

Final Drainage Report  
for  
**Rolling Hills Ranch Filing 2**  
at  
**Meridian Ranch**



EL PASO COUNTY, COLORADO

November 2020

Prepared For:

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

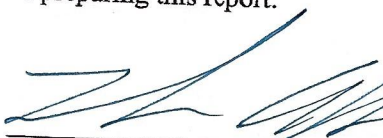
Prepared By:  
Tech Contractors  
11886 Stapleton Drive  
Falcon, CO 80831  
719.495.7444

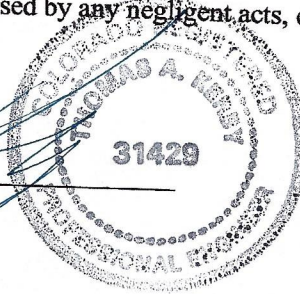
PCD Project No. SF-20-020

## 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



11-3-2020  
Date

### Owner/Developer's Statement:

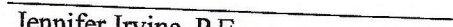
I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

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

November 3, 2020  
Date

### El Paso County:

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

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

**APPROVED**  
**Engineering Department**

02/04/2021 10:05:50 AM

  
dsdnijkamp

**EPC Planning & Community  
Development Department**

# Rolling Hills Ranch Filing 2 at Meridian Ranch

## Final Drainage Report Report

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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 the Rolling Hills Ranch Filing 2 at Meridian Ranch (RHR2) development. Runoff quantities and proposed facilities have been calculated using the current City of Colorado Springs/El Paso County Drainage Criteria Manual (DCM) (1994 version) and portions of the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version).

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

RHR2 encompasses 88.2± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6<sup>th</sup> Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

Rolling Hills Ranch is located within Gieck Ranch Drainage Basin. The Gieck Ranch Basin has been studied but has not received final approval from El Paso County.

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

## **INTRODUCTION**

### ***Purpose***

The purpose of the following Final Drainage Report Report (FDR) is to present proposed changes to the drainage patterns as a result of the development of RHR2. The report outlines the proposed drainage mitigation based on calculated developed flows in excess of allowable exiting runoff discharge.

### ***Scope***

The scope of this report includes:

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

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

### ***Background***

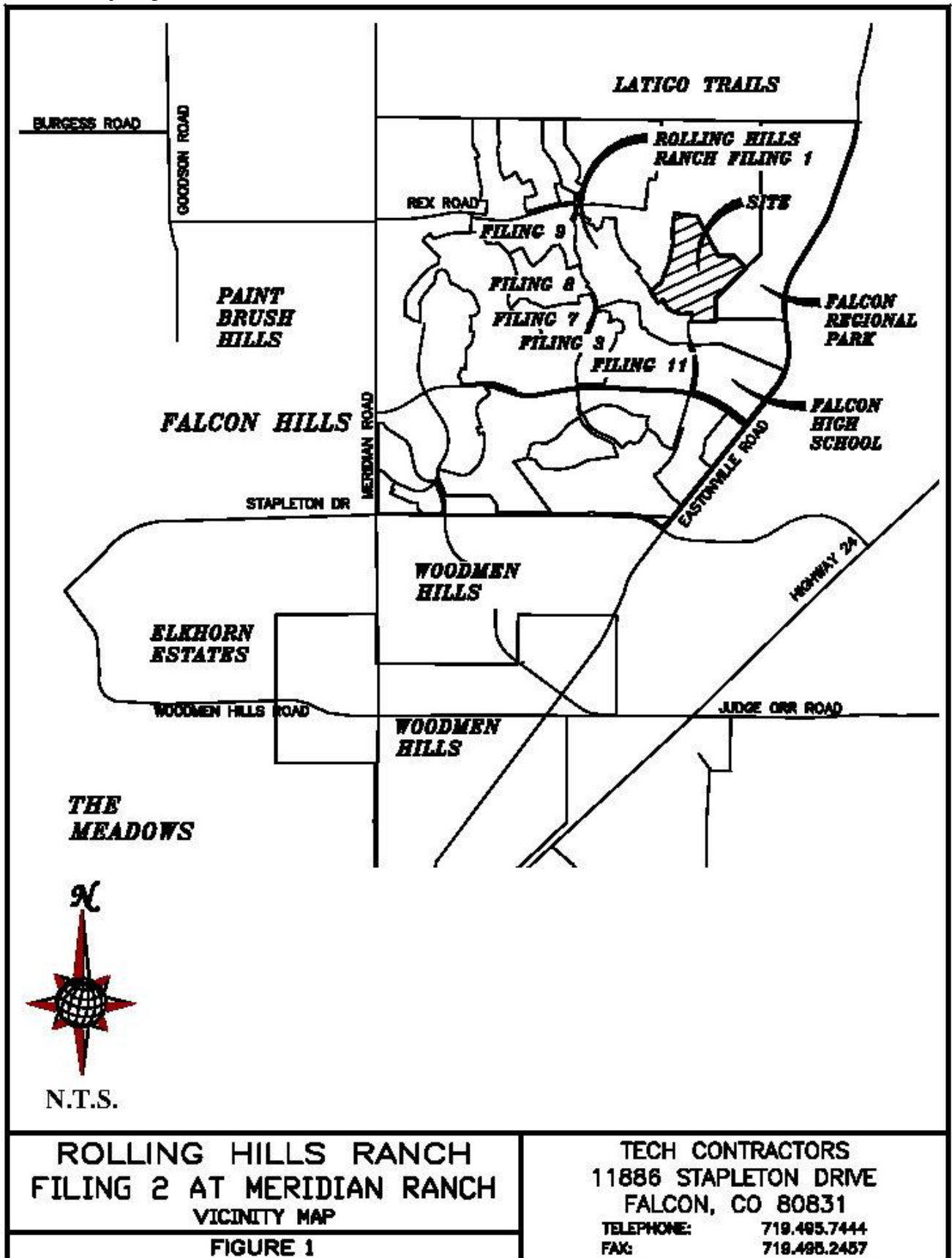
On November 16, 2000 the El Paso County Board of County Commissioners approved the rezoning of the Meridian Ranch project (PUD-00-010) from A-35 to PUD with several conditions. Condition number seven stated in part that “drainage plans shall release and/or retain at approximately eight percent (80%)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

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

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

# Rolling Hills Ranch Filing 2

Figure 1: Vicinity Map



## **EXISTING CONDITIONS**

### ***General Location***

RHR2 project encompasses 88.2± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6<sup>th</sup> Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

### ***Land Use***

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

### ***Climate***

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

### ***Topography and Floodplains***

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

The Flood Insurance Rate Maps (FIRM No. 08041C0552G, dated 12/07/2018) indicates the project is not located within a designated floodplain. Please see Figure 2: Rolling Hills Ranch Filing 2 Federal Emergency Management Agency (FEMA) Floodplain Map.

### ***Geology***

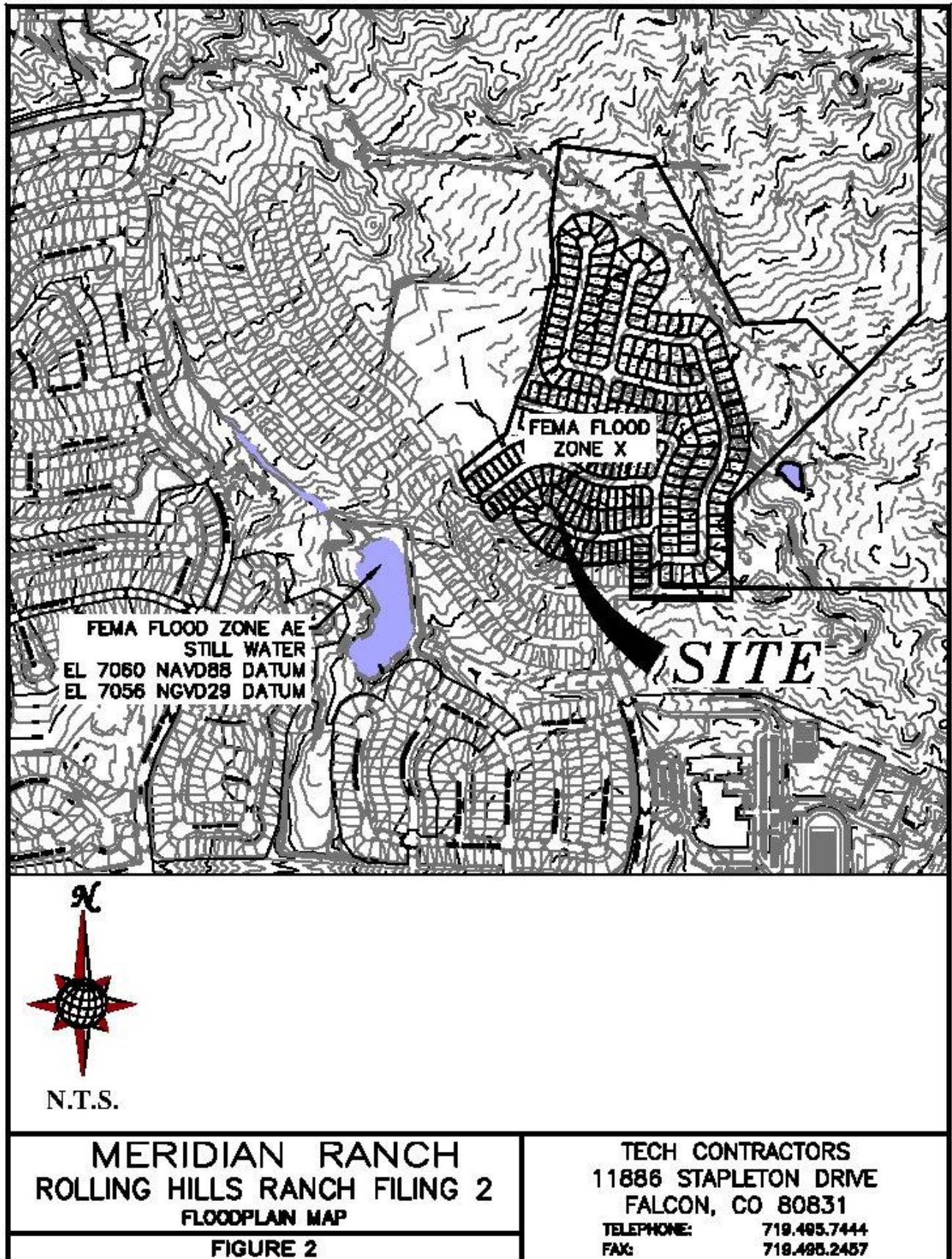
The National Resources Conservation Service (NRCS) soil survey records indicate that the service area is predominately covered by soils classified in the Columbine (2 ac.) and Stapleton series (93 ac.). These series are categorized in the Hydrological Soil Groups A & B.

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



## Rolling Hills Ranch Filing 2

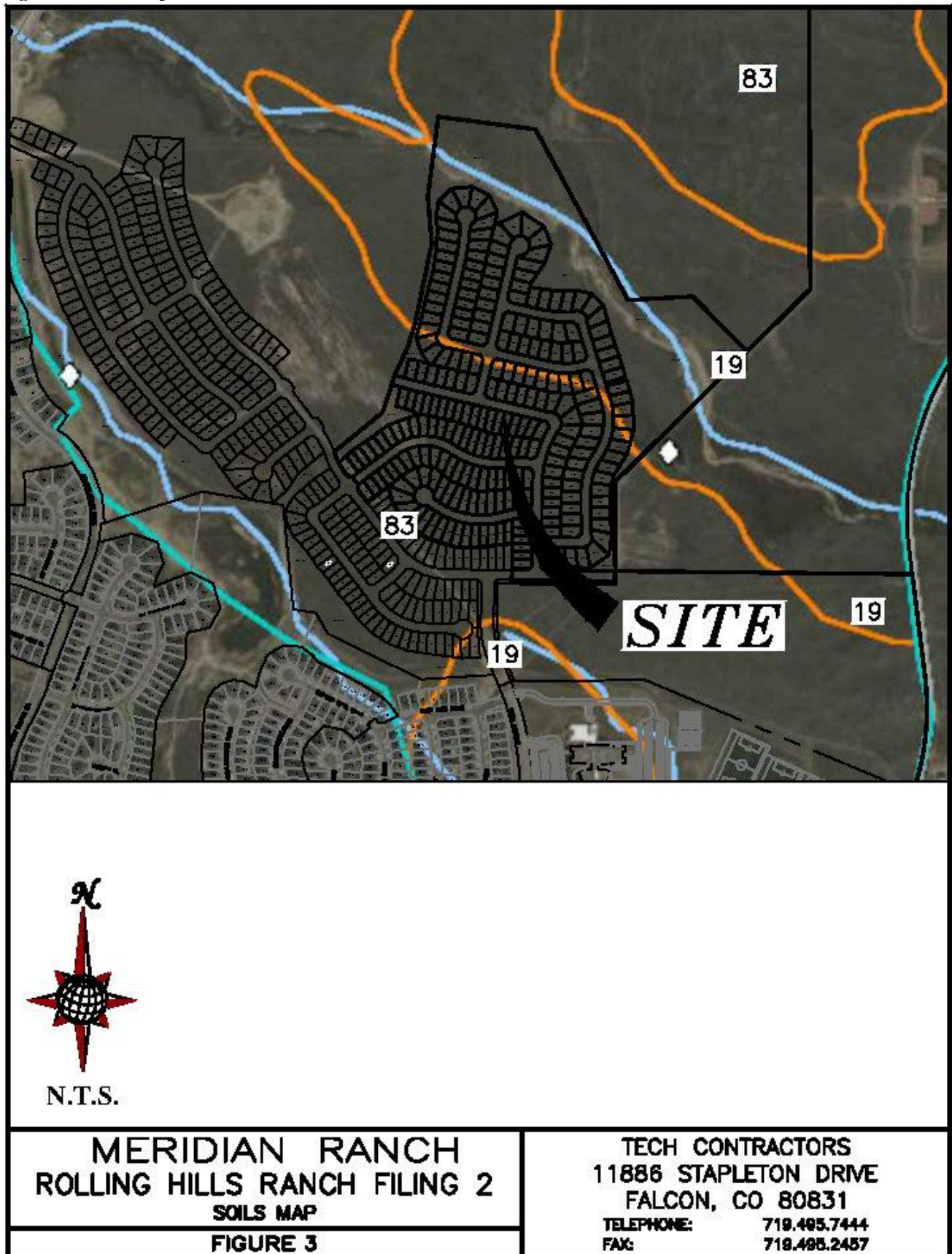
Figure 2: FEMA Floodplain Map





Rolling Hills Ranch Filing 2

Figure 3: Soils Map



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

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

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

Note: (#) indicates Soil Conservation Survey soil classification number. See Figure 3 RHR2 – Soils Map.

### ***Natural Hazards Analysis***

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

### **DRAINAGE BASINS AND SUB-BASINS**

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

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

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

The second scenario is the interim conditions scenario and it consists of the current existing conditions for all tributary areas whether developed or undeveloped/historic with the addition of RHR2 in the proposed developed condition. The current existing conditions assume all approved projects tributary to Rolling Hills Ranch Filing 2 are at full buildout. This condition was analyzed to ensure the full spectrum of historic flow rates exiting the Meridian Ranch development are maintained after the development of RHR2 is completed.

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

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

## **DRAINAGE DESIGN CRITERIA**

### ***SCS Hydrograph Procedure***

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

**Table 1: SCS Runoff Curve Numbers**

| Condition                   | CN* |                    |    |
|-----------------------------|-----|--------------------|----|
| Residential Lots (5 acre)   | 63  | 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. El Paso County adopted portions of the City's 2014 DCM by resolution in January 2015; the County resolution adopted Chapter 6 (Hydrology) and Section 3.2.1 of Chapter 13 (Full Spectrum Detention) for projects outside of the City of Colorado Springs establishing a 1 year review period to analyze the impacts of the Full Spectrum Design on the storm drainage analysis of projects. This report has incorporated the use of full spectrum in the analysis using the SCS Method to determine the size requirements for the detention pond during the interim and future conditions.

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



## **DRAINAGE CALCULATIONS**

### ***SCS General Overview***

The project is located within the Gieck Ranch Drainage Basin; storm water runoff will be conveyed across the site overland and within existing and proposed storm drain networks to existing and proposed detention ponds. Portions of the site are tributary the existing Detention Pond E; runoff will be directed to an existing storm drain system located at the northern terminus of Lambert Road, then conveyed via the existing storm drain system to the pond. Portions of the site tributary to the proposed Detention Pond G will be conveyed via a storm drain system directly into the pond. Additionally, the proposed detention Pond G 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 detention facilities have been adequately sized such that the developed flows detained and released will approximate the historic flow rates for the various design storm events as outlined in the El Paso County DCM and those sections of the City of Colorado Springs DCM-1 adopted by the El Paso County Board of County Commissioners. Existing facilities located downstream of the proposed development have been designed and/or constructed to accept the given release flow rates from Meridian Ranch. Those existing facilities have been reviewed sufficiently to verify the capacity to convey the storm flow rates from Meridian Ranch. See approved Meridian Ranch MDDP, dated January 2018.

Rear lots adjacent to the Falcon Regional Park will drain into open space and then will be directed via a shallow swale to the proposed detention pond prior to exiting the site.

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

**Table 2: Detention Ponds Summary:**

| EXISTING POND E    |                |                 |                 |                   |
|--------------------|----------------|-----------------|-----------------|-------------------|
|                    | PEAK<br>INFLOW | PEAK<br>OUTFLOW | PEAK<br>STORAGE | PEAK<br>ELEVATION |
|                    | CFS            | CFS             | AC-FT           | FT                |
| INTERIM CONDITIONS |                |                 |                 |                   |
| 2-YEAR STORM       | 63             | 5.6             | 8.8             | 6970.3            |
| 5-YEAR STORM       | 122            | 13              | 16.6            | 6971.2            |
| 10-YEAR STORM      | 190            | 26              | 21.8            | 6971.8            |
| 50-YEAR STORM      | 424            | 141             | 35.6            | 6973.0            |
| 100-YEAR STORM     | 556            | 231             | 41.5            | 6973.5            |
| FUTURE CONDITIONS  |                |                 |                 |                   |
| 2-YEAR STORM       | 64             | 5.8             | 9.5             | 6970.4            |
| 5-YEAR STORM       | 126            | 14              | 17.2            | 6971.3            |
| 10-YEAR STORM      | 197            | 28              | 22.4            | 6971.8            |
| 50-YEAR STORM      | 433            | 149             | 36.2            | 6973.0            |
| 100-YEAR STORM     | 618            | 240             | 42.2            | 6973.6            |

| POND G             |             |              |              |                |
|--------------------|-------------|--------------|--------------|----------------|
|                    | PEAK INFLOW | PEAK OUTFLOW | PEAK STORAGE | PEAK ELEVATION |
|                    | CFS         | CFS          | AC-FT        | FT             |
| INTERIM CONDITIONS |             |              |              |                |
| 2-YEAR STORM       | 10          | 4.0          | 2.8          | 7026.1         |
| 5-YEAR STORM       | 40          | 12           | 7.1          | 7027.2         |
| 10-YEAR STORM      | 87          | 32           | 9.2          | 7027.6         |
| 50-YEAR STORM      | 309         | 218          | 17.4         | 7029.0         |
| 100-YEAR STORM     | 491         | 369          | 21.4         | 7029.7         |
| FUTURE CONDITIONS  |             |              |              |                |
| 2-YEAR STORM       | 24          | 5.1          | 4.6          | 7026.6         |
| 5-YEAR STORM       | 75          | 20           | 8.0          | 7027.4         |
| 10-YEAR STORM      | 149         | 51           | 10.7         | 7027.8         |
| 50-YEAR STORM      | 451         | 307          | 19.7         | 7029.4         |
| 100-YEAR STORM     | 653         | 465          | 24.8         | 7030.2         |

Figure 5: Meridian Ranch SCS Calculations – Historic Conditions Map, Figure 6: Meridian Ranch SCS Calculations – Interim Conditions Map and Figure 7: Meridian Ranch SCS Calculations – Future Conditions Map depict the historic, interim and future general drainage patterns for Rolling Hills Ranch Filing 2.

The purpose of this report is to show that the development of Rolling Hills Ranch Filing 2 will not adversely impact the existing drainage facilities adjacent to and downstream of the developed area and the existing Ponds E & G are properly sized for the anticipated future development of Rolling Hills Ranch.

