4.78-9.70)	7.79 (5.25-11.1)

HISTORIC 100-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
HG07	0.0984	47	01Jul2015, 12:24	7
HG07-G11	0.0984	47	01Jul2015, 12:30	7
HG08	0.1328	73	01Jul2015, 12:18	10
G11	0.2312	115	01Jul2015, 12:24	17
G11-G12	0.2312	114	01Jul2015, 12:30	16
HG09	0.1781	73	01Jul2015, 12:30	13
G12	0.4093	187	01Jul2015, 12:30	29
G12-H08	0.4093	183	01Jul2015, 12:36	28
HG10	0.1375	39	01Jul2015, 13:06	10
H08	0.5468	216	01Jul2015, 12:42	38
HG11	0.2047	77	01Jul2015, 12:36	15
H09	0.2047	77	01Jul2015, 12:36	15
HH01	0.0984	65	01Jul2015, 12:12	7
H12	0.0984	65	01Jul2015, 12:12	7
HG12	0.1297	57	01Jul2015, 12:30	9
H10	0.1297	57	01Jul2015, 12:30	9

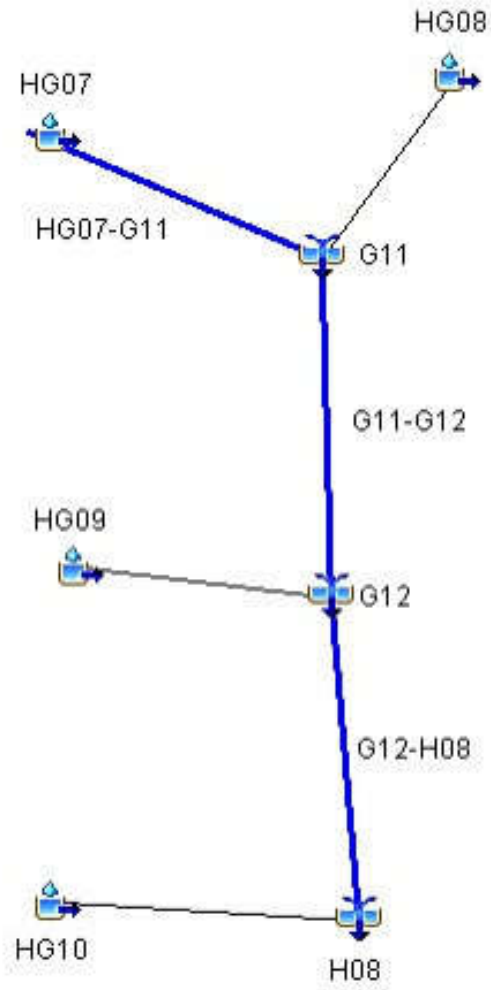
HISTORIC 50-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₅₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₅₀ (AC. FT.)
HG07	0.0984	31	01Jul2015, 12:24	5
HG07-G11	0.0984	31	01Jul2015, 12:30	5
HG08	0.1328	48	01Jul2015, 12:18	7
G11	0.2312	75	01Jul2015, 12:24	12
G11-G12	0.2312	75	01Jul2015, 12:30	11
HG09	0.1781	48	01Jul2015, 12:36	9
G12	0.4093	122	01Jul2015, 12:30	20
G12-H08	0.4093	121	01Jul2015, 12:42	20
HG10	0.1375	26	01Jul2015, 13:06	7
H08	0.5468	142	01Jul2015, 12:42	27
HG11	0.2047	51	01Jul2015, 12:42	10
H09	0.2047	51	01Jul2015, 12:42	10
HH01	0.0984	43	01Jul2015, 12:12	5
H12	0.0984	43	01Jul2015, 12:12	5
HG12	0.1297	38	01Jul2015, 12:30	7
H10	0.1297	38	01Jul2015, 12:30	7

Add a footnote identifying what the green and yellow highlight means.

HISTORIC 25-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q_{25} (CFS)	TIME OF PEAK	TOTAL VOLUME Q_{25} (AC. FT.)
HG07	0.0984	18	01Jul2015, 12:30	3.3
HG07-G11	0.0984	18	01Jul2015, 12:30	3.2
HG08	0.1328	28	01Jul2015, 12:18	4.4
G11	0.2312	44	01Jul2015, 12:24	7.6
G11-G12	0.2312	44	01Jul2015, 12:30	7.5
HG09	0.1781	29	01Jul2015, 12:36	5.9
G12	0.4093	72	01Jul2015, 12:36	13.4
G12-H08	0.4093	71	01Jul2015, 12:48	13.0
HG10	0.1375	16	01Jul2015, 13:06	4.5
H08	0.5468	85	01Jul2015, 12:48	17.5
HG11	0.2047	30	01Jul2015, 12:42	6.7
H09	0.2047	30	01Jul2015, 12:42	6.7
HH01	0.0984	25	01Jul2015, 12:12	3.3
H12	0.0984	25	01Jul2015, 12:12	3.3
HG12	0.1297	22	01Jul2015, 12:30	4.3
H10	0.1297	22	01Jul2015, 12:30	4.3

HISTORIC 10-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q_{10} (CFS)	TIME OF PEAK	TOTAL VOLUME Q_{10} (AC. FT.)
HG07	0.0984	7	01Jul2015, 12:30	1.6
HG07-G11	0.0984	7	01Jul2015, 12:36	1.6
HG08	0.1328	11	01Jul2015, 12:24	2.2
G11	0.2312	17	01Jul2015, 12:30	3.9
G11-G12	0.2312	17	01Jul2015, 12:42	3.8
HG09	0.1781	11	01Jul2015, 12:42	3.0
G12	0.4093	28	01Jul2015, 12:42	6.8
G12-H08	0.4093	28	01Jul2015, 13:00	6.5
HG10	0.1375	7	01Jul2015, 13:18	2.2
H08	0.5468	34	01Jul2015, 13:00	8.8
HG11	0.2047	12	01Jul2015, 12:48	3.4
H09	0.2047	12	01Jul2015, 12:48	3.4
HH01	0.0984	9	01Jul2015, 12:18	1.7
H12	0.0984	9	01Jul2015, 12:18	1.7
HG12	0.1297	9	01Jul2015, 12:36	2.2
H10	0.1297	9	01Jul2015, 12:36	2.2

GIECK. HISTORIC



HISTORIC 5-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₅ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₅ (AC. FT.)
HG07	0.0984	2.4	01Jul2015, 12:42	0.8
HG07-G11	0.0984	2.4	01Jul2015, 12:48	0.8
HG08	0.1328	3.6	01Jul2015, 12:30	1.1
G11	0.2312	5.7	01Jul2015, 12:42	2
G11-G12	0.2312	5.6	01Jul2015, 12:54	1.9
HG09	0.1781	4.1	01Jul2015, 12:48	1.5
G12	0.4093	9.7	01Jul2015, 12:54	3.4
G12-H08	0.4093	9.7	01Jul2015, 13:18	3.3
HG10	0.1375	2.6	01Jul2015, 13:30	1.1
H08	0.5468	12.1	01Jul2015, 13:18	4.4
HG11	0.2047	4.5	01Jul2015, 13:00	1.7
H09	0.2047	4.5	01Jul2015, 13:00	1.7
HH01	0.0984	3	01Jul2015, 12:18	0.9
H12	0.0984	3	01Jul2015, 12:18	0.9
HG12	0.1297	3.1	01Jul2015, 12:42	1.1
H10	0.1297	3.1	01Jul2015, 12:42	1.1

HISTORIC 2-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₂ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₂ (AC. FT.)
HG07	0.0984	0.40	01Jul2015, 13:42	0.3
HG07-G11	0.0984	0.40	01Jul2015, 14:00	0.3
HG08	0.1328	0.50	01Jul2015, 13:36	0.4
G11	0.2312	0.90	01Jul2015, 13:48	0.6
G11-G12	0.2312	0.90	01Jul2015, 14:12	0.6
HG09	0.1781	0.70	01Jul2015, 13:54	0.5
G12	0.4093	1.60	01Jul2015, 14:06	1.0
G12-H08	0.4093	1.60	01Jul2015, 14:54	0.9
HG10	0.1375	0.50	01Jul2015, 14:42	0.3
H08	0.5468	2.10	01Jul2015, 14:48	1.3
HG11	0.2047	0.80	01Jul2015, 14:06	0.5
H09	0.2047	0.80	01Jul2015, 14:06	0.5
HH01	0.0984	0.40	01Jul2015, 13:24	0.3
H12	0.0984	0.40	01Jul2015, 13:24	0.3
HG12	0.1297	0.50	01Jul2015, 13:48	0.3
H10	0.1297	0.50	01Jul2015, 13:48	0.3

MISC. HISTORIC

HG11



H09



HG12



H10



HH01



H12



INTERIM 100-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	117	01Jul2015, 12:06	10
FG08A-G05	0.0750	111	01Jul2015, 12:12	10
FG08B	0.0630	87	01Jul2015, 12:12	9
FG08B-G05	0.0630	85	01Jul2015, 12:12	9
FG11	0.0625	76	01Jul2015, 12:18	9
FG09	0.0484	49	01Jul2015, 12:12	6
FG09-G05	0.0484	48	01Jul2015, 12:18	6
HG10	0.0467	29	01Jul2015, 12:18	4
G05	0.2956	344	01Jul2015, 12:12	37
FG13	0.0661	44	01Jul2015, 12:24	6
FG12	0.0328	51	01Jul2015, 12:12	5
POND D	0.3945	107	01Jul2015, 13:00	39
POND D-G17	0.3945	107	01Jul2015, 13:00	39
HG15	0.0297	13	01Jul2015, 12:30	2
FG15a	0.0156	28	01Jul2015, 12:06	2
G17	0.4398	119	01Jul2015, 12:54	43
G17-G18	0.4398	119	01Jul2015, 12:54	43
FG16	0.0773	127	01Jul2015, 12:06	11
G18	0.5171	167	01Jul2015, 12:06	54
G18-POND E	0.5171	161	01Jul2015, 12:06	54
HG30	0.1844	50	01Jul2015, 13:06	13
FG30-PONDHS	0.1844	50	01Jul2015, 13:12	13
FG31	0.0922	118	01Jul2015, 12:18	14
POND HS	0.2766	102	01Jul2015, 12:36	27
FG17a	0.0694	108	01Jul2015, 12:06	10
FG17a-POND E	0.0694	106	01Jul2015, 12:06	10
FG18	0.0644	56	01Jul2015, 12:24	8
FG18-POND E	0.0644	56	01Jul2015, 12:24	8
FG19	0.0527	85	01Jul2015, 12:06	8
FG17c	0.0313	32	01Jul2015, 12:06	3
FG17b	0.0214	40	01Jul2015, 12:06	3
POND E	1.0329	199	01Jul2015, 13:48	89
H08	1.0329	173	01Jul2015, 13:48	78
H09	0.0000	25	01Jul2015, 13:48	11
FH01	0.1348	120	01Jul2015, 12:24	17
POND H	0.1348	47	01Jul2015, 13:06	14
FH02	0.0091	11	01Jul2015, 12:06	1
FH03	0.0081	14	01Jul2015, 12:06	1
H12	0.1520	50	01Jul2015, 13:06	16

INTERIM 50-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	91	01Jul2015, 12:06	8
FG08A-G05	0.0750	86	01Jul2015, 12:12	8
FG08B	0.0630	67	01Jul2015, 12:12	7
FG08B-G05	0.0630	66	01Jul2015, 12:12	7
FG11	0.0625	59	01Jul2015, 12:18	7
FG09	0.0484	36	01Jul2015, 12:12	4
FG09-G05	0.0484	36	01Jul2015, 12:18	4
HG10	0.0467	20	01Jul2015, 12:18	3
G05	0.2956	261	01Jul2015, 12:12	29
FG13	0.0661	31	01Jul2015, 12:24	5
FG12	0.0328	40	01Jul2015, 12:12	4
POND D	0.3945	70	01Jul2015, 13:12	29
POND D-G17	0.3945	69	01Jul2015, 13:12	29
HG15	0.0297	9	01Jul2015, 12:36	2
FG15a	0.0156	22	01Jul2015, 12:06	2
G17	0.4398	77	01Jul2015, 13:06	32
G17-G18	0.4398	77	01Jul2015, 13:06	32
FG16	0.0773	98	01Jul2015, 12:06	9
G18	0.5171	126	01Jul2015, 12:06	40
G18-POND E	0.5171	121	01Jul2015, 12:06	40
HG30	0.1844	33	01Jul2015, 13:12	9
FG30-PONDHS	0.1844	33	01Jul2015, 13:18	9
FG31	0.0922	92	01Jul2015, 12:18	11
POND HS	0.2766	62	01Jul2015, 12:48	20
FG17a	0.0694	84	01Jul2015, 12:06	8
FG17a-POND E	0.0694	82	01Jul2015, 12:06	8
FG18	0.0644	42	01Jul2015, 12:24	6
FG18-POND E	0.0644	42	01Jul2015, 12:24	6
FG19	0.0527	67	01Jul2015, 12:06	6
FG17c	0.0313	22	01Jul2015, 12:06	2
FG17b	0.0214	31	01Jul2015, 12:06	3
POND E	1.0329	119	01Jul2015, 14:24	62
H08	1.0329	107	01Jul2015, 14:24	54
H09	0.0000	12	01Jul2015, 14:24	8
FH01	0.1348	91	01Jul2015, 12:24	13
POND H	0.1348	26	01Jul2015, 13:24	10
FH02	0.0091	8	01Jul2015, 12:06	1
FH03	0.0081	11	01Jul2015, 12:06	1
H12	0.1520	28	01Jul2015, 13:18	12

INTERIM 25-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	67	01Jul2015, 12:06	6
FG08A-G05	0.0750	65	01Jul2015, 12:12	6
FG08B	0.0630	50	01Jul2015, 12:12	5
FG08B-G05	0.0630	49	01Jul2015, 12:12	5
FG11	0.0625	45	01Jul2015, 12:18	5
FG09	0.0484	26	01Jul2015, 12:18	3
FG09-G05	0.0484	25	01Jul2015, 12:18	3
HG10	0.0467	12	01Jul2015, 12:18	2
G05	0.2956	190	01Jul2015, 12:12	21
FG13	0.0661	20	01Jul2015, 12:24	3
FG12	0.0328	31	01Jul2015, 12:12	3
POND D	0.3945	34	01Jul2015, 13:42	20
POND D-G17	0.3945	34	01Jul2015, 13:42	20
HG15	0.0297	5	01Jul2015, 12:36	1
FG15a	0.0156	17	01Jul2015, 12:06	1
G17	0.4398	38	01Jul2015, 13:30	23
G17-G18	0.4398	38	01Jul2015, 13:36	22
FG16	0.0773	74	01Jul2015, 12:06	7
G18	0.5171	93	01Jul2015, 12:06	29
G18-POND E	0.5171	89	01Jul2015, 12:06	29
HG30	0.1844	20	01Jul2015, 13:12	6
FG30-PONDHS	0.1844	20	01Jul2015, 13:24	6
FG31	0.0922	71	01Jul2015, 12:18	9
POND HS	0.2766	40	01Jul2015, 13:00	14
FG17a	0.0694	63	01Jul2015, 12:06	6
FG17a-POND E	0.0694	61	01Jul2015, 12:06	6
FG18	0.0644	30	01Jul2015, 12:24	4
FG18-POND E	0.0644	30	01Jul2015, 12:24	4
FG19	0.0527	51	01Jul2015, 12:06	5
FG17c	0.0313	15	01Jul2015, 12:06	1
FG17b	0.0214	24	01Jul2015, 12:06	2
POND E	1.0329	61	01Jul2015, 15:18	40
H08	1.0329	54	01Jul2015, 15:18	33
H09	0.0000	7	01Jul2015, 15:18	6
FH01	0.1348	66	01Jul2015, 12:24	10
POND H	0.1348	15	01Jul2015, 13:42	7
FH02	0.0091	6	01Jul2015, 12:12	1
FH03	0.0081	8	01Jul2015, 12:06	1
H12	0.1520	16	01Jul2015, 13:36	8

INTERIM 10-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	42	01Jul2015, 12:06	4
FG08A-G05	0.0750	41	01Jul2015, 12:12	4
FG08B	0.0630	31	01Jul2015, 12:12	3
FG08B-G05	0.0630	30	01Jul2015, 12:12	3
FG11	0.0625	29	01Jul2015, 12:18	4
FG09	0.0484	15	01Jul2015, 12:18	2
FG09-G05	0.0484	14	01Jul2015, 12:18	2
HG10	0.0467	5	01Jul2015, 12:24	1
G05	0.2956	115	01Jul2015, 12:12	13
FG13	0.0661	10	01Jul2015, 12:30	2
FG12	0.0328	20	01Jul2015, 12:12	2
POND D	0.3945	15	01Jul2015, 14:24	12
POND D-G17	0.3945	15	01Jul2015, 14:30	12
HG15	0.0297	2	01Jul2015, 12:42	1
FG15a	0.0156	11	01Jul2015, 12:06	1
G17	0.4398	17	01Jul2015, 13:36	13
G17-G18	0.4398	17	01Jul2015, 13:36	13
FG16	0.0773	47	01Jul2015, 12:06	4
G18	0.5171	59	01Jul2015, 12:06	17
G18-POND E	0.5171	56	01Jul2015, 12:12	17
HG30	0.1844	8	01Jul2015, 13:24	3
FG30-PONDHS	0.1844	8	01Jul2015, 13:36	3
FG31	0.0922	46	01Jul2015, 12:18	6
POND HS	0.2766	27	01Jul2015, 12:42	9
FG17a	0.0694	40	01Jul2015, 12:06	4
FG17a-POND E	0.0694	39	01Jul2015, 12:12	4
FG18	0.0644	17	01Jul2015, 12:24	3
FG18-POND E	0.0644	17	01Jul2015, 12:30	3
FG19	0.0527	33	01Jul2015, 12:12	3
FG17c	0.0313	7	01Jul2015, 12:06	1
FG17b	0.0214	16	01Jul2015, 12:06	1
POND E	1.0329	24	01Jul2015, 18:36	20
H08	1.0329	19	01Jul2015, 18:36	15
H09	0.0000	5	01Jul2015, 18:36	5
FH01	0.1348	39	01Jul2015, 12:24	6
POND H	0.1348	6	01Jul2015, 14:30	4
FH02	0.0091	3	01Jul2015, 12:12	0
FH03	0.0081	6	01Jul2015, 12:06	1
H12	0.1520	9	01Jul2015, 12:12	5

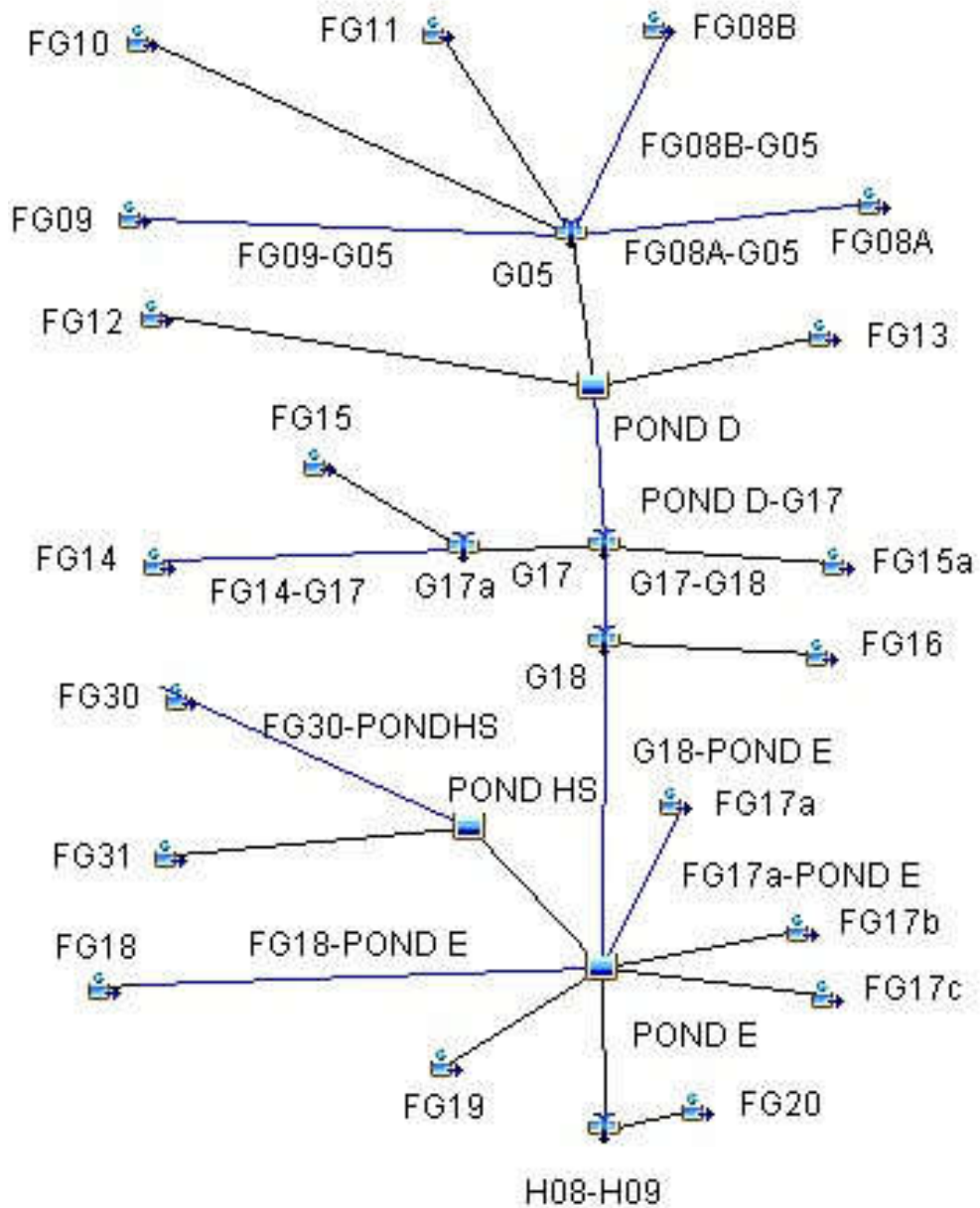
INTERIM 5-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	27	01Jul2015, 12:06	3
FG08A-G05	0.0750	27	01Jul2015, 12:12	3
FG08B	0.0630	20	01Jul2015, 12:12	2
FG08B-G05	0.0630	20	01Jul2015, 12:18	2
FG11	0.0625	19	01Jul2015, 12:18	2
FG09	0.0484	8	01Jul2015, 12:18	1
FG09-G05	0.0484	8	01Jul2015, 12:18	1
HG10	0.0467	2	01Jul2015, 12:24	1
G05	0.2956	72	01Jul2015, 12:18	9
FG13	0.0661	5	01Jul2015, 12:30	1
FG12	0.0328	14	01Jul2015, 12:12	1
POND D	0.3945	9	01Jul2015, 15:00	7
POND D-G17	0.3945	9	01Jul2015, 15:00	7
HG15	0.0297	1	01Jul2015, 12:48	0
FG15a	0.0156	7	01Jul2015, 12:06	1
G17	0.4398	9	01Jul2015, 14:36	8
G17-G18	0.4398	9	01Jul2015, 14:42	8
FG16	0.0773	31	01Jul2015, 12:06	3
G18	0.5171	38	01Jul2015, 12:06	11
G18-POND E	0.5171	37	01Jul2015, 12:12	11
HG30	0.1844	3	01Jul2015, 13:36	2
FG30-PONDHS	0.1844	3	01Jul2015, 13:48	2
FG31	0.0922	31	01Jul2015, 12:18	4
POND HS	0.2766	19	01Jul2015, 12:42	5
FG17a	0.0694	26	01Jul2015, 12:12	3
FG17a-POND E	0.0694	26	01Jul2015, 12:12	3
FG18	0.0644	10	01Jul2015, 12:30	2
FG18-POND E	0.0644	10	01Jul2015, 12:30	2
FG19	0.0527	23	01Jul2015, 12:12	2
FG17c	0.0313	3	01Jul2015, 12:12	0
FG17b	0.0214	11	01Jul2015, 12:06	1
POND E	1.0329	12	01Jul2015, 21:24	10
H08	1.0329	8	01Jul2015, 21:24	7
H09	0.0000	3	01Jul2015, 21:24	3
FH01	0.1348	24	01Jul2015, 12:30	4
POND H	0.1348	2	01Jul2015, 17:00	2
FH02	0.0091	2	01Jul2015, 12:12	0
FH03	0.0081	4	01Jul2015, 12:06	0
H12	0.1520	6	01Jul2015, 12:12	3

INTERIM 2-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	14	01Jul2015, 12:12	2
FG08A-G05	0.0750	14	01Jul2015, 12:12	2
FG08B	0.0630	10	01Jul2015, 12:12	1
FG08B-G05	0.0630	10	01Jul2015, 12:18	1
FG11	0.0625	10	01Jul2015, 12:18	1
FG09	0.0484	3	01Jul2015, 12:18	1
FG09-G05	0.0484	3	01Jul2015, 12:24	1
HG10	0.0467	0	01Jul2015, 13:00	0
G05	0.2956	36	01Jul2015, 12:18	5
FG13	0.0661	1	01Jul2015, 12:42	1
FG12	0.0328	8	01Jul2015, 12:12	1
POND D	0.3945	3	01Jul2015, 20:18	3
POND D-G17	0.3945	3	01Jul2015, 20:18	3
HG15	0.0297	0	01Jul2015, 13:36	0
FG15a	0.0156	4	01Jul2015, 12:06	0
G17	0.4398	4	01Jul2015, 12:06	3
G17-G18	0.4398	4	01Jul2015, 12:12	3
FG16	0.0773	16	01Jul2015, 12:06	2
G18	0.5171	20	01Jul2015, 12:06	5
G18-POND E	0.5171	20	01Jul2015, 12:12	5
HG30	0.1844	1	01Jul2015, 14:48	1
FG30-PONDHS	0.1844	1	01Jul2015, 15:12	0
FG31	0.0922	18	01Jul2015, 12:18	2
POND HS	0.2766	10	01Jul2015, 12:42	3
FG17a	0.0694	14	01Jul2015, 12:12	2
FG17a-POND E	0.0694	14	01Jul2015, 12:12	2
FG18	0.0644	5	01Jul2015, 12:30	1
FG18-POND E	0.0644	5	01Jul2015, 12:30	1
FG19	0.0527	13	01Jul2015, 12:12	1
FG17c	0.0313	1	01Jul2015, 12:18	0
FG17b	0.0214	6	01Jul2015, 12:06	1
POND E	1.0329	6	02Jul2015, 00:00	5
H08	1.0329	3	02Jul2015, 00:00	3
H09	0.0000	2	02Jul2015, 00:00	2
FH01	0.1348	11	01Jul2015, 12:30	2
POND H	0.1348	1	01Jul2015, 18:36	1
FH02	0.0091	1	01Jul2015, 12:12	0
FH03	0.0081	2	01Jul2015, 12:12	0
H12	0.1520	3	01Jul2015, 12:12	2

HAEGLER INTERIM CONDITIONS



GIECK INTERIM CONDITIONS



FUTURE 100-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀₀ (AC. FT.)
FG08A	0.0750	117	01Jul2015, 12:06	10
FG08A-G05	0.0750	111	01Jul2015, 12:12	10
FG10	0.0669	46	01Jul2015, 12:36	8
FG08B	0.0630	87	01Jul2015, 12:12	9
FG08B-G05	0.0630	85	01Jul2015, 12:12	9
FG11	0.0625	76	01Jul2015, 12:18	9
FG09	0.0484	49	01Jul2015, 12:12	6
FG09-G05	0.0484	48	01Jul2015, 12:18	6
G05	0.3158	342	01Jul2015, 12:12	41
FG13	0.0661	44	01Jul2015, 12:24	6
FG14	0.0331	42	01Jul2015, 12:12	5
FG12	0.0328	51	01Jul2015, 12:12	5
POND D	0.4478	131	01Jul2015, 13:06	47
POND D-G17	0.4478	131	01Jul2015, 13:06	47
FG15	0.1017	95	01Jul2015, 12:18	12
G17a	0.1017	95	01Jul2015, 12:18	12
FG15a	0.0156	28	01Jul2015, 12:06	2
G17	0.5651	184	01Jul2015, 12:30	61
G17-G18	0.5651	184	01Jul2015, 12:36	61
FG16	0.0773	127	01Jul2015, 12:06	11
G18	0.6424	235	01Jul2015, 12:12	72
G18-POND E	0.6424	233	01Jul2015, 12:12	72
FG31	0.0922	118	01Jul2015, 12:18	14
FG30	0.0400	76	01Jul2015, 12:06	6
FG30-PONDHS	0.0400	74	01Jul2015, 12:12	6
POND HS	0.1322	156	01Jul2015, 12:24	20
FG17a	0.0694	102	01Jul2015, 12:06	9
FG17a-POND E	0.0694	100	01Jul2015, 12:06	9
FG18	0.0644	57	01Jul2015, 12:24	8
FG18-POND E	0.0644	57	01Jul2015, 12:24	8
FG19	0.0527	85	01Jul2015, 12:06	8
FG17c	0.0313	32	01Jul2015, 12:06	3
FG17b	0.0214	40	01Jul2015, 12:06	3
POND E	1.0138	240	01Jul2015, 13:30	99
H08	1.0138	204	01Jul2015, 13:30	87
H09	0.0000	36	01Jul2015, 13:30	13
FH01	0.1344	152	01Jul2015, 12:18	18
POND H	0.1344	57	01Jul2015, 12:54	15
FH02	0.0091	11	01Jul2015, 12:06	1
FH03	0.0081	14	01Jul2015, 12:06	1
H12	0.1516	62	01Jul2015, 12:48	17

FUTURE 50-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₅₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₅₀ (AC. FT.)
FG08A	0.0750	91	01Jul2015, 12:06	8
FG08A-G05	0.0750	86	01Jul2015, 12:12	8
FG10	0.0669	34	01Jul2015, 12:36	6
FG08B	0.0630	67	01Jul2015, 12:12	7
FG08B-G05	0.0630	66	01Jul2015, 12:12	7
FG11	0.0625	59	01Jul2015, 12:18	7
FG09	0.0484	36	01Jul2015, 12:12	4
FG09-G05	0.0484	36	01Jul2015, 12:18	4
G05	0.3158	262	01Jul2015, 12:12	32
FG13	0.0661	31	01Jul2015, 12:24	5
FG14	0.0331	32	01Jul2015, 12:12	4
FG12	0.0328	40	01Jul2015, 12:12	4
POND D	0.4478	89	01Jul2015, 13:12	35
POND D-G17	0.4478	89	01Jul2015, 13:12	35
FG15	0.1017	71	01Jul2015, 12:18	9
G17a	0.1017	71	01Jul2015, 12:18	9
FG15a	0.0156	22	01Jul2015, 12:06	2
G17	0.5651	121	01Jul2015, 12:42	46
G17-G18	0.5651	121	01Jul2015, 12:42	46
FG16	0.0773	98	01Jul2015, 12:06	9
G18	0.6424	177	01Jul2015, 12:12	54
G18-POND E	0.6424	176	01Jul2015, 12:12	54
FG31	0.0922	92	01Jul2015, 12:18	11
FG30	0.0400	60	01Jul2015, 12:06	5
FG30-PONDHS	0.0400	59	01Jul2015, 12:12	5
POND HS	0.1322	107	01Jul2015, 12:30	16
FG17a	0.0694	79	01Jul2015, 12:06	7
FG17a-POND E	0.0694	77	01Jul2015, 12:06	7
FG18	0.0644	43	01Jul2015, 12:24	6
FG18-POND E	0.0644	42	01Jul2015, 12:24	6
FG19	0.0527	67	01Jul2015, 12:06	6
FG17c	0.0313	22	01Jul2015, 12:06	2
FG17b	0.0214	31	01Jul2015, 12:06	3
POND E	1.0138	151	01Jul2015, 14:00	71
H08	1.0138	136	01Jul2015, 14:00	62
H09	0.0000	16	01Jul2015, 14:00	9
FH01	0.1344	117	01Jul2015, 12:18	14
POND H	0.1344	32	01Jul2015, 13:06	11
FH02	0.0091	8	01Jul2015, 12:06	1
FH03	0.0081	11	01Jul2015, 12:06	1
H12	0.1516	35	01Jul2015, 13:00	13

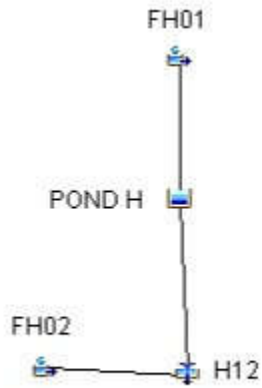
FUTURE 25-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₂₅ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₂₅ (AC. FT.)
FG08A	0.0750	67	01Jul2015, 12:06	6.0
FG08A-G05	0.0750	65	01Jul2015, 12:12	6.0
FG10	0.0669	24	01Jul2015, 12:36	4.4
FG08B	0.0630	50	01Jul2015, 12:12	5.0
FG08B-G05	0.0630	49	01Jul2015, 12:12	5.0
FG11	0.0625	45	01Jul2015, 12:18	5.3
FG09	0.0484	26	01Jul2015, 12:18	3.0
FG09-G05	0.0484	25	01Jul2015, 12:18	3.0
G05	0.3158	192	01Jul2015, 12:12	23.7
FG13	0.0661	20	01Jul2015, 12:24	3.2
FG14	0.0331	24	01Jul2015, 12:12	2.7
FG12	0.0328	31	01Jul2015, 12:12	3.0
POND D	0.4478	51	01Jul2015, 13:30	24.6
POND D-G17	0.4478	51	01Jul2015, 13:30	24.6
FG15	0.1017	51	01Jul2015, 12:18	6.8
G17a	0.1017	51	01Jul2015, 12:18	6.8
FG15a	0.0156	17	01Jul2015, 12:06	1.4
G17	0.5651	72	01Jul2015, 12:24	32.7
G17-G18	0.5651	72	01Jul2015, 12:24	32.6
FG16	0.0773	74	01Jul2015, 12:06	6.5
G18	0.6424	127	01Jul2015, 12:12	39.1
G18-POND E	0.6424	126	01Jul2015, 12:12	39.1
FG31	0.0922	71	01Jul2015, 12:18	8.5
FG30	0.0400	46	01Jul2015, 12:06	3.7
FG30-PONDHS	0.0400	45	01Jul2015, 12:12	3.7
POND HS	0.1322	60	01Jul2015, 12:36	12.1
FG17a	0.0694	58	01Jul2015, 12:06	5.5
FG17a-POND E	0.0694	57	01Jul2015, 12:12	5.5
FG18	0.0644	31	01Jul2015, 12:24	4.4
FG18-POND E	0.0644	30	01Jul2015, 12:24	4.4
FG19	0.0527	51	01Jul2015, 12:06	4.9
FG17c	0.0313	15	01Jul2015, 12:06	1.4
FG17b	0.0214	24	01Jul2015, 12:06	2.0
POND E	1.0138	81	01Jul2015, 14:36	47.1
H08	1.0138	73	01Jul2015, 14:36	40.3
H09	0.0000	8	01Jul2015, 14:36	6.8
FH01	0.1344	87	01Jul2015, 12:18	10.5
POND H	0.1344	18	01Jul2015, 13:18	7.9
FH02	0.0091	6	01Jul2015, 12:12	0.6
FH03	0.0081	8	01Jul2015, 12:06	0.8
H12	0.1516	20	01Jul2015, 13:12	9.2

FUTURE 10-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₁₀ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₁₀ (AC. FT.)
FG08A	0.0750	42	01Jul2015, 12:06	3.9
FG08A-G05	0.0750	41	01Jul2015, 12:12	3.9
FG10	0.0669	14	01Jul2015, 12:42	2.7
FG08B	0.0630	31	01Jul2015, 12:12	3.2
FG08B-G05	0.0630	30	01Jul2015, 12:12	3.2
FG11	0.0625	29	01Jul2015, 12:18	3.5
FG09	0.0484	15	01Jul2015, 12:18	1.8
FG09-G05	0.0484	14	01Jul2015, 12:18	1.8
G05	0.3158	117	01Jul2015, 12:18	15.1
FG13	0.0661	10	01Jul2015, 12:30	1.8
FG14	0.0331	15	01Jul2015, 12:18	1.8
FG12	0.0328	20	01Jul2015, 12:12	2.0
POND D	0.4478	19	01Jul2015, 14:30	15.0
POND D-G17	0.4478	19	01Jul2015, 14:30	15.0
FG15	0.1017	29	01Jul2015, 12:24	4.2
G17a	0.1017	29	01Jul2015, 12:24	4.2
FG15a	0.0156	11	01Jul2015, 12:06	0.9
G17	0.5651	40	01Jul2015, 12:24	20.0
G17-G18	0.5651	40	01Jul2015, 12:30	20.0
FG16	0.0773	47	01Jul2015, 12:06	4.2
G18	0.6424	77	01Jul2015, 12:12	24.2
G18-POND E	0.6424	77	01Jul2015, 12:12	24.2
FG31	0.0922	46	01Jul2015, 12:18	5.7
FG30	0.0400	31	01Jul2015, 12:06	2.5
FG30-PONDHS	0.0400	29	01Jul2015, 12:12	2.4
POND HS	0.1322	37	01Jul2015, 12:42	8.1
FG17a	0.0694	36	01Jul2015, 12:06	3.5
FG17a-POND E	0.0694	36	01Jul2015, 12:12	3.5
FG18	0.0644	18	01Jul2015, 12:24	2.7
FG18-POND E	0.0644	18	01Jul2015, 12:30	2.7
FG19	0.0527	33	01Jul2015, 12:12	3.3
FG17c	0.0313	7	01Jul2015, 12:06	0.8
FG17b	0.0214	16	01Jul2015, 12:06	1.3
POND E	1.0138	30	01Jul2015, 17:42	24.6
H08	1.0138	24	01Jul2015, 17:42	19.2
H09	0.0000	6	01Jul2015, 17:42	5.4
FH01	0.1344	53	01Jul2015, 12:18	6.7
POND H	0.1344	8	01Jul2015, 13:54	4.6
FH02	0.0091	3	01Jul2015, 12:12	0.3
FH03	0.0081	6	01Jul2015, 12:06	0.5
H12	0.1516	10	01Jul2015, 12:12	5.5