### ***SCS Calculations***

#### **Historic Drainage - SCS Calculation Method**

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

**Table 3: Historic Drainage Basins – SCS**

| HISTORIC MDDP      |                         |                           |                          |                          |                         |                         |
|--------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06               | 0.1313                  | 81                        | 53                       | 12                       | 3.9                     | 0.5                     |
| OS06-G02           | 0.1313                  | 79                        | 52                       | 12                       | 3.8                     | 0.5                     |
| OS05               | 0.0578                  | 40                        | 26                       | 5.9                      | 1.8                     | 0.2                     |
| OS05-G01           | 0.0578                  | 38                        | 26                       | 5.7                      | 1.8                     | 0.2                     |
| HG01               | 0.0547                  | 33                        | 21                       | 4.8                      | 1.6                     | 0.2                     |
| G01                | 0.1125                  | 71                        | 47                       | 10                       | 3.3                     | 0.5                     |
| G01-G02            | 0.1125                  | 70                        | 47                       | 10                       | 3.3                     | 0.5                     |
| HG02               | 0.0906                  | 46                        | 30                       | 6.9                      | 2.4                     | 0.4                     |
| G02                | 0.3344                  | 194                       | 129                      | 28                       | 9.4                     | 1.4                     |
| G02-G03            | 0.3344                  | 192                       | 127                      | 28                       | 9.3                     | 1.4                     |
| HG03               | 0.1828                  | 79                        | 51                       | 12                       | 4.4                     | 0.8                     |

| HISTORIC MDDP      |                         |                           |                          |                          |                         |                         |
|--------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS07               | 0.0328                  | 25                        | 17                       | 4.6                      | 1.7                     | 0.3                     |
| OS07-G03           | 0.0328                  | 24                        | 17                       | 4.4                      | 1.7                     | 0.3                     |
| G03                | 0.55                    | 295                       | 195                      | 44                       | 15                      | 2.4                     |
| G03-G04            | 0.55                    | 286                       | 192                      | 43                       | 15                      | 2.4                     |
| OS09               | 0.1547                  | 92                        | 64                       | 19                       | 8.5                     | 2.0                     |
| OS09-G04           | 0.1547                  | 91                        | 63                       | 19                       | 8.5                     | 2.0                     |
| HG04               | 0.0891                  | 40                        | 27                       | 6.1                      | 2.2                     | 0.4                     |
| HG05               | 0.1125                  | 50                        | 33                       | 7.6                      | 2.7                     | 0.5                     |
| OS08               | 0.0406                  | 36                        | 25                       | 7.9                      | 3.5                     | 0.8                     |
| OS08-G04           | 0.0406                  | 34                        | 24                       | 7.6                      | 3.5                     | 0.8                     |
| G04                | 0.9469                  | 502                       | 336                      | 78                       | 28                      | 4.9                     |
| G04-G05            | 0.9469                  | 496                       | 322                      | 78                       | 28                      | 4.9                     |
| HG06A              | 0.1375                  | 50                        | 33                       | 7.8                      | 2.9                     | 0.5                     |
| G05                | 1.0844                  | 544                       | 355                      | 86                       | 31                      | 5.4                     |
| G05-G06            | 1.0844                  | 530                       | 353                      | 86                       | 31                      | 5.4                     |
| HG06B              | 0.1031                  | 34                        | 22                       | 5.4                      | 2.1                     | 0.4                     |
| G06                | 1.1875                  | 561                       | 375                      | 91                       | 33                      | 5.8                     |
| HG07               | 0.0984                  | 47                        | 31                       | 7.1                      | 2.4                     | 0.4                     |
| HG07-G11           | 0.0984                  | 47                        | 31                       | 7.0                      | 2.4                     | 0.4                     |
| HG08               | 0.1328                  | 73                        | 48                       | 11                       | 3.6                     | 0.5                     |
| G11                | 0.2312                  | 115                       | 75                       | 17                       | 5.7                     | 0.9                     |
| G11-G12            | 0.2312                  | 114                       | 75                       | 17                       | 5.6                     | 0.9                     |
| HG09               | 0.1781                  | 73                        | 48                       | 11                       | 4.1                     | 0.7                     |
| G12                | 0.4093                  | 187                       | 122                      | 28                       | 9.7                     | 1.6                     |
| G12-H08            | 0.4093                  | 183                       | 121                      | 28                       | 9.7                     | 1.6                     |
| HG10               | 0.1375                  | 39                        | 26                       | 6.5                      | 2.6                     | 0.5                     |
| H08                | 0.5468                  | 216                       | 142                      | 34                       | 12                      | 2.1                     |
| HG14               | 0.2297                  | 81                        | 53                       | 13                       | 4.8                     | 0.9                     |
| HG13               | 0.0844                  | 55                        | 37                       | 9.8                      | 3.9                     | 0.7                     |
| G07                | 0.0844                  | 55                        | 37                       | 9.8                      | 3.9                     | 0.7                     |
| G07-G08            | 0.0844                  | 54                        | 37                       | 9.7                      | 3.8                     | 0.7                     |
| G08                | 0.3141                  | 119                       | 78                       | 20                       | 7.6                     | 1.5                     |
| HG15               | 0.2563                  | 70                        | 46                       | 12                       | 4.7                     | 0.9                     |
| H13                | 0.2563                  | 70                        | 46                       | 12                       | 4.7                     | 0.9                     |
| HG11               | 0.2047                  | 77                        | 51                       | 12                       | 4.5                     | 0.8                     |
| H09                | 0.2047                  | 77                        | 51                       | 12                       | 4.5                     | 0.8                     |
| HG12               | 0.1297                  | 57                        | 38                       | 8.7                      | 3.1                     | 0.5                     |
| H10                | 0.1297                  | 57                        | 38                       | 8.7                      | 3.1                     | 0.5                     |

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

#### Interim Drainage - SCS Calculation Method

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

**Table 4: Interim Drainage Basins-SCS**

| INTERIM MDDP (Full Spectrum) |                         |                           |                          |                          |                         |                         |
|------------------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
|                              | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06                         | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a                          | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a-G2                       | 0.1313                  | 79                        | 52                       | 11                       | 3.6                     | 0.5                     |

| INTERIM MDDP (Full Spectrum) |                               |                                    |                                   |                                   |                                  |                                  |
|------------------------------|-------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|                              | DRAINAGE<br>AREA<br>(SQ. MI.) | PEAK<br>DISCHARGE<br>Q100<br>(CFS) | PEAK<br>DISCHARGE<br>Q50<br>(CFS) | PEAK<br>DISCHARGE<br>Q10<br>(CFS) | PEAK<br>DISCHARGE<br>Q5<br>(CFS) | PEAK<br>DISCHARGE<br>Q2<br>(CFS) |
| OS05                         | 0.0578                        | 39                                 | 26                                | 6                                 | 1.8                              | 0.2                              |
| OS05-G1                      | 0.0578                        | 39                                 | 25                                | 6                                 | 1.7                              | 0.2                              |
| FG01                         | 0.0531                        | 31                                 | 22                                | 7                                 | 3.3                              | 0.9                              |
| FG01-G1                      | 0.0531                        | 31                                 | 22                                | 7                                 | 3.3                              | 0.9                              |
| G1                           | 0.1109                        | 61                                 | 41                                | 11                                | 4.8                              | 1.1                              |
| G1-G2                        | 0.1109                        | 60                                 | 41                                | 11                                | 4.8                              | 1.1                              |
| FG02                         | 0.0391                        | 32                                 | 22                                | 6                                 | 2.6                              | 0.5                              |
| G2                           | 0.2813                        | 166                                | 112                               | 27                                | 10.2                             | 1.9                              |
| G2-G3                        | 0.2813                        | 163                                | 108                               | 27                                | 10.1                             | 1.9                              |
| FG03                         | 0.0203                        | 24                                 | 17                                | 6                                 | 3.0                              | 0.8                              |
| FG04                         | 0.0172                        | 22                                 | 16                                | 6                                 | 3.1                              | 0.9                              |
| G3                           | 0.3188                        | 184                                | 123                               | 31                                | 12.0                             | 2.4                              |
| G3-POND F                    | 0.3188                        | 183                                | 121                               | 31                                | 11.9                             | 2.4                              |
| FG06                         | 0.0677                        | 51                                 | 36                                | 11                                | 5.3                              | 1.3                              |
| FG05                         | 0.0580                        | 45                                 | 33                                | 12                                | 6.7                              | 2.4                              |
| OS07a                        | 0.0170                        | 14                                 | 9                                 | 2                                 | 0.9                              | 0.1                              |
| OS07a-POND F                 | 0.0170                        | 13                                 | 9                                 | 2                                 | 0.9                              | 0.1                              |
| POND F IN                    | 0.4615                        | 291                                | 198                               | 54                                | 23.1                             | 5.0                              |
| POND F                       | 0.4615                        | 178                                | 121                               | 16                                | 8.1                              | 2.1                              |
| POND F-G7                    | 0.4615                        | 177                                | 121                               | 16                                | 8.1                              | 2.1                              |
| OS07b                        | 0.0156                        | 15                                 | 10                                | 3                                 | 1.0                              | 0.1                              |
| OS07b-G4                     | 0.0156                        | 14                                 | 10                                | 2                                 | 0.9                              | 0.1                              |
| FG21a                        | 0.0095                        | 6                                  | 4                                 | 1                                 | 0.4                              | 0.1                              |
| G4                           | 0.0251                        | 20                                 | 14                                | 4                                 | 1.4                              | 0.2                              |
| G4-G7                        | 0.0251                        | 20                                 | 13                                | 3                                 | 1.3                              | 0.2                              |
| FG21b                        | 0.0150                        | 21                                 | 15                                | 6                                 | 3.8                              | 1.6                              |
| G7                           | 0.5016                        | 190                                | 129                               | 18                                | 8.8                              | 2.3                              |
| G7-G8                        | 0.5016                        | 190                                | 129                               | 18                                | 8.8                              | 2.3                              |
| FG22                         | 0.1397                        | 119                                | 85                                | 29                                | 14.9                             | 4.3                              |
| OS08                         | 0.0397                        | 35                                 | 24                                | 8                                 | 3.4                              | 0.7                              |
| OS08-G8                      | 0.0397                        | 34                                 | 23                                | 7                                 | 3.4                              | 0.7                              |
| FG23a                        | 0.0177                        | 18                                 | 13                                | 5                                 | 2.7                              | 1.0                              |
| G8                           | 0.6987                        | 261                                | 170                               | 46                                | 23.5                             | 6.9                              |
| G8-G10                       | 0.6987                        | 260                                | 170                               | 45                                | 23.3                             | 6.6                              |
| OS09                         | 0.1527                        | 90                                 | 62                                | 18                                | 8.2                              | 1.9                              |
| OS09-G9                      | 0.1527                        | 88                                 | 62                                | 18                                | 8.1                              | 1.9                              |
| FG24                         | 0.1394                        | 63                                 | 42                                | 10                                | 3.7                              | 0.7                              |
| G9                           | 0.2921                        | 150                                | 102                               | 28                                | 11.8                             | 2.5                              |
| G9-G10                       | 0.2921                        | 149                                | 101                               | 28                                | 11.6                             | 2.5                              |
| FG23b                        | 0.0359                        | 21                                 | 14                                | 3                                 | 1.2                              | 0.2                              |
| G10                          | 1.0267                        | 413                                | 261                               | 65                                | 29.1                             | 7.3                              |
| G10-G11                      | 1.0267                        | 413                                | 257                               | 64                                | 28.8                             | 7.2                              |
| FG23c                        | 0.0081                        | 6                                  | 5                                 | 2                                 | 0.7                              | 0.2                              |
| G11                          | 1.0348                        | 415                                | 259                               | 65                                | 29.3                             | 7.3                              |
| FG28                         | 0.0673                        | 38                                 | 26                                | 7                                 | 2.7                              | 0.5                              |
| FG25a                        | 0.0583                        | 50                                 | 35                                | 12                                | 5.7                              | 1.5                              |
| FG25a-POND G                 | 0.0583                        | 48                                 | 34                                | 11                                | 5.5                              | 1.4                              |
| FG25b                        | 0.0506                        | 52                                 | 38                                | 16                                | 9.3                              | 3.8                              |
| POND G IN                    | 1.2110                        | 491                                | 309                               | 87                                | 39.6                             | 10.2                             |
| POND G                       | 1.2110                        | 369                                | 218                               | 32                                | 12.5                             | 4.0                              |
| G12                          | 1.2110                        | 369                                | 218                               | 32                                | 12.5                             | 4.0                              |
| G12-G06                      | 1.2110                        | 368                                | 217                               | 32                                | 12.5                             | 4.0                              |
| FG29                         | 0.0997                        | 60                                 | 39                                | 9                                 | 2.8                              | 0.4                              |

| INTERIM MDDP (Full Spectrum) |                               |                                    |                                   |                                   |                                  |                                  |
|------------------------------|-------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|                              | DRAINAGE<br>AREA<br>(SQ. MI.) | PEAK<br>DISCHARGE<br>Q100<br>(CFS) | PEAK<br>DISCHARGE<br>Q50<br>(CFS) | PEAK<br>DISCHARGE<br>Q10<br>(CFS) | PEAK<br>DISCHARGE<br>Q5<br>(CFS) | PEAK<br>DISCHARGE<br>Q2<br>(CFS) |
| FG32                         | 0.0402                        | 29                                 | 19                                | 4                                 | 1.3                              | 0.2                              |
| FG32-G06                     | 0.0402                        | 28                                 | 19                                | 4                                 | 1.3                              | 0.2                              |
| G06                          | 1.3509                        | 388                                | 228                               | 34                                | 13.3                             | 4.3                              |
| FG10A                        | 0.0806                        | 103                                | 77                                | 32                                | 19.8                             | 8.6                              |
| FG08A                        | 0.0750                        | 116                                | 90                                | 41                                | 26.8                             | 13.4                             |
| FG08A-G05                    | 0.0750                        | 110                                | 86                                | 41                                | 26.5                             | 13.1                             |
| FG08B                        | 0.0630                        | 86                                 | 67                                | 31                                | 20.1                             | 10.2                             |
| FG08B-G05                    | 0.0630                        | 84                                 | 65                                | 29                                | 19.5                             | 10.0                             |
| FG11                         | 0.0625                        | 75                                 | 59                                | 28                                | 18.6                             | 9.8                              |
| FG09                         | 0.0484                        | 48                                 | 36                                | 14                                | 8.3                              | 3.2                              |
| FG09-G05                     | 0.0484                        | 48                                 | 36                                | 14                                | 8.0                              | 3.2                              |
| FG10B                        | 0.0416                        | 42                                 | 31                                | 12                                | 7.0                              | 2.7                              |
| G05                          | 0.3711                        | 455                                | 347                               | 153                               | 95.2                             | 46.1                             |
| FG13                         | 0.0534                        | 34                                 | 24                                | 7                                 | 3.6                              | 0.9                              |
| FG12                         | 0.0328                        | 50                                 | 40                                | 20                                | 13.7                             | 7.8                              |
| POND D IN                    | 0.4573                        | 531                                | 405                               | 177                               | 110.8                            | 53.4                             |
| POND D                       | 0.4573                        | 134                                | 90                                | 18                                | 10.9                             | 3.7                              |
| POND D-G17                   | 0.4573                        | 133                                | 90                                | 18                                | 10.9                             | 3.7                              |
| FG15                         | 0.0103                        | 15                                 | 12                                | 6                                 | 3.9                              | 2.1                              |
| FG15-G17A                    | 0.0103                        | 15                                 | 12                                | 6                                 | 3.9                              | 2.1                              |
| G17A                         | 0.4676                        | 136                                | 92                                | 18                                | 11.2                             | 3.8                              |
| FG14                         | 0.1000                        | 98                                 | 74                                | 32                                | 19.9                             | 9.2                              |
| G17                          | 0.5676                        | 201                                | 134                               | 42                                | 24.9                             | 11.8                             |
| G17-G18                      | 0.5676                        | 199                                | 134                               | 42                                | 24.8                             | 11.7                             |
| FG16                         | 0.0791                        | 133                                | 104                               | 50                                | 33.9                             | 18.3                             |
| G18                          | 0.6467                        | 247                                | 179                               | 78                                | 50.4                             | 25.3                             |
| G18-POND E                   | 0.6467                        | 247                                | 177                               | 77                                | 49.5                             | 24.7                             |
| FG31                         | 0.0922                        | 116                                | 92                                | 45                                | 31.0                             | 17.2                             |
| FG30                         | 0.0389                        | 30                                 | 20                                | 4                                 | 1.3                              | 0.2                              |
| FG30-PONDHS                  | 0.0389                        | 28                                 | 19                                | 4                                 | 1.2                              | 0.2                              |
| POND HS                      | 0.1311                        | 112                                | 63                                | 28                                | 18.8                             | 10.0                             |
| FG17a                        | 0.0694                        | 101                                | 78                                | 35                                | 23.0                             | 11.7                             |
| FG17a-POND E                 | 0.0694                        | 99                                 | 76                                | 35                                | 22.9                             | 11.6                             |
| FG18                         | 0.0644                        | 56                                 | 42                                | 18                                | 10.6                             | 4.7                              |
| FG18-POND E                  | 0.0644                        | 56                                 | 42                                | 17                                | 10.6                             | 4.6                              |
| FG19                         | 0.0527                        | 84                                 | 66                                | 33                                | 22.9                             | 13.1                             |
| FG17c                        | 0.0313                        | 31                                 | 22                                | 7                                 | 2.9                              | 0.5                              |
| FG17b                        | 0.0214                        | 39                                 | 31                                | 16                                | 10.8                             | 6.1                              |
| POND E IN                    | 1.0170                        | 556                                | 424                               | 190                               | 122.3                            | 62.7                             |
| POND E                       | 1.0170                        | 231                                | 141                               | 26                                | 12.8                             | 5.6                              |
| H08                          | 1.0170                        | 198                                | 127                               | 20                                | 9.1                              | 3.4                              |
| H09                          | 0.0000                        | 33                                 | 14                                | 6                                 | 3.7                              | 2.2                              |

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

## Future Drainage - SCS Calculation Method

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

**Table 5: Future Drainage Basins-SCS**

| FUTURE MDDP  |                               |                                    |                                   |                                   |                                  |                                  |
|--------------|-------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|              | DRAINAGE<br>AREA<br>(SQ. MI.) | PEAK<br>DISCHARGE<br>Q100<br>(CFS) | PEAK<br>DISCHARGE<br>Q50<br>(CFS) | PEAK<br>DISCHARGE<br>Q10<br>(CFS) | PEAK<br>DISCHARGE<br>Q5<br>(CFS) | PEAK<br>DISCHARGE<br>Q2<br>(CFS) |
| OS06         | 0.1313                        | 80                                 | 52                                | 12                                | 3.8                              | 0.5                              |
| G1a          | 0.1313                        | 80                                 | 52                                | 12                                | 3.8                              | 0.5                              |
| G1a-G2       | 0.1313                        | 79                                 | 52                                | 11                                | 3.6                              | 0.5                              |
| OS05         | 0.0578                        | 39                                 | 26                                | 6                                 | 1.8                              | 0.2                              |
| OS05-G1      | 0.0578                        | 39                                 | 25                                | 6                                 | 1.7                              | 0.2                              |
| FG01         | 0.0531                        | 31                                 | 22                                | 7                                 | 3.3                              | 0.9                              |
| FG01-G1      | 0.0531                        | 31                                 | 22                                | 7                                 | 3.3                              | 0.9                              |
| G1           | 0.1109                        | 61                                 | 41                                | 11                                | 4.8                              | 1.1                              |
| G1-G2        | 0.1109                        | 60                                 | 41                                | 11                                | 4.8                              | 1.1                              |
| FG02         | 0.0391                        | 32                                 | 22                                | 6                                 | 2.6                              | 0.5                              |
| G2           | 0.2813                        | 166                                | 112                               | 27                                | 10.2                             | 1.9                              |
| G2-G3        | 0.2813                        | 163                                | 108                               | 27                                | 10.1                             | 1.9                              |
| FG03         | 0.0203                        | 24                                 | 17                                | 6                                 | 3.0                              | 0.8                              |
| FG04         | 0.0172                        | 22                                 | 16                                | 6                                 | 3.1                              | 0.9                              |
| G3           | 0.3188                        | 184                                | 123                               | 31                                | 12.0                             | 2.4                              |
| G3-POND F    | 0.3188                        | 183                                | 121                               | 31                                | 11.9                             | 2.4                              |
| FG06         | 0.0677                        | 51                                 | 36                                | 11                                | 5.3                              | 1.3                              |
| FG05         | 0.0580                        | 45                                 | 33                                | 12                                | 6.7                              | 2.4                              |
| OS07a        | 0.0170                        | 14                                 | 9                                 | 2                                 | 0.9                              | 0.1                              |
| OS07a-POND F | 0.0170                        | 13                                 | 9                                 | 2                                 | 0.9                              | 0.1                              |
| POND F IN    | 0.4615                        | 291                                | 198                               | 54                                | 23.1                             | 5.0                              |
| POND F       | 0.4615                        | 178                                | 121                               | 16                                | 8.1                              | 2.1                              |
| POND F-G7    | 0.4615                        | 177                                | 121                               | 16                                | 8.1                              | 2.1                              |
| OS07b-G4     | 0.0156                        | 14                                 | 10                                | 2                                 | 0.9                              | 0.1                              |
| FG21a        | 0.0095                        | 6                                  | 4                                 | 1                                 | 0.4                              | 0.1                              |
| G4           | 0.0251                        | 20                                 | 14                                | 4                                 | 1.4                              | 0.2                              |
| G4-G7        | 0.0251                        | 20                                 | 13                                | 3                                 | 1.3                              | 0.2                              |
| FG21b        | 0.0150                        | 21                                 | 15                                | 6                                 | 3.8                              | 1.6                              |
| G7           | 0.5016                        | 190                                | 129                               | 18                                | 8.8                              | 2.3                              |
| G7-G8        | 0.5016                        | 189                                | 128                               | 18                                | 8.8                              | 2.3                              |
| FG22         | 0.1397                        | 119                                | 85                                | 29                                | 14.9                             | 4.3                              |
| OS08         | 0.0397                        | 35                                 | 24                                | 8                                 | 3.4                              | 0.7                              |
| OS08-G8      | 0.0397                        | 34                                 | 23                                | 7                                 | 3.4                              | 0.7                              |
| FG23a        | 0.0216                        | 21                                 | 15                                | 5                                 | 2.7                              | 0.8                              |
| G8           | 0.7026                        | 271                                | 175                               | 48                                | 24.6                             | 7.3                              |
| G8-G10       | 0.7026                        | 271                                | 174                               | 47                                | 24.0                             | 7.1                              |
| OS09         | 0.1527                        | 90                                 | 62                                | 18                                | 8.2                              | 1.9                              |
| OS09-G9      | 0.1527                        | 88                                 | 62                                | 18                                | 8.2                              | 1.9                              |
| FG24         | 0.1369                        | 101                                | 72                                | 25                                | 12.8                             | 3.9                              |
| G9           | 0.2896                        | 179                                | 126                               | 38                                | 17.2                             | 4.5                              |
| G9-G10       | 0.2896                        | 179                                | 125                               | 37                                | 17.1                             | 4.5                              |
| FG23b        | 0.0305                        | 27                                 | 19                                | 6                                 | 2.8                              | 0.7                              |
| G10          | 1.0227                        | 450                                | 281                               | 81                                | 39.4                             | 11.4                             |
| G10-G11      | 1.0227                        | 450                                | 279                               | 80                                | 39.2                             | 11.3                             |
| FG23c        | 0.0122                        | 12                                 | 9                                 | 3                                 | 1.5                              | 0.4                              |
| G11          | 1.0349                        | 453                                | 281                               | 82                                | 39.9                             | 11.5                             |
| FG25         | 0.1086                        | 112                                | 85                                | 36                                | 21.9                             | 9.9                              |