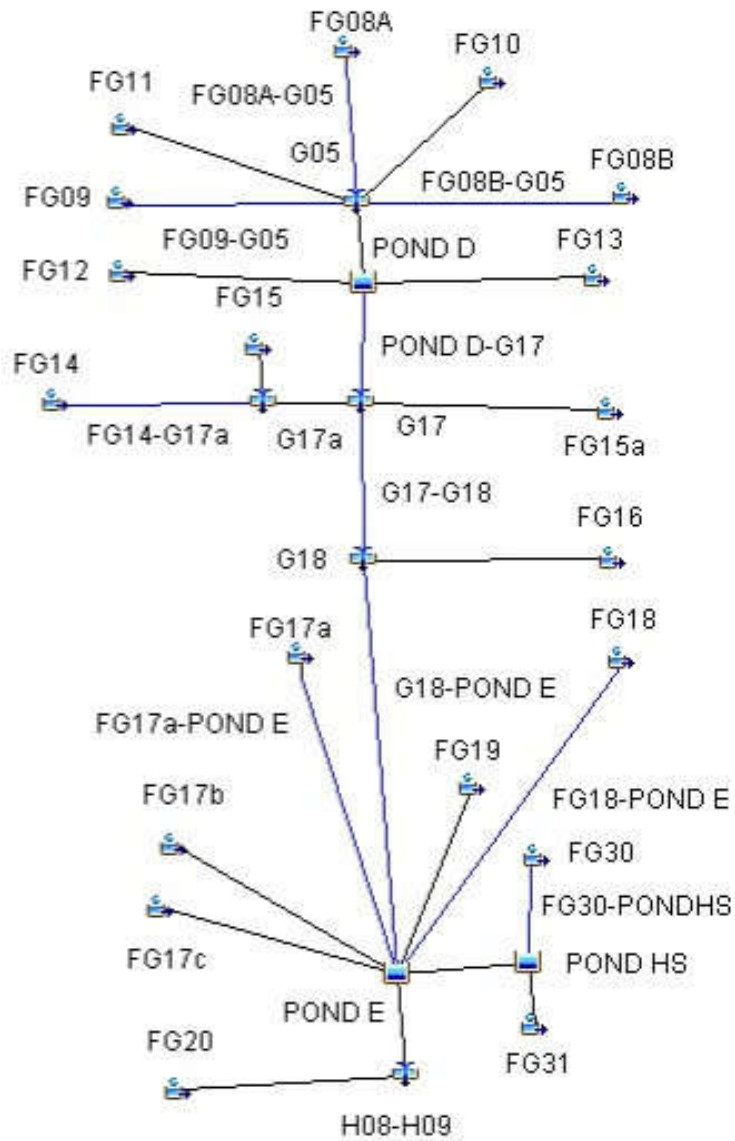
FUTURE 5-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₅ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₅ (AC. FT.)
FG08A	0.0750	27	01Jul2015, 12:06	2.6
FG08A-G05	0.0750	27	01Jul2015, 12:12	2.6
FG10	0.0669	8	01Jul2015, 12:42	1.7
FG08B	0.0630	20	01Jul2015, 12:12	2.2
FG08B-G05	0.0630	20	01Jul2015, 12:18	2.2
FG11	0.0625	19	01Jul2015, 12:18	2.4
FG09	0.0484	8	01Jul2015, 12:18	1.2
FG09-G05	0.0484	8	01Jul2015, 12:18	1.2
G05	0.3158	75	01Jul2015, 12:18	10.1
FG13	0.0661	5	01Jul2015, 12:30	1.1
FG14	0.0331	10	01Jul2015, 12:18	1.2
FG12	0.0328	14	01Jul2015, 12:12	1.4
POND D	0.4478	12	01Jul2015, 14:42	9.3
POND D-G17	0.4478	12	01Jul2015, 14:42	9.3
FG15	0.1017	18	01Jul2015, 12:24	2.7
G17a	0.1017	18	01Jul2015, 12:24	2.7
FG15a	0.0156	7	01Jul2015, 12:06	0.6
G17	0.5651	23	01Jul2015, 12:18	12.6
G17-G18	0.5651	23	01Jul2015, 12:24	12.6
FG16	0.0773	31	01Jul2015, 12:06	2.9
G18	0.6424	49	01Jul2015, 12:12	15.5
G18-POND E	0.6424	48	01Jul2015, 12:12	15.5
FG31	0.0922	31	01Jul2015, 12:18	4.0
FG30	0.0400	21	01Jul2015, 12:06	1.7
FG30-PONDHS	0.0400	20	01Jul2015, 12:12	1.7
POND HS	0.1322	27	01Jul2015, 12:36	5.7
FG17a	0.0694	23	01Jul2015, 12:12	2.4
FG17a-POND E	0.0694	23	01Jul2015, 12:12	2.4
FG18	0.0644	11	01Jul2015, 12:30	1.8
FG18-POND E	0.0644	11	01Jul2015, 12:30	1.8
FG19	0.0527	23	01Jul2015, 12:12	2.3
FG17c	0.0313	3	01Jul2015, 12:12	0.4
FG17b	0.0214	11	01Jul2015, 12:06	0.9
POND E	1.0138	16	01Jul2015, 20:06	13.1
H08	1.0138	12	01Jul2015, 20:06	9.3
H09	0.0000	4	01Jul2015, 20:06	3.8
FH01	0.1344	34	01Jul2015, 12:18	4.5
POND H	0.1344	3	01Jul2015, 15:24	2.6
FH02	0.0091	2	01Jul2015, 12:12	0.2
FH03	0.0081	4	01Jul2015, 12:06	0.4
H12	0.1516	6	01Jul2015, 12:12	3.2

FUTURE 2-YEAR				
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q ₂ (CFS)	TIME OF PEAK	TOTAL VOLUME Q ₂ (AC. FT.)
FG08A	0.0750	13.6	01Jul2015, 12:12	1.5
FG08A-G05	0.0750	13.6	01Jul2015, 12:12	1.5
FG10	0.0669	3.6	01Jul2015, 12:48	0.9
FG08B	0.0630	10.3	01Jul2015, 12:12	1.3
FG08B-G05	0.0630	10.1	01Jul2015, 12:18	1.2
FG11	0.0625	10.0	01Jul2015, 12:18	1.4
FG09	0.0484	3.3	01Jul2015, 12:18	0.6
FG09-G05	0.0484	3.3	01Jul2015, 12:24	0.6
G05	0.3158	37.9	01Jul2015, 12:18	5.6
FG13	0.0661	1.4	01Jul2015, 12:42	0.5
FG14	0.0331	5.2	01Jul2015, 12:18	0.7
FG12	0.0328	7.9	01Jul2015, 12:12	0.9
POND D	0.4478	4.5	01Jul2015, 17:48	4.1
POND D-G17	0.4478	4.5	01Jul2015, 17:54	4.1
FG15	0.1017	7.5	01Jul2015, 12:24	1.4
G17a	0.1017	7.5	01Jul2015, 12:24	1.4
FG15a	0.0156	4.0	01Jul2015, 12:06	0.4
G17	0.5651	10.8	01Jul2015, 12:24	5.9
G17-G18	0.5651	10.7	01Jul2015, 12:30	5.9
FG16	0.0773	16.1	01Jul2015, 12:06	1.7
G18	0.6424	24.4	01Jul2015, 12:12	7.6
G18-POND E	0.6424	23.9	01Jul2015, 12:12	7.6
FG31	0.0922	17.5	01Jul2015, 12:18	2.4
FG30	0.0400	12.2	01Jul2015, 12:06	1.0
FG30-PONDHS	0.0400	11.3	01Jul2015, 12:18	1.0
POND HS	0.1322	15.1	01Jul2015, 12:42	3.4
FG17a	0.0694	11.9	01Jul2015, 12:12	1.4
FG17a-POND E	0.0694	11.8	01Jul2015, 12:12	1.4
FG18	0.0644	4.8	01Jul2015, 12:30	0.9
FG18-POND E	0.0644	4.7	01Jul2015, 12:30	0.9
FG19	0.0527	13.3	01Jul2015, 12:12	1.4
FG17c	0.0313	0.5	01Jul2015, 12:18	0.2
FG17b	0.0214	6.2	01Jul2015, 12:06	0.6
POND E	1.0138	6.6	02Jul2015, 00:00	5.9
H08	1.0138	4.2	02Jul2015, 00:00	3.6
H09	0.0000	2.4	02Jul2015, 00:00	2.3
FH01	0.1344	16.6	01Jul2015, 12:18	2.5
POND H	0.1344	1.2	01Jul2015, 18:36	1.4
FH02	0.0091	0.7	01Jul2015, 12:12	0.1
FH03	0.0081	2.2	01Jul2015, 12:12	0.2
H12	0.1516	3.5	01Jul2015, 12:12	1.7

HAEGLER FUTURE CONDITIONS



GIECK FUTURE CONDITIONS



Appendix D - Detention Pond Information

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond H-INTERIM - WindingWalk Filing 2

Creek Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	500
embankment elev =	6976
spillway length =	50
spillway elevation =	6974.5
100 year storage elev.=	6973.3
100 year storage vol.=	7.2
100 year discharge=	47
5 year storage elev.=	6971.6
5 year storage vol.=	2.5
5 year discharge=	2.3
WQCV storage elev.=	6970.3
WQCV storage vol.=	0.5
1/2 WQCV storage elev.=	6969.9
1/2 WQCV storage vol.=	0.25

Data for outlet pipe and grate:

Type	Dimensions			Bottom
	H or V	Width (ft.) X Height (ft.)	Dia.(in)	
Rectangular	Orifice 1:	0.0195	1.33	6968.5
Rectangular	Orifice 2:	4.5000	1.40	6971.50
None Selected	Orifice 3:			
Circular	Orifice 4:		6	6970

Stand Pipe Dimensions		50 year storage elev.=		6972.9	
Rect Grate	x	4.5	Elev =	6972.90	
Circ. Grate	dia.		Elev =	6972.90	
					26
					6972.5
					15
					6972.0
					6.0
					6971.0
					1.1

Outlet Culvert Dimensions		Type	
Width (ft.)	Height (ft.)	Dia. (ft.)	Type
		3.5	Circular
Outlet Culvert	x		
Area	9.6	TOP	
Outlet I. E.	6968.5	6972.38	
Wall Thick.	4.5		

STORAGE

ELEV	HEIGHT	AREA sqft	VOLUME acft	cum acft	DISCHARGE			ORIFICE (max outflow)	GRATE (max outflow)	PIPE	TOTAL FLOW
					TOPOF BANK	SPILLWAY	ORIFICE				
6968.5	0	0	0.00	0.00	-	-	-	-	Rectangular	-	-
6969	0.5	477	0.00	0.003	-	-	0.02	-	-	1	0.02
6969.5	1	11450	0.07	0.07	-	-	0.06	-	-	5	0.059
6970	1.5	22422	0.26	0.27	-	-	0.11	-	-	10	0.107
6970.25	1.75	33514	0.77	0.43	-	-	0.13	-	-	14	0.603
6970.5	2	44606	1.02	0.78	-	-	0.14	-	-	18	0.813
6971	2.5	67898	1.56	1.30	-	-	0.17	-	-	27	1.115
6971.5	3	92319	2.12	0.92	-	-	0.19	-	-	36	1.349
6971.75	3.25	104329	2.40	1.20	-	-	0.20	-	-	42	1.319
6972	3.5	116739	2.68	1.20	-	-	0.21	-	-	47	1.349
6972.5	4	125636	2.88	1.39	-	-	0.23	-	-	58	1.523
6973	4.5	134533	3.09	1.49	-	-	0.25	-	-	70	1.849
6973.5	5	141972	3.26	1.59	-	-	0.26	-	-	79	2.115
6974	5.5	149410	3.43	1.67	-	-	0.28	-	-	86	2.381
6975	6.5	165140	3.79	1.81	-	-	0.30	-	-	98	2.813
6976	7.5	192114	4.41	1.728	275.6	275.6	0.33	-	-	110	3.851

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. $Q=CA(2gH)^{0.5}$ (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 2.6 & 2.7.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Proposed Detention Pond H-FUTURE
Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	500
embankment elev =	6976
spillway length =	50
spillway elevation =	6974.5
100 year storage elev =	6973.4
100 year storage vol =	7.7
100 year discharge =	57
5 year storage elev =	6971.7
5 year storage vol =	2.8
5 year discharge =	3.0
WQCV storage elev =	6970.3
WQCV storage vol =	0.5
1/2 WQCV storage elev =	6969.9
1/2 WQCV storage vol =	0.25

Data for outlet pipe and grate:

Type	H or V	Dimensions			Bottom
		Width (ft.)	X Height (ft.)	Dia.(in)	
Rectangular	Orifice 1:	0.0195	1.33		6968.5
Rectangular	Orifice 2:	4.5000	1.40		6971.50
None Selected	Orifice 3:				
Circular	Orifice 4:			6	6970

Stand Pipe Dimensions		Dimensions		Bottom
Rec Grate	Circ. Grate	Width (ft.)	X Height (ft.)	
		9	4.5	6972.90
				6972.90

Outlet Culvert Dimensions		Height (ft.)		Type
Outlet Culvert	Area	Width (ft.)	Dia. (ft.)	
		x	3.5	Circular
		TOP		
Outlet I. E.		6968.5	6972.38	
Wall Thick.		4.5		

STORAGE

ELEV	HEIGHT	AREA	VOLUME	DISCHARGE			ORIFICE (max outflow)	GRATE (max outflow)	PIPE	REALIZED CULVERT OUTFLOW	TOTAL FLOW
				TOP OF BANK	SPILLWAY	TOP OF BANK					
6968.5	0	0.00	0.0								
6969	0.5	0.01	0.003								
6969.5	1	0.26	0.07								
6970	1.5	0.51	0.26								
6970.25	1.75	0.77	0.43								
6970.5	2	1.02	0.78								
6971	2.5	1.56	1.04								
6971.5	3	2.12	1.30								
6971.75	3.25	2.40	1.56								
6972	3.5	2.68	1.80								
6972.5	4	2.88	2.00								
6973	4.5	3.09	2.19								
6973.5	5	3.26	2.36								
6974	5.5	3.43	2.53								
6975	6.5	3.79	3.61								
6976	7.5	4.41	4.10								

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

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E- FINAL INTERIM - WindingWalk Filing 2 (TOTAL FLOWS)

Gieck Basin - El Paso County, Colorado

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev. =	6973.3
100 year storage vol. =	39.2
100 year discharge =	193
5 year storage elev. =	6971.1
5 year storage vol. =	15.7
5 year discharge =	12
WQCV storage elev. =	6968.9
WQCV storage vol. =	1.5
WQCV depth =	1.9
1/2 WQCV storage elev. =	6968.3
1/2 WQCV storage vol. =	0.8

50 year storage elev. =	6972.8
50 year storage vol. =	33.2
50 year discharge =	115
25 year storage elev. =	6972.3
25 year storage vol. =	27.5
25 year discharge =	58
10 year storage elev. =	6971.7
10 year storage vol. =	21.1
10 year discharge =	24
2 year storage elev. =	6970.3
2 year storage vol. =	8.6
2 year discharge =	5.5

ELEV	STAGE	STORAGE			TOTAL DISCHARGE								REALIZED CULVERT OUTFLOW	TOTAL FLOW			
		AREA sqft	VOLUME acft	TOP OF BANK	SPILLWAY		ORIFICE (max outflow)			GRATE (max outflow)							
					1	2	1	2	3	4	1	2					
6967	0	1808	0.04	0.0	0.00	-	-	-	-	-	-	-	-	-	-	-	-
6967.5	0.5	16136.5	0.37	0.1	0.10	-	0.0	-	-	-	-	-	-	-	1.4	13	0.03
6968	1	30465	0.70	0.3	0.37	-	0.1	-	-	-	-	-	-	-	26	26	0.11
6968.5	1.5	81028.5	1.86	0.6	1.01	-	0.2	-	-	-	-	-	-	-	47	47	0.23
6969	2	131592	3.02	1.2	2.23	-	0.4	-	-	-	-	-	-	-	77	77	0.37
6969.5	2.5	201294.5	4.62	1.9	4.14	-	0.5	-	-	3.0	-	-	-	-	110	110	3.5
6970	3	270997	6.22	4.6	6.85	-	0.6	-	-	4.3	-	-	-	-	146	146	4.9
6970.5	3.5	329360	7.56	3.4	10.30	-	0.6	-	-	5.3	-	-	-	-	183	183	6.1
6970.75	3.75	358540.75	8.23	2.0	12.27	-	0.7	-	-	5.7	-	-	-	-	203	203	7.6
6971	4	387722	8.90	7.6	14.41	-	0.7	-	-	6.1	-	-	-	-	218	218	10
6971.25	4.25	408751	9.38	2.3	16.70	-	0.7	-	-	6.5	-	-	-	-	236	236	13
6971.5	4.5	429780	9.87	4.7	19.10	-	0.7	-	-	6.8	-	-	-	-	252	252	18
6971.75	4.75	450809	10.35	2.5	21.63	-	0.8	-	-	7.1	-	-	-	-	266	266	25
6972	5	471838	10.83	5.2	24.28	-	0.8	-	-	7.5	-	-	-	-	280	280	35
6972.25	5.25	482595.75	11.08	2.7	27.02	-	0.8	-	-	7.8	-	-	-	-	292	292	54
6972.5	5.5	493354	11.33	5.5	29.82	-	0.8	-	-	8.1	-	-	-	-	304	304	78
6973	6	514869	11.82	5.8	35.60	-	0.9	-	-	8.6	-	-	-	-	327	327	142
6973.25	6.25	518272	11.90	3.0	38.57	-	0.9	-	-	8.9	-	-	-	-	338	338	183
6973.5	6.5	521675	11.98	5.9	41.55	-	0.9	-	-	9.1	-	-	-	-	349	349	232
6974	7	528481	12.13	12.0	47.58	-	1.0	-	-	19.8	-	-	-	-	369	369	307
6976	9	553685	12.71	24.8	72.42	-	1.1	-	-	25.4	-	-	-	-	443	443	1,545

Notes: 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. $Q = CLH^{1.5}$ (C=3.0)

2) Orifice flows are also from section 11.3.1. $Q = CA(2gH)^{0.5}$ (C=6)

3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow $Q = (3PH^{1.5})/F$, Orifice Flow $Q = 4.815 * AH^{0.5}$

4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-FINAL INTERIM - WindingWalk Filing 2 (H08)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974
100 year storage elev.=	6973.3
100 year storage vol.=	39.2
5 year storage elev.=	6971.15
5 year storage vol.=	15.7
5 year discharge=	8.3
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

50 year storage elev.=	6972.8
50 year discharge=	107
25 year storage elev.=	6972.3
25 year discharge=	54
10 year storage elev.=	6971.7
10 year discharge=	19
2 year storage elev.=	6970.3
2 year discharge=	3.3

ELEV	STAGE	HEIGHT	AREA		VOLUME	TOP OF BANK	SPILLWAY	ORIFICE (max outflow)			GRATE (max outflow)	PIPE	REALIZED CULVERT OUTFLOW	TOTAL FLOW	
			sqft	acre				1	2	3					4
			acft	acft				1	2	3					4
6967.5	0		1808	0.04	0.0										
6967.5	0.5		16136.5	0.37	0.1									0.01	
6968	1		30465	0.70	0.3									0.06	
6968.5	1.5		81028.5	1.86	1.0									0.11	
6969	2		131592	3.02	2.2									0.18	
6969.5	2.5		201294.5	4.62	4.1									0.2	
6970	3		270997	6.22	6.9									2.1	
6970.5	3.5		329359.5	7.56	10									2.9	
6970.75	3.75		358540.75	8.23	12.3									3.7	
6971	4		387722	8.90	14									5	
6971.25	4.25		408751	9.38	17									7	
6971.5	4.5		429780	9.87	19									9	
6971.75	4.75		450809	10.35	22									14	
6972	5		471838	10.83	24									20	
6972.25	5.25		482595.75	11.08	27									29	
6972.5	5.5		493354	11.33	30									47	
6973	6		514869	11.82	36									70	
6973.25	6.25		518272	11.90	39									128	
6973.5	6.5		521675	11.98	42									162	
6974	7		528481	12.13	48									199	
6976	9		553685	12.71	72									244	
														291	

Notes: 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM: $Q = CLH^{1.5}$ (C=3.0)

2) Orifice flows are also from section 11.3.1. $Q = CAG\sqrt{H}^{1.5}$ (C=6)

3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow $Q = (3PH^{1.5})/F$, Orifice Flow $Q = 4.815 * AH^{0.5}$

4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

Meridian Ranch Existing Detention Pond E-FINAL INTERIM - WindingWalk Filing 2 (H09)

Gleek Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.3
100 year storage vol.=	39.2
100 year discharge=	2.5
5 year storage elev.=	6971.15
5 year storage vol.=	15.7
5 year discharge=	3.4
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

Type	Dimensions		
	H or V	Width (ft.) X Height (ft.)	Dia.(in)
Rectangular	Orifice 1:	0.0248	1.65
Rectangular	Orifice 2:	0.75	1
Circular	Orifice 3:		8
Rectangular	Orifice 4:	3.5	1.25

Stand Pipe Dimensions	
Rec Grate	x 4.25
Circ. Grate	dia. 3
	Elev = 6973.00
	Elev = 6973.00

Outlet Culvert Dimensions

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

ELEV	STAGE	HEIGHT	STORAGE				DISCHARGE				ORIFICE (max outflow)	GRATE (max outflow)	PIPE	REALIZED CULVERT OUTFLOW	TOTAL FLOW	
			AREA sqft	VOLUME acft	TOP OF BANK	SPILLWAY	TOP OF BANK	SPILLWAY	1	2						3
6967	0	0	1808	0.04	0.0											
6967.5	0.5	0.1	16136.5	0.37	0.1											0.01
6968	1	0.3	30465	0.70	0.3											0.06
6968.5	1.5	1.86	81028.5	1.86	0.6											0.11
6969	2	3.02	131592	3.02	1.2											0.18
6969.5	2.5	4.62	201294.5	4.62	1.9											1.4
6970	3	6.22	270997	6.22	4.6											2.0
6970.5	3.5	7.56	329359.5	7.56	3.4											2.4
6970.75	3.75	8.23	358540.75	8.23	2.0											2.6
6971	4	8.90	387722	8.90	14.4											2.6
6971.25	4.25	9.38	408751	9.38	16.7											3.0
6971.5	4.5	9.87	429780	9.87	19.1											3.7
6971.75	4.75	10.35	450809	10.35	21.6											4.5
6972	5	10.83	471838	10.83	24.3											5.4
6972.25	5.25	11.08	482595.75	11.08	27.0											6.4
6972.5	5.5	11.33	493354	11.33	29.8											7.0
6973	6	11.82	514869	11.82	35.6											8.1
6973.25	6.25	11.90	518272	11.90	38.6											14
6973.5	6.5	11.98	521675	11.98	41.6											21
6974	7	12.13	528481	12.13	47.6											33
6976	9	12.71	553685	12.71	72.4											63
																151

Notes: 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. $Q = CLH^{1.5}$ (C=3.0)

2) Orifice flows are also from section 11.3.1. $Q = CA(2gH)^{0.5}$ (C=6)

3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow $Q = (3PH^{1.5})/F$, Orifice Flow $Q = 4.815 * AH^{0.5}$

4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974
100 year storage elev.=	6973.6
100 year storage vol.=	42.2
100 year discharge=	204
5 year storage elev.=	6971.4
5 year storage vol.=	18.0
5 year discharge=	12
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

Type	H or V	Dimensions		
		Width (ft.)	X Height (ft.)	Dia.(in)
Rectangular	Orifice 1:	0.0248	1.65	
Rectangular	Orifice 2:	2	0.8	
Circular	Orifice 3:	H		10
Rectangular	Orifice 4:	V	6	0.7

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

DISCHARGE

ELEV	STAGE HEIGHT	AREA	VOLUME	TOP OF BANK	SPILLWAY			ORIFICE (max outflow)			GRATE (max outflow)	PIPE	REALIZED CULVERT OUTFLOW	TOTAL FLOW	
					acft	cum acft	acre	1	2	3					4
6967	0	0.04	0.0												
6967.5	0.5	0.37	0.1												
6968	1	30465	0.3												
6968.5	1.5	81028.5	1.86												
6969	2	131592	3.02												
6969.5	2.5	201294.5	4.62												
6970	3	270997	6.22												
6970.5	3.5	329359.5	7.56												
6970.75	3.75	358540.75	8.23												
6971	4	387722	8.90												
6971.25	4.25	408751	9.38												
6971.5	4.5	429780	9.87												
6971.75	4.75	450809	10.35												
6972	5	471838	10.83												
6972.25	5.25	482595.75	11.08												
6972.5	5.5	493354	11.33												
6973	6	514869	11.82												
6973.25	6.25	518272	11.90												
6973.5	6.5	521675	11.98												
6974	7	528481	12.13												
6976	9	553685	12.71												

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

STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

Gleek Basin - El Paso County, Colorado

Data for spillway and embankment:

embankment length =	1860
embankment elev =	6976
spillway length =	200
spillway elevation =	6974.5
100 year storage elev.=	6973.6
100 year storage vol.=	42.2
100 year discharge=	36
5 year storage elev.=	6971.4
5 year storage vol.=	18.0
5 year discharge=	4.2
WQCV storage elev.=	6968.9
WQCV storage vol.=	1.5
1/2 WQCV storage elev.=	6968.3
1/2 WQCV storage vol.=	0.8

Data for outlet pipe and grate:

Type	Dimensions			
	H or V	Width (ft.)	X Height (ft.)	Dia.(in)
Rectangular	Orifice 1:	0.0248	1.65	
Rectangular	Orifice 2:	0.75	1	
Circular	Orifice 3:			8
Rectangular	Orifice 4:	3.5	1.25	

Stand Pipe Dimensions	
Rec Grate	x 4.25
Circ. Grate	dia. 3

Outlet Culvert Dimensions	
Outlet Culvert	x 3.5
Area	9.6
Outlet I. E.	6966.8
Wall Thick.	5

Stand Pipe Dimensions	
50 year storage elev.=	6973.1
50 year discharge=	16
25 year storage elev.=	6972.5
25 year discharge=	8.4
10 year storage elev.=	6971.9
10 year discharge=	6.0
2 year storage elev.=	6970.6
2 year discharge=	2.4

ELEV	STAGE	HEIGHT	STORAGE			DISCHARGE			ORIFICE (max outflow)	GRATE (max outflow)	PIPE		REALIZED CULVERT OUTFLOW	TOTAL FLOW
			AREA sqft	VOLUME acft	TOP OF BANK	SPILLWAY	TOP OF BANK	PIPE			2			
6967	0	0	1808	0.04	0.0						0.45		-	-
6967.5	0.5	0.1	16136.5	0.37	0.1						5.0		0.01	0.01
6968	1	0.3	30465	0.70	0.3						8.8		0.06	0.06
6968.5	1.5	1.86	81028.5	1.86	0.6						17		0.11	0.11
6969	2	3.02	131592	3.02	1.2						26		0.2	0.18
6969.5	2.5	4.62	201294.5	4.62	1.9						35		1.4	1.4
6970	3	6.22	270997	6.22	4.6						48		2.0	2.0
6970.5	3.5	7.56	329359.5	7.56	3.4						61		2.4	2.4
6970.75	3.75	8.23	358540.75	8.23	2.0						68		2.6	2.6
6971	4	8.90	387722	8.90	14.4						73		3.0	3.0
6971.25	4.25	9.38	408751	9.38	2.3						79		3.7	3.7
6971.5	4.5	9.87	429780	9.87	19.1						85		4.5	4.5
6971.75	4.75	10.35	450809	10.35	2.5						90		5.4	5.4
6972	5	10.83	471838	10.83	5.2						99		6.4	6.4
6972.25	5.25	11.08	482595.75	11.08	2.7						103		7.0	7.0
6972.5	5.5	11.33	493354	11.33	5.5						111		8	8.1
6973	6	11.82	514869	11.82	5.8						111		14	14
6973.25	6.25	11.90	518272	11.90	3.0						114		21	21
6973.5	6.5	11.98	521675	11.98	5.9						118		33	33
6974	7	12.13	528481	12.13	12.0						125		63	63
6976	9	12.71	553685	12.71	24.8						151		151	151

Notes: 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. $Q = CLH^{1.5}$ (C=3.0)

2) Orifice flows are also from section 11.3.1. $Q = CA(2gH)^{0.5}$ (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.

WINDINGWALK FILING 2 INTERIM CONDITION

Simulation Run: WW2-100 YR Reservoir: POND H

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

Computed Results:

Peak Inflow: 120(CFS) Date/Time of Peak Inflow: 01Jul2015, 12:24
Peak Outflow: 47 (CFS) Date/Time of Peak Outflow: 01Jul2015, 13:06
Total Inflow : 16.9 (AC-FT) Peak Storage: 7.2 (AC-FT)
Total Outflow: 14.0 (AC-FT) Peak Elevation: 6973.3 (FT)

Simulation Run: WW2-005 YR Reservoir: POND H

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

Computed Results:

Peak Inflow: 24 (CFS) Date/Time of Peak Inflow: 01Jul2015, 12:30
Peak Outflow: 2.3 (CFS) Date/Time of Peak Outflow: 01Jul2015, 17:00
Total Inflow : 4.0 (AC-FT) Peak Storage: 2.5 (AC-FT)
Total Outflow: 2.1 (AC-FT) Peak Elevation: 6971.6 (FT)

Simulation Run: WW2-100 YR Reservoir: POND E

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

Computed Results:

Peak Inflow: 484 (CFS) Date/Time of Peak Inflow: 01Jul2015, 12:12
Peak Outflow: 199 (CFS) Date/Time of Peak Outflow: 01Jul2015, 13:48
Total Inflow : 112.5 (AC-FT) Peak Storage: 39.5 (AC-FT)
Total Outflow: 88.5 (AC-FT) Peak Elevation: 6973.3 (FT)

Simulation Run: WW2-005 YR Reservoir: POND E

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

Volume Units: AC-FT

Computed Results:

Peak Inflow: 113 (CFS)	Date/Time of Peak Inflow: 01Jul2015, 12:12
Peak Outflow: 12 (CFS)	Date/Time of Peak Outflow: 01Jul2015, 21:24
Total Inflow : 24.1 (AC-FT)	Peak Storage: 15.9 (AC-FT)
Total Outflow: 9.8 (AC-FT)	Peak Elevation: 6971.2 (FT)

WINDINGWALK FILING 2 FUTURE CONDITION

Simulation Run: F-100 YR Reservoir: POND H

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

Volume Units: AC-FT

Computed Results:

Peak Inflow: 152(CFS)	Date/Time of Peak Inflow: 01Jul2015, 12:06
Peak Outflow: 57 (CFS)	Date/Time of Peak Outflow: 01Jul2015, 12:32
Total Inflow : 18.0 (AC-FT)	Peak Storage: 7.7 (AC-FT)
Total Outflow: 15.2 (AC-FT)	Peak Elevation: 6973.4 (FT)

Simulation Run: F-005 YR Reservoir: POND H

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

Volume Units: AC-FT

Computed Results:

Peak Inflow: 34 (CFS)	Date/Time of Peak Inflow: 01Jul2015, 06:14
Peak Outflow: 3.1 (CFS)	Date/Time of Peak Outflow: 01Jul2015, 08:24
Total Inflow : 4.5 (AC-FT)	Peak Storage: 2.8 (AC-FT)
Total Outflow: 2.6 (AC-FT)	Peak Elevation: 6971.7 (FT)

Simulation Run: F-100 YR Reservoir: POND E

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

Volume Units: AC-FT

Computed Results:

Peak Inflow: 609 (CFS)	Date/Time of Peak Inflow: 01Jul2015, 12:06
Peak Outflow: 240 (CFS)	Date/Time of Peak Outflow: 01Jul2015, 12:32
Total Inflow : 123.4 (AC-FT)	Peak Storage: 42.2 (AC-FT)
Total Outflow: 99.4 (AC-FT)	Peak Elevation: 6973.6 (FT)

Simulation Run: F-005 YR Reservoir: POND E

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

Volume Units: AC-FT

Computed Results:

Peak Inflow: 126 (CFS)	Date/Time of Peak Inflow: 01Jul2015, 06:14
Peak Outflow: 16 (CFS)	Date/Time of Peak Outflow: 01Jul2015, 08:24
Total Inflow : 29.0 (AC-FT)	Peak Storage: 17.9 (AC-FT)
Total Outflow: 13.1 (AC-FT)	Peak Elevation: 6971.9 (FT)

Appendix E – Outlet Protection

RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

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

OUTLET # **EXIST OS-3**

Outlet Size (D):	54 in.	Discharge (q):	193 CFS
Capacity (Q): (full flow)	158 CFS	Flow depth (d): (calculated)	4 ft.

Q _{full} =	193 CFS	q/Q _{full} =	1.00
A _{full} =	15.9 SF		
V _{full} =	12.1 FPS	Q/D ^{2.5} =	4.5

d/D	1.00	from HS-20a using q/Q _{full}
d/D	0.91	from HS-20b using Q/D ^{2.5}

A' (A/A _{full})	0.91	from HS-20a using smaller d/D from above	Flow Area (a=A' x A _{full})	14.5 SF
------------------------------	------	---	--	---------

Outlet Velocity (V) = q/a 13.3 FPS

$P_d = (V^2 + gd)^{1/2} = 18$

RIP-RAP SIZE: **M** from HS-20c

d₅₀ = 12 in T = 1.75 x d₅₀ = 1.75 ft

Basin Length (L)	18.0 FT.	Cutoff Wall Depth	4 FT
Basin Width (W)	18.0 FT.	(B=D/2+T)	

RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

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

OUTLET # **OS-4**

Outlet Size (D):	24	in.	Discharge (q):	16	CFS
Capacity (Q): (full flow)	23	CFS	Flow depth (d): (calculated)	1.6	ft.

Q _{full} =	23	CFS	q/Q _{full} =	0.69
A _{full} =	3.1	SF		
V _{full} =	7.4	FPS	Q/D ^{2.5} =	2.8

d/D	0.67	from HS-20a using q/Q _{full}
d/D	0.68	from HS-20b using Q/D ^{2.5}

A' (A/A _{full})	0.67	from HS-20a using smaller d/D from above	Flow Area (a=A' x A _{full})	2.1	SF
------------------------------	------	---	--	-----	----

Outlet Velocity (V = q/a) 7.6 FPS

$$P_d = (V^2 + gd)^{1/2} = 10$$

RIP-RAP SIZE: **L** from HS-20c
 $d_{50} = 9$ in $T = 1.75d_{50} = 1.313$ ft

Basin Length (L)	8.0 FT.	Cutoff Wall Depth (B=D/2+T)	2.313	FT
Basin Width (W)	8.0 FT.			

Appendix F – Sideyard Overflow Analysis

Worksheet for Sump Inlets 42 & 43

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02000	ft/ft
Left Side Slope	10.00	ft/ft (H:V)
Right Side Slope	10.00	ft/ft (H:V)
Discharge	27.00	ft ³ /s

Results

Normal Depth	0.88	ft
Flow Area	7.79	ft ²
Wetted Perimeter	17.73	ft
Hydraulic Radius	0.44	ft
Top Width	17.65	ft
Critical Depth	0.85	ft
Critical Slope	0.02387	ft/ft
Velocity	3.47	ft/s
Velocity Head	0.19	ft
Specific Energy	1.07	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.88	ft
Critical Depth	0.85	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.02387	ft/ft

Appendix G – Soil Resource Report



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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

Custom Soil Resource Report for El Paso County Area, Colorado

WindingWalk Filing 2



Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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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

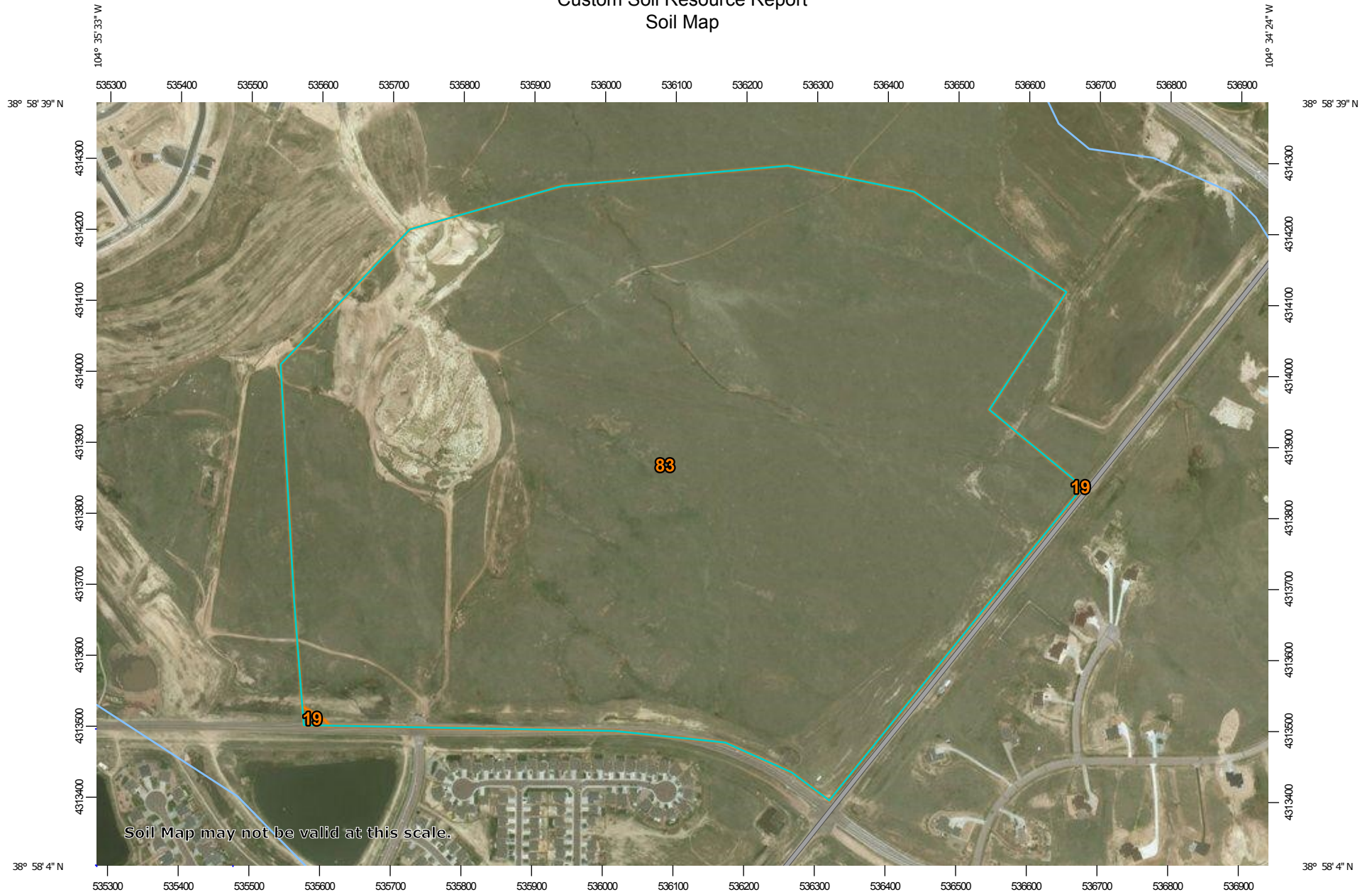
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

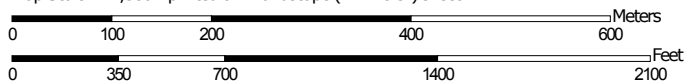
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.


Map Scale: 1:7,580 if printed on A landscape (11" x 8.5") sheet.