| FUTURE MDDP  |                               |                                    |                                   |                                   |                                  |                                  |
|--------------|-------------------------------|------------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|
|              | DRAINAGE<br>AREA<br>(SQ. MI.) | PEAK<br>DISCHARGE<br>Q100<br>(CFS) | PEAK<br>DISCHARGE<br>Q50<br>(CFS) | PEAK<br>DISCHARGE<br>Q10<br>(CFS) | PEAK<br>DISCHARGE<br>Q5<br>(CFS) | PEAK<br>DISCHARGE<br>Q2<br>(CFS) |
| FG26         | 0.0863                        | 78                                 | 58                                | 22                                | 12.2                             | 4.6                              |
| FG26-POND G  | 0.0863                        | 77                                 | 57                                | 22                                | 12.2                             | 4.5                              |
| FG27         | 0.0500                        | 52                                 | 40                                | 17                                | 10.7                             | 5.0                              |
| FG28         | 0.0245                        | 24                                 | 17                                | 6                                 | 2.7                              | 0.6                              |
| POND G IN    | 1.3043                        | 653                                | 451                               | 149                               | 75.1                             | 24.1                             |
| POND G       | 1.3043                        | 465                                | 307                               | 51                                | 20.0                             | 5.1                              |
| G12          | 1.3043                        | 465                                | 307                               | 51                                | 20.0                             | 5.1                              |
| G12-G06      | 1.3043                        | 464                                | 306                               | 51                                | 20.0                             | 5.1                              |
| FG29         | 0.0997                        | 60                                 | 39                                | 9                                 | 2.8                              | 0.4                              |
| FG32         | 0.0402                        | 72                                 | 57                                | 29                                | 19.8                             | 11.1                             |
| FG32-G06     | 0.0402                        | 69                                 | 54                                | 27                                | 18.2                             | 10.5                             |
| G06          | 1.4442                        | 493                                | 324                               | 55                                | 21.7                             | 10.5                             |
| FG08A        | 0.0750                        | 116                                | 90                                | 41                                | 26.8                             | 13.4                             |
| FG08A-G05    | 0.0750                        | 110                                | 86                                | 41                                | 26.5                             | 13.1                             |
| FG08B        | 0.0630                        | 86                                 | 67                                | 31                                | 20.1                             | 10.2                             |
| FG08B-G05    | 0.0630                        | 84                                 | 65                                | 29                                | 19.5                             | 10.0                             |
| FG09         | 0.0484                        | 48                                 | 36                                | 14                                | 8.3                              | 3.2                              |
| FG09-G05     | 0.0484                        | 48                                 | 36                                | 14                                | 8.0                              | 3.2                              |
| FG10B        | 0.0416                        | 42                                 | 31                                | 12                                | 7.0                              | 2.7                              |
| G05          | 0.2280                        | 282                                | 215                               | 94                                | 58.8                             | 28.7                             |
| FG10A        | 0.0806                        | 103                                | 77                                | 32                                | 19.8                             | 8.6                              |
| FG11         | 0.0625                        | 75                                 | 59                                | 28                                | 18.6                             | 9.8                              |
| FG13         | 0.0534                        | 34                                 | 24                                | 7                                 | 3.6                              | 0.9                              |
| FG12         | 0.0328                        | 50                                 | 40                                | 20                                | 13.7                             | 7.8                              |
| POND D IN    | 0.4573                        | 531                                | 405                               | 177                               | 110.8                            | 53.4                             |
| POND D       | 0.4573                        | 134                                | 90                                | 18                                | 10.9                             | 3.7                              |
| POND D-G17   | 0.4573                        | 133                                | 90                                | 18                                | 10.9                             | 3.7                              |
| FG15         | 0.0103                        | 15                                 | 12                                | 6                                 | 3.9                              | 2.1                              |
| FG15-G17A    | 0.0103                        | 15                                 | 12                                | 6                                 | 3.9                              | 2.1                              |
| G17A         | 0.4676                        | 136                                | 92                                | 18                                | 11.2                             | 3.8                              |
| FG14         | 0.1000                        | 98                                 | 74                                | 32                                | 19.9                             | 9.2                              |
| G17          | 0.5676                        | 201                                | 134                               | 42                                | 24.9                             | 11.8                             |
| G17-G18      | 0.5676                        | 199                                | 134                               | 42                                | 24.8                             | 11.7                             |
| FG16         | 0.0791                        | 133                                | 104                               | 50                                | 33.9                             | 18.3                             |
| G18          | 0.6467                        | 247                                | 179                               | 78                                | 50.4                             | 25.3                             |
| G18-POND E   | 0.6467                        | 247                                | 177                               | 77                                | 49.5                             | 24.7                             |
| FG31         | 0.0922                        | 116                                | 92                                | 45                                | 31.0                             | 17.2                             |
| FG30         | 0.0389                        | 73                                 | 57                                | 29                                | 20.1                             | 11.4                             |
| FG30-PONDHS  | 0.0389                        | 70                                 | 56                                | 27                                | 18.2                             | 10.9                             |
| POND HS      | 0.1311                        | 153                                | 106                               | 36                                | 26.2                             | 14.8                             |
| FG17a        | 0.0694                        | 101                                | 78                                | 35                                | 23.0                             | 11.7                             |
| FG17a-POND E | 0.0694                        | 99                                 | 76                                | 35                                | 22.9                             | 11.6                             |
| FG18         | 0.0644                        | 56                                 | 42                                | 18                                | 10.6                             | 4.7                              |
| FG18-POND E  | 0.0644                        | 56                                 | 42                                | 17                                | 10.6                             | 4.6                              |
| FG19         | 0.0527                        | 84                                 | 66                                | 33                                | 22.9                             | 13.1                             |
| FG17c        | 0.0313                        | 31                                 | 22                                | 7                                 | 2.9                              | 0.5                              |
| FG17b        | 0.0214                        | 39                                 | 31                                | 16                                | 10.8                             | 6.1                              |
| POND E IN    | 1.0170                        | 618                                | 433                               | 197                               | 125.8                            | 63.6                             |
| POND E       | 1.0170                        | 240                                | 149                               | 28                                | 14.0                             | 5.8                              |
| H08          | 1.0170                        | 204                                | 134                               | 22                                | 10.2                             | 3.5                              |
| H09          | 0.0000                        | 36                                 | 15                                | 6                                 | 3.8                              | 2.3                              |
|              |                               |                                    |                                   |                                   |                                  |                                  |

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

### ***Rational Calculations***

The Rational Hydrologic Calculation Method was used to estimate the total runoff from the 5-year and the 100-year design storm and thus establish the storm drainage system design. Using the rational calculation methodology outlined in the Hydrology Section (Ch 6) of the COSDCM coupled with the El Paso County EPCDCM an effective storm drainage design for RHR2 has been designed. The storm drainage facilities have been designed such that the minor storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not overtop the curbs. The storm drainage facility has been designed such that the major storm will be captured by the inlets and conveyed by the storm drain pipes such that the street flow does not exceed the right-of-way widths for residential streets and the hydraulic grade line will be less than one foot below the surface.

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

Rational hydrologic and hydraulic calculations were performed for the project based on full buildout conditions. This is done to ensure the storm drain system is properly sized for future full buildout. The storm drain runoff will be collected by a series of inlets and storm drain pipe then conveyed through the project and discharged either into an existing storm drain system located within Lambert Road discharged into the existing Pond E or directly into existing Pond G.

### ***Rational Narrative***

The following is a detailed narrative of the storm drainage system located in RHR2. The description is organized by storm drain system.

#### **Storm Drain System D**

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

- Basin D01 (6.9 acres,  $Q_5 = 6.8$  CFS,  $Q_{100} = 19$  CFS) contains lots in Future Rolling Hills Ranch 3 along east side of Bluffpoint Dr and Crooked Bluff Dr. The surface runoff will sheet flow off the residential lots and directed to the street then to a 15' Type R forced sump inlet located at I19. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.8$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 14$  CFS) with the remaining flow ( $Q_{100} = 5.7$  CFS) continuing downstream to Design Point 2. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 15 and via a 24" RCP to Storm Manhole 16.
- Basin D02 (3.8 acres,  $Q_5 = 3.8$  CFS,  $Q_{100} = 11$  CFS) contains lots in Future Rolling Hills Ranch 3 along west side of Crooked Bluff Dr. The surface runoff will sheet flow



off the residential lots directed to the street to Design Point 2 then combined with flow-by from I19 for a 5-year flow of 3.8 CFS and a 100-year flow of 16 CFS. The surface flow will continue inlet I20.

- Basin D03 (3.8 acres,  $Q_5 = 4.1$  CFS,  $Q_{100} = 12$  CFS) contains lots along the west side of Coastal Hills Ln in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 20' Type R forced sump inlet located at I20 where it is combined with the surface flow from DP2 for a 5-year flow of 7.1 CFS and a 100-year flow of 20 CFS. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 7.1$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 17$  CFS) with the remaining flow ( $Q_{100} = 2.8$  CFS) continuing downstream to Design Point 3. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 16.
- The total pipe flow conveyed from MH16 to Storm Manhole 17 via a 30" RCP is  $Q_5 = 13$  CFS,  $Q_{100} = 30$  CFS.
- Basin D04 (5.3 acres,  $Q_5 = 5.0$  CFS,  $Q_{100} = 14$  CFS) contains lots along the west side of Coastal Hills Ln and Bluffpoint Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots directed to the street to Design Point 3 then combined with flow-by from I20 for a 5-year flow of 5.0 CFS and a 100-year flow of 16 CFS. The surface flow will continue inlet I21.
- Basin D05 (2.0 acres,  $Q_5 = 2.2$  CFS,  $Q_{100} = 6.3$  CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R forced sump inlet located at I21 where it is combined with the surface flow from DP3 and flow-by from I22 for a 5-year flow of 6.7 CFS and a 100-year flow of 23 CFS. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.7$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 14$  CFS) with the remaining flow ( $Q_{100} = 9.1$  CFS) continuing downstream to inlet I26. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 17.
- The total pipe flow conveyed from MH17 to Storm Manhole 19 via a 30" RCP is  $Q_5 = 19$  CFS,  $Q_{100} = 41$  CFS.
- Basin D06 (3.2 acres,  $Q_5 = 3.2$  CFS,  $Q_{100} = 9.0$  CFS) contains lots along the east side of Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R flow-by inlet located at I22. Most of the flow is captured by this inlet ( $Q_5 = 2.6$  CFS,  $Q_{100} = 6.2$  CFS) with the remaining ( $Q_5 = 0.6$  CFS,  $Q_{100} = 2.8$  CFS) continuing downstream to Inlet 21. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.
- Basin D07 (6.6 acres,  $Q_5 = 6.1$  CFS,  $Q_{100} = 17$  CFS) contains lots along the west side of Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R forced sump inlet

located at I23. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.1$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 9.9$  CFS) with the remaining flow ( $Q_{100} = 7.4$  CFS) continuing downstream to inlet I24. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.

- The total pipe flow conveyed from MH18 to Storm Manhole 19 via a 24" RCP is  $Q_5 = 8.5$  CFS,  $Q_{100} = 16$  CFS.
- Basin D08 (1.6 acres,  $Q_5 = 1.8$  CFS,  $Q_{100} = 5.1$  CFS) contains lots along the west side of Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R forced sump inlet located at I24. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 1.8$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 9.9$  CFS) with the remaining flow ( $Q_{100} = 1.0$  CFS) continuing downstream to inlet I25. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.
- The total pipe flow conveyed from MH19 to Storm Manhole 20 via a 42" RCP is  $Q_5 = 29$  CFS,  $Q_{100} = 65$  CFS.
- Basin D09 (1.6 acres,  $Q_5 = 1.2$  CFS,  $Q_{100} = 3.4$  CFS) contains runoff from adjacent lots and open space tract located in Rolling Hills Ranch Filing 2 and future Rolling Hills Ranch 3. The surface runoff will sheet flow off the adjacent residential lots and be conveyed to a Type C grated inlet located at CB2. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to inlet I25.
- Basin D10 (0.8 acres,  $Q_5 = 0.9$  CFS,  $Q_{100} = 2.5$  CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R sump inlet located at I25. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 20.
- Basin D11 (4.2 acres,  $Q_5 = 2.4$  CFS,  $Q_{100} = 6.9$  CFS) contains runoff from adjacent lots and open space tract located in Rolling Hills Ranch Filing 2 and future Rolling Hills Ranch 3. The surface runoff will sheet flow off the adjacent residential lots and be conveyed to an 18" flared end section located at ES1. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to inlet I26.
- Basin D12 (2.7 acres,  $Q_5 = 2.4$  CFS,  $Q_{100} = 6.9$  CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Future Rolling Hills Ranch 3. The surface runoff will sheet flow off the residential lots, combine with flow-by ( $Q_{100} = 9.1$  CFS) from inlet I21 and be conveyed to a 20' Type R sump inlet located at I26. All of the flow is captured by this inlet and conveyed downstream via a 24" RCP to Storm Manhole 20.
- The total pipe flow conveyed from MH20 to Storm Manhole 21 via a 42" RCP is  $Q_5 = 29$  CFS,  $Q_{100} = 71$  CFS.

- Basin D13 (1.8 acres,  $Q_5 = 2.2$  CFS,  $Q_{100} = 5.8$  CFS) contains lots along the west side of Rolling Ranch Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R flow-by inlet located at I27. Most of the flow is captured by this inlet ( $Q_5 = 1.7$  CFS,  $Q_{100} = 3.9$  CFS) with the remaining ( $Q_5 = 0.4$  CFS,  $Q_{100} = 1.8$  CFS) continuing downstream to inlet I33. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 21.
- The total pipe flow conveyed from MH21 to Storm Manhole 23 via a 42" RCP is  $Q_5 = 29$  CFS,  $Q_{100} = 72$  CFS.
- Basin D14 (6.5 acres,  $Q_5 = 6.3$  CFS,  $Q_{100} = 18$  CFS) contains lots in Rolling Hills Ranch 2 along Overlook Bluff Ln, Foggy Meadows Dr and Foggy Bend Ln. The surface runoff will sheet flow off the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I28. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.3$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 9.9$  CFS) with the remaining flow ( $Q_{100} = 7.9$  CFS) continuing downstream to inlet I31. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 22.
- Basin D15 (6.4 acres,  $Q_5 = 6.2$  CFS,  $Q_{100} = 18$  CFS) contains lots in Rolling Hills Ranch 2 along Overlook Bluff Ln, Foggy Meadows Dr and Foggy Bend Ln. The surface runoff will sheet flow off the residential lots and directed to the street then to a 10' Type R forced sump inlet located at I29. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.2$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 9.9$  CFS) with the remaining flow ( $Q_{100} = 7.7$  CFS) continuing downstream to inlet I30. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 22.
- The total pipe flow conveyed from MH22 to Storm Manhole 23 via a 24" RCP is  $Q_5 = 12$  CFS,  $Q_{100} = 20$  CFS and combine with the pipe flow from MH21. The total pipe flow conveyed from MH23 to Storm Manhole 24 via a 48" RCP is  $Q_5 = 35$  CFS,  $Q_{100} = 84$  CFS.
- Basin D16 (4.0 acres,  $Q_5 = 4.2$  CFS,  $Q_{100} = 12$  CFS) contains lots along Morning Hills Dr, Morning Ridge Ln and Foggy Meadows Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 10' Type R forced sump inlet located at I30. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 4.2$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 9.9$  CFS) with the remaining flow ( $Q_{100} = 7.3$  CFS) continuing downstream to inlet I31. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 24.
- The total pipe flow conveyed from MH24 to Storm Manhole 25 then to Storm Manhole 26 via a 48" RCP is  $Q_5 = 38$  CFS,  $Q_{100} = 90$  CFS.
- Basin D17 (5.1 acres,  $Q_5 = 5.3$  CFS,  $Q_{100} = 15$  CFS) contains lots in Rolling Hills Ranch 2 along Morning Hills Dr and Foggy Meadows Dr. The surface runoff will sheet flow off the residential lots combined with additional surface flow from I28 and I30, ( $Q_5 = 5.3$  CFS,  $Q_{100} = 27$  CFS) then directed along the street then to a 15' Type R

sump inlet located at I31. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 5.3$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 24$  CFS) with the remaining flow ( $Q_{100} = 2.5$  CFS) continuing downstream to inlet I32. The captured flow is conveyed downstream via a 30" RCP to Storm Manhole 26.

- The total pipe flow conveyed from MH26 to inlet 32 via a 48" RCP is  $Q_5 = 41$  CFS,  $Q_{100} = 107$  CFS.
- Basin D18 (3.1 acres,  $Q_5 = 3.0$  CFS,  $Q_{100} = 8.4$  CFS) contains lots in Rolling Hills Ranch 2 along Morning Hills Dr, Morning Ridge Ln and Overlook Bluff Ln. The surface runoff will sheet flow off the residential lots directed to the street to a 15' Type R sump inlet located at I32 and combined with flow-by from I31. All of the flow ( $Q_5 = 3.0$  CFS,  $Q_{100} = 10$  CFS) is captured by this inlet and combined with flow from Storm Manhole 26.

Should the sump inlets (I31 & I32) become blocked and cannot take capture all the runoff at the sump inlets, the surface flow will travel overland within an open space between lots 441 & 442.

- The pipe flow conveyed from Storm Manhole 26 is  $Q_5 = 41$  CFS,  $Q_{100} = 107$  CFS is combined with the surface flow captured by I32 ( $Q_5 = 3.0$  CFS,  $Q_{100} = 10$  CFS) for a total 5-year flow of 43 CFS and a total 100-year flow of 114 CFS, then conveyed to existing Pond G constructed with Rolling Hills Ranch Early Grading approved in April 2020.
- Lots 439 – 465 along Morning Hills Drive and adjacent to Pond G surface flow directly into the pond or into a swale adjacent to the lot and directed to the pond. Pond G is designed and constructed with the required Water Quality Capture Volume.

### Storm Drain System E

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

- Basin E01 (5.4 acres,  $Q_5 = 6.2$  CFS,  $Q_{100} = 17$  CFS) contains lots along Valley Peak Dr, Rolling Ranch Dr and Woods Grove Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 20' Type R forced sump inlet located at I33. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to Storm Manhole 27 then to Storm Manhole 28.
- Basin E02 (6.5 acres,  $Q_5 = 7.3$  CFS,  $Q_{100} = 19$  CFS) contains lots along Valley Peak Dr, Woods Grove Dr and Savannah Falls Ct in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 20' Type R forced sump inlet located at I34. All of the 5-year storm flow is captured by this inlet ( $Q_5 =$

- 7.3 CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 17$  CFS) with the remaining flow ( $Q_{100} = 2.3$  CFS) continuing downstream to inlet I37. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 28.
- The total pipe flow conveyed from MH28 to Storm Manhole 29 via a 30" RCP is  $Q_5 = 13$  CFS,  $Q_{100} = 33$  CFS.
  - Basin E03 (5.8 acres,  $Q_5 = 6.5$  CFS,  $Q_{100} = 17$  CFS) contains lots along Rolling Ranch Dr, Woods Grove Dr, New Ranch Ln and Morning Hills Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R forced sump inlet located at I35. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.5$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 14$  CFS) with the remaining flow ( $Q_{100} = 3.7$  CFS) continuing downstream to inlet I36. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 29.
  - The total pipe flow conveyed from MH29 to Storm Manhole 30 via a 36" RCP is  $Q_5 = 19$  CFS,  $Q_{100} = 46$  CFS.
  - Basin E04 (3.1 acres,  $Q_5 = 3.9$  CFS,  $Q_{100} = 9.7$  CFS) contains lots along New Ranch Ln and Morning Hills Dr in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 15' Type R forced sump inlet located at I36. All of the flow ( $Q_5 = 3.9$  CFS,  $Q_{100} = 13$  CFS) is captured by this inlet and conveyed downstream via an 18" RCP to existing Storm Manhole 30.
  - Basin E05 (2.6 acres,  $Q_5 = 2.7$  CFS,  $Q_{100} = 9.3$  CFS) contains lots along Woods Grove Dr and Savannah Falls Ct in Rolling Hills Ranch 2. The surface runoff will sheet flow off the residential lots and be conveyed to a 20' Type R flow-by inlet located at I37. Most of the flow is captured by this inlet ( $Q_5 = 2.6$  CFS,  $Q_{100} = 7.1$  CFS) with the remaining ( $Q_5 = 0.2$  CFS,  $Q_{100} = 2.2$  CFS) continuing downstream to Inlet I41. The captured flow is conveyed downstream via an 18" RCP to existing Storm Manhole 30.
  - The total pipe flow conveyed from existing MH30 to existing Storm Manhole 31 and Storm Manhole 36 via a 36" RCP is  $Q_5 = 25$  CFS,  $Q_{100} = 65$  CFS.

The following basins are located within Rolling Hills Ranch Filing 1, the Construction Plans and Final Drainage Report for Rolling Hills Ranch Filing 1 were approved in September 2020.

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

- Basin E07 (2.1 acres,  $Q_5 = 2.5$  CFS,  $Q_{100} = 6.7$  CFS) contains lots along Rolling Peaks Dr and Valley Peak Dr in Rolling Hills Ranch 1 and 2. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 15' Type R flow-by inlet located at I39. Most of the flow is captured by this inlet ( $Q_5 = 2.0$  CFS,  $Q_{100} = 4.5$  CFS) with the remaining ( $Q_5 = 0.5$  CFS,  $Q_{100} = 2.2$  CFS) continuing downstream to existing Inlet I41. The captured flow is conveyed downstream via an existing 18" RCP to Storm Manhole 33.
- The total pipe flow conveyed from MH33 to Storm Manhole 34 via an existing 18" RCP is  $Q_5 = 3.5$  CFS,  $Q_{100} = 8.5$  CFS.
- Basin E08 (4.2 acres,  $Q_5 = 4.8$  CFS,  $Q_{100} = 13$  CFS) contains lots surrounded by Rolling Peaks Dr, Valley Peak Dr, Summer Ridge Dr and Bridge Way in Rolling Hills Ranch 1. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 10' Type R forced sump inlet located at I40. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 4.8$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 10$  CFS) with the remaining flow ( $Q_{100} = 2.8$  CFS) continuing downstream to an existing inlet located at the intersection of Park Gate Dr. with Lambert Rd. The captured flow is conveyed downstream via an existing 18" RCP to Storm Manhole 34.
- The total pipe flow conveyed from MH34 to Storm Manhole 35 then to Storm Manhole 36 via an existing 24" RCP is  $Q_5 = 8.0$  CFS,  $Q_{100} = 18$  CFS.
- Basin E09 (5.4 acres,  $Q_5 = 6.2$  CFS,  $Q_{100} = 17$  CFS) contains lots along Rolling Peaks Dr in Rolling Hills Ranch 1 and 2. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 15' Type R sump inlet located at I41. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.2$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 14$  CFS) with the remaining flow ( $Q_{100} = 3.9$  CFS) continuing downstream to existing Inlet I43. The captured flow is conveyed downstream via an existing 24" RCP to Storm Manhole 36.
- The total combined pipe flow from MH30, MH34 and I41 is conveyed to Storm Manhole 37 via an existing 42" RCP is  $Q_5 = 35$  CFS,  $Q_{100} = 86$  CFS.
- Basin E10 (7.0 acres,  $Q_5 = 7.0$  CFS,  $Q_{100} = 10$  CFS) contains lots along Summer Ridge Dr in Rolling Hills Ranch 1. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 20' Type R sump inlet located at I42. All of the flow is captured by this inlet and conveyed downstream via an existing 24" RCP to Storm Manhole 37.
- The total combined pipe flow from MH37 is conveyed to Storm Manhole 38 via an existing 48" RCP is  $Q_5 = 41$  CFS,  $Q_{100} = 102$  CFS.
- Basin E11 (13 acres,  $Q_5 = 6.3$  CFS,  $Q_{100} = 18$  CFS) contains runoff from an open space tract in Rolling Hills Ranch 1 and rear lots within portions of Meridian Ranch

Filing 11B. The surface runoff will sheet flow off the residential lots and be conveyed to a Type C grated inlet located at CB3. All of the flow is captured by this inlet and conveyed downstream via an existing 24" RCP to Storm Manhole 37.

- Basin E12 (1.6 acres,  $Q_5 = 3.6$  CFS,  $Q_{100} = 7.5$  CFS) contains runoff from Rolling Peaks Dr and Lambert Rd in Rolling Hills Ranch 1 and 2. The surface runoff will be collected in the curb and gutter then conveyed to an existing 20' Type R flow-by inlet located at I43. Most of the flow is captured by this inlet ( $Q_5 = 3.2$  CFS,  $Q_{100} = 7.1$  CFS) with the remaining ( $Q_5 = 0.4$  CFS,  $Q_{100} = 2.1$  CFS) continuing downstream to existing Inlet I41. The captured flow is conveyed downstream via an existing 18" RCP to Storm Manhole 38.
- The total combined pipe flow from MH38, I43 and CB3 is conveyed to an existing Storm Manhole EJ02 via an existing 54" RCP is  $Q_5 = 52$  CFS,  $Q_{100} = 131$  CFS.
- Basin E13 (6.0 acres,  $Q_5 = 8.2$  CFS,  $Q_{100} = 19$  CFS) contains runoff from Park Gate Rd, Lambert Rd. found in Meridian Ranch Filing 11A and Rolling Peaks Dr in Rolling Hills Ranch 1. The surface runoff will sheet flow off the residential lots and be conveyed to an existing 15' Type R forced sump inlet constructed with the improvements associated with Meridian Ranch Filing 11A located at EI1. All of the 5-year storm flow is captured by this inlet ( $Q_5 = 6.0$  CFS) and most of the 100-yr storm flow is captured ( $Q_{100} = 13$  CFS) with the remaining flow ( $Q_{100} = 6.5$  CFS) continuing downstream to an existing inlet located along the west side of Lambert Rd. The captured flow is conveyed downstream via an existing 18" RCP to existing manhole EJ01.
- The existing storm drain system at existing manhole EJ01 conveys storm flow from other parts of Meridian Ranch Filing 11A and the discharge from Pond D. The flow rates upstream of EJ01 as from the SCS model are 12 CFS for the 5-year storm and 136 CFS for the 100-year storm. The coefficient-area (CA) figure from the approved Final Drainage Report for Meridian Ranch Filing 11A and the time of concentration was adjusted to match the flow rate from the SCS Model to replicate the flow rate in the storm drain. The total flow from Meridian Ranch Filing 11A from MH EJ01 to EJ02 is 22 CFS for the 5-year storm and 140 CFS for the 100-year storm.
- The total combined storm flow at MH EJ02 from Rolling Hills Ranch, Meridian Ranch Filing 11A and the discharge from Pond D is 39 CFS for the 5-year storm and 182 CFS for the 100-year storm will ultimately be discharged into the existing Pond E. The existing storm drain located within Lambert Rd was installed with the construction of the Falcon High School in 2007. The anticipated 10-year flow rate at 128 CFS and the 100-year flow rate for the storm drain was 245 CFS per the approved 2007 Londonderry-Lambert Final Drainage Report. The approved Final Drainage Report for Meridian Ranch Filing 11A shows the 5-year flow rate at 63 CFS and 212 CFS for the 100-year storm. These calculations result buildout flow rates ( $Q_5 = 39$  CFS,  $Q_{100} = 182$  CFS) below the previously approved drainage reports,

therefore this development will not have any adverse impacts on the existing storm drain located in Lambert Road, Londonderry Drive and downstream Pond E.

#### Various Rear yard discharges to Waters of the State

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

#### **DETENTION PONDS**

The storm water runoff from Rolling Hills Ranch Filing 2 is ultimately discharged into existing Detention Pond E and Pond G. Pond E was constructed prior to the passage of Senate Bill 15-212 and is exempt from providing support calculations showing drain time compliance. Pond G was constructed with Rolling Hills Ranch Early Grading permit and the supporting calculations showing drain time compliance has been provided with the Final Drainage Report for Rolling Hills Ranch Filing 1 approved September 2020.

#### ***Existing Pond E Detention Storage Criteria***

Existing Detention Pond E is located south of Londonderry and west of Eastonville and was constructed as a part of the Meridian Ranch Filing 11 Grading, the pond is owned and maintained by the Meridian Service Metropolitan District (MSMD). It has been in operation since 2013 and a maintenance agreement between the Meridian Service Metropolitan District and El Paso County has been recorded as a part of the Meridian Ranch Filing 11A Final Plat process.

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

An analysis of the SCS calculations show the development of Rolling Hills Ranch Filing 2 and the discharge flow rates from Pond E approximate those of the historic flow rates at Eastonville Road. No additional improvements or modifications are necessary to this pond as a result of the full buildout of RHR2. Table 6 provides summary data for the various design



storms for the completed development for all areas tributary to Pond E including RHR2. Rolling Hills Ranch completes the development of the areas tributary to Pond E.

**Table 6: Existing Pond E Summary Data**

| EXISTING POND E    |                |                 |                 |                   |
|--------------------|----------------|-----------------|-----------------|-------------------|
|                    | PEAK<br>INFLOW | PEAK<br>OUTFLOW | PEAK<br>STORAGE | PEAK<br>ELEVATION |
|                    | CFS            | CFS             | AC-FT           | FT                |
| INTERIM CONDITIONS |                |                 |                 |                   |
| 2-YEAR STORM       | 63             | 5.6             | 8.8             | 6970.3            |
| 5-YEAR STORM       | 122            | 13              | 16.6            | 6971.2            |
| 10-YEAR STORM      | 190            | 26              | 21.8            | 6971.8            |
| 50-YEAR STORM      | 424            | 141             | 35.6            | 6973.0            |
| 100-YEAR STORM     | 556            | 231             | 41.5            | 6973.5            |
| FUTURE CONDITIONS  |                |                 |                 |                   |
| 2-YEAR STORM       | 64             | 5.8             | 9.5             | 6970.4            |
| 5-YEAR STORM       | 126            | 14              | 17.2            | 6971.3            |
| 10-YEAR STORM      | 197            | 28              | 22.4            | 6971.8            |
| 50-YEAR STORM      | 433            | 149             | 36.2            | 6973.0            |
| 100-YEAR STORM     | 618            | 240             | 42.2            | 6973.6            |

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

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

### ***Existing Pond G Detention Storage Criteria***

Existing Detention Pond G is located adjacent and northeast of Rolling Hills Ranch Filing 2 and was constructed with Rolling Hills Ranch Early Grading permit and the supporting calculations showing drain time compliance has been provided with the Final Drainage

Report for Rolling Hills Ranch Filing 1 approved September 2020., the pond is owned and maintained by the Meridian Service Metropolitan District (MSMD). There is a maintenance agreement between the Meridian Service Metropolitan District and El Paso County has been recorded as a part of the Rolling Hills Ranch Filing 1 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 within the adjacent Falcon Regional Park and downstream of Eastonville Road. The ultimate future build-out design of the tributary areas was analyzed to insure the sizing of the pond would be adequate after development of Meridian Ranch is complete. This SCS calculation can be found in the appendix.

An analysis of the SCS calculations show the development of Rolling Hills Ranch Filing 2 and the discharge flow rates from Pond G approximate those of the historic flow rates at the project boundary and Eastonville Road. No additional improvements or modifications are necessary to this pond as a result of the full buildout of RHR2. Table 7 provides summary data for the various design storms for the completed development for all areas tributary to Pond G including RHR2.

**Table 7: Existing Pond G Summary Data**

| POND G             |                |                 |                 |                   |
|--------------------|----------------|-----------------|-----------------|-------------------|
|                    | PEAK<br>INFLOW | PEAK<br>OUTFLOW | PEAK<br>STORAGE | PEAK<br>ELEVATION |
|                    | CFS            | CFS             | AC-FT           | FT                |
| INTERIM CONDITIONS |                |                 |                 |                   |
| 2-YEAR STORM       | 10             | 4.0             | 2.8             | 7026.1            |
| 5-YEAR STORM       | 40             | 12              | 7.1             | 7027.2            |
| 10-YEAR STORM      | 87             | 32              | 9.2             | 7027.6            |
| 50-YEAR STORM      | 309            | 218             | 17.4            | 7029.0            |
| 100-YEAR STORM     | 491            | 369             | 21.4            | 7029.7            |
| FUTURE CONDITIONS  |                |                 |                 |                   |
| 2-YEAR STORM       | 24             | 5.1             | 4.6             | 7026.6            |
| 5-YEAR STORM       | 75             | 20              | 8.0             | 7027.4            |
| 10-YEAR STORM      | 149            | 51              | 10.7            | 7027.8            |
| 50-YEAR STORM      | 451            | 307             | 19.7            | 7029.4            |
| 100-YEAR STORM     | 653            | 465             | 24.8            | 7030.2            |

A water quality capture volume (WQCV) was added to the required storage volume for the final build out condition. The purpose of the WQCV is to allow particulates to settle out and accumulate over time to improve water quality and to maintain full volume for detention during the life of the facility for a major storm event. The WQCV of 1.5 ac-ft. was added to the detention of the minor storm and half (0.75 ac-ft.) was added to the detention volume of the major storm. This was accomplished with respect to the HEC-HMS computer run by providing a starting detention volume of 0.90 ft. for the 5-year storm and 0.45 ft. for the 100-

year storm. The resulting storage elevations remain well below the emergency spillway elevation. See Appendix B for more information.

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

Table 8: Key Design Point Comparison – SCS

| MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (INTERIM)     |               |  |   |   |  |
|--|---------------|--|---|---|--|
|  |               | PEAK<br>DISCHARGE<br>Q <sub>100</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>50</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>10</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>5</sub><br>(CFS) |
| G12 - POND G OUTLET<br>REGIONAL PARK<br>(G05 - HISTORIC) | Historic      | 544  | 355   | 86  | 31   |
|  | Interim       | 369  | 218   | 32  | 12   |
|  | % of Historic | 68%  | 61%   | 37%   | 40%  |
| G06 - EASTONVILLE ROAD <sup>1</sup>                      | Historic      | 561  | 375   | 91  | 33   |
|  | Interim       | 388  | 228   | 34  | 13   |
|  | % of Historic | 69%  | 61%   | 37%   | 41%  |
| H08 - EASTONVILLE ROAD<br>(POND E NORTH OUTLET)          | Historic      | 216  | 142   | 34  | 12   |
|  | Interim       | 198  | 127   | 20  | 9.1  |
|  | % of Historic | 92%  | 90%   | 61%   | 75%  |
| H09 - EASTONVILLE ROAD<br>(POND E SOUTH OUTLET)          | Historic      | 77   | 51  | 12  | 4.5  |
|  | Interim       | 33   | 14  | 5.5   | 3.7  |
|  | % of Historic | 42%  | 27%   | 45%   | 81%  |

| MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (FUTURE)      |               |  |   |   |  |
|--|---------------|--|---|---|--|
|  |               | PEAK<br>DISCHARGE<br>Q <sub>100</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>50</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>10</sub><br>(CFS) | PEAK<br>DISCHARGE<br>Q <sub>5</sub><br>(CFS) |
| G12 - POND G OUTLET<br>REGIONAL PARK<br>(G05 - HISTORIC) | Historic      | 544  | 355   | 86  | 31   |
|  | Future        | 465  | 307   | 51  | 20   |
|  | % of Historic | 85%  | 87%   | 59%   | 65%  |
| G06 - EASTONVILLE ROAD <sup>1</sup>                      | Historic      | 561  | 375   | 91  | 33   |
|  | Future        | 493  | 324   | 55  | 22   |
|  | % of Historic | 88%  | 86%   | 61%   | 67%  |
| H08 - EASTONVILLE ROAD<br>(POND E NORTH OUTLET)          | Historic      | 216  | 142   | 34  | 12   |
|  | Future        | 204  | 134   | 22  | 10   |
|  | % of Historic | 95%  | 95%   | 66%   | 84%  |
| H09 - EASTONVILLE ROAD<br>(POND E SOUTH OUTLET)          | Historic      | 77   | 51  | 12  | 4.5  |
|  | Future        | 36   | 15  | 5.7   | 3.8  |
|  | % of Historic | 47%  | 30%   | 47%   | 85%  |

<sup>1</sup> Flow rate at Eastonville Rd. listed for reference only

The developed peak flow rate for the full spectrum of design storms are calculated to be below that of the corresponding historic peak flow rates. See Table 8 for a complete

comparative list of the peak flow rates for the key design points impacted by the development of Rolling Hills Ranch Filing 2.

### **DRAINAGE FEES**

The proposed development falls in the Gieck Drainage Basin. The entire development occupies 88.2 acres of residential development of which 46.7 acres are residential development and 13.6 acres are designated as right-of-way, 28.0 open space.

The following is the imperviousness calculation:

|                  | <u>Acres</u> | <u>Assumed Imperviousness</u> | <u>Impervious Acres</u> |
|------------------|--------------|-------------------------------|-------------------------|
| Open Space       | 27.97        | 3%                            | 0.84                    |
| Right-of-way     | 13.59        | 85%                           | 11.55                   |
| Residential Lots | 46.66        | 45% (237 Lots)                | 21.00                   |
| Total            | 88.22        |                               | 33.39=37.8% imperv      |

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

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

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### **CONCLUSIONS**

Based upon the above analysis and calculations, this project will not cause any additional adverse impacts to downstream property nor existing facilities. The existing storm drain system and detention ponds have been designed and properly constructed to accept and convey the storm drain runoff from this project.

## **EROSION CONTROL DESIGN**

### ***General Concept***

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

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

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

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

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

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

### ***Four Step Process***

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

#### **Step 1: Employ Runoff Reduction Practices**

This development incorporates wider rights-of-way than other developments, thus increasing the amount area devoted to pervious areas. 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 nearly 28 acres of open space, accounting for over 30% of this final plat, creating a lower density development.

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

**Step 2: Stabilize Drainageways**

The natural arroyo located adjacent to and north of the project was analyzed with Rolling Hills Ranch Filing 1 for stability and was determined to be mostly stable. Areas of instability were protected with rip-rap along the sides and bottom of the arroyo to reduce velocities and erosion.

**Step 3: Provide Water Quality Capture Volume (WQCV)**

Existing extended detention ponds with water quality capture volume are located to the east and south of the project that have been 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 sediment control for the areas upstream during construction. Runoff will travel overland toward the existing sedimentation ponds, collected and diverted into the proposed storm drain system and discharged into existing downstream systems. The pond will provide initial sediment control over exposed upstream areas.

***Detention Pond***

The 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.

## **REFERENCES**

1. “City of Colorado Springs/El Paso County Drainage Criteria Manual” September 1987, Revised November 1991, Revised October 1994.
2. Chapter 6, Hydrology and Chapter 11, Storage, Section 3.2.1 of the “City of Colorado Springs Drainage Criteria Manual” May 2014.
3. “Volume 2, El Paso County/City of Colorado Springs Drainage Criteria Manual- Stormwater Quality Policies, Procedures and Best Management Practices” November 1, 2002.
4. “Urban Storm Drainage Criteria Manual” September 1969, Revised January 2016.
5. Flood Insurance Rate Study for El Paso County, Colorado and Incorporated Areas. Federal Emergency Management Agency, December 7, 2018.
6. Soils Survey of El Paso County area, Natural Resources Conservation Services of Colorado.
7. Master Development Drainage Plan Meridian Ranch. August 2000. Prepared by URS Corp.
8. Revision to Master Development Drainage Plan Meridian Ranch. January 2018. Prepared by Tech Contractors.
9. Master Development Drainage Plan Latigo Trails. October 2001. Prepared by URS Corp.
10. Final Drainage Report for Meridian Ranch Filing 3. August 2011. Prepared by Tech Contractors.
11. Preliminary and Final Drainage Report for Meridian Ranch Filing 7. June 2012. Prepared by Tech Contractors.
12. Final Drainage Report for Meridian Ranch Estates Filing 2. July 2013. Prepared by Tech Contractors.
13. Final Drainage Report for Meridian Ranch Filing 11A. March 2014. Prepared by Tech Contractors.
14. Preliminary and Final Drainage Report for Meridian Ranch Filing 8. December 2014. Prepared by Tech Contractors.
15. Final Drainage Report for Meridian Ranch Filing 9. May 2015. Prepared by Tech Contractors.
16. Final Drainage Report for Meridian Ranch Estates Filing 3. October 2015. Prepared by Tech Contractors.

17. Final Drainage Report for the Vistas Filing 1 at Meridian Ranch. July 2016. Prepared by Tech Contractors.
18. Final Drainage Report for Stonebridge Filing 3 at Meridian Ranch. April 2017. Prepared by Tech Contractors.
19. Interim Drainage Report for WindingWalk Grading. February 2018. Prepared by Tech Contractors.
20. Final Drainage Report Report for WindingWalk Filings 1 & 2 PUD and Final Drainage Report for WindingWalk Filing 1 at Meridian Ranch. April 2018. Prepared by Tech Contractors.
21. Final Drainage Report for WindingWalk Filing 2 at Meridian Ranch. August 2018. Prepared by Tech Contractors.
22. Final Drainage Report for Stonebridge Filing 4 at Meridian Ranch. September 2018. Prepared by Tech Contractors.
23. Preliminary Drainage Report for Rolling Hills Ranch at Meridian Ranch PUD. February 2020. Prepared by Tech Contractors.
24. Final Drainage Report for Estates at Rolling Hills Ranch Filing 1. March 2020. Prepared by Tech Contractors.