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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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 15, Oct 10, 2017

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

Date(s) aerial images were photographed: May 22, 2016—Mar 9, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	0.1	0.1%
83	Stapleton sandy loam, 3 to 8 percent slopes	187.8	99.9%
Totals for Area of Interest		187.9	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,

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

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

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

Map Unit Setting

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

Map Unit Composition

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

Description of Columbine

Setting

Landform: Fan terraces, fans, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

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

Properties and qualities

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

Interpretive groups

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

Minor Components

Fluvaquentic haplaquolls

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

Other soils

Percent of map unit:

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Hydric soil rating: No

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

83—Stapleton sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369z

Elevation: 6,500 to 7,300 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 46 to 48 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Not prime farmland

Map Unit Composition

Stapleton and similar soils: 80 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Stapleton

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 11 inches: sandy loam

Bw - 11 to 17 inches: gravelly sandy loam

C - 17 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

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Ecological site: Gravelly Foothill (R049BY214CO)

Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit:

Landform: Swales

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

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

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

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

Figure 4 - Meridian Ranch Rational Basin Map

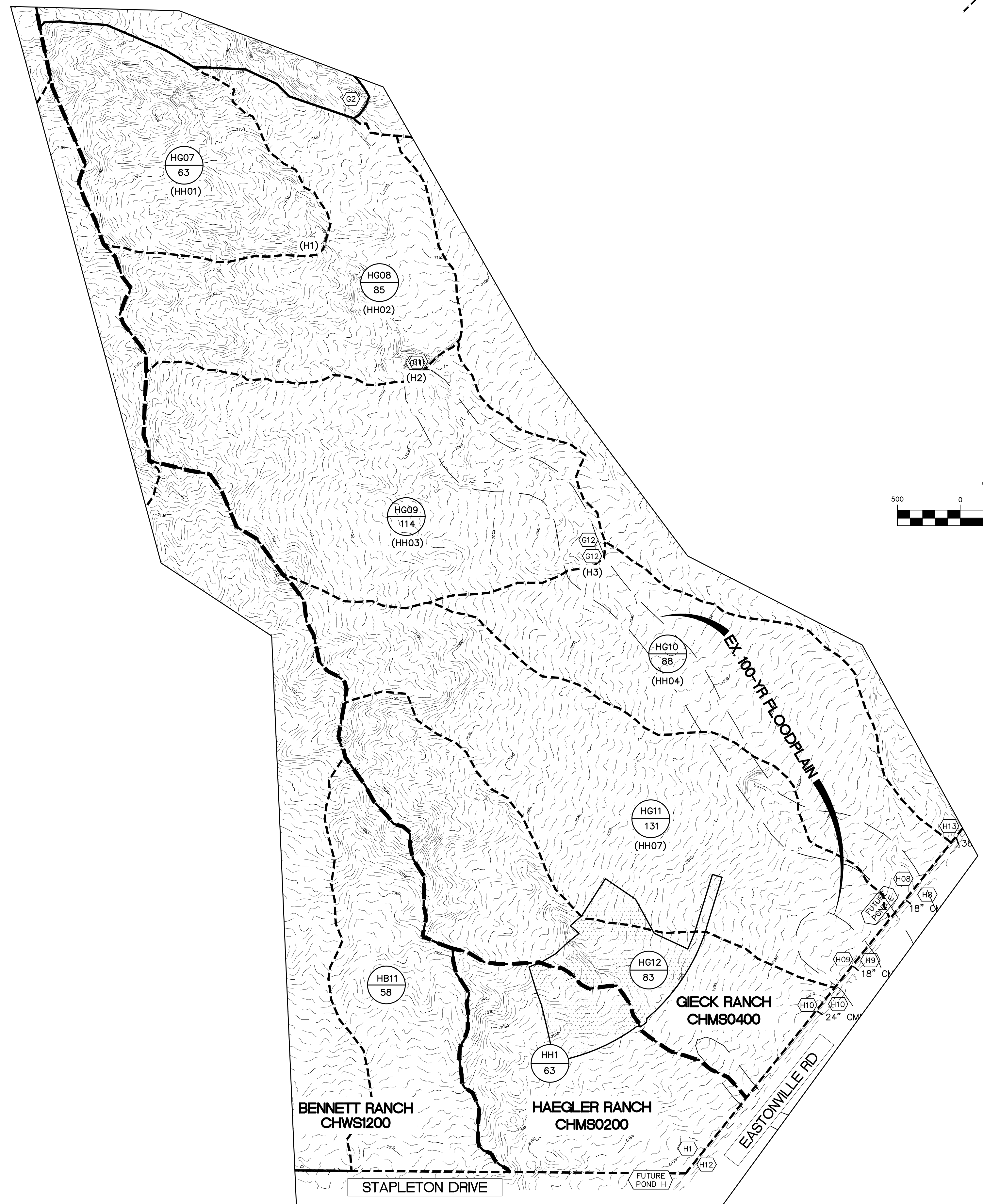
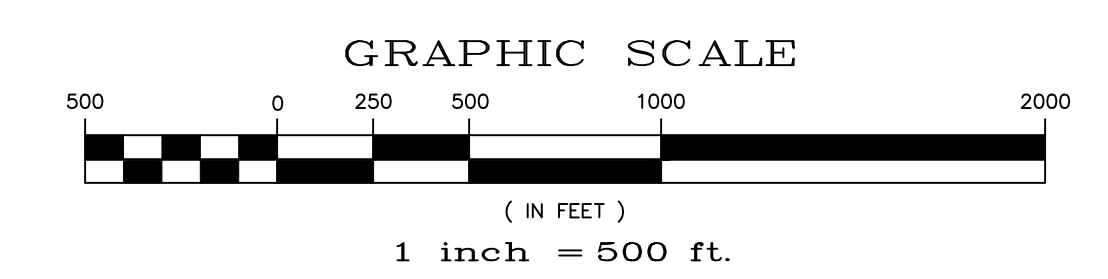
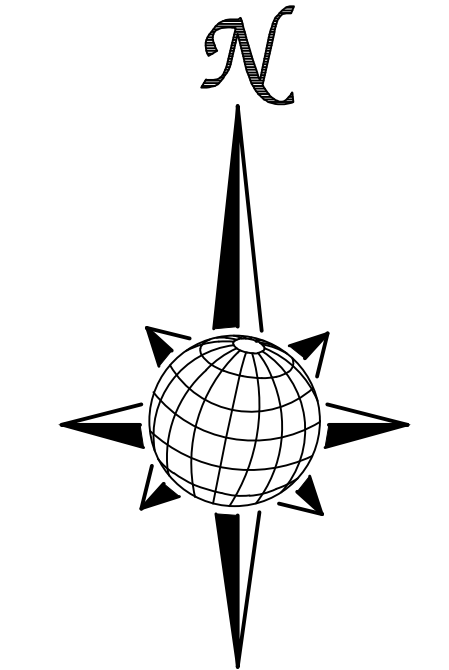
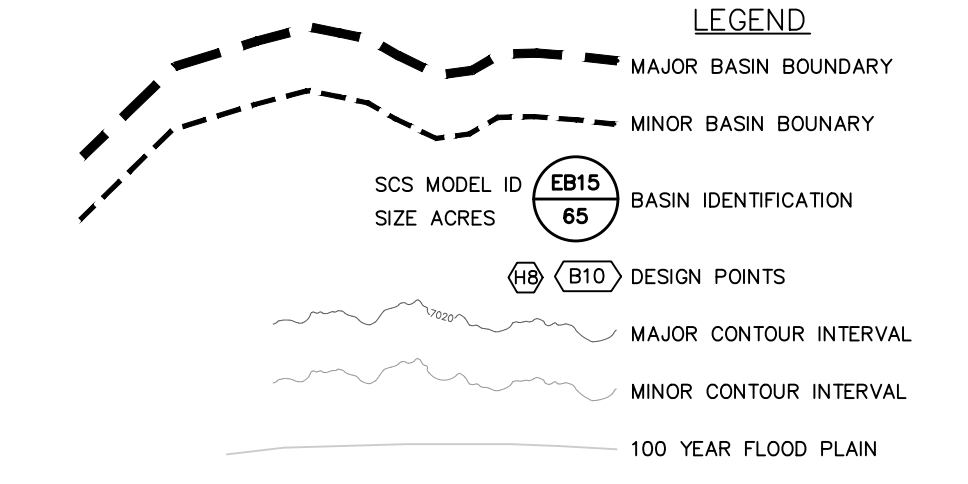
Figure 5 - Meridian Ranch SCS Method – Historic Basins Map

Figure 6 - Meridian Ranch SCS Method – Interim Basins Map

Figure 7 - Meridian Ranch SCS Method – Future Basins Map

SCS DRAINAGE MAP MERIDIAN RANCH WINDINGWALK FILING 2

HISTORIC							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
HG07	0.0984	47	31	18	7.1	2.4	0.4
HG07-G11	0.0984	47	31	18	7.0	2.4	0.4
HG08	0.1328	73	48	28	11	3.6	0.5
G11	0.2312	115	75	44	17	5.7	0.9
G11-G12	0.2312	114	75	44	17	5.6	0.9
HG09	0.1781	73	48	29	11	4.1	0.7
G12	0.4093	187	122	72	28	9.7	1.6
G12-H08	0.4093	183	121	71	28	9.7	1.6
HG10	0.1375	39	26	16	6.5	2.6	0.5
H08	0.5468	216	142	85	34	12	2.1
HG11	0.2047	77	51	30	12	4.5	0.8
H09	0.2047	77	51	30	12	4.5	0.8
HH01	0.0984	65	43	25	9.4	3.0	0.4
H12	0.0984	65	43	25	9.4	3.0	0.4
HG12	0.1297	57	38	22	8.7	3.1	0.5
H10	0.1297	57	38	22	8.7	3.1	0.5



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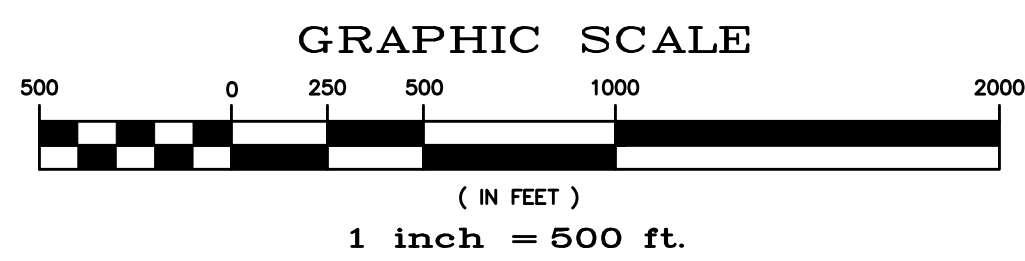
HISTORIC CONDITIONS

FIGURE 4

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SCS DRAINAGE MAP MERIDIAN RANCH WINDINGWALK FILING 2

INTERIM CONDITIONS							
HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG08A	0.075	117	91	67	42	27.1	13.6
FG08A-G05	0.075	111	86	65	41	26.7	13.6
FG08B	0.063	87	67	50	31	20.4	10.3
FG08B-G05	0.063	85	66	49	30	19.5	10.1
FG11	0.0625	76	59	45	29	18.8	10.0
FG09	0.0484	49	36	26	15	8.4	3.3
FG09-G05	0.0484	48	36	25	14	8.2	3.3
HG10	0.0467	29	20	12	5	2.1	0.4
G05	0.2956	344	261	190	115	72.3	36.3
FG13	0.0661	44	31	20	10	4.9	1.4
FG12	0.0328	51	40	31	20	13.9	7.9
POND D	0.3945	107	70	34	15	8.6	2.7
POND D-G17	0.3945	107	69	34	15	8.6	2.7
HG15	0.0297	13	8.8	5.4	2.2	0.9	0.2
FG15a	0.0156	28	22	17	11	7.3	4.0
G17	0.4398	119	77	38	17	9.3	4.3
G17-G18	0.4398	119	77	38	17	9.3	4.0
FG16	0.0773	127	98	74	47	31	16
G18	0.5171	167	126	93	59	38	20
G18-POND E	0.5171	161	121	89	56	37	20
HG30	0.1844	50	33	20	8.4	3.3	0.7
FG30-PONDHS	0.1844	50	33	20	8.4	3.3	0.7
FG31	0.0922	118	92	71	46	31	18
POND HS	0.2766	102	62	40	27	19	10
FG17a	0.0694	108	84	63	40	26	14
FG17a-POND E	0.0694	106	82	61	39	26	14
FG18	0.0644	56	42	30	17	10.4	4.6
FG18-POND E	0.0644	56	42	30	17	10.4	4.5
FG19	0.0527	85	67	51	33	23	13.3
FG17c	0.0313	32	22	15	7	2.9	0.5
FG17b	0.0214	40	31	24	16	11	6.2
POND E	1.0329	199	119	61	24	12	5.5
H08	173	107	54	19	8.3	3.3	3.3
H09	25	12	7.3	5.3	3.4	2.2	2.2
FH01	0.1348	120	91	66	39	24	11.0
POND H	0.1348	47	26	15	6.0	2.3	1.1
FH02	0.0091	11	8.0	5.6	3.2	1.9	0.7
FH03	0.0081	14	11	8.3	5.5	3.8	2.2
H12	0.152	50	28	16	9.2	6.2	3.1



LEGEND

- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY
- SCS MODEL ID BASIN IDENTIFICATION
- SIZE ACRES
- DESIGN POINTS
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL
- 100 YEAR FLOOD PLAIN

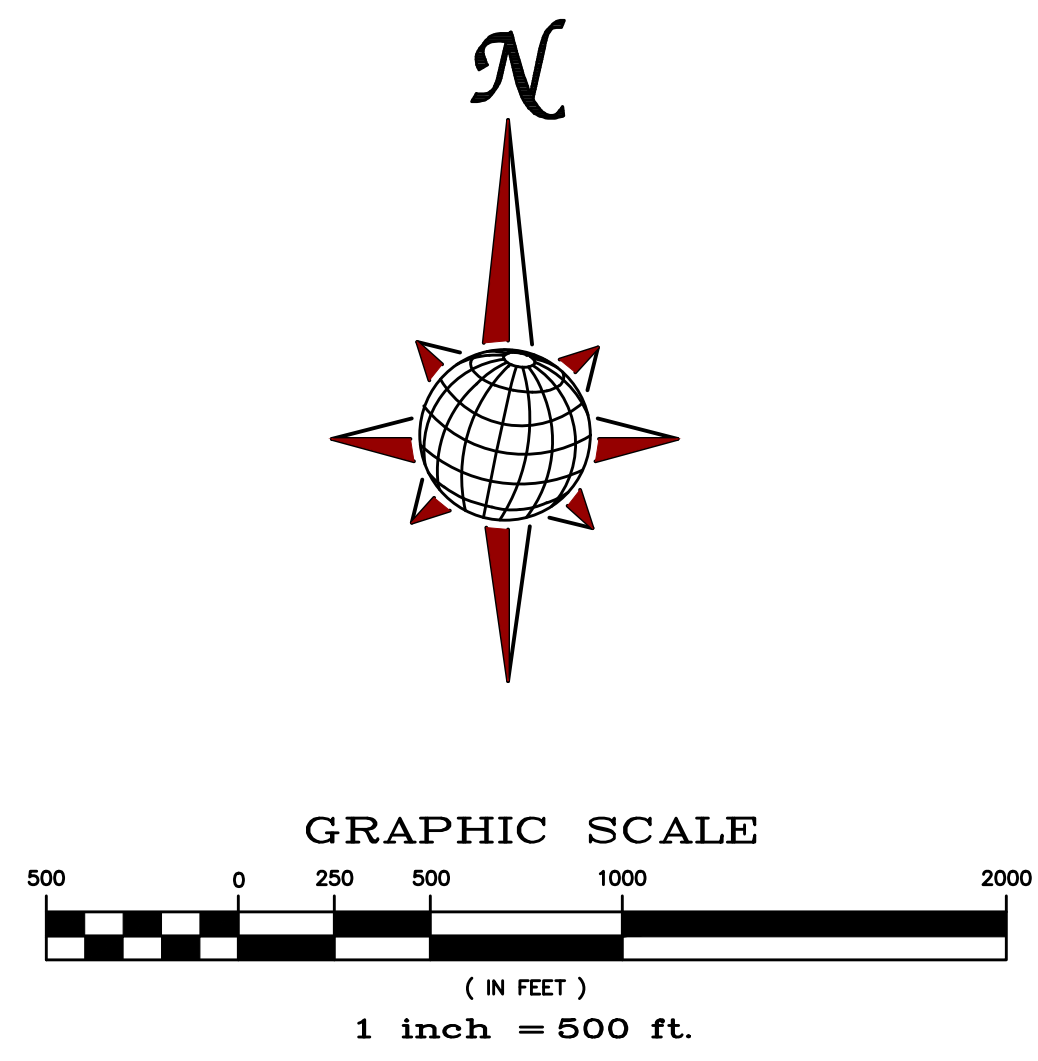
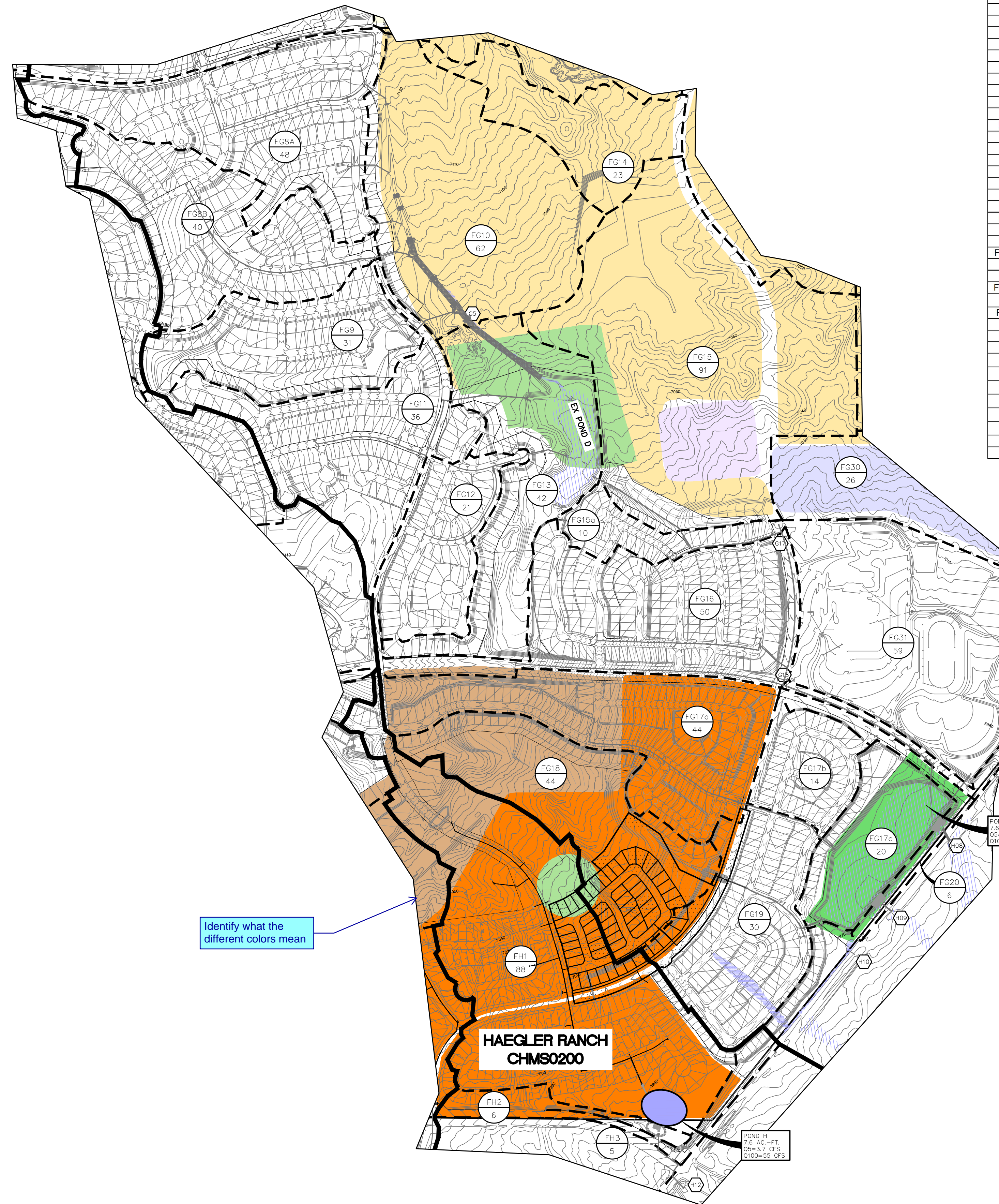
INTERIM CONDITIONS