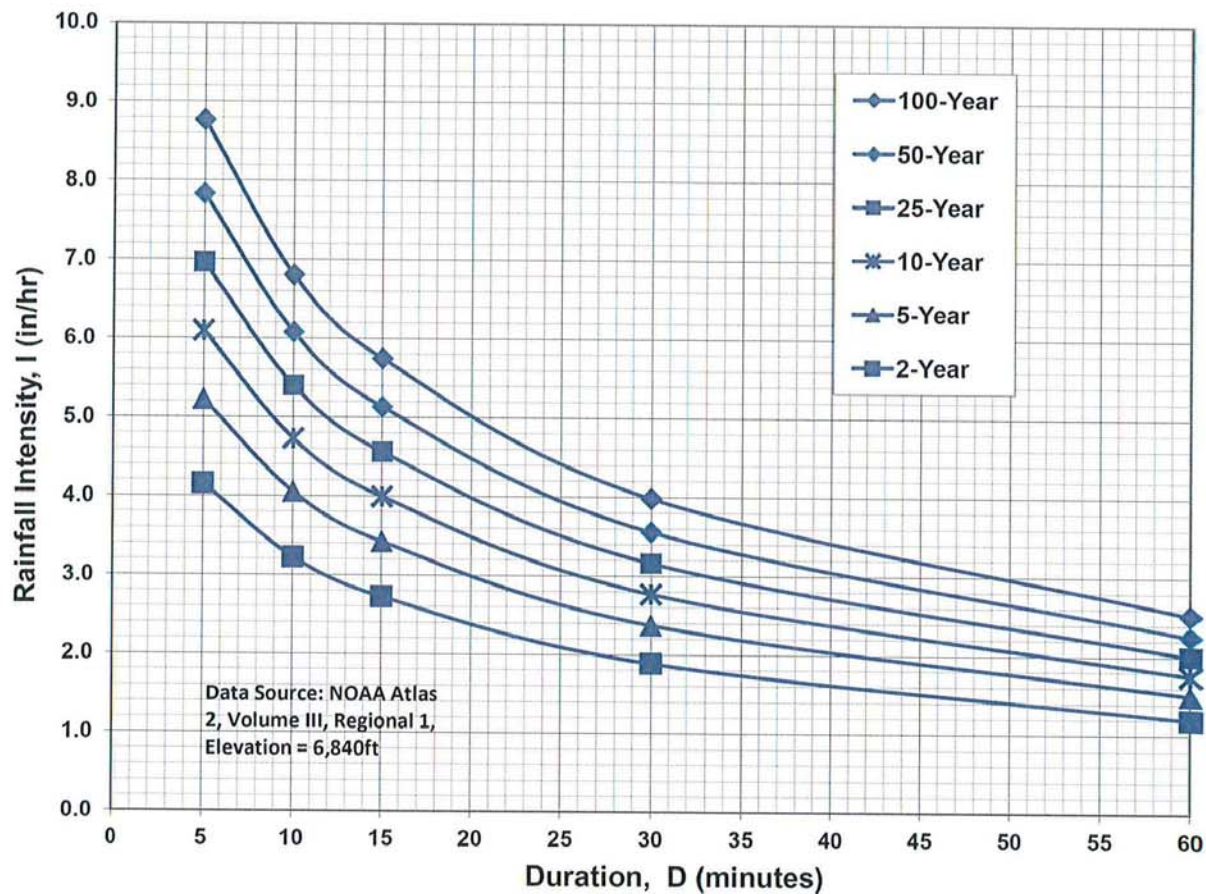
## **Appendices**

## Appendix A – Rational Calculations

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

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

**Figure 6-5. Colorado Springs Rainfall Intensity Duration Frequency**



#### IDF Equations

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

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

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

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

$$I_5 = -1.50 \ln(D) + 7.583$$

$$I_2 = -1.19 \ln(D) + 6.035$$

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

## COMPOSITE 'C' FACTORS

PROJECT: **Rolling Hills Ranch Filing 2**

11/3/2020

| BASIN<br>DESIGNATION                  | AREA (AC.) |         |         |         |                        |       | COMPOSITE FACTOR |          | Percent<br>Impervious |
|---------------------------------------|------------|---------|---------|---------|------------------------|-------|------------------|----------|-----------------------|
|                                       | 3 DU/AC    | 4 DU/AC | 5 DU/AC | STREETS | OPEN SPACE<br>PARKS/GC | TOTAL | 5-year           | 100-year |                       |
| Future Rolling Hills Ranch Filing 3   |            |         |         |         |                        |       |                  |          |                       |
| D01                                   | 1.0        | 5.9     |         |         |                        | 6.9   | 0.29             | 0.50     | 38.6%                 |
| D02                                   | 0.6        | 3.3     |         |         |                        | 3.8   | 0.29             | 0.50     | 38.6%                 |
| D03                                   | 0.6        | 3.3     |         |         |                        | 3.8   | 0.29             | 0.50     | 38.6%                 |
| D04                                   | 0.8        | 4.5     |         |         |                        | 5.3   | 0.29             | 0.50     | 38.6%                 |
| D05                                   | 0.3        | 1.7     |         |         |                        | 2.0   | 0.29             | 0.50     | 38.6%                 |
| D06                                   | 0.5        | 2.7     |         |         |                        | 3.2   | 0.29             | 0.50     | 38.6%                 |
| D07                                   | 0.9        | 5.7     |         |         |                        | 6.6   | 0.29             | 0.50     | 38.6%                 |
| D08                                   | 0.2        | 1.4     |         |         |                        | 1.6   | 0.29             | 0.50     | 38.6%                 |
| D10                                   | 0.1        | 0.7     |         |         |                        | 0.8   | 0.29             | 0.50     | 38.5%                 |
| Proposed Rolling Hills Ranch Filing 2 |            |         |         |         |                        |       |                  |          |                       |
| D09                                   | 0.1        | 0.5     |         |         | 1.1                    | 1.6   | 0.26             | 0.44     | 13.9%                 |
| D11                                   | 0.4        | 2.2     |         |         | 1.6                    | 4.2   | 0.27             | 0.46     | 24.6%                 |
| D12                                   | 0.4        | 2.3     |         |         |                        | 2.7   | 0.29             | 0.50     | 38.6%                 |
| D13                                   |            | 0.9     | 0.9     |         |                        | 1.8   | 0.32             | 0.51     | 41.4%                 |
| D14                                   | 0.9        | 5.5     |         |         |                        | 6.5   | 0.29             | 0.50     | 38.6%                 |
| D15                                   | 0.9        | 5.4     |         |         |                        | 6.4   | 0.29             | 0.50     | 38.6%                 |
| D16                                   | 0.6        | 3.4     |         |         |                        | 4.0   | 0.29             | 0.50     | 38.6%                 |
| D17                                   | 0.7        | 4.4     |         |         |                        | 5.1   | 0.29             | 0.50     | 38.6%                 |
| D18                                   | 0.5        | 2.7     |         |         |                        | 3.1   | 0.29             | 0.50     | 38.6%                 |
|                                       |            |         |         |         |                        |       |                  |          |                       |
| E01                                   |            | 2.8     | 2.6     |         |                        | 5.4   | 0.32             | 0.51     | 41.4%                 |
| E02                                   |            | 3.4     | 3.1     |         |                        | 6.5   | 0.32             | 0.51     | 41.4%                 |
| E03                                   |            | 3.1     | 2.8     |         |                        | 5.8   | 0.32             | 0.51     | 41.4%                 |
| E04                                   |            | 1.4     | 1.3     | 0.3     | 0.2                    | 3.1   | 0.37             | 0.54     | 43.8%                 |
| E05                                   |            | 1.3     | 1.2     |         |                        | 2.6   | 0.32             | 0.51     | 41.4%                 |
| Existing Rolling Hills Ranch Filing 1 |            |         |         |         |                        |       |                  |          |                       |
| E06                                   |            | 0.7     | 0.6     |         |                        | 1.3   | 0.32             | 0.51     | 41.4%                 |
| E07                                   |            | 1.1     | 1.0     |         |                        | 2.1   | 0.32             | 0.51     | 41.4%                 |
| E08                                   |            | 2.2     | 2.0     |         |                        | 4.2   | 0.32             | 0.51     | 41.4%                 |
| E09                                   |            | 2.9     | 2.6     |         |                        | 5.4   | 0.32             | 0.51     | 41.4%                 |
| E10                                   |            | 3.7     | 3.3     |         |                        | 7.0   | 0.32             | 0.51     | 41.4%                 |
| E11                                   |            | 1.0     | 2.1     |         | 9.9                    | 13.0  | 0.26             | 0.44     | 11.6%                 |
| E12                                   |            |         |         | 1.0     | 0.6                    | 1.6   | 0.64             | 0.74     | 61.4%                 |
| E13                                   |            | 1.3     | 2.5     | 1.0     | 1.2                    | 6.0   | 0.41             | 0.57     | 44.0%                 |
|                                       |            |         |         |         |                        |       |                  |          |                       |
|                                       |            |         |         |         |                        |       | Composite:       |          | 36.7%                 |
| TOTAL                                 | 9          | 81      | 26      | 2       | 15                     | 133.4 | 0.31             | 0.50     | 36.7%                 |

**TIME OF CONCENTRATION**

PROJECT: **Rolling Hills Ranch Filing 2**

DATE: 11/3/2020

| TIME OF CONCENTRATION |                |           |                                      |      |            |                        |                               |    |            |            |       |               |                         |  |  |                                  |                                  |
|-----------------------|----------------|-----------|--------------------------------------|------|------------|------------------------|-------------------------------|----|------------|------------|-------|---------------|-------------------------|--|--|----------------------------------|----------------------------------|
| SUBBASIN DATA         |                |           | INIT/OVERLAND TIME (T <sub>i</sub> ) |      |            |                        | TRAVEL TIME (T <sub>t</sub> ) |    |            |            |       |               |                         | TOTAL<br>T <sub>i</sub> +T <sub>t</sub> (Min.) | T <sub>c</sub> Check<br>(Urbanized Basins) |                                  | FINAL<br>T <sub>c</sub><br>(min) |
| BASIN<br>DESIGNATION  | C <sub>s</sub> | AREA (AC) | LENGTH<br>(FT)                       | ΔH   | SLOPE<br>% | T <sub>i</sub> (Min.)* | LENGTH<br>(FT)                | ΔH | SLOPE<br>% | CONVEYANCE |       | VEL.<br>(FPS) | T <sub>t</sub> (Min.)** |  | L (FT)                                     | T <sub>c</sub> = (L/180)<br>+ 10 |                                  |
|                       |                |           |                                      |      |            |                        |                               |    |            | TYPE       | COEF. |               |                         |  |  |                                  |                                  |
| D01                   | 0.29           | 6.9       | 125                                  | 2.5  | 2.0%       | 13.1                   | 1060                          | 23 | 2.2%       | P          | 20    | 2.9           | 6.0                     | 19.1   | 1185.00                                    | 16.6                             | 16.6                             |
| D02                   | 0.29           | 3.8       | 260                                  | 10.0 | 3.8%       | 15.2                   | 880                           | 16 | 1.8%       | P          | 20    | 2.7           | 5.4                     | 20.7   | 1140.00                                    | 16.3                             | 16.3                             |
| D03                   | 0.29           | 3.8       | 40                                   | 0.8  | 2.0%       | 7.4                    | 1140                          | 28 | 2.4%       | P          | 20    | 3.1           | 6.1                     | 13.5   | 1180.00                                    | 16.6                             | 13.5                             |
| D04                   | 0.29           | 5.3       | 90                                   | 1.8  | 2.0%       | 11.1                   | 1390                          | 32 | 2.3%       | P          | 20    | 3.0           | 7.6                     | 18.8   | 1480.00                                    | 18.2                             | 18.2                             |
| D05                   | 0.29           | 2.0       | 155                                  | 3.1  | 2.0%       | 14.6                   | 350                           | 5  | 1.4%       | P          | 20    | 2.4           | 2.4                     | 17.1   | 505.00                                     | 12.8                             | 12.8                             |
| D06                   | 0.29           | 3.2       | 140                                  | 2.8  | 2.0%       | 13.9                   | 1005                          | 26 | 2.6%       | P          | 20    | 3.2           | 5.2                     | 19.1   | 1145.00                                    | 16.4                             | 16.4                             |
| D07                   | 0.29           | 6.6       | 215                                  | 4.3  | 2.0%       | 17.2                   | 1420                          | 35 | 2.5%       | P          | 20    | 3.1           | 7.5                     | 24.8   | 1635.00                                    | 19.1                             | 19.1                             |
| D08                   | 0.29           | 1.6       | 150                                  | 3.0  | 2.0%       | 14.4                   | 405                           | 4  | 1.0%       | P          | 20    | 2.0           | 3.4                     | 17.8   | 555.00                                     | 13.1                             | 13.1                             |
| D09                   | 0.26           | 1.6       | 175                                  | 3.5  | 2.0%       | 16.2                   | 285                           | 3  | 1.0%       | L          | 7     | 0.7           | 6.8                     | 23.0   | NON-URBAN AREA                             |                                  | 23.0                             |
| D10                   | 0.29           | 0.8       | 80                                   | 1.6  | 2.0%       | 10.5                   | 435                           | 4  | 0.9%       | P          | 20    | 1.9           | 3.8                     | 14.3   | 515.00                                     | 12.9                             | 12.9                             |
| D11                   | 0.27           | 4.2       | 195                                  | 6.0  | 3.1%       | 14.6                   | 975                           | 10 | 1.0%       | L          | 7     | 0.7           | 22.9                    | 37.5   | NON-URBAN AREA                             |                                  | 37.5                             |
| D12                   | 0.29           | 2.7       | 150                                  | 3.0  | 2.0%       | 14.4                   | 1565                          | 16 | 1.0%       | P          | 20    | 2.0           | 12.9                    | 27.3   | 1715.00                                    | 19.5                             | 19.5                             |
| D13                   | 0.32           | 1.8       | 145                                  | 2.9  | 2.0%       | 13.6                   | 405                           | 8  | 2.0%       | P          | 20    | 2.8           | 2.4                     | 16.0   | 550.00                                     | 13.1                             | 13.1                             |
| D14                   | 0.29           | 6.5       | 150                                  | 3.0  | 2.0%       | 14.4                   | 1120                          | 14 | 1.3%       | P          | 20    | 2.2           | 8.3                     | 22.7   | 1270.00                                    | 17.1                             | 17.1                             |
| D15                   | 0.29           | 6.4       | 145                                  | 2.9  | 2.0%       | 14.1                   | 1110                          | 15 | 1.4%       | P          | 20    | 2.3           | 8.0                     | 22.1   | 1255.00                                    | 17.0                             | 17.0                             |
| D16                   | 0.29           | 4.0       | 255                                  | 5.1  | 2.0%       | 18.8                   | 500                           | 13 | 2.6%       | P          | 20    | 3.2           | 2.6                     | 21.3   | 755.00                                     | 14.2                             | 14.2                             |
| D17                   | 0.29           | 5.1       | 245                                  | 4.9  | 2.0%       | 18.4                   | 660                           | 14 | 2.1%       | P          | 20    | 2.9           | 3.8                     | 22.2   | 905.00                                     | 15.0                             | 15.0                             |
| D18                   | 0.29           | 3.1       | 100                                  | 2.0  | 2.0%       | 11.7                   | 1390                          | 24 | 1.7%       | P          | 20    | 2.6           | 8.8                     | 20.6   | 1490.00                                    | 18.3                             | 18.3                             |
|                       |                |           |                                      |      |            |                        |                               |    |            |            |       |               |                         |  |  |                                  |                                  |
| E01                   | 0.32           | 5.4       | 165                                  | 3.3  | 2.0%       | 14.5                   | 672                           | 17 | 2.5%       | P          | 20    | 3.2           | 3.5                     | 18.0   | 837.00                                     | 14.7                             | 14.7                             |
| E02                   | 0.32           | 6.5       | 268                                  | 13.0 | 4.9%       | 13.8                   | 700                           | 20 | 2.9%       | P          | 20    | 3.4           | 3.5                     | 17.2   | 968.00                                     | 15.4                             | 15.4                             |
| E03                   | 0.32           | 5.8       | 247                                  | 6.0  | 2.4%       | 16.6                   | 805                           | 6  | 0.7%       | P          | 20    | 1.7           | 7.8                     | 24.4   | 1052.00                                    | 15.8                             | 15.8                             |
| E04                   | 0.37           | 3.1       | 50                                   | 1.0  | 2.0%       | 7.6                    | 1115                          | 8  | 0.7%       | P          | 20    | 1.7           | 11.0                    | 18.5   | 1165.00                                    | 16.5                             | 16.5                             |
| E05                   | 0.32           | 2.6       | 242                                  | 12.0 | 5.0%       | 13.0                   | 1135                          | 26 | 2.3%       | P          | 20    | 3.0           | 6.2                     | 19.2   | 1377.00                                    | 17.7                             | 17.7                             |
| E06                   | 0.32           | 1.3       | 140                                  | 2.8  | 2.0%       | 13.4                   | 307                           | 6  | 2.0%       | P          | 20    | 2.8           | 1.8                     | 15.2   | 447.00                                     | 12.5                             | 12.5                             |
| E07                   | 0.32           | 2.1       | 280                                  | 11.0 | 3.9%       | 15.1                   | 200                           | 8  | 4.0%       | P          | 20    | 4.0           | 0.8                     | 15.9   | 480.00                                     | 12.7                             | 12.7                             |
| E08                   | 0.32           | 4.2       | 140                                  | 2.8  | 2.0%       | 13.4                   | 740                           | 16 | 2.2%       | P          | 20    | 2.9           | 4.2                     | 17.6   | 880.00                                     | 14.9                             | 14.9                             |
| E09                   | 0.32           | 5.4       | 255                                  | 8.0  | 3.1%       | 15.5                   | 625                           | 18 | 2.9%       | P          | 20    | 3.4           | 3.1                     | 18.6   | 880.00                                     | 14.9                             | 14.9                             |
| E10                   | 0.32           | 7.0       | 172                                  | 6.0  | 3.5%       | 12.3                   | 1583                          | 35 | 2.2%       | P          | 20    | 3.0           | 8.9                     | 21.2   | 1755.00                                    | 19.8                             | 19.8                             |
| E11                   | 0.26           | 13.0      | 182                                  | 3.0  | 1.6%       | 17.5                   | 1696                          | 35 | 2.1%       | L          | 7     | 1.0           | 28.1                    | 45.6   | NON-URBAN AREA                             |                                  | 45.6                             |
| E12                   | 0.64           | 1.6       | 25                                   | 0.5  | 2.0%       | 3.3                    | 1186                          | 12 | 1.0%       | P          | 20    | 2.0           | 9.8                     | 13.2   | 1211.00                                    | 16.7                             | 13.2                             |
| E13                   | 0.41           | 6.0       | 161                                  | 6.0  | 3.7%       | 10.3                   | 1188                          | 22 | 1.9%       | P          | 20    | 2.7           | 7.3                     | 17.6   | 1349.00                                    | 17.5                             | 17.5                             |

|        |  |                           |
|--------|--|---------------------------|
| Notes: | * T <sub>i</sub> = $\frac{* T_i = 0.395 (1.1 - C_5)L^{0.5}}{S^{0.33}}$ |                           |
|        | V = C <sub>v</sub> S <sub>w</sub> <sup>0.5</sup>                       | ** T <sub>t</sub> = L x V |

| TYPE OF SURFACE         |   | C <sub>v</sub> |
|-------------------------|---|----------------|
| HEAVY MEADOW            | H | 25             |
| TILLAGE/FIELD           | T | 5              |
| RIPRAP (not buried)     | R | 6.5            |
| SHORT PASTURE AND LAWNS | L | 7              |
| NEARLY BARE GROUND      | B | 10             |
| GRASSED WATERWAY        | G | 15             |
| PAVED AREAS             | P | 20             |

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

PROJECT: **Rolling Hills Ranch Filing 2**

Date: 11/3/2020

| 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 DP       | CONVEYANCE TYPE | COEFFICIENT C <sub>v</sub> | SLOPE % | VEL. (FPS) | LENGTH (FT) | TRAVEL TIME T <sub>t</sub> |
|              |               |           |           | (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) |                      |                 |                            |         |            |             |                            |
| I19          | D01           | 6.9       | 16.6      | 3.37        | 5.66     | 0.29     | 0.50     | 2.01   | 3.41     | 6.8    | 19       |               |             |          |        |          | 6.8    | 19       | DP2                  | P               | 20.0                       | 0.95%   | 1.9        | 110         | 0.9                        |
| DP2          | D02           | 3.8       | 16.3      | 3.39        | 5.70     | 0.29     | 0.50     | 1.12   | 1.90     | 3.8    | 11       | 17.5          | 3.29        | 5.52     | 1.12   | 2.90     | 3.8    | 16       | I20                  | P               | 20.0                       | 0.95%   | 1.9        | 210         | 1.8                        |
| I20          | D03           | 3.8       | 13.5      | 3.67        | 6.17     | 0.29     | 0.50     | 1.12   | 1.90     | 4.1    | 12       | 19.3          | 3.14        | 5.27     | 2.25   | 3.80     | 7.1    | 20       | DP3                  | P               | 20.0                       | 0.50%   | 1.4        | 45          | 0.5                        |
| DP3          | D04           | 5.3       | 18.2      | 3.23        | 5.42     | 0.29     | 0.50     | 1.55   | 2.63     | 5.0    | 14       | 19.8          | 3.10        | 5.20     | 1.55   | 3.16     | 5.0    | 16       | I21                  | P               | 20.0                       | 0.70%   | 1.7        | 285         | 2.8                        |
| I21          | D05           | 2.0       | 12.8      | 3.76        | 6.31     | 0.29     | 0.50     | 0.59   | 0.99     | 2.2    | 6.3      | 22.7          | 2.90        | 4.87     | 2.31   | 4.65     | 6.7    | 23       | I26                  | P               | 20.0                       | 0.95%   | 1.9        | 215         | 1.8                        |
| I22          | D06           | 3.2       | 16.4      | 3.39        | 5.69     | 0.29     | 0.50     | 0.94   | 1.59     | 3.2    | 9.0      |               |             |          |        |          | 3.2    | 9.0      | I21                  | P               | 20.0                       | 1.40%   | 2.4        | 350         | 2.5                        |
| I23          | D07           | 6.6       | 19.1      | 3.16        | 5.30     | 0.29     | 0.50     | 1.93   | 3.27     | 6.1    | 17       |               |             |          |        |          | 6.1    | 17       | I24                  | P               | 20.0                       | 0.95%   | 1.9        | 315         | 2.7                        |
| I24          | D08           | 1.6       | 13.1      | 3.73        | 6.26     | 0.29     | 0.50     | 0.48   | 0.81     | 1.8    | 5.1      | 21.8          | 2.96        | 4.97     | 0.48   | 2.21     | 1.8    | 11       | I25                  | P               | 20.0                       | 0.95%   | 1.9        | 220         | 1.9                        |
| CB2          | D09           | 1.6       | 23.0      | 2.88        | 4.83     | 0.26     | 0.44     | 0.42   | 0.71     | 1.2    | 3.4      |               |             |          |        |          | 1.2    | 3.4      |                      |                 |                            |         |            |             |                            |
| I25          | D10           | 0.8       | 12.9      | 3.75        | 6.30     | 0.29     | 0.50     | 0.24   | 0.40     | 0.9    | 2.5      | 23.7          | 2.84        | 4.76     | 0.24   | 0.61     | 0.9    | 2.9      |                      |                 |                            |         |            |             |                            |
| ES1          | D11           | 4.2       | 37.5      | 2.15        | 3.60     | 0.27     | 0.46     | 1.13   | 1.93     | 2.4    | 6.9      |               |             |          |        |          | 2.4    | 6.9      |                      |                 |                            |         |            |             |                            |
| I26          | D12           | 2.7       | 19.5      | 3.13        | 5.25     | 0.29     | 0.50     | 0.78   | 1.32     | 2.4    | 6.9      | 24.5          | 2.78        | 4.67     | 0.78   | 3.18     | 2.4    | 15       |                      |                 |                            |         |            |             |                            |
| I27          | D13           | 1.8       | 13.1      | 3.73        | 6.26     | 0.32     | 0.51     | 0.58   | 0.92     | 2.2    | 5.8      |               |             |          |        |          | 2.2    | 5.8      | I33                  | P               | 20.0                       | 2.40%   | 3.1        | 706         | 3.8                        |
| I28          | D14           | 6.5       | 17.1      | 3.33        | 5.59     | 0.29     | 0.50     | 1.89   | 3.20     | 6.3    | 18       |               |             |          |        |          | 6.3    | 18       | I31                  | P               | 20.0                       | 2.00%   | 2.8        | 803         | 4.7                        |
| I29          | D15           | 6.4       | 17.0      | 3.34        | 5.60     | 0.29     | 0.50     | 1.86   | 3.15     | 6.2    | 18       |               |             |          |        |          | 6.2    | 18       | I30                  | P               | 20.0                       | 2.25%   | 3.0        | 622         | 3.5                        |
| I30          | D16           | 4.0       | 14.2      | 3.60        | 6.05     | 0.29     | 0.50     | 1.18   | 1.99     | 4.2    | 12       | 20.4          | 3.06        | 5.13     | 1.18   | 3.37     | 4.2    | 17       | I31                  | P               | 20.0                       | 0.90%   | 1.9        | 162         | 1.4                        |
| I31          | D17           | 5.1       | 15.0      | 3.52        | 5.91     | 0.29     | 0.50     | 1.50   | 2.54     | 5.3    | 15       | 21.9          | 2.96        | 4.96     | 1.50   | 5.39     | 5.3    | 27       | I32                  | P               | 20.0                       | 0.50%   | 1.4        | 30          | 0.4                        |
| I32          | D18           | 3.1       | 18.3      | 3.22        | 5.41     | 0.29     | 0.50     | 0.92   | 1.55     | 3.0    | 8.4      | 22.2          | 2.93        | 4.92     | 0.92   | 2.06     | 3.0    | 10       |                      |                 |                            |         |            |             |                            |
| I33          | E01           | 5.4       | 14.7      | 3.56        | 5.97     | 0.32     | 0.51     | 1.74   | 2.77     | 6.2    | 17       | 16.9          | 3.35        | 5.62     | 1.85   | 3.06     | 6.2    | 17       | I34                  | P               | 20.0                       | 1.90%   | 2.8        |             | 0.0                        |
| I34          | E02           | 6.5       | 15.4      | 3.48        | 5.85     | 0.32     | 0.51     | 2.10   | 3.33     | 7.3    | 19       |               |             |          | 2.10   | 3.33     | 7.3    | 19       | I37                  | P               | 20.0                       | 1.40%   | 2.4        | 360         | 2.5                        |
| I35          | E03           | 5.8       | 15.8      | 3.44        | 5.77     | 0.32     | 0.51     | 1.88   | 2.99     | 6.5    | 17       |               |             |          |        |          | 6.5    | 17       | I36                  | P               | 20.0                       | 0.85%   | 1.8        | 175         | 1.6                        |
| I36          | E04           | 3.1       | 16.5      | 3.38        | 5.67     | 0.37     | 0.54     | 1.15   | 1.71     | 3.9    | 9.7      | 17.4          | 3.30        | 5.53     | 1.15   | 2.35     | 3.9    | 13       |                      |                 |                            |         |            |             |                            |
| I37          | E05           | 2.6       | 17.7      | 3.28        | 5.50     | 0.32     | 0.51     | 0.83   | 1.31     | 2.7    | 7.2      | 17.9          | 3.25        | 5.46     | 0.83   | 1.70     | 2.7    | 9.3      | I41                  | P               | 20.0                       | 0.90%   | 1.9        | 280         | 2.5                        |
| I38          | E06           | 1.3       | 12.5      | 3.80        | 6.37     | 0.32     | 0.51     | 0.41   | 0.65     | 1.6    | 4.2      |               |             |          |        |          | 1.6    | 4.2      |                      |                 |                            |         |            |             |                            |
| I39          | E07           | 2.1       | 12.7      | 3.77        | 6.34     | 0.32     | 0.51     | 0.66   | 1.05     | 2.5    | 6.7      |               |             |          |        |          | 2.5    | 6.7      | I41                  | P               | 20.0                       | 2.80%   | 3.3        | 675         | 3.4                        |
| I40          | E08           | 4.2       | 14.9      | 3.53        | 5.93     | 0.32     | 0.51     | 1.35   | 2.14     | 4.8    | 13       |               |             |          |        |          | 4.8    | 13       | EI1                  | P               | 20.0                       | 2.30%   | 3.0        | 1290        | 7.1                        |
| I41          | E09           | 5.4       | 14.9      | 3.53        | 5.93     | 0.32     | 0.51     | 1.76   | 2.80     | 6.2    | 17       | 20.4          | 3.06        | 5.14     | 1.95   | 3.54     | 6.2    | 18       | I43                  | P               | 20.0                       | 1.10%   | 2.1        | 545         | 4.3                        |
| I42          | E10           | 7.0       | 19.8      | 3.11        | 5.22     | 0.32     | 0.51     | 2.26   | 3.59     | 7.0    | 19       |               |             |          |        |          | 7.0    | 19       |                      |                 |                            |         |            |             |                            |
| CB3          | E11           | 13.0      | 45.6      | 1.85        | 3.11     | 0.26     | 0.44     | 3.42   | 5.69     | 6.3    | 18       |               |             |          |        |          | 6.3    | 18       |                      |                 |                            |         |            |             |                            |
| I43          | E12           | 1.6       | 13.2      | 3.72        | 6.24     | 0.64     | 0.74     | 1.02   | 1.19     | 3.8    | 7.4      | 24.7          | 2.77        | 4.65     | 1.02   | 2.09     | 3.8    | 9.7      | EI3                  | P               | 20.0                       | 1.25%   | 2.2        | 1190        | 8.9                        |
| EI1          | E13           | 6.0       | 17.5      | 3.29        | 5.52     | 0.41     | 0.57     | 2.48   | 3.45     | 8.2    | 19       | 22.0          | 2.95        | 4.95     | 2.48   | 3.92     | 8.2    | 19       | EI2                  | P               | 20.0                       | 1.25%   | 2.2        | 560         | 4.2                        |