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SCS DRAINAGE MAP MERIDIAN RANCH WINDINGWALK FILING 2

HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)	FUTURE CONDITIONS					
		DISCHARGE PEAK Q100 (CFS)	DISCHARGE PEAK Q50 (CFS)	DISCHARGE PEAK Q25 (CFS)	DISCHARGE PEAK Q10 (CFS)	DISCHARGE PEAK Q5 (CFS)	DISCHARGE PEAK Q2 (CFS)
FG08A	0.0750	117	91	67	42	27	14
FG08A-G05	0.0750	111	86	65	41	27	14
FG10	0.0669	46	34	24	14	8.3	3.6
FG08B	0.0630	87	67	50	31	20	10
FG08B-G05	0.0630	85	66	49	30	20	10
FG11	0.0625	76	59	45	29	19	10
FG09	0.0484	49	36	26	15	8.4	3.3
FG09-G05	0.0484	48	36	25	14	8.2	3.3
G05	0.3158	342	262	192	117	75	38
FG13	0.0661	44	31	20	10	4.9	1.4
FG14	0.0331	42	32	24	15	10	5.2
FG12	0.0328	51	40	31	20	14	7.9
POND D	0.4478	131	89	51	19	12	4.5
POND D-G17	0.4478	131	89	51	19	12	4.5
FG15	0.1017	95	71	51	29	18	7.5
G17a	0.1017	95	71	51	29	18	7.5
FG15a	0.0156	28	22	17	11	7.3	4.0
G17	0.5651	184	121	72	40	23	11
G17-G18	0.5651	184	121	72	40	23	11
FG16	0.0773	127	98	74	47	31	16
G18	0.6424	235	177	127	77	49	24
G18-POND E	0.6424	233	176	126	77	48	24
FG31	0.0922	118	92	71	46	31	18
FG30	0.0400	76	60	46	31	21	12
FG30-PONDHS	0.0400	74	59	45	29	20	11
POND HS	0.1322	156	107	80	37	27	15
FG17a	0.0694	102	79	58	36	23	12
FG17a-POND E	0.0694	100	77	57	36	23	12
FG18	0.0644	57	43	31	18	11	4.8
FG18-POND E	0.0644	57	42	30	18	11	4.7
FG19	0.0527	85	67	51	33	23	13
FG17c	0.0313	32	22	15	6.7	2.9	0.5
FG17b	0.0214	40	31	24	16	11	6.2
POND E	1.0138	240	151	81	30	16	7
H08	1.0138	204	136	73	24	12	4.2
H09	0.0000	36	16	8	6.0	4.2	2.4
FH01	0.1344	152	117	87	53	34	17
POND H	0.1344	57	32	18	7.8	3.0	1.2
FH02	0.0091	11	8.0	5.6	3.2	1.9	0.7
FH03	0.0081	14	11	8	5.5	3.8	2.2
H12	0.1516	62	35	20	10	6.3	3.5



- LEGEND**
- MAJOR BASIN BOUNDARY
 - MINOR BASIN BOUNDARY
 - SCS MODEL ID (FG31) BASIN IDENTIFICATION
SIZE ACRES (2)
 - DESIGN POINTS (B10)
 - MAJOR CONTOUR INTERVAL
 - MINOR CONTOUR INTERVAL
 - 100 YEAR FLOOD PLAIN

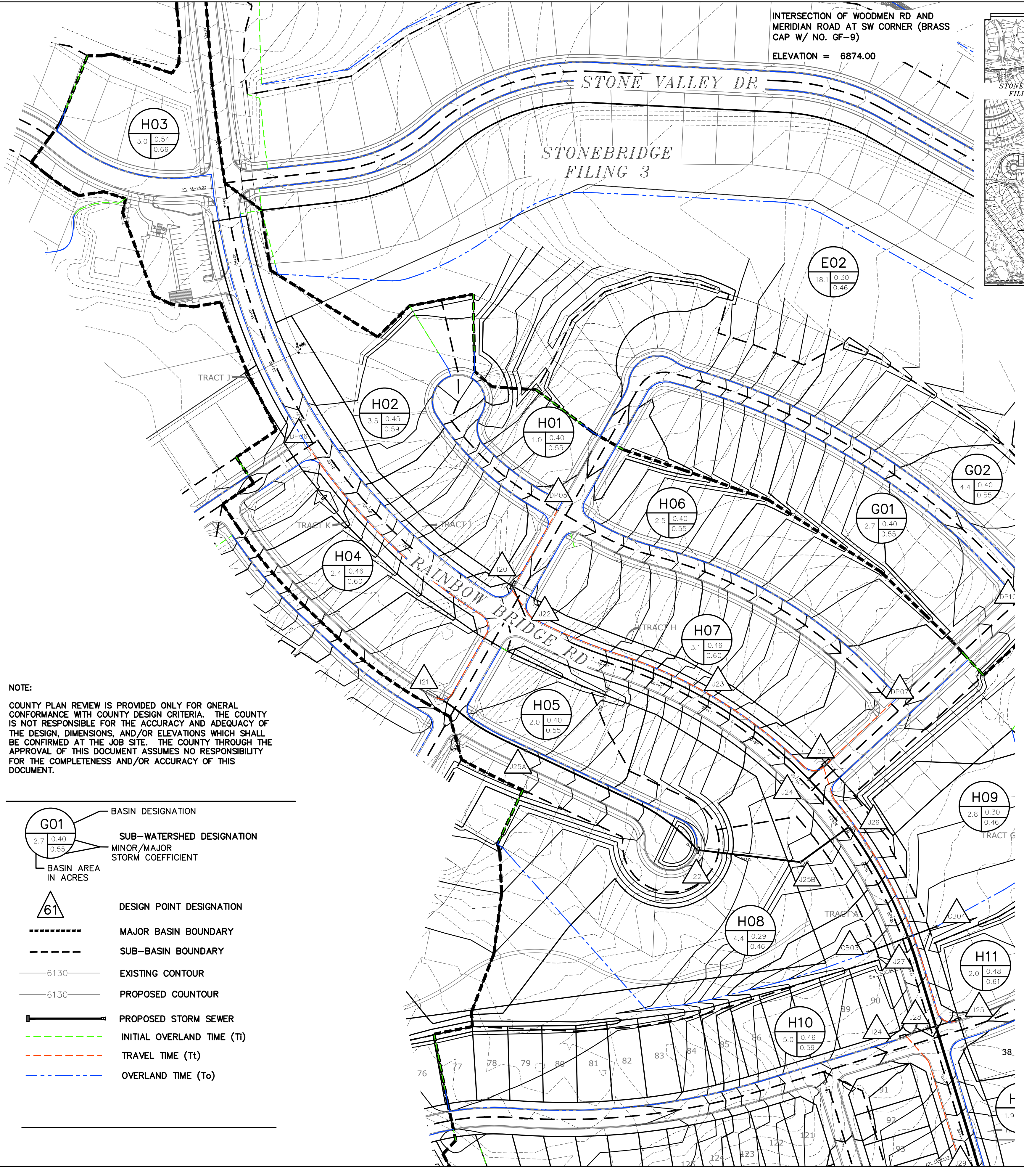
FUTURE CONDITIONS

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

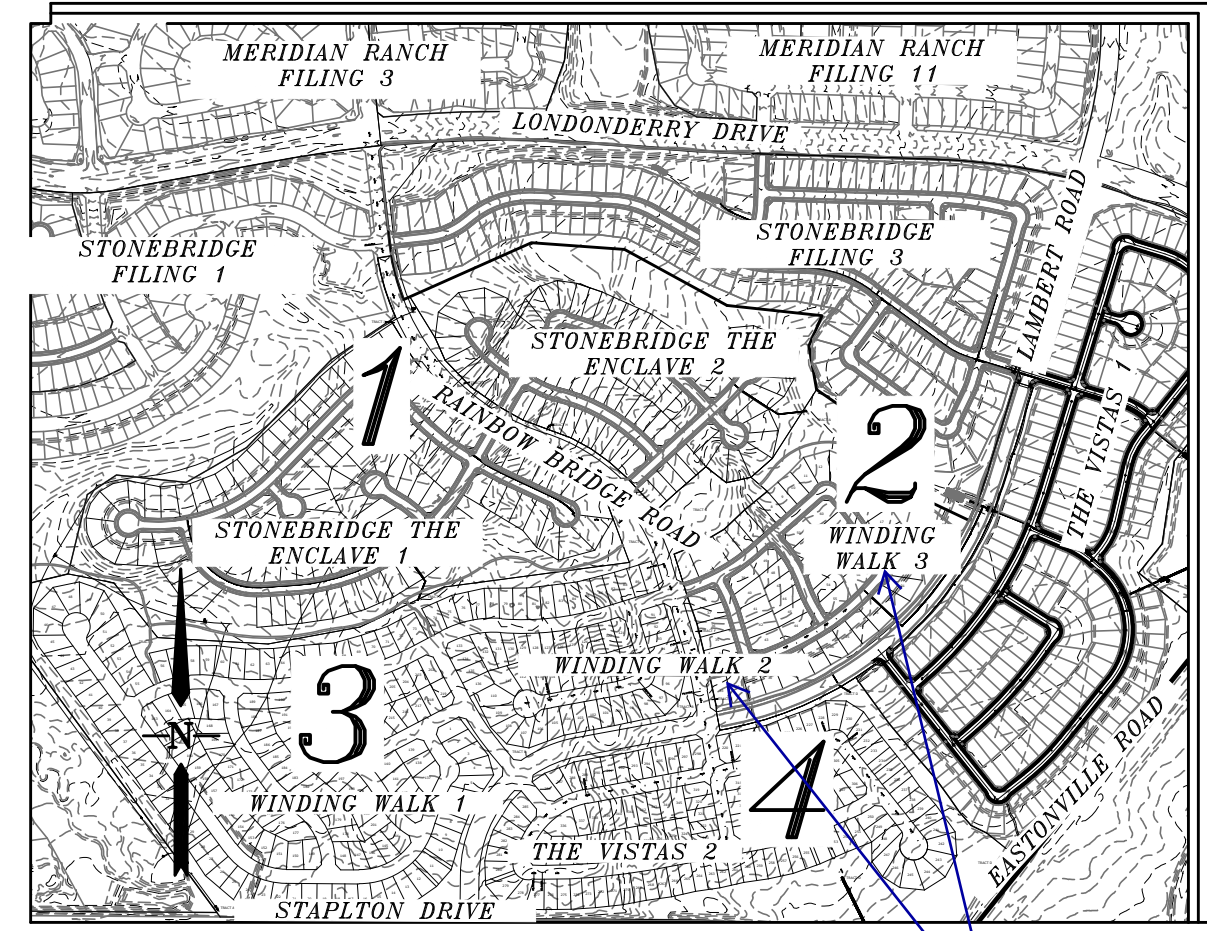
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Minor storm is for 5 year event

DP	BASIN	AREA (AC)	Q(10) (CFS)	Q(100) (CFS)	INLET	PIPE
DP05	H01	0.99	1.5	3.5		
I20	H02	3.48	7.4	16	PR 15" FORCED SUMP	18" RCP
J22						18" RCP
J23						18" RCP
DP07	H06	2.52	4.3	9.9		
I23	H07	3.14	8.4	20	PR 15" FORCED SUMP	24" RCP
J24						24" RCP
DP06	H03	2.97	5.8	12		
I21	H04	2.37	9.0	19	PR 20" FORCED SUMP	24" RCP
J25A						24" RCP
I22	H05	2.04	3.5	7.9	PR 10" SUMP	24" RCP
J25B						24" RCP
J26						30" RCP
CB03	H08	4.40	4.6	12	PR Type C	18" RCP
CB04	H09	2.78	3.1	8.0	PR Type C	18" RCP
J27						42" RCP
I24	H10	4.98	8.2	18	PR 10" FORCED SUMP	18" RCP
I25	H11	1.98	3.8	11	PR 10" FORCED SUMP	18" RCP
J28						42" RCP
I26	H12	4.88	6.9	16	PR 5" SUMP	18" RCP
I27	H13	1.28	2.1	8.7	PR 10" SUMP	24" RCP
J29						42" RCP
DP08	H14	1.53	2.7	6.2		
I28	H15	1.88	5.8	13	PR 15" FORCED SUMP	18" RCP
J30						42" RCP
I29	H16	4.15	7.7	21	PR 20" FORCED SUMP	24" RCP
J31						48" RCP
I30	H17	3.44	6.2	13	PR 10" FORCED SUMP	18" RCP
J32						48" RCP
I31	H18	5.99	8.6	22	PR 20" FORCED SUMP	24" RCP
J33						48" RCP
J34						48" RCP
I32	H19	3.83	5.4	12	PR 10" FORCED SUMP	24" RCP
I33	H20	4.59	7.0	16	PR 5" SUMP	18" RCP
J35						48" RCP
I34	H21	4.01	5.0	17	PR 10" SUMP	48" RCP
I35	H22	3.03	5.7	12	PR 5" SUMP	18" RCP
I36	H23	1.02	3.0	5.7	PR 5" SUMP	24" RCP
OS4	H24	3.28	11	24		
POND	H25	11.31	12	32		
EI37a	H26	3.60	4.6	12	EX 20" FLOW-BY	30" RCP
EI37b			0.9	4.0	EX 20" FLOW-BY	30" RCP
DP09	H27	2.21	5.7	14.6		
EI38	H28	1.68	5.7	10	EX 20" FLOW-BY	30" RCP
EI39			1.3	3.2	EX 20" FLOW-BY	
DP10	G01	2.70	4.6	11		
I40	G02	4.36	9.7	22	PR 10" SUMP	18" RCP
I41	G03	1.21	2.1	8.1	PR 10" SUMP	24" RCP
J33						24" RCP
DP11	G04	1.64	2.9	6.6		
I42	G05	3.42	8.3	19	PR 10" SUMP	18" RCP
I43	G06	3.53	4.7	12	PR 10" SUMP	24" RCP
J37						30" RCP
J38						30" RCP
DP12	E02	18.07	17	42		
DP13	E03	6.26	19	48		
I44	E04	3.91	8.4	17	PR 10" SUMP	42" RCP
J39						24" RCP
I45	E05	1.72	3.6	7.5	PR 10" SUMP	42" RCP
EI04	E06	5.41	8.4	19	EX 10" SUMP	42" RCP
EI05	E07	4.88	6.9	16	EX 10" FORCED SUMP	18" RCP
EI04						42" RCP
DP1	E09	2.93	4.3	9.8		
EI06	E10	4.87	9.2	21		
DP2	E11	2.98	4.4	10		
EI06	E12	2.59	7.5	17		
EI06		0	0.00	15.8	EX 20" SUMP	24" RCP
EI07	E13	3.17	5.8	20		
EI07	E08	1.24	2.3	7.5	EX 15" SUMP	24" RCP
EI05						36" RCP
EI06						48" RCP

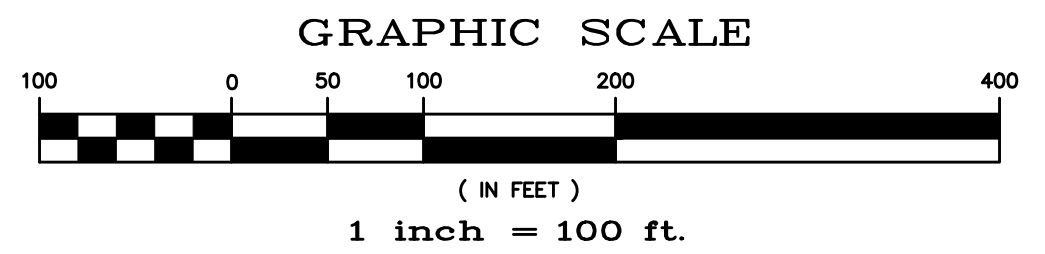


INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)
ELEVATION = 6874.00



INDEX MAP
N.T.S.

Remove the Winding Walk 3



NOTE:
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL 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.

- 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 CONTOUR
- PROPOSED STORM SEWER
- INITIAL OVERLAND TIME (Ti)
- TRAVEL TIME (Tt)
- OVERLAND TIME (To)

TECH CONTRACTORS 12311 REX ROAD FALCON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.2457			MERIDIAN RANCH		RATIONAL DRAINAGE MAP FINAL DRAINAGE REPORT WINDINGWALK FILING 2		
Scale AS SHOWN	Drawn by LCA	Checked by TKM	Date JUL 2008				
1 of 4							

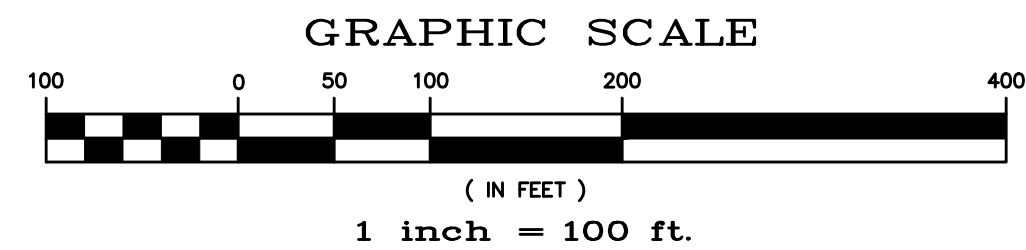
FIGURE 7

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

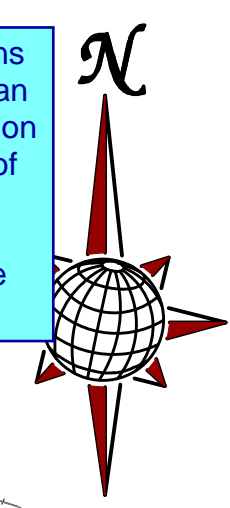
ELEVATION = 6874.00

NOTE:

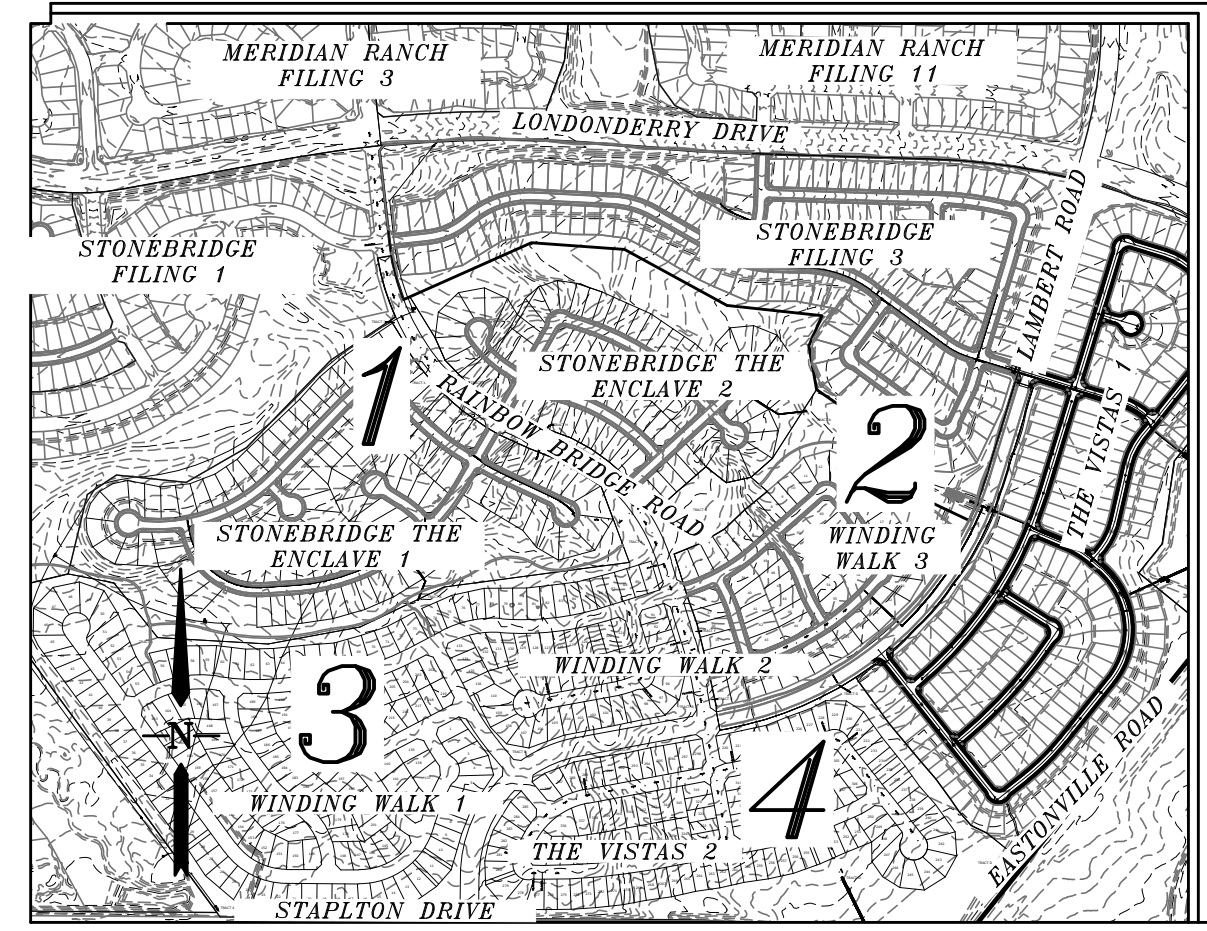
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY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



Update the rational drainage map and calculations to specifically be for winding walk filing 2. You can add text box identifying the surrounding subdivision filing or highlight the subject area. The majority of the subbasins in sheets 1 & 3 are for a different subbasin.
Main takeaway is that the project area should be readily discernible.