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



**STORM DRAINAGE SYSTEM DESIGN  
INLET CALCULATIONS**

PROJECT: **Rolling Hills Ranch Filing 2**

Date: 11/3/2020

| DP  | BASIN | Inlet size<br>L(i) | Proposed or<br>Existing | INLET<br>TYPE     | CROSS<br>SLOPE | STREET<br>SLOPE | T <sub>c</sub> | Q <sub>Total</sub>      |                           | Q <sub>Capture</sub>    |                           |                              |                                | Q <sub>Flow-by</sub>    |                           |                              |                                | DEPTH (max)            |                          | SPREAD                 |                          |
|-----|-------|--------------------|-------------------------|-------------------|----------------|-----------------|----------------|-------------------------|---------------------------|-------------------------|---------------------------|------------------------------|--------------------------------|-------------------------|---------------------------|------------------------------|--------------------------------|------------------------|--------------------------|------------------------|--------------------------|
|     |       |                    |                         |                   |                |                 |                | Q <sub>5</sub><br>(cfs) | Q <sub>100</sub><br>(cfs) | Q <sub>5</sub><br>(cfs) | Q <sub>100</sub><br>(cfs) | CA <sub>eqv.</sub><br>(5-yr) | CA <sub>eqv.</sub><br>(100-yr) | Q <sub>5</sub><br>(cfs) | Q <sub>100</sub><br>(cfs) | CA <sub>eqv.</sub><br>(5-yr) | CA <sub>eqv.</sub><br>(100-yr) | Q <sub>5</sub><br>(ft) | Q <sub>100</sub><br>(ft) | Q <sub>5</sub><br>(ft) | Q <sub>100</sub><br>(ft) |
| I19 | D01   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 16.6           | 6.8                     | 19                        | 6.8                     | 14                        | 2.01                         | 2.40                           | -                       | 5.7                       | -                            | 1.00                           | 0.47                   | 0.47                     |                        |                          |
| I20 | D03   | 20                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 19.3           | 7.1                     | 20                        | 7.1                     | 17                        | 2.25                         | 3.27                           | -                       | 2.8                       | -                            | 0.53                           | 0.47                   | 0.47                     |                        |                          |
| I21 | D05   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 22.7           | 6.7                     | 23                        | 6.7                     | 14                        | 2.31                         | 2.79                           | -                       | 9.1                       | -                            | 1.86                           | 0.47                   | 0.47                     |                        |                          |
| I22 | D06   | 15                 | PROP                    | FLOW-BY           | 2.0%           | 1.0%            | 16.4           | 3.2                     | 9.0                       | 2.6                     | 6.2                       | 0.77                         | 1.09                           | 0.6                     | 2.8                       | 0.17                         | 0.50                           | 0.31                   | 0.41                     | 11.1                   | 16.5                     |
| I23 | D07   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 19.1           | 6.1                     | 17                        | 6.1                     | 9.9                       | 1.93                         | 1.87                           | -                       | 7.4                       | -                            | 1.39                           | 0.47                   | 0.47                     |                        |                          |
| I24 | D08   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 21.8           | 1.8                     | 11                        | 1.8                     | 9.9                       | 0.60                         | 2.00                           | -                       | 1.0                       | -                            | 0.21                           | 0.47                   | 0.47                     |                        |                          |
| CB2 | D09   | Type C             | PROP                    | SUMP              | 2.0%           |                 | 23.0           | 1.2                     | 3.4                       | 1.2                     | 3.4                       | 0.42                         | 0.71                           | -                       | -                         | -                            | -                              | 0.17                   | 0.34                     |                        |                          |
| I25 | D10   | 10                 | PROP                    | SUMP              | 2.0%           |                 | 23.7           | 0.9                     | 2.9                       | 0.9                     | 2.9                       | 0.31                         | 0.61                           | -                       | -                         | -                            | -                              | 0.50                   | 0.70                     |                        |                          |
| ES1 | D11   | FES                | PROP                    | SUMP              | 2.0%           |                 | 37.5           | 2.4                     | 6.9                       | 2.4                     | 6.9                       | 1.13                         | 1.93                           | -                       | -                         | -                            | -                              | 0.27                   | 0.47                     |                        |                          |
| I26 | D12   | 20                 | PROP                    | SUMP              | 2.0%           |                 | 24.5           | 2.4                     | 15                        | 2.4                     | 15                        | 0.88                         | 3.18                           | -                       | -                         | -                            | -                              | 0.50                   | 0.70                     |                        |                          |
| I27 | D13   | 15                 | PROP                    | FLOW-BY           | 2.0%           | 2.0%            | 13.1           | 2.2                     | 5.8                       | 1.7                     | 3.9                       | 0.47                         | 0.63                           | 0.4                     | 1.8                       | 0.11                         | 0.29                           | 0.25                   | 0.33                     | 8.5                    | 12.2                     |
| I28 | D14   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 17.1           | 6.3                     | 18                        | 6.3                     | 9.9                       | 1.89                         | 1.78                           | -                       | 7.9                       | -                            | 1.42                           | 0.47                   | 0.47                     |                        |                          |
| I29 | D15   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 17.0           | 6.2                     | 18                        | 6.2                     | 9.9                       | 1.86                         | 1.77                           | -                       | 7.7                       | -                            | 1.37                           | 0.47                   | 0.47                     |                        |                          |
| I30 | D16   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 20.4           | 4.2                     | 17                        | 4.2                     | 9.9                       | 1.39                         | 1.94                           | -                       | 7.3                       | -                            | 1.43                           | 0.47                   | 0.47                     |                        |                          |
| I31 | D17   | 15                 | PROP                    | SUMP              | 2.0%           |                 | 21.9           | 5.3                     | 27                        | 5.3                     | 24                        | 1.79                         | 4.89                           | -                       | 2.5                       | -                            | 0.51                           | 0.50                   | 0.70                     |                        |                          |
| I32 | D18   | 15                 | PROP                    | SUMP              | 2.0%           |                 | 22.2           | 3.0                     | 10                        | 3.0                     | 10                        | 1.01                         | 2.06                           | -                       | -                         | -                            | -                              | 0.50                   | 0.70                     |                        |                          |
| I33 | E01   | 20                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 16.9           | 6.2                     | 17                        | 6.2                     | 17                        | 1.85                         | 3.06                           | -                       | -                         | -                            | -                              | 0.47                   | 0.47                     |                        |                          |
| I34 | E02   | 20                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 15.4           | 7.3                     | 19                        | 7.3                     | 17                        | 2.10                         | 2.95                           | -                       | 2.3                       | -                            | 0.39                           | 0.47                   | 0.47                     |                        |                          |
| I35 | E03   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 15.8           | 6.5                     | 17                        | 6.5                     | 14                        | 1.88                         | 2.35                           | -                       | 3.7                       | -                            | 0.64                           | 0.47                   | 0.47                     |                        |                          |
| I36 | E04   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 17.4           | 3.9                     | 13                        | 3.9                     | 13                        | 1.18                         | 2.35                           | -                       | -                         | -                            | -                              | 0.47                   | 0.47                     |                        |                          |
| I37 | E05   | 20                 | PROP                    | FLOW-BY           | 2.0%           | 1.0%            | 17.9           | 2.7                     | 9.3                       | 2.6                     | 7.1                       | 0.78                         | 1.30                           | 0.2                     | 2.2                       | 0.05                         | 0.40                           | 0.29                   | 0.42                     | 10.5                   | 16.6                     |
| I38 | E06   | 5                  | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 12.5           | 1.6                     | 4.2                       | 1.6                     | 4.2                       | 0.41                         | 0.65                           | -                       | -                         | -                            | -                              | 0.47                   | 0.47                     |                        |                          |
| I39 | E07   | 15                 | PROP                    | FLOW-BY           | 2.0%           | 2.0%            | 12.7           | 2.5                     | 6.7                       | 2.0                     | 4.5                       | 0.52                         | 0.70                           | 0.5                     | 2.2                       | 0.14                         | 0.35                           | 0.26                   | 0.34                     | 8.9                    | 12.9                     |
| I40 | E08   | 10                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 14.9           | 4.8                     | 13                        | 4.8                     | 9.9                       | 1.35                         | 1.67                           | -                       | 2.8                       | -                            | 0.47                           | 0.47                   | 0.47                     |                        |                          |
| I41 | E09   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 20.4           | 6.2                     | 18                        | 6.2                     | 14                        | 2.03                         | 2.64                           | -                       | 4.6                       | -                            | 0.90                           | 0.47                   | 0.47                     |                        |                          |
| I42 | E10   | 20                 | PROP                    | SUMP              | 2.0%           |                 | 19.8           | 7.0                     | 19                        | 7.0                     | 19                        | 2.26                         | 3.59                           | -                       | -                         | -                            | -                              | 0.50                   | 0.70                     |                        |                          |
| CB3 | E11   | Type C             | PROP                    | SUMP              | 2.0%           |                 | 45.6           | 6.3                     | 18                        | 6.3                     | 18                        | 3.42                         | 5.69                           | -                       | -                         | -                            | -                              | 0.45                   | 0.70                     |                        |                          |
| I43 | E12   | 20                 | PROP                    | FLOW-BY           | 2.0%           | 1.0%            | 24.7           | 3.8                     | 9.7                       | 3.4                     | 7.4                       | 1.22                         | 1.59                           | 0.4                     | 2.3                       | 0.15                         | 0.50                           | 0.32                   | 0.42                     | 11.9                   | 16.9                     |
| EI1 | E13   | 15                 | PROP                    | SUMP <sup>1</sup> | 2.0%           |                 | 22.0           | 8.2                     | 19                        | 8.2                     | 13                        | 2.77                         | 2.61                           | -                       | 6.5                       | -                            | 1.31                           | 0.45                   | 0.45                     |                        |                          |

<sup>1</sup> Forced sump at intersection

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

PROJECT: **Rolling Hills Ranch Filing 2**

Date: 11/3/2020

| UPSTREAM<br>DESIGN POINT | UPSTREAM<br>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)<br>(Estimate)* | TRAVEL TIME Tt |
|                          |                   |            | (5 YR)       | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) |               | (5 YR)       | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) |             |               |                |         |             |                           |                |
| I19                      | D01               | 16.6       | 3.37         | 5.66     | 2.01   | 2.40     | 6.8    | 14       |               |              |          |        |          | 6.8    | 14       | 18          | 0.013         | J15            | 1.03%   | 54          | 6                         | 0.1            |
| J15                      |                   |            |              |          |        |          |        |          | 16.7          | 3.36         | 5.64     | 2.01   | 2.40     | 6.8    | 14       | 24          | 0.013         | J16            | 7.30%   | 252         | 20                        | 0.2            |
| I20                      | D03               | 19.3       | 3.14         | 5.27     | 2.25   | 3.27     | 7.1    | 17       |               |              |          |        |          | 7.1    | 17       | 18          | 0.013         | J16            | 0.99%   | 25          | 6                         | 0.1            |
| J16                      |                   |            |              |          |        |          |        |          | 19.3          | 3.14         | 5.27     | 4.26   | 5.67     | 13     | 30       | 30          | 0.013         | J17            | 0.57%   | 331         | 6                         | 0.9            |
| I21                      | D05               | 22.7       | 2.90         | 4.87     | 2.31   | 2.79     | 6.7    | 14       |               |              |          |        |          | 6.7    | 14       | 18          | 0.013         | J17            | 0.97%   | 5.2         | 6                         | 0.0            |
| J17                      |                   |            |              |          |        |          |        |          | 22.7          | 2.90         | 4.87     | 6.57   | 8.46     | 19     | 41       | 30          | 0.013         | J19            | 1.02%   | 25          | 8                         | 0.0            |
| I22                      | D06               | 16.4       | 3.39         | 5.69     | 0.77   | 1.09     | 2.6    | 6.2      |               |              |          |        |          | 2.6    | 6.2      | 18          | 0.013         | J18            | 3.01%   | 43          | 10                        | 0.1            |
| I23                      | D07               | 19.1       | 3.16         | 5.30     | 1.93   | 1.87     | 6.1    | 9.9      |               |              |          |        |          | 6.1    | 9.9      | 18          | 0.013         | J18            | 1.00%   | 45          | 6                         | 0.1            |
| J18                      |                   |            |              |          |        |          |        |          | 19.2          | 3.15         | 5.29     | 2.70   | 2.96     | 8.5    | 16       | 24          | 0.013         | J19            | 0.98%   | 296         | 7                         | 0.7            |
| I24                      | D08               | 21.8       | 2.96         | 4.97     | 0.60   | 2.00     | 1.8    | 9.9      |               |              |          |        |          | 1.8    | 9.9      | 18          | 0.013         | J19            | 0.90%   | 45          | 6                         | 0.1            |
| J19                      |                   |            |              |          |        |          |        |          | 22.8          | 2.90         | 4.86     | 9.87   | 13.42    | 29     | 65       | 42          | 0.013         | J20            | 2.78%   | 204         | 17                        | 0.2            |
| CB2                      | D09               | 23.0       | 2.88         | 4.83     | 0.42   | 0.71     | 1.2    | 3.4      |               |              |          |        |          | 1.2    | 3.4      | 18          | 0.013         | I25            | 4.21%   | 32          | 12                        | 0.0            |
| I25                      | D10               | 23.7       | 2.84         | 4.76     | 0.31   | 0.61     | 0.9    | 2.9      | 23.1          | 2.88         | 4.83     | 0.73   | 1.32     | 2.1    | 6.4      | 18          | 0.013         | J20            | 8.11%   | 25          | 17                        | 0.0            |
| ES1                      | D11               | 37.5       | 2.15         | 3.60     | 1.13   | 1.93     | 2.4    | 6.9      |               |              |          |        |          | 2.4    | 6.9      | 18          | 0.013         | I26            | 0.56%   | 54          | 4                         | 0.2            |
| I26                      | D12               | 24.5       | 2.78         | 4.67     | 0.88   | 3.18     | 2.4    | 15       | 37.7          | 2.14         | 3.59     | 2.01   | 5.11     | 4.3    | 18       | 24          | 0.013         | J20            | 1.07%   | 4.7         | 7                         | 0.0            |
| J20                      |                   |            |              |          |        |          |        |          | 37.7          | 2.14         | 3.59     | 12.61  | 19.85    | 29     | 71       | 42          | 0.013         | J21            | 0.75%   | 510         | 9                         | 0.9            |
| I27                      | D13               | 13.1       | 3.73         | 6.26     | 0.47   | 0.63     | 1.7    | 3.9      |               |              |          |        |          | 1.7    | 3.9      | 18          | 0.013         | J21            | 1.01%   | 30          | 6                         | 0.1            |
| J21                      |                   |            |              |          |        |          |        |          | 38.6          | 2.10         | 3.53     | 13.08  | 20.48    | 29     | 72       | 42          | 0.013         | J23            | 2.59%   | 301         | 17                        | 0.3            |
| I28                      | D14               | 17.1       | 3.33         | 5.59     | 1.89   | 1.78     | 6.3    | 9.9      |               |              |          |        |          | 6.3    | 9.9      | 18          | 0.013         | J22            | 1.40%   | 32          | 7                         | 0.1            |
| I29                      | D15               | 17.0       | 3.34         | 5.60     | 1.86   | 1.77     | 6.2    | 9.9      |               |              |          |        |          | 6.2    | 9.9      | 18          | 0.013         | J22            | 0.99%   | 25          | 6                         | 0.1            |
| J22                      |                   |            |              |          |        |          |        |          | 17.1          | 3.32         | 5.58     | 3.75   | 3.55     | 12     | 20       | 24          | 0.013         | J23            | 5.17%   | 24          | 16                        | 0.0            |
| J23                      |                   |            |              |          |        |          |        |          | 38.9          | 2.09         | 3.51     | 16.83  | 24.03    | 35     | 84       | 48          | 0.013         | J24            | 2.19%   | 595         | 17                        | 0.6            |
| I30                      | D16               | 20.4       | 3.06         | 5.13     | 1.39   | 1.94     | 4.2    | 9.9      |               |              |          |        |          | 4.2    | 9.9      | 18          | 0.013         | J24            | 8.57%   | 4.7         | 17                        | 0.0            |
| J24                      |                   |            |              |          |        |          |        |          | 39.5          | 2.07         | 3.47     | 18.21  | 25.97    | 38     | 90       | 48          | 0.013         | J25            | 1.00%   | 40          | 11                        | 0.1            |
| J25                      |                   |            |              |          |        |          |        |          | 39.6          | 2.07         | 3.47     | 18.21  | 25.97    | 38     | 90       | 48          | 0.013         | J26            | 1.87%   | 129         | 16                        | 0.1            |
| I31                      | D17               | 21.9       | 2.96         | 4.96     | 1.79   | 4.89     | 5.3    | 24       |               |              |          |        |          | 5.3    | 24       | 30          | 0.013         | J26            | 6.10%   | 4.9         | 21                        | 0.0            |
| J26                      |                   |            |              |          |        |          |        |          | 39.7          | 2.06         | 3.46     | 20.00  | 30.86    | 41     | 107      | 54          | 0.013         | I32            | 1.03%   | 24          | 13                        | 0.0            |
| I32                      | D18               | 22.2       | 2.93         | 4.92     | 1.01   | 2.06     | 3.0    | 10       | 39.7          | 2.06         | 3.46     | 21.01  | 32.91    | 43     | 114      | 54          | 0.013         | OS4            | 0.60%   | 178         | 10                        | 0.3            |
|                          |                   |            |              |          |        |          |        |          | 40.1          |              |          |        |          |        |          |             |               |                |         |             |                           |                |

| UPSTREAM<br>DESIGN POINT   | UPSTREAM<br>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)<br>(Estimate)* | TRAVEL TIME Tt |
|  |                   |            | (5 YR)       | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) |               | (5 YR)       | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) |             |               |                |         |             |                           |                |
| I33  | E01               | 16.9       | 3.35         | 5.62     | 1.85   | 3.06     | 6.2    | 17       |               |              |          |        |          | 6.2    | 17       | 18          | 0.013         | J27            | 0.76%   | 53          | 5                         | 0.2            |
| J27  |                   |            |              |          |        |          |        |          | 17.0          | 3.33         | 5.59     | 1.85   | 3.06     | 6.2    | 17       | 18          | 0.013         | J28            | 2.35%   | 245         | 9                         | 0.4            |
| I34  | E02               | 15.4       | 3.48         | 5.85     | 2.10   | 2.95     | 7.3    | 17.2     |               |              |          |        |          | 7.3    | 17       | 18          | 0.013         | J28            | 0.99%   | 25          | 6                         | 0.1            |
| J28  |                   |            |              |          |        |          |        |          | 17.5          | 3.29         | 5.53     | 3.95   | 6.01     | 13     | 33       | 30          | 0.013         | J29            | 1.91%   | 175         | 12                        | 0.3            |
| I35  | E03               | 15.8       | 3.44         | 5.77     | 1.88   | 2.35     | 6.5    | 13.6     |               |              |          |        |          | 6.5    | 14       | 24          | 0.013         | J29            | 1.00%   | 45          | 7                         | 0.1            |
| J29  |                   |            |              |          |        |          |        |          | 17.7          | 3.27         | 5.49     | 5.84   | 8.36     | 19     | 46       | 30          | 0.013         | J30            | 0.70%   | 179         | 7                         | 0.4            |
| I36  | E04               | 17.4       | 3.30         | 5.53     | 1.18   | 2.35     | 3.9    | 13.0     |               |              |          |        |          | 3.9    | 13       | 18          | 0.013         | J30            | 1.01%   | 25          | 6                         | 0.1            |
| I37  | E05               | 17.9       | 3.25         | 5.46     | 0.78   | 1.30     | 2.6    | 7.1      |               |              |          |        |          | 2.6    | 7.1      | 18          | 0.013         | J30            | 5.35%   | 4.7         | 14                        | 0.0            |
| J30  |                   |            |              |          |        |          |        |          | 17.9          | 3.25         | 5.46     | 7.80   | 12.01    | 25     | 66       | 36          | 0.013         | J31            | 1.03%   | 44          | 10                        | 0.1            |
| J31  |                   |            |              |          |        |          |        |          | 18.0          | 3.25         | 5.45     | 7.80   | 12.01    | 25     | 65       | 42          | 0.013         | J36            | 0.79%   | 272         | 9                         | 0.5            |
| I38  | E06               | 12.5       | 3.80         | 6.37     | 0.41   | 0.65     | 1.6    | 4.2      |               |              |          |        |          | 1.6    | 4.2      | 18          | 0.013         | J32            | 1.16%   | 90          | 6                         | 0.2            |
| J32  |                   |            |              |          |        |          |        |          | 12.7          | 3.77         | 6.33     | 0.41   | 0.65     | 1.5    | 4.1      | 18          | 0.013         | J33            | 4.61%   | 348         | 13                        | 0.5            |
| I39  | E07               | 12.7       | 3.77         | 6.34     | 0.52   | 0.70     | 2.0    | 4.5      |               |              |          |        |          | 2.0    | 4.5      | 18          | 0.013         | J33            | 3.70%   | 26          | 11                        | 0.0            |
| J33  |                   |            |              |          |        |          |        |          | 13.2          | 3.72         | 6.24     | 0.93   | 1.36     | 3.5    | 8.5      | 18          | 0.013         | J34            | 1.95%   | 151         | 8                         | 0.3            |
| I40  | E08               | 14.9       | 3.53         | 5.93     | 1.35   | 1.67     | 4.8    | 9.9      |               |              |          |        |          | 4.8    | 9.9      | 18          | 0.013         | J34            | 1.04%   | 24          | 6                         | 0.1            |
| J34  |                   |            |              |          |        |          |        |          | 15.0          | 3.53         | 5.92     | 2.28   | 3.03     | 8.0    | 18       | 24          | 0.013         | J35            | 3.02%   | 478         | 13                        | 0.6            |
| J35  |                   |            |              |          |        |          |        |          | 15.6          | 3.46         | 5.81     | 2.28   | 3.03     | 8.0    | 18       | 24          | 0.013         | J36            | 1.29%   | 62          | 8                         | 0.1            |
| I41  | E09               | 20.4       | 3.06         | 5.14     | 2.03   | 2.64     | 6.2    | 14       |               |              |          |        |          | 6.2    | 14       | 24          | 0.013         | J36            | 1.03%   | 24          | 7                         | 0.1            |
| J36  |                   |            |              |          |        |          |        |          | 20.4          | 3.06         | 5.13     | 12.12  | 17.68    | 37     | 91       | 42          | 0.013         | J37            | 1.03%   | 316         | 11                        | 0.5            |
| I42  | E10               | 19.8       | 3.11         | 5.22     | 2.26   | 3.59     | 7.0    | 19       |               |              |          |        |          | 7.0    | 19       | 24          | 0.013         | J37            | 1.04%   | 106         | 7                         | 0.2            |
| J37  |                   |            |              |          |        |          |        |          | 20.9          | 3.02         | 5.07     | 14.38  | 21.27    | 43     | 108      | 48          | 0.013         | J38            | 1.22%   | 201         | 13                        | 0.3            |
| CB3  | E11               | 45.6       | 1.85         | 3.11     | 3.42   | 5.69     | 6.3    | 18       |               |              |          |        |          | 6.3    | 18       | 24          | 0.013         | J38            | 1.52%   | 112         | 9                         | 0.2            |
| I43  | E12               | 24.7       | 2.77         | 4.65     | 1.22   | 1.59     | 3.4    | 7.4      |               |              |          |        |          | 3.4    | 7.4      | 18          | 0.013         | J38            | 1.14%   | 13          | 6                         | 0.0            |
| J38  |                   |            |              |          |        |          |        |          | 24.7          | 2.77         | 4.65     | 19.02  | 28.55    | 53     | 133      | 54          | 0.013         | EJ01           | 2.39%   | 227         | 19                        | 0.2            |
| E11  | E13               | 22.0       | 2.95         | 4.95     | 2.77   | 2.61     | 8.2    | 13       |               |              |          |        |          | 8.2    | 13       | 18          | 0.013         | EJ02           | 2.20%   | 4.5         | 9                         | 0.0            |
| CA's FROM MERIDIAN RANCH FILING 11A FDR, TIME OF CONCENTRATION ADJUSTED TO MATCH FLOW RATE FROM SCS METHOD |                   |            |              |          |        |          |        |          | 87.5          | 0.88         | 1.47     | 22.47  | 92.72    | 20     | 136      |             |               |                |         |             |                           |                |
| EJ02   |                   |            |              |          |        |          |        |          | 87.5          | 0.88         | 1.47     | 25.24  | 95.33    | 22     | 140      | 54          | 0.013         | EJ01           | 0.49%   | 67          | 9                         | 0.1            |

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

# STORM DRAINAGE SYSTEM DESIGN HYDRAULICS

PROJECT: **Rolling Hills Ranch Filing 2**

Date: **11/3/2020**

| Label | Upstrm Node | Dnstrm Node | Inlet CA (acres) | Inlet Tc (min) | Inlet Flow (ft³/s) | System CA (acres) | System Flow Time (min) | System Intensity (in/hr) | Section Size (in) | Length (ft) | Slope (%) | Capacity (Full Flow) (ft³/s) | System Flow (ft³/s) | Velocity (Ave) (ft/s) | Elev. Ground (Upstrm) (ft) | Hydraulic Grade Line (Upstrm) (ft) | Invert (Upstrm) (ft) | Elev. Ground (Dnstrm) (ft) | Hydraulic Grade Line (Dnstrm) (ft) | Invert (Dnstrm) (ft) |
|-------|-------------|-------------|------------------|----------------|--------------------|-------------------|------------------------|--------------------------|-------------------|-------------|-----------|------------------------------|---------------------|-----------------------|----------------------------|------------------------------------|----------------------|----------------------------|------------------------------------|----------------------|
| P36   | I19         | J15         | 2.40             | 16.6           | 14                 | 2.40              | 16.6                   | 5.66                     | 18                | 53.6        | 1.03%     | 11                           | 14                  | 7.7                   | 7072.63                    | 7069.9                             | 7068.10              | 7072.32                    | 7068.9                             | 7067.55              |
| P37   | J15         | J16         |                  |                |                    | 2.40              | 16.7                   | 5.64                     | 24                | 252.3       | 0.73%     | 19                           | 14                  | 6.7                   | 7072.32                    | 7068.4                             | 7067.05              | 7070.40                    | 7066.9                             | 7065.20              |
| P54   | I20         | J16         | 3.27             | 19.3           | 17                 | 3.27              | 19.3                   | 5.28                     | 18                | 25.2        | 0.99%     | 11                           | 17                  | 9.8                   | 7070.45                    | 7067.9                             | 7065.95              | 7070.40                    | 7067.2                             | 7065.70              |
| P38   | J16         | J17         |                  |                |                    | 5.67              | 19.3                   | 5.27                     | 30                | 331.0       | 0.57%     | 31                           | 30                  | 7.2                   | 7070.40                    | 7066.7                             | 7064.70              | 7068.13                    | 7065.1                             | 7062.80              |
| P56   | I21         | J17         | 2.79             | 22.7           | 14                 | 2.79              | 22.7                   | 4.87                     | 18                | 5.17        | 0.97%     | 10                           | 14                  | 7.7                   | 7068.34                    | 7066.0                             | 7063.85              | 7068.13                    | 7065.9                             | 7063.80              |
| P42   | J17         | J19         |                  |                |                    | 8.46              | 22.7                   | 4.87                     | 30                | 24.6        | 1.02%     | 41                           | 42                  | 9.6                   | 7068.13                    | 7065.0                             | 7062.80              | 7068.45                    | 7064.9                             | 7062.55              |
| P58   | I23         | J18         | 1.87             | 19.1           | 10                 | 1.87              | 19.1                   | 5.30                     | 18                | 44.9        | 1.00%     | 11                           | 10                  | 6.8                   | 7071.39                    | 7068.1                             | 7066.90              | 7071.49                    | 7067.6                             | 7066.45              |
| P57   | I22         | J18         | 1.09             | 16.4           | 6.2                | 1.09              | 16.4                   | 5.69                     | 18                | 43.2        | 3.01%     | 18                           | 6.2                 | 9.3                   | 7072.25                    | 7068.7                             | 7067.75              | 7071.49                    | 7067.6                             | 7066.45              |
| P40   | J18         | J19         |                  |                |                    | 2.96              | 19.2                   | 5.29                     | 24                | 295.8       | 0.98%     | 22                           | 16                  | 7.7                   | 7071.49                    | 7067.4                             | 7065.95              | 7068.45                    | 7064.3                             | 7063.05              |
| P59   | I24         | J19         | 2.00             | 21.8           | 10                 | 2.00              | 21.8                   | 4.97                     | 18                | 44.7        | 0.90%     | 10                           | 10                  | 6.4                   | 7068.44                    | 7065.2                             | 7063.95              | 7068.45                    | 7064.8                             | 7063.55              |
| P43   | J19         | J20         |                  |                |                    | 13.42             | 22.8                   | 4.86                     | 42                | 203.5       | 2.78%     | 168                          | 66                  | 16                    | 7068.45                    | 7064.1                             | 7061.55              | 7066.47                    | 7058.7                             | 7055.90              |
| P62   | FES1        | I26         | 1.93             | 37.5           | 7.0                | 1.93              | 37.5                   | 3.60                     | 18                | 53.8        | 0.56%     | 7.8                          | 7.0                 | 5.0                   | 7062.00                    | 7059.6                             | 7058.25              | 7066.70                    | 7059.4                             | 7057.95              |
| P63   | I26         | J20         | 3.18             | 24.5           | 15                 | 5.11              | 37.7                   | 3.59                     | 24                | 4.67        | 1.07%     | 23                           | 19                  | 8.3                   | 7066.70                    | 7059.4                             | 7057.45              | 7066.47                    | 7059.4                             | 7057.40              |
| P60   | CB2         | I25         | 0.71             | 23.0           | 3.5                | 0.71              | 23.0                   | 4.83                     | 18                | 32.1        | 4.21%     | 22                           | 3.5                 | 8.9                   | 7064.00                    | 7062.0                             | 7061.25              | 7066.70                    | 7060.9                             | 7059.90              |
| P61   | I25         | J20         | 0.61             | 23.7           | 2.9                | 1.32              | 23.7                   | 4.76                     | 18                | 24.7        | 8.11%     | 30                           | 6.3                 | 13                    | 7066.70                    | 7060.9                             | 7059.90              | 7066.47                    | 7059.4                             | 7057.90              |
| P69   | J20         | J21         |                  |                |                    | 19.85             | 37.7                   | 3.59                     | 42                | 510.2       | 0.75%     | 87                           | 72                  | 10                    | 7066.47                    | 7058.6                             | 7055.90              | 7059.10                    | 7055.6                             | 7052.05              |
| P64   | I27         | J21         | 0.63             | 13.1           | 4.0                | 0.63              | 13.1                   | 6.25                     | 18                | 29.6        | 1.01%     | 11                           | 4.0                 | 5.6                   | 7058.87                    | 7055.4                             | 7054.35              | 7059.10                    | 7055.4                             | 7054.05              |
| P48   | J21         | J23         |                  |                |                    | 20.48             | 38.5                   | 3.53                     | 42                | 300.8       | 2.59%     | 162                          | 73                  | 16                    | 7059.10                    | 7054.7                             | 7052.05              | 7052.17                    | 7047.3                             | 7044.25              |
| P65   | I28         | J22         | 1.78             | 17.1           | 10                 | 1.78              | 17.1                   | 5.58                     | 18                | 32.2        | 1.40%     | 12                           | 10                  | 7.8                   | 7052.48                    | 7049.2                             | 7047.95              | 7051.98                    | 7048.9                             | 7047.50              |
| P66   | I29         | J22         | 1.77             | 17.0           | 10                 | 1.77              | 17.0                   | 5.60                     | 18                | 25.2        | 0.99%     | 11                           | 10                  | 6.7                   | 7052.27                    | 7049.0                             | 7047.75              | 7051.98                    | 7048.9                             | 7047.50              |
| P47   | J22         | J23         |                  |                |                    | 3.55              | 17.2                   | 5.57                     | 24                | 24.2        | 5.17%     | 51                           | 20                  | 15                    | 7051.98                    | 7048.6                             | 7047.00              | 7052.17                    | 7046.8                             | 7045.75              |
| P49   | J23         | J24         |                  |                |                    | 24.03             | 38.8                   | 3.51                     | 48                | 594.7       | 2.19%     | 213                          | 85                  | 16                    | 7052.17                    | 7046.6                             | 7043.75              | 7037.93                    | 7034.1                             | 7030.70              |
| P67   | I30         | J24         | 1.94             | 20.4           | 10                 | 1.94              | 20.4                   | 5.14                     | 18                | 4.67        | 8.57%     | 31                           | 10                  | 16                    | 7038.10                    | 7034.8                             | 7033.60              | 7037.93                    | 7034.1                             | 7033.20              |
| P50   | J24         | J25         |                  |                |                    | 25.97             | 39.5                   | 3.47                     | 48                | 40.2        | 1.00%     | 143                          | 91                  | 12                    | 7037.93                    | 7033.8                             | 7030.70              | 7037.78                    | 7033.9                             | 7030.30              |
| P51   | J25         | J26         |                  |                |                    | 25.97             | 39.5                   | 3.47                     | 48                | 128.5       | 1.87%     | 196                          | 91                  | 15                    | 7037.78                    | 7033.2                             | 7030.30              | 7036.66                    | 7031.5                             | 7027.90              |
| P68   | I31         | J26         | 4.89             | 21.9           | 24                 | 4.89              | 21.9                   | 4.96                     | 30                | 4.92        | 6.10%     | 101                          | 24                  | 17                    | 7036.89                    | 7031.4                             | 7029.70              | 7036.66                    | 7030.7                             | 7029.40              |
| P52   | J26         | I32         |                  |                |                    | 30.86             | 39.7                   | 3.46                     | 54                | 24.3        | 1.03%     | 200                          | 108                 | 13                    | 7036.66                    | 7030.8                             | 7027.40              | 7036.89                    | 7030.9                             | 7027.15              |
| P53   | I32         | OS4         | 2.06             | 22.2           | 10                 | 32.92             | 39.7                   | 3.46                     | 54                | 177.6       | 0.27%     | 102                          | 115                 | 7.2                   | 7036.89                    | 7030.9                             | 7027.15              | 7033.42                    | 7029.8                             | 7026.67              |
| P76   | I38         | J32         | 0.65             | 12.5           | 4.2                | 0.65              | 12.5                   | 6.37                     | 18                | 90.5        | 1.16%     | 11                           | 4.2                 | 5.9                   | 7063.08                    | 7059.3                             | 7058.55              | 7061.76                    | 7058.4                             | 7057.50              |
| P77   | J32         | J33         |                  |                |                    | 0.65              | 12.8                   | 6.32                     | 18                | 347.8       | 4.61%     | 23                           | 4.1                 | 9.7                   | 7061.76                    | 7058.3                             | 7057.50              | 7046.59                    | 7042.8                             | 7041.45              |
| P89   | I39         | J33         | 0.70             | 12.7           | 4.5                | 0.70              | 12.7                   | 6.33                     | 18                | 25.7        | 3.70%     | 20                           | 4.5                 | 9.2                   | 7046.92                    | 7043.2                             | 7042.40              | 7046.59                    | 7042.7                             | 7041.45              |
| P78   | J33         | J34         |                  |                |                    | 1.35              | 13.4                   | 6.20                     | 18                | 151.5       | 1.95%     | 15                           | 8.4                 | 8.6                   | 7046.59                    | 7042.6                             | 7041.45              | 7043.51                    | 7039.8                             | 7038.50              |
| P90   | I40         | J34         | 1.67             | 14.9           | 10                 | 1.67              | 14.9                   | 5.93                     | 18                | 24.0        | 1.04%     | 11                           | 10                  | 6.9                   | 7043.24                    | 7040.0                             | 7038.75              | 7043.51                    | 7039.8                             | 7038.50              |
| P79   | J34         | J35         |                  |                |                    | 3.02              | 15.0                   | 5.92                     | 24                | 478.1       | 3.02%     | 39                           | 18                  | 12                    | 7043.51                    | 7039.5                             | 7038.00              | 7028.30                    | 7025.9                             | 7023.55              |
| P80   | J35         | J36         |                  |                |                    | 3.02              | 15.6                   | 5.81                     | 24                | 62.2        | 1.29%     | 26                           | 18                  | 5.6                   | 7028.30                    | 7025.8                             | 7023.55              | 7027.76                    | 7025.4                             | 7022.75              |
| P70   | I33         | J27         | 3.06             | 16.9           | 17                 | 3.06              | 16.9                   | 5.61                     | 18                | 52.9        | 0.76%     | 9.1                          | 17                  | 9.8                   | 7041.12                    | 7039.3                             | 7036.60              | 7040.47                    | 7037.9                             | 7036.20              |
| P71   | J27         | J28         |                  |                |                    | 3.06              | 17.0                   | 5.60                     | 18                | 244.9       | 2.35%     | 16                           | 17                  | 10                    | 7040.47                    | 7037.6                             | 7036.20              | 7035.51                    | 7031.8                             | 7030.45              |
| P85   | I34         | J28         | 2.95             | 15.4           | 17                 | 2.95              | 15.4                   | 5.84                     | 18                | 25.2        | 0.99%     | 11                           | 17                  | 9.8                   | 7035.22                    | 7032.8                             | 7030.70              | 7035.51                    | 7032.1                             | 7030.45              |
| P72   | J28         | J29         |                  |                |                    | 6.01              | 17.4                   | 5.54                     | 30                | 175.0       | 1.91%     | 57                           | 34                  | 12                    | 7035.51                    | 7031.4                             | 7029.45              | 7032.24                    | 7030.2                             | 7026.10              |
| P86   | I35         | J29         | 2.35             | 15.8           | 14                 | 2.35              | 15.8                   | 5.78                     | 24                | 45.2        | 1.00%     | 23                           | 14                  | 4.4                   | 7032.09                    | 7030.4                             | 7027.05              | 7032.24                    | 7030.2                             | 7026.60              |

PROJECT: **Rolling Hills Ranch Filing 2**

Date: 11/3/2020

| Label | Upstrm Node | Dnstrm Node | Inlet CA (acres) | Inlet Tc (min) | Inlet Flow (ft³/s) | System CA (acres) | System Flow Time (min) | System Intensity (in/hr) | Section Size (in) | Length (ft) | Slope (%) | Capacity (Full Flow) (ft³/s) | System Flow (ft³/s) | Velocity (Ave) (ft/s) | Elev. Ground (Upstrm) (ft) | Hydraulic Grade Line (Upstrm) (ft) | Invert (Upstrm) (ft) | Elev. Ground (Dnstrm) (ft) | Hydraulic Grade Line (Dnstrm) (ft) | Invert (Dnstrm) (ft) |
|-------|-------------|-------------|------------------|----------------|--------------------|-------------------|------------------------|--------------------------|-------------------|-------------|-----------|------------------------------|---------------------|-----------------------|----------------------------|------------------------------------|----------------------|----------------------------|------------------------------------|----------------------|
| P73   | J29         | J30         |                  |                |                    | 8.36              | 17.6                   | 5.50                     | 30                | 178.5       | 0.70%     | 34                           | 46                  | 9.4                   | 7032.24                    | 7029.9                             | 7026.10              | 7030.40                    | 7027.6                             | 7024.85              |
| P87   | I36         | J30         | 2.35             | 17.4           | 13                 | 2.35              | 17.4                   | 5.54                     | 18                | 24.7        | 1.01%     | 11                           | 13                  | 7.4                   | 7030.36                    | 7028.9                             | 7026.10              | 7030.40                    | 7028.5                             | 7025.85              |
| P88   | I37         | J30         | 1.30             | 17.9           | 7.2                | 1.30              | 17.9                   | 5.47                     | 18                | 4.67        | 5.35%     | 24                           | 7.2                 | 4.1                   | 7030.36                    | 7028.5                             | 7026.10              | 7030.40                    | 7028.5                             | 7025.85              |
| P74   | J30         | J31         |                  |                |                    | 12.01             | 18.0                   | 5.46                     | 36                | 43.7        | 1.03%     | 68                           | 66                  | 9.3                   | 7030.40                    | 7027.5                             | 7024.35              | 7030.41                    | 7027.0                             | 7023.90              |
| P75   | J31         | J36         |                  |                |                    | 12.01             | 18.0                   | 5.45                     | 42                | 272.0       | 0.79%     | 89                           | 66                  | 10                    | 7030.41                    | 7026.4                             | 7023.40              | 7027.76                    | 7025.4                             | 7021.25              |
| P91   | I41         | J36         | 2.64             | 20.4           | 14                 | 2.64              | 20.4                   | 5.14                     | 24                | 24.2        | 1.03%     | 23                           | 14                  | 7.6                   | 7027.99                    | 7024.3                             | 7023.00              | 7027.76                    | 7024.4                             | 7022.75              |
| P81   | J36         | J37         |                  |                |                    | 17.67             | 20.5                   | 5.13                     | 42                | 315.8       | 1.03%     | 102                          | 91                  | 12                    | 7027.76                    | 7024.2                             | 7021.25              | 7024.27                    | 7020.6                             | 7018.00              |
| P92   | I42         | J37         | 3.59             | 19.8           | 19                 | 3.59              | 19.8                   | 5.21                     | 24                | 106.0       | 1.04%     | 23                           | 19                  | 8.2                   | 7026.54                    | 7022.3                             | 7020.60              | 7024.27                    | 7021.7                             | 7019.50              |
| P82   | J37         | J38         |                  |                |                    | 21.26             | 20.9                   | 5.08                     | 48                | 201.2       | 1.22%     | 159                          | 109                 | 14                    | 7024.27                    | 7020.7                             | 7017.50              | 7022.16                    | 7017.5                             | 7015.05              |
| P93   | CB3         | J38         | 5.69             | 45.6           | 18                 | 5.69              | 45.6                   | 3.11                     | 24                | 112.2       | 1.52%     | 28                           | 18                  | 9.4                   | 7022.00                    | 7020.3                             | 7018.75              | 7022.16                    | 7018.2                             | 7017.05              |
| P94   | I43         | J38         | 1.59             | 24.7           | 7.5                | 1.59              | 24.7                   | 4.65                     | 18                | 13.2        | 1.14%     | 11                           | 7.5                 | 6.8                   | 7022.21                    | 7018.8                             | 7017.70              | 7022.16                    | 7018.5                             | 7017.55              |
| P83   | J38         | EJ01        |                  |                |                    | 28.54             | 45.8                   | 3.10                     | 54                | 226.9       | 2.39%     | 304                          | 89                  | 17                    | 7022.16                    | 7017.3                             | 7014.55              | 7018.68                    | 7012.9                             | 7009.12              |
|       |             |             |                  |                |                    |                   |                        |                          |                   |             |           |                              |                     |                       |                            |                                    |                      |                            |                                    |                      |