- G01 BASIN DESIGNATION
- 2.7 0.40 0.55 SUB-WATERSHED DESIGNATION MINOR/MAJOR STORM COEFFICIENT
- △ 61 DESIGN POINT DESIGNATION
- MAJOR BASIN BOUNDARY
- - - - - SUB-BASIN BOUNDARY
- 6130 EXISTING CONTOUR
- 6130 PROPOSED COUNTOUR
- PROPOSED STORM SEWER
- INITIAL OVERLAND TIME (Ti)
- TRAVEL TIME (Tt)
- OVERLAND TIME (To)



Minor storm is for 5 year event

INDEX MAP
N.T.S.

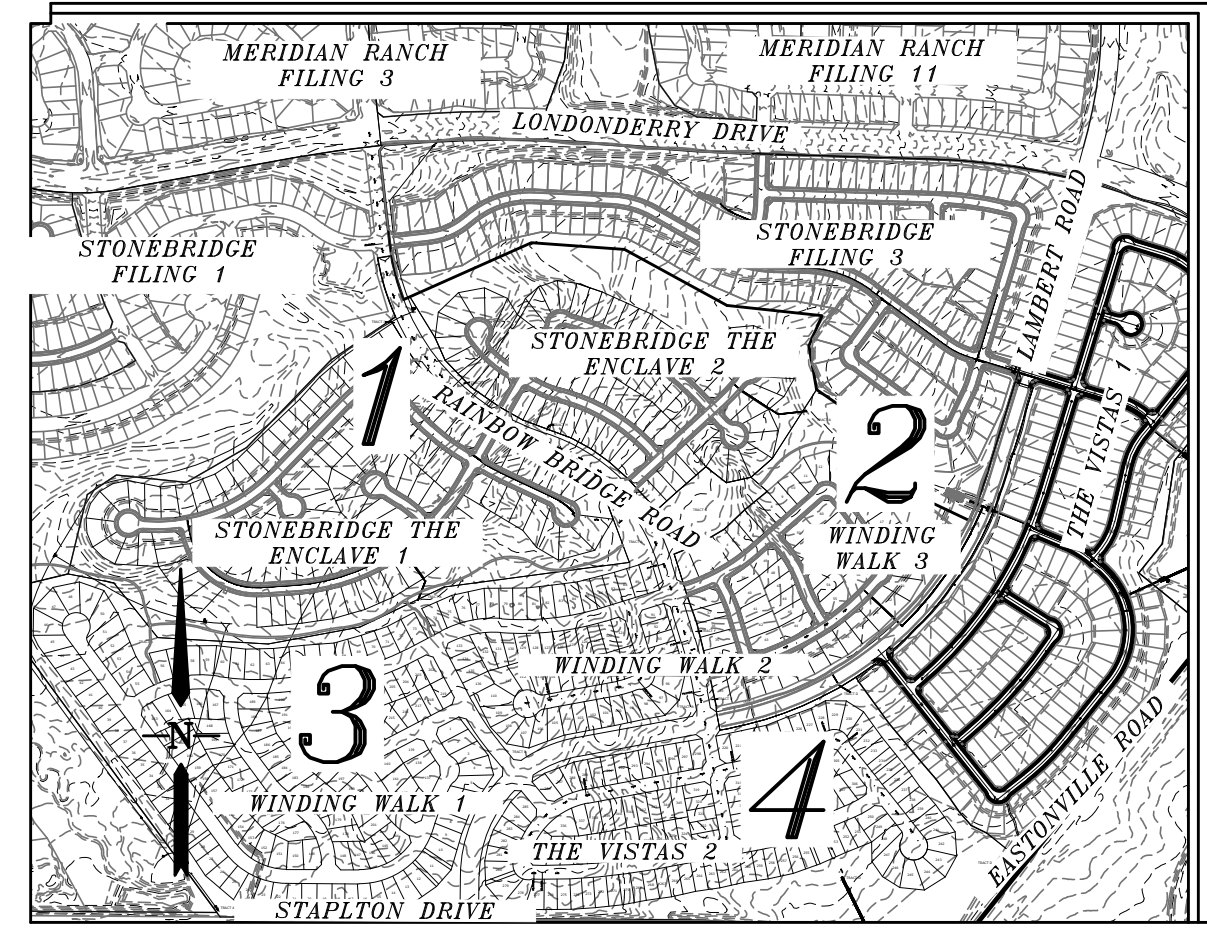
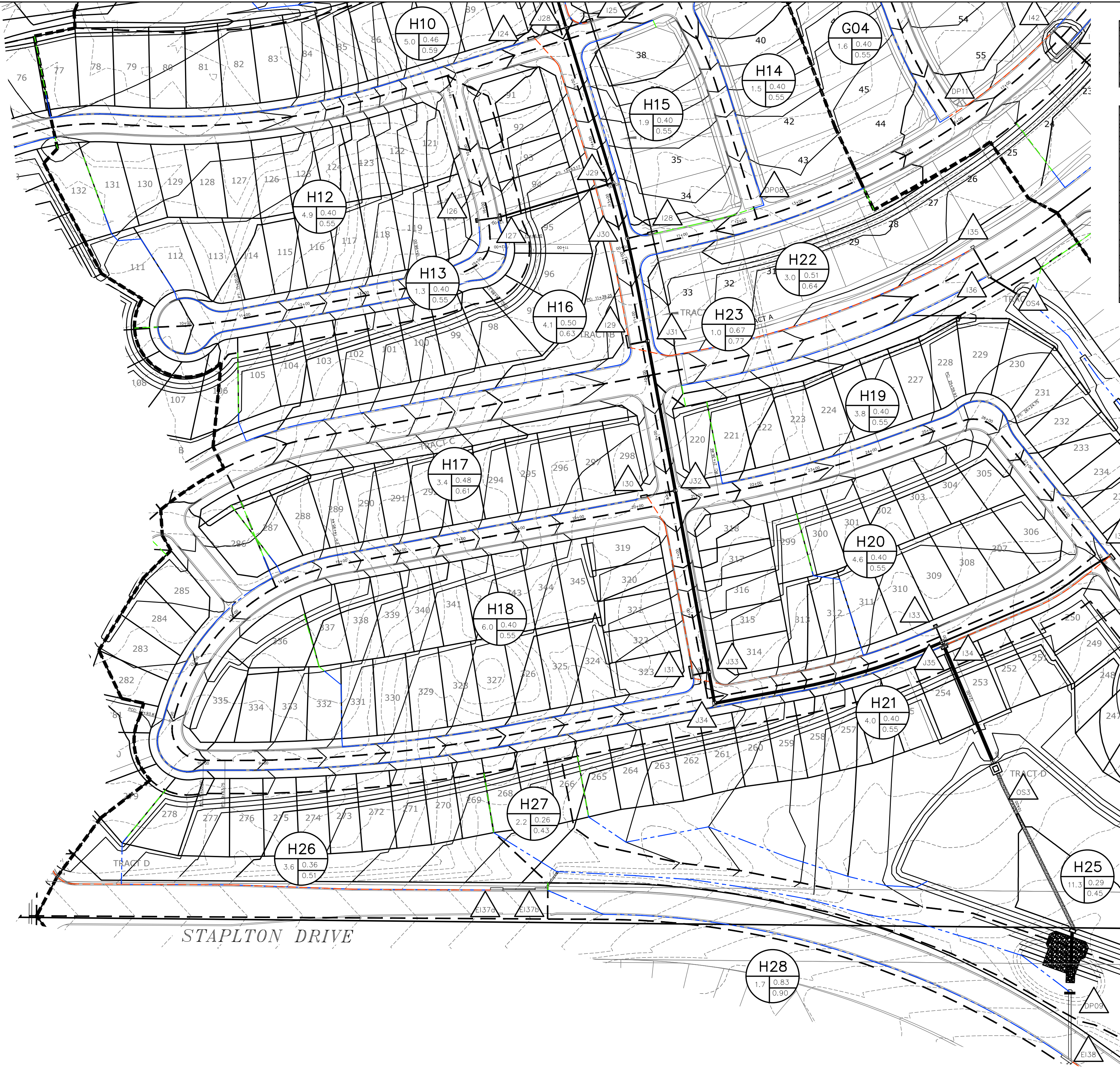
DP	BASIN	AREA (AC)	Q(10) (CFS)	Q(100) (CFS)	INLET	PIPE
DP05	H01	0.99	1.5	3.5	PR 15" FORCED SUMP	18" RCP
I20	H02	3.48	7.4	16		18" RCP
J22						18" RCP
J23						18" RCP
DP07	H06	2.52	4.3	9.9	PR 15" FORCED SUMP	24" RCP
J24	H07	3.14	8.4	20		24" RCP
DP06	H03	2.97	5.8	12		24" RCP
I21	H04	2.37	9.0	19	PR 20" FORCED SUMP	24" RCP
J25A						24" RCP
I22	H05	2.04	3.5	7.9	PR 10" SUMP	24" RCP
J25B						24" RCP
J26						30" RCP
CB03	H08	4.40	4.6	12	PR Type C	18" RCP
CB04	H09	2.78	3.1	8.0	PR Type C	18" RCP
J27						42" RCP
I24	H10	4.98	8.2	18	PR 10" FORCED SUMP	18" RCP
I25	H11	1.98	3.8	11	PR 10" FORCED SUMP	18" RCP
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I26	H12	4.88	6.9	16	PR 5" SUMP	18" RCP
I27	H13	1.28	2.1	8.7	PR 10" SUMP	24" RCP
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DP08	H14	1.53	2.7	6.2		18" RCP
I28	H15	1.88	5.8	13	PR 15" FORCED SUMP	18" RCP
J30						42" RCP
I29	H16	4.15	7.7	21	PR 20" FORCED SUMP	24" RCP
J31						48" RCP
I30	H17	3.44	6.2	13	PR 10" FORCED SUMP	18" RCP
J32						48" RCP
I31	H18	5.99	8.6	22	PR 20" FORCED SUMP	48" RCP
J33						48" RCP
J34						48" RCP
I32	H19	3.83	5.4	12	PR 10" FORCED SUMP	24" RCP
I33	H20	4.59	7.0	16	PR 5" SUMP	18" RCP
J35						48" RCP
I34	H21	4.01	5.0	17	PR 10" SUMP	48" RCP
I35	H22	3.03	5.7	12	PR 5" SUMP	18" RCP
I36	H23	1.02	3.0	5.7	PR 5" SUMP	24" RCP
OS4	H24	3.28	11	24		
POND	H25	11.31	12	32		
EI37a	H26	3.60	4.6	12	EX 20" FLOW-BY	30" RCP
EI37b		0.9	4.0		EX 20" FLOW-BY	30" RCP
DP09	H27	2.21	5.7	14.6		
EI38	H28	1.68	5.7	10	EX 20" FLOW-BY	30" RCP
EI39		1.3	3.2		EX 20" FLOW-BY	
DP10	G01	2.70	4.6	11		
I40	G02	4.36	9.7	22	PR 10" SUMP	18" RCP
I41	G03	1.21	2.1	8.1	PR 10" SUMP	24" RCP
J33						24" RCP
DP11	G04	1.64	2.9	6.6		
I42	G05	3.42	8.3	19	PR 10" SUMP	18" RCP
I43	G06	3.53	4.7	12	PR 10" SUMP	24" RCP
J37						30" RCP
J38						30" RCP
DP12	E02	18.07	17	42		
DP13	E03	6.26	19	48		
I44	E04	3.91	8.4	17	PR 10" SUMP	42" RCP
J39						24" RCP
I45	E05	1.72	3.6	7.5	PR 10" SUMP	42" RCP
EI04	E06	5.41	8.4	19	EX 10" SUMP	42" RCP
EI05	E07	4.88	6.9	16	EX 10" FORCED SUMP	18" RCP
EI04						42" RCP
DP1	E09	2.93	4.3	9.8		
EI06	E10	4.87	9.2	21		
DP2	E11	2.98	4.4	10		
EI06	E12	2.59	7.5	17		
EI06		0.00	15.8	36	EX 20" SUMP	24" RCP
EI07	E13	3.17	5.8	20		
EI07	E08	1.24	2.3	7.5	EX 15" SUMP	24" RCP
EI05						36" RCP
EI06						48" RCP

FIGURE 7

TECH CONTRACTORS 12311 REX ROAD FALCON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.2457	
RATIONAL DRAINAGE MAP FINAL DRAINAGE REPORT WINDING WALK FILING 2	
Drawn by LOG	Checked by TK
Date JUL 2008	
Scale AS SHOWN	2 of 4
Revisions	No.
Date	Appr.
Date	Date

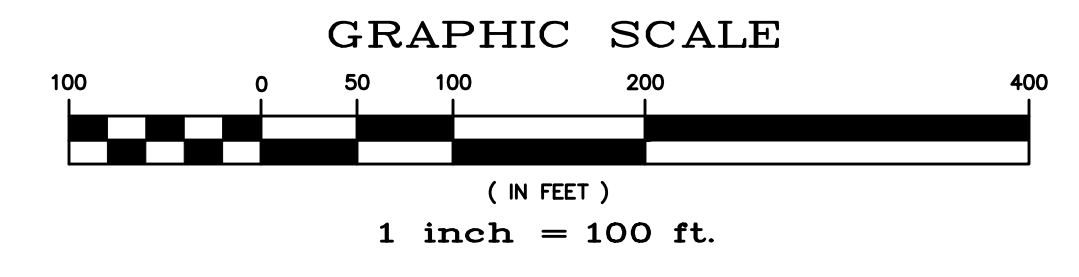
Minor storm is for 5 year event

DP	BASIN	AREA (AC)	Q(10) (CFS)	Q(100) (CFS)	INLET	PIPE
DP05	H01	0.99	1.5	3.5		
J20	H02	3.48	7.4	16	PR 15' FORCED SUMP	18" RCP
J23						18" RCP
J24						24" RCP
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J23	H07	3.14	8.4	20		24" RCP
J24						24" RCP
DP06	H03	2.97	5.8	12		
J25A	H04	2.37	9.0	19	PR 20' FORCED SUMP	24" RCP
J22	H05	2.04	3.5	7.9	PR 10' SUMP	24" RCP
J25B						24" RCP
J26						30" RCP
CB03	H08	4.40	4.6	12	PR Type C	18" RCP
CB04	H09	2.78	3.1	8.0	PR Type C	18" RCP
J27						42" RCP
J24	H10	4.98	8.2	18	PR 10' FORCED SUMP	18" RCP
J25	H11	1.98	3.8	11	PR 10' FORCED SUMP	18" RCP
J28						42" RCP
J26	H12	4.88	6.9	16	PR 5' SUMP	18" RCP
J27	H13	1.28	2.1	8.7	PR 10' SUMP	24" RCP
J29						42" RCP
DP08	H14	1.53	2.7	6.2	PR 15' FORCED SUMP	18" RCP
J28	H15	1.88	5.8	13		42" RCP
J30						24" RCP
J29	H16	4.15	7.7	21	PR 20' FORCED SUMP	24" RCP
J31						48" RCP
J30	H17	3.44	6.2	13	PR 10' FORCED SUMP	18" RCP
J32						48" RCP
J31	H18	5.99	8.6	22	PR 20' FORCED SUMP	24" RCP
J33						48" RCP
J34						48" RCP
J32	H19	3.83	5.4	12	PR 10' FORCED SUMP	24" RCP
J33	H20	4.59	7.0	16	PR 5' SUMP	18" RCP
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J34	H21	4.01	5.0	17	PR 10' SUMP	48" RCP
J35	H22	3.03	5.7	12	PR 5' SUMP	18" RCP
J36	H23	1.02	3.0	5.7	PR 5' SUMP	24" RCP
OS4	H24	3.28	11	24		
POND	H25	11.31	12	32		
EI37a	H26	3.60	4.6	12	EX 20' FLOW-BY	30" RCP
EI37b			0.9	4.0	EX 20' FLOW-BY	30" RCP
DP09	H27	2.21	5.7	14.6		
EI38	H28	1.68	5.7	10	EX 20' FLOW-BY	30" RCP
EI39			1.3	3.2	EX 20' FLOW-BY	
DP10	G01	2.70	4.6	11		
I40	G02	4.36	9.7	22	PR 10' SUMP	18" RCP
I41	G03	1.21	2.1	8.1	PR 10' SUMP	24" RCP
J33						24" RCP
DP11	G04	1.64	2.9	6.6		
I42	G05	3.42	8.3	19	PR 10' SUMP	18" RCP
I43	G06	3.53	4.7	12	PR 10' SUMP	24" RCP
J37						30" RCP
J38						30" RCP
DP12	E02	18.07	17	42		
DP13	E03	6.26	19	48		
I44	E04	3.91	8.4	17	PR 10' SUMP	42" RCP
J39						24" RCP
I45	E05	1.72	3.6	7.5	PR 10' SUMP	42" RCP
EI04	E06	5.41	8.4	19	EX 10' SUMP	42" RCP
EI05	E07	4.88	6.9	16	EX 10' FORCED SUMP	18" RCP
EI04						42" RCP
DP1	E09	2.93	4.3	9.8		
EI06	E10	4.87	9.2	21		
DP2	E11	2.98	4.4	10		
EI06	E12	2.59	7.5	17		
EI06		0.00	15.8	36	EX 20' SUMP	24" RCP
EI07	E13	3.17	5.8	20		
EI07	E08	1.24	2.3	7.5	EX 15' SUMP	24" RCP
EI05						36" RCP
EI06						48" RCP



INDEX MAP
N.T.S.

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- SUB-WATERSHED DESIGNATION
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- SUB-BASIN BOUNDARY
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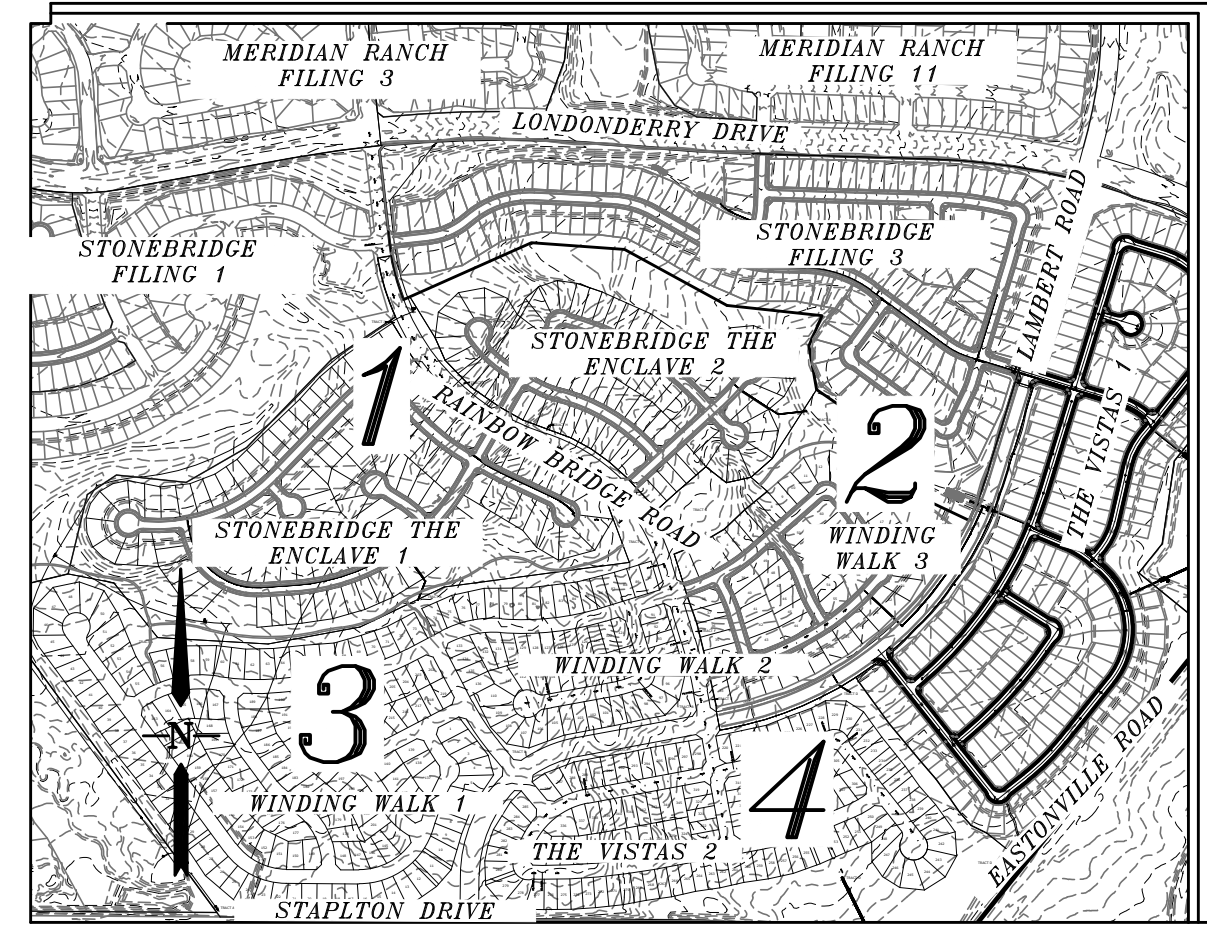
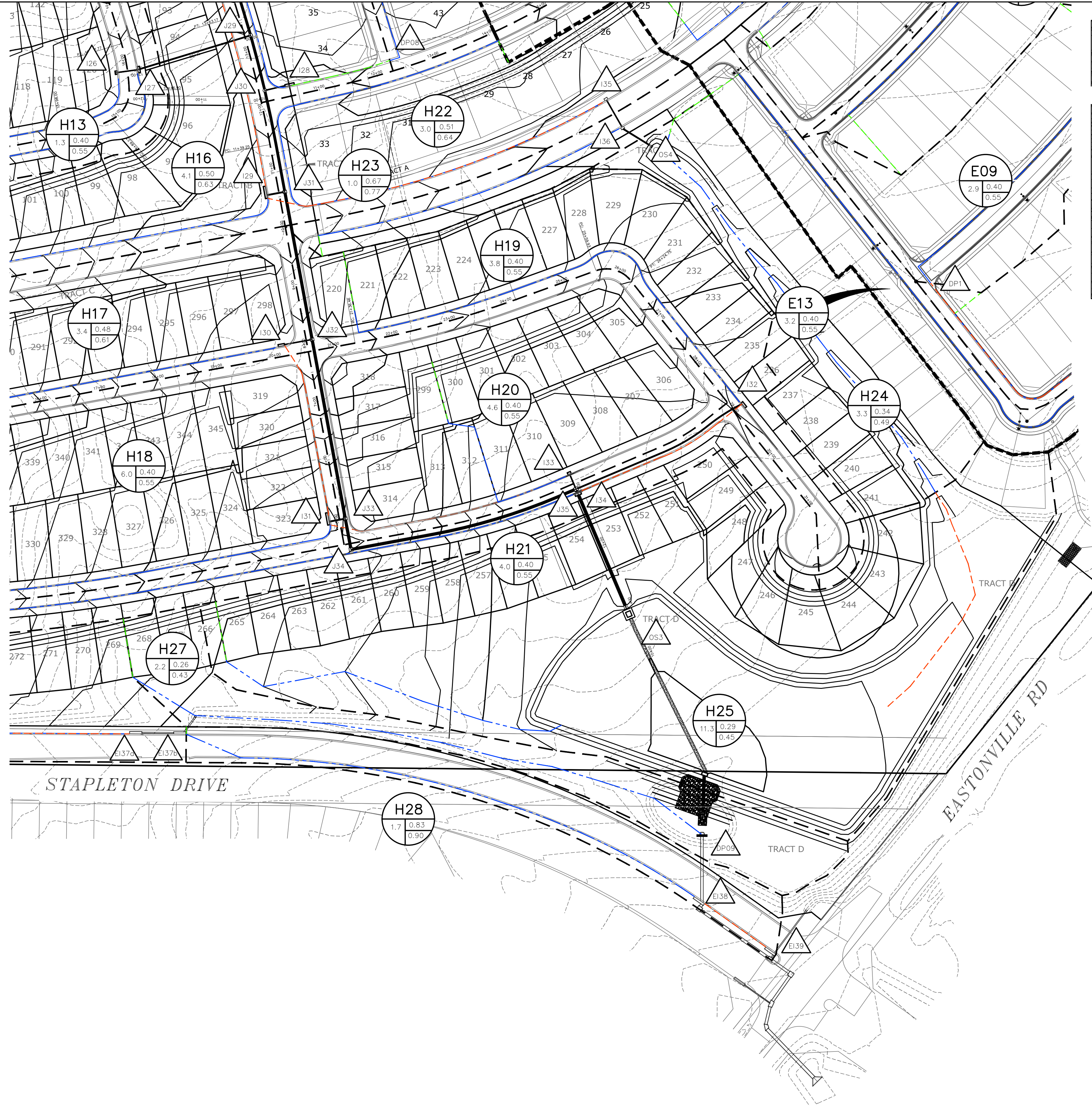
NOTE:
 INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)
 ELEVATION = 6874.00
 COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS 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.

	No. _____ Revisions
	Date _____ Inst. _____ Appr. _____ Date _____
TECH CONTRACTORS 12311 REX ROAD FALCON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.2457	
RATIONAL DRAINAGE MAP FINAL DRAINAGE REPORT WINDING WALK FILING 2	
Drawn by LGJ	Checked by TKM
AS SHOWN	Date JUL 2008
Scale 3 of 4	Date JUL 2008

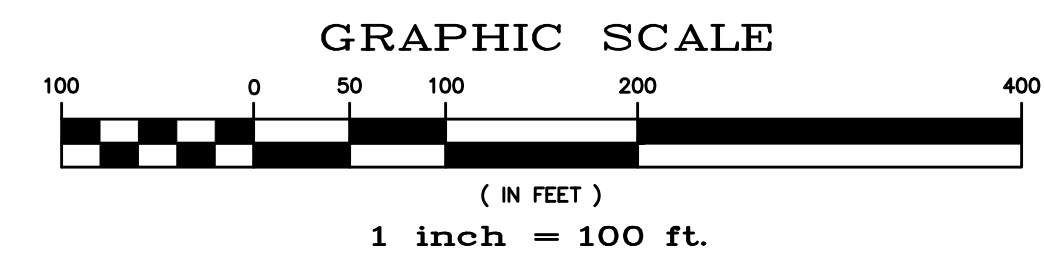
FIGURE 7

Minor storm is for 5 year event

DP	Basin	Area (AC)	Q(10) (CFS)	Q(100) (CFS)	Inlet	Pipe
DP05	H01	0.99	1.5	3.5		
I20	H02	3.48	7.4	16	PR 15" FORCED SUMP	18" RCP
J23						18" RCP
J22						18" RCP
DP07	H06	2.52	4.3	9.9		
I23	H07	3.14	8.4	20	PR 15" FORCED SUMP	24" RCP
J24						24" RCP
DP06	H03	2.97	5.8	12		
I21	H04	2.37	9.0	19	PR 20" FORCED SUMP	24" RCP
J25A						24" RCP
I22	H05	2.04	3.5	7.9	PR 10" SUMP	24" RCP
J25B						24" RCP
J26						30" RCP
CB03	H08	4.40	4.6	12	PR Type C	18" RCP
CB04	H09	2.78	3.1	8.0	PR Type C	18" RCP
J27						42" RCP
I24	H10	4.98	8.2	18	PR 10" FORCED SUMP	18" RCP
I25	H11	1.98	3.8	11	PR 10" FORCED SUMP	18" RCP
J28						42" RCP
I26	H12	4.88	6.9	16	PR 5" SUMP	18" RCP
I27	H13	1.28	2.1	8.7	PR 10" SUMP	24" RCP
J29						42" RCP
DP08	H14	1.53	2.7	6.2		
I28	H15	1.88	5.8	13	PR 15" FORCED SUMP	18" RCP
J30						42" RCP
I29	H16	4.15	7.7	21	PR 20" FORCED SUMP	24" RCP
J31						48" RCP
I30	H17	3.44	6.2	13	PR 10" FORCED SUMP	18" RCP
J32						48" RCP
I31	H18	5.99	8.6	22	PR 20" FORCED SUMP	24" RCP
J33						48" RCP
J34						48" RCP
I32	H19	3.83	5.4	12	PR 10" FORCED SUMP	24" RCP
I33	H20	4.59	7.0	16	PR 5" SUMP	18" RCP
J35						48" RCP
I34	H21	4.01	5.0	17	PR 10" SUMP	48" RCP
I35	H22	3.03	5.7	12	PR 5" SUMP	18" RCP
I36	H23	1.02	3.0	5.7	PR 5" SUMP	18" RCP
OS4	H24	3.28	11	24		24" RCP
POND	H25	11.31	12	32		
E137a	H26	3.60	4.6	12	EX 20" FLOW-BY	30" RCP
E137b			0.9	4.0	EX 20" FLOW-BY	30" RCP
DP09	H27	2.21	5.7	14.6		
E138	H28	1.68	5.7	10	EX 20" FLOW-BY	30" RCP
E139		1.3	3.2		EX 20" FLOW-BY	
DP10	G01	2.70	4.6	11		
I40	G02	4.36	9.7	22	PR 10" SUMP	18" RCP
I41	G03	1.21	2.1	8.1	PR 10" SUMP	24" RCP
J33						24" RCP
J38						30" RCP
DP11	G04	1.64	2.9	6.6		
I42	G05	3.42	8.3	19	PR 10" SUMP	18" RCP
I43	G06	3.53	4.7	12	PR 10" SUMP	24" RCP
J37						30" RCP
J38						30" RCP
DP12	E02	18.07	17	42		
DP13	E03	6.26	19	48		
I44	E04	3.91	8.4	17	PR 10" SUMP	42" RCP
J39						24" RCP
I45	E05	1.72	3.6	7.5	PR 10" SUMP	42" RCP
E104	E06	5.41	8.4	19	EX 10" SUMP	42" RCP
E105	E07	4.88	6.9	16	EX 10" FORCED SUMP	18" RCP
E104						42" RCP
DP1	E09	2.93	4.3	9.8		
E106	E10	4.87	9.2	21		
DP2	E11	2.98	4.4	10		
E106	E12	2.59	7.5	17		
E106	0	0.00	15.8	36	EX 20" SUMP	24" RCP
E107	E13	3.17	5.8	20		
E107	E08	1.24	2.3	7.5	EX 15" SUMP	24" RCP
E105						36" RCP
E106						48" RCP



INDEX MAP
N.T.S.



- 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)

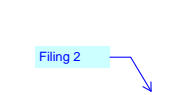
NOTE:
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO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

INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)
ELEVATION = 6874.00

Scale	AS SHOWN	4 of 4	
	Drawn by	Checked by	Date
TECH CONTRACTORS 12311 REX ROAD FALCON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.2457		Revisions	No.
MERIDIAN RANCH		RATIONAL DRAINAGE MAP FINAL DRAINAGE REPORT WINDINGWALK FLING 2	
FIGURE 7		JUL 2008	


Markup Summary

Daniel Torres (7)


of the WindingWalk Filing 1 at
ainage facilities adjacent to and
E & H are properly sized for the

Subject: Callout
Page Label: 20
Author: Daniel Torres
Date: 8/20/2018 10:52:10 AM
Color: ■

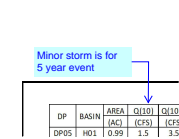
Filing 2


Minor storm is for
5 year event

DP	BASIN	AREA	Q1(0)	Q1(1)
DP01	H01	0.99	1.5	3
H01	H01	3.58	7.4	11
H11				

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Page Label: 137
Author: Daniel Torres
Date: 8/20/2018 12:35:28 PM
Color: ■

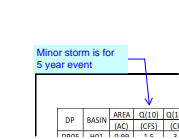
Minor storm is for 5 year event


Minor storm is for
5 year event

DP	BASIN	AREA	Q1(0)	Q1(1)
DP05	H01	0.99	1.5	3.5

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Page Label: 136
Author: Daniel Torres
Date: 8/20/2018 12:36:05 PM
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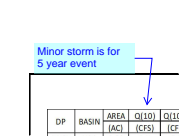
Minor storm is for 5 year event


Minor storm is for
5 year event

DP	BASIN	AREA	Q1(0)	Q1(1)
DP05	H01	0.99	1.5	3.5

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Date: 8/20/2018 12:41:00 PM
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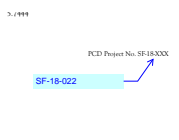
Minor storm is for 5 year event


Minor storm is for
5 year event

DP	BASIN	AREA	Q1(0)	Q1(1)
DP05	H01	0.99	1.5	3.5


Subject: Callout
Page Label: 138
Author: Daniel Torres
Date: 8/20/2018 12:45:46 PM
Color: ■

Minor storm is for 5 year event


PCD Project No. SF-18-022

Subject: Callout
Page Label: 1
Author: Daniel Torres
Date: 8/20/2018 8:27:07 AM
Color: ■

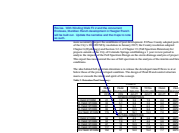
SF-18-022


Final Drainage Report

Subject: Callout
Page Label: 5
Author: Daniel Torres
Date: 8/20/2018 9:14:26 AM
Color: ■

Final Drainage Report

dsdlaforce (16)


EXECUTIVE SUMMARY
EXTRADITION

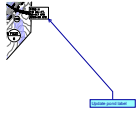
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Page Label: 18
Author: dsdlaforce
Date: 8/20/2018 1:38:51 PM
Color: ■

Revise. With Winding Walk Fil 2 and the concurrent Enclaves, Meridian Ranch development in Haegler Ranch will be built out. Update the narrative and the maps to note as such.



Subject: Callout
Page Label: 17
Author: dsdlaforce
Date: 8/20/2018 1:48:54 PM
Color: ■

Update the interim scenario to also reflect the Enclaves development. With Winding Walk Fil 2 and the concurrent Enclaves, Meridian Ranch development in Haegler Ranch will be built out. Update the narrative and the maps to note as such.



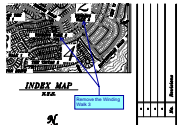
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Author: dsdlaforce
Date: 8/20/2018 11:30:52 AM
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Update pond label



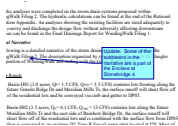
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Page Label: 134
Author: dsdlaforce
Date: 8/20/2018 11:34:59 AM
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Update pond label



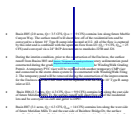
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Page Label: 136
Author: dsdlaforce
Date: 8/20/2018 2:07:29 PM
Color: ■

Remove the Winding Walk 3



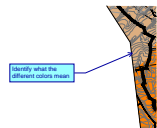
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Page Label: 23
Author: dsdlaforce
Date: 8/20/2018 2:19:50 PM
Color: ■

Update. Some of the subbasins in the narrative are a part of the Enclave at Stonebridge 4.



Subject: Cloud+
Page Label: 24
Author: dsdlaforce
Date: 8/20/2018 2:22:27 PM
Color: ■

Remove. This appears to be regarding the Enclaves filing and not relevant to this filing.



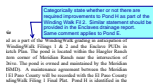
Subject: Callout
Page Label: 135
Author: dsdlaforce
Date: 8/20/2018 2:30:09 PM
Color: ■

Identify what the different colors mean



Subject: Cloud+
Page Label: 29
Author: dsdlaforce
Date: 8/20/2018 2:39:54 PM
Color: ■

If interim is based on Winding Walk Fil 1 & 2 and Enclaves then Meridian Ranch development within the Haegler Ranch basin is builtout so interim is equal to future condition. Why is there a discrepancy?



Subject: Callout
Page Label: 28
Author: dsdlaforce
Date: 8/20/2018 2:42:59 PM
Color: ■

Categorically state whether or not there are required improvements to Pond H as part of the Winding Walk Fil 2. Similar statement should be provided in the Enclaves drainage report. Same comment applies to Pond E.



Subject: Cloud+
Page Label: 35
Author: dsdlaforce
Date: 8/20/2018 2:46:47 PM
Color: ■

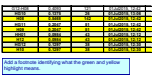
Staff recommends removing this section or condensing the information given. The itemized cost estimate for Pond H is not relevant to this drainage report since Pond H is located and is being constructed with Winding Walk Fil 1



Subject: Cloud
Page Label: 36
Author: dsdlaforce
Date: 8/20/2018 2:47:13 PM
Color: ■

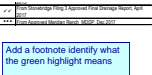
Subject: Text Box
Page Label: 137
Author: dsdlaforce
Date: 8/20/2018 2:50:26 PM
Color: ■

Update the rational drainage map and calculations to specifically be for winding walk filing 2. You can add text box identifying the surrounding subdivision filing or highlight the subject area. The majority of the subbasins in sheets 1 & 3 are for a different subbasin. Main takeaway is that the project area should be readily discernible.



Subject: Text Box
Page Label: 71
Author: dsdlaforce
Date: 8/20/2018 2:52:32 PM
Color: ■

Add a footnote identifying what the green and yellow highlight means.



Subject: Text Box
Page Label: 69
Author: dsdlaforce
Date: 8/20/2018 2:53:08 PM
Color: ■

Add a footnote identify what the green highlight means



Subject: Callout
Page Label: 134
Author: dsdlaforce
Date: 8/20/2018 3:00:20 PM
Color: ■

Add the hatching in the legend. Staff recommends highlight the site so be immediately distinguished as the project site location.