## Appendix B - HEC-HMS Data

## Input Data

### Rolling Hills Ranch Filing 2

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

| BASIN   | AREA   |                    | CURVE NO. | LAG TIME (min) |
|---------|--------|--------------------|-----------|----------------|
|         | (acre) | (mi <sup>2</sup> ) |           |                |
| INTERIM |        |                    |           |                |
| OS05    | 37     | 0.0578             | 61.0      | 15.2           |
| OS06    | 84     | 0.1313             | 61.0      | 18.7           |
| OS07a   | 11     | 0.0170             | 63.1      | 13.9           |
| OS07b   | 10     | 0.0156             | 63.1      | 10.9           |
| OS08    | 25     | 0.0397             | 65.7      | 15.9           |
| OS09    | 98     | 0.1527             | 65.0      | 29.5           |
| FG01    | 34     | 0.0531             | 66.4      | 33.8           |
| FG02    | 25     | 0.0391             | 64.4      | 16.1           |
| FG03    | 13     | 0.0203             | 68.0      | 11.6           |
| FG04    | 11     | 0.0172             | 68.0      | 7.6            |
| FG05    | 37     | 0.0580             | 70.1      | 28.7           |
| FG06    | 43     | 0.0677             | 66.1      | 21.2           |
| FG08A   | 48     | 0.0750             | 76.8      | 13.3           |
| FG08B   | 40     | 0.0630             | 76.7      | 16.6           |
| FG09    | 31     | 0.0484             | 71.7      | 20.8           |
| FG10a   | 52     | 0.0806             | 73.2      | 14.5           |
| FG10b   | 27     | 0.0416             | 71.4      | 20.0           |
| FG11    | 40     | 0.0625             | 78.2      | 23.2           |
| FG12    | 21     | 0.0328             | 80.0      | 16.1           |
| FG13    | 34     | 0.0534             | 66.3      | 29.6           |
| FG14    | 64     | 0.1000             | 74.6      | 26.4           |
| FG15    | 7      | 0.0103             | 78.6      | 15.6           |
| FG16    | 51     | 0.0791             | 78.8      | 13.0           |
| FG17a   | 44     | 0.0694             | 76.5      | 14.4           |
| FG17b   | 14     | 0.0214             | 79.9      | 11.4           |
| FG17c   | 20     | 0.0313             | 65.2      | 11.8           |
| FG18    | 41     | 0.0644             | 73.5      | 29.9           |
| FG19    | 34     | 0.0527             | 80.3      | 15.3           |
| FG19a   | 5      | 0.0077             | 75.2      | 16.4           |
| FG20    | 7      | 0.0109             | 92.9      | 10.1           |
| FG21a   | 6      | 0.0095             | 63.2      | 21.4           |
| FG21b   | 10     | 0.0150             | 72.9      | 12.7           |
| FG22    | 89     | 0.1397             | 67.9      | 20.3           |
| FG23a   | 14     | 0.0216             | 68.6      | 18.7           |
| FG23b   | 23     | 0.0359             | 61.8      | 21.5           |
| FG23c   | 5      | 0.0081             | 67.0      | 20.6           |
| FG24    | 89     | 0.1394             | 61.6      | 32.3           |
| FG25a   | 37     | 0.0583             | 67.0      | 19.0           |
| FG25b   | 32     | 0.0506             | 72.4      | 20.9           |
| FG28    | 4      | 0.0063             | 686.3     | 25.6           |
| FG29    | 64     | 0.0997             | 61.0      | 19.1           |
| FG30    | 25     | 0.0389             | 61.0      | 12.0           |
| FG31    | 59     | 0.0922             | 80.0      | 24.0           |
| FG32    | 26     | 0.0402             | 61.0      | 13.6           |
|         |        |                    |           |                |

| BASIN  | AREA   |                    | CURVE NO. | LAG TIME (min) |
|--------|--------|--------------------|-----------|----------------|
|        | (acre) | (mi <sup>2</sup> ) |           |                |
| FUTURE |        |                    |           |                |
| OS05   | 37     | 0.0578             | 61.0      | 15.2           |
| OS06   | 84     | 0.1313             | 61.0      | 18.7           |
| OS07a  | 11     | 0.0170             | 63.1      | 13.9           |
| OS07b  | 10     | 0.0156             | 63.1      | 10.9           |
| OS08   | 25     | 0.0397             | 65.7      | 15.9           |
| OS09   | 98     | 0.1527             | 65.0      | 29.5           |
| FG01   | 34     | 0.0531             | 66.4      | 33.8           |
| FG02   | 25     | 0.0391             | 64.4      | 16.1           |
| FG03   | 13     | 0.0203             | 68.0      | 11.6           |
| FG04   | 11     | 0.0172             | 68.0      | 7.6            |
| FG05   | 37     | 0.0580             | 70.1      | 28.7           |
| FG06   | 43     | 0.0677             | 66.1      | 21.2           |
| FG08A  | 48     | 0.0750             | 76.8      | 13.3           |
| FG08B  | 40     | 0.0630             | 76.7      | 16.6           |
| FG09   | 31     | 0.0484             | 71.7      | 20.8           |
| FG10a  | 52     | 0.0806             | 73.2      | 14.5           |
| FG10b  | 27     | 0.0416             | 71.4      | 20.0           |
| FG11   | 40     | 0.0625             | 78.2      | 23.2           |
| FG12   | 21     | 0.0328             | 80.0      | 16.1           |
| FG13   | 34     | 0.0534             | 66.3      | 29.6           |
| FG14   | 64     | 0.1000             | 74.6      | 26.4           |
| FG15   | 7      | 0.0103             | 78.6      | 15.6           |
| FG16   | 51     | 0.0791             | 78.8      | 13.0           |
| FG17a  | 44     | 0.0694             | 76.5      | 14.4           |
| FG17b  | 14     | 0.0214             | 79.9      | 11.4           |
| FG17c  | 20     | 0.0313             | 65.2      | 11.8           |
| FG18   | 41     | 0.0644             | 73.5      | 29.9           |
| FG19   | 34     | 0.0527             | 80.3      | 15.3           |
| FG19a  | 5      | 0.0077             | 75.2      | 16.4           |
| FG20   | 7      | 0.0109             | 92.9      | 10.1           |
| FG21a  | 6      | 0.0095             | 63.2      | 21.4           |
| FG21b  | 10     | 0.0150             | 72.9      | 12.7           |
| FG22   | 89     | 0.1397             | 67.9      | 20.3           |
| FG23a  | 14     | 0.0216             | 68.6      | 18.0           |
| FG23b  | 20     | 0.0305             | 66.3      | 16.5           |
| FG23c  | 8      | 0.0122             | 67.3      | 14.0           |
| FG24   | 88     | 0.1369             | 68.1      | 26.2           |
| FG25   | 70     | 0.1086             | 74.1      | 23.8           |
| FG26   | 55     | 0.0863             | 70.7      | 23.1           |
| FG27   | 32     | 0.0500             | 74.7      | 23.9           |
| FG28   | 16     | 0.0245             | 66.6      | 14.0           |
| FG29   | 64     | 0.0997             | 61.0      | 19.1           |
| FG30   | 25     | 0.0389             | 80.0      | 10.9           |
| FG31   | 59     | 0.0922             | 80.0      | 24.0           |
| FG32   | 26     | 0.0402             | 80.0      | 12.1           |
|        |        |                    |           |                |



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



## POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aeriels](#)

### PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup> |                                     |                        |                        |                        |                        |                        |                       |                       |                      |                      |
|--|-------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|----------------------|----------------------|
| Duration   | Average recurrence interval (years) |                        |                        |                        |                        |                        |                       |                       |                      |                      |
|  | 1                                   | 2                      | 5                      | 10                     | 25                     | 50                     | 100                   | 200                   | 500                  | 1000                 |
| 5-min  | 0.239<br>(0.190-0.301)              | 0.291<br>(0.232-0.367) | 0.381<br>(0.302-0.482) | 0.460<br>(0.363-0.585) | 0.576<br>(0.442-0.764) | 0.670<br>(0.501-0.899) | 0.770<br>(0.556-1.06) | 0.875<br>(0.606-1.23) | 1.02<br>(0.680-1.48) | 1.14<br>(0.737-1.66) |
| 10-min   | 0.349<br>(0.278-0.441)              | 0.426<br>(0.339-0.538) | 0.558<br>(0.443-0.706) | 0.674<br>(0.532-0.857) | 0.843<br>(0.647-1.12)  | 0.982<br>(0.734-1.32)  | 1.13<br>(0.814-1.55)  | 1.28<br>(0.888-1.80)  | 1.50<br>(0.996-2.16) | 1.67<br>(1.08-2.44)  |
| 15-min   | 0.426<br>(0.340-0.538)              | 0.519<br>(0.413-0.656) | 0.680<br>(0.540-0.861) | 0.822<br>(0.648-1.04)  | 1.03<br>(0.789-1.36)   | 1.20<br>(0.895-1.61)   | 1.37<br>(0.993-1.89)  | 1.56<br>(1.08-2.20)   | 1.82<br>(1.22-2.64)  | 2.03<br>(1.31-2.97)  |
| 30-min   | 0.608<br>(0.485-0.768)              | 0.741<br>(0.590-0.936) | 0.969<br>(0.769-1.23)  | 1.17<br>(0.923-1.49)   | 1.46<br>(1.12-1.94)    | 1.70<br>(1.27-2.28)    | 1.95<br>(1.41-2.68)   | 2.21<br>(1.53-3.12)   | 2.58<br>(1.72-3.73)  | 2.87<br>(1.86-4.20)  |
| 60-min   | 0.778<br>(0.620-0.982)              | 0.934<br>(0.744-1.18)  | 1.21<br>(0.962-1.54)   | 1.47<br>(1.16-1.86)    | 1.84<br>(1.42-2.46)    | 2.16<br>(1.62-2.91)    | 2.50<br>(1.81-3.44)   | 2.87<br>(1.99-4.05)   | 3.38<br>(2.26-4.91)  | 3.80<br>(2.46-5.56)  |
| 2-hr   | 0.948<br>(0.762-1.19)               | 1.13<br>(0.905-1.41)   | 1.46<br>(1.16-1.83)    | 1.76<br>(1.40-2.22)    | 2.23<br>(1.73-2.96)    | 2.62<br>(1.99-3.51)    | 3.05<br>(2.23-4.18)   | 3.52<br>(2.47-4.95)   | 4.19<br>(2.82-6.04)  | 4.73<br>(3.09-6.87)  |
| 3-hr   | 1.04<br>(0.839-1.29)                | 1.22<br>(0.986-1.52)   | 1.57<br>(1.26-1.96)    | 1.90<br>(1.51-2.38)    | 2.41<br>(1.90-3.21)    | 2.86<br>(2.18-3.83)    | 3.35<br>(2.47-4.59)   | 3.90<br>(2.75-5.47)   | 4.68<br>(3.18-6.75)  | 5.33<br>(3.50-7.71)  |
| 6-hr   | 1.21<br>(0.980-1.49)                | 1.40<br>(1.14-1.73)    | 1.78<br>(1.44-2.21)    | 2.16<br>(1.74-2.68)    | 2.76<br>(2.19-3.65)    | 3.29<br>(2.53-4.38)    | 3.88<br>(2.88-5.28)   | 4.53<br>(3.23-6.34)   | 5.49<br>(3.76-7.88)  | 6.29<br>(4.17-9.04)  |
| 12-hr  | 1.39<br>(1.14-1.70)                 | 1.62<br>(1.33-1.98)    | 2.06<br>(1.68-2.53)    | 2.48<br>(2.02-3.06)    | 3.16<br>(2.53-4.14)    | 3.76<br>(2.92-4.96)    | 4.42<br>(3.31-5.97)   | 5.15<br>(3.70-7.14)   | 6.22<br>(4.30-8.85)  | 7.10<br>(4.75-10.1)  |
| 24-hr  | 1.61<br>(1.33-1.95)                 | 1.88<br>(1.55-2.29)    | 2.39<br>(1.97-2.92)    | 2.88<br>(2.35-3.52)    | 3.63<br>(2.91-4.69)    | 4.27<br>(3.34-5.58)    | 4.98<br>(3.75-6.66)   | 5.75<br>(4.17-7.90)   | 6.87<br>(4.78-9.70)  | 7.79<br>(5.25-11.1)  |
| 2-day  | 1.86<br>(1.55-2.24)                 | 2.19<br>(1.83-2.64)    | 2.79<br>(2.31-3.36)    | 3.33<br>(2.75-4.04)    | 4.15<br>(3.35-5.30)    | 4.85<br>(3.81-6.25)    | 5.59<br>(4.25-7.39)   | 6.40<br>(4.67-8.70)   | 7.55<br>(5.30-10.6)  | 8.49<br>(5.77-12.0)  |
| 3-day  | 2.04<br>(1.71-2.45)                 | 2.41<br>(2.01-2.88)    | 3.05<br>(2.54-3.66)    | 3.63<br>(3.01-4.38)    | 4.51<br>(3.65-5.71)    | 5.24<br>(4.14-6.72)    | 6.03<br>(4.59-7.92)   | 6.87<br>(5.03-9.29)   | 8.07<br>(5.69-11.2)  | 9.04<br>(6.18-12.7)  |
| 4-day  | 2.20<br>(1.85-2.62)                 | 2.58<br>(2.16-3.08)    | 3.25<br>(2.72-3.89)    | 3.86<br>(3.21-4.63)    | 4.77<br>(3.87-6.01)    | 5.53<br>(4.38-7.06)    | 6.34<br>(4.85-8.31)   | 7.22<br>(5.31-9.73)   | 8.46<br>(5.98-11.7)  | 9.46<br>(6.50-13.2)  |
| 7-day  | 2.60<br>(2.20-3.08)                 | 3.00<br>(2.54-3.56)    | 3.71<br>(3.13-4.41)    | 4.36<br>(3.65-5.20)    | 5.33<br>(4.36-6.67)    | 6.14<br>(4.89-7.78)    | 7.00<br>(5.40-9.11)   | 7.93<br>(5.87-10.6)   | 9.26<br>(6.59-12.8)  | 10.3<br>(7.14-14.4)  |
| 10-day   | 2.96<br>(2.51-3.48)                 | 3.39<br>(2.88-4.00)    | 4.16<br>(3.52-4.92)    | 4.85<br>(4.08-5.76)    | 5.88<br>(4.82-7.31)    | 6.73<br>(5.38-8.48)    | 7.63<br>(5.91-9.88)   | 8.61<br>(6.39-11.5)   | 9.97<br>(7.13-13.7)  | 11.1<br>(7.70-15.4)  |
| 20-day   | 3.95<br>(3.38-4.61)                 | 4.55<br>(3.89-5.32)    | 5.57<br>(4.75-6.52)    | 6.44<br>(5.46-7.58)    | 7.68<br>(6.32-9.39)    | 8.67<br>(6.97-10.8)    | 9.69<br>(7.54-12.4)   | 10.8<br>(8.04-14.1)   | 12.2<br>(8.79-16.6)  | 13.3<br>(9.36-18.4)  |
| 30-day   | 4.75<br>(4.09-5.51)                 | 5.49<br>(4.72-6.38)    | 6.70<br>(5.74-7.81)    | 7.72<br>(6.58-9.04)    | 9.12<br>(7.52-11.1)    | 10.2<br>(8.24-12.6)    | 11.3<br>(8.83-14.3)   | 12.4<br>(9.32-16.2)   | 13.9<br>(10.1-18.7)  | 15.0<br>(10.6-20.6)  |
| 45-day   | 5.73<br>(4.96-6.62)                 | 6.62<br>(5.72-7.65)    | 8.05<br>(6.93-9.33)    | 9.21<br>(7.89-10.7)    | 10.8<br>(8.91-12.9)    | 12.0<br>(9.68-14.6)    | 13.1<br>(10.3-16.5)   | 14.3<br>(10.7-18.5)   | 15.8<br>(11.4-21.1)  | 16.9<br>(12.0-23.0)  |
| 60-day   | 6.56<br>(5.70-7.55)                 | 7.55<br>(6.55-8.69)    | 9.12<br>(7.88-10.5)    | 10.4<br>(8.92-12.0)    | 12.1<br>(9.98-14.4)    | 13.3<br>(10.8-16.1)    | 14.5<br>(11.4-18.1)   | 15.6<br>(11.8-20.2)   | 17.1<br>(12.5-22.8)  | 18.2<br>(12.9-24.8)  |

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

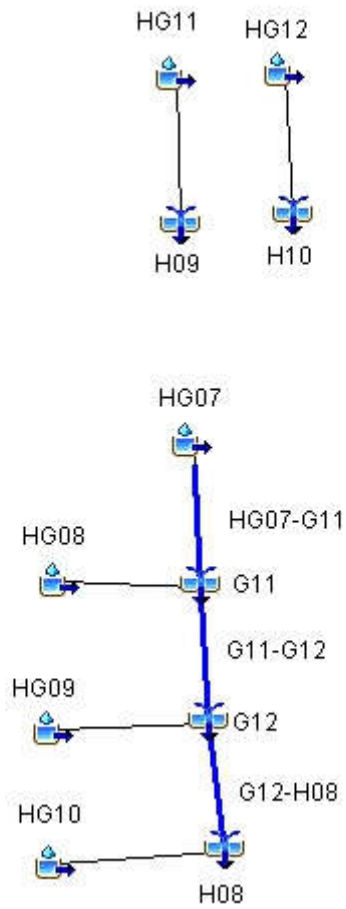
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| HISTORIC MDDP (100-YEAR) |                         |                           |                  |                             |
|--------------------------|-------------------------|---------------------------|------------------|-----------------------------|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

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

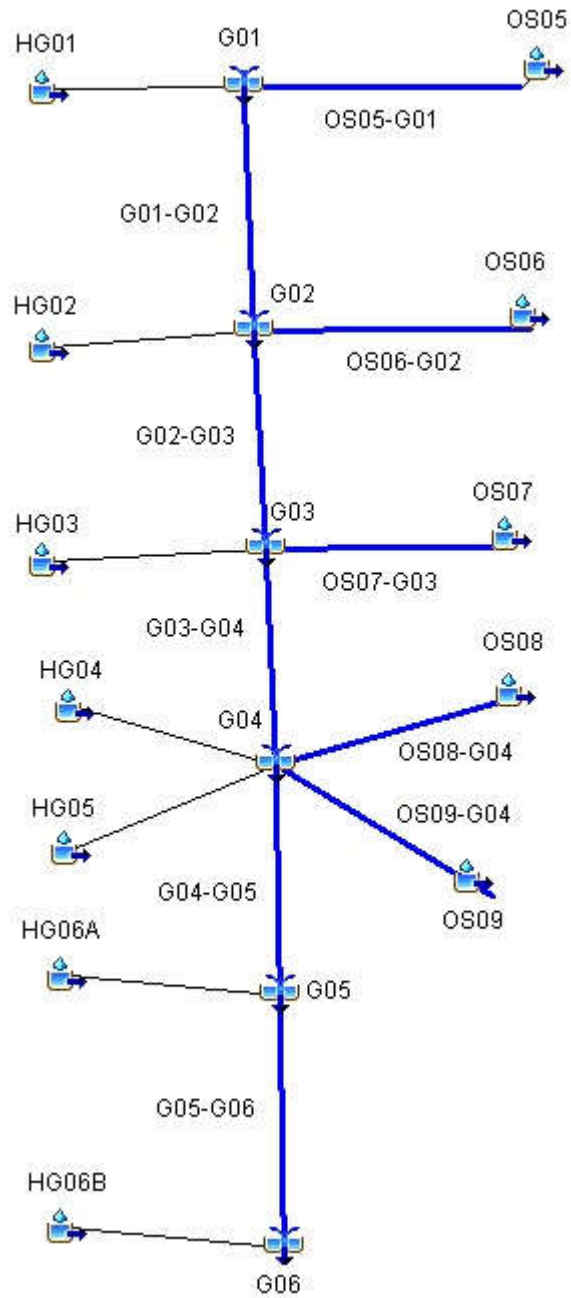
## HISTORIC



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

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

# GIECK. HISTORIC



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

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

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

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

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

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

| INTERIM MDDP (100-YEAR) |                         |                           |                  |                             |
|-------------------------|-------------------------|---------------------------|------------------|-----------------------------|
| HYDROLOGIC ELEMENT      | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q100 (AC. FT.) |
| OS06                    | 0.1313                  | 80                        | 01Jul2015, 12:12 | 9.3                         |
| G1a                     | 0.1313                  | 80                        | 01Jul2015, 12:12 | 9.3                         |
| G1a-G2                  | 0.1313                  | 79                        | 01Jul2015, 12:18 | 9.2                         |
| OS05                    | 0.0578                  | 39                        | 01Jul2015, 12:12 | 4.1                         |
| OS05-G1                 | 0.0578                  | 39                        | 01Jul2015, 12:12 | 4.1                         |
| FG01                    | 0.0531                  | 31                        | 01Jul2015, 12:30 | 4.8                         |
| FG01-G1                 | 0.0531                  | 31                        | 01Jul2015, 12:30 | 4.8                         |
| G1                      | 0.1109                  | 61                        | 01Jul2015, 12:18 | 8.9                         |
| G1-G2                   | 0.1109                  | 60                        | 01Jul2015, 12:18 | 8.9                         |
| FG02                    | 0.0391                  | 32                        | 01Jul2015, 12:12 | 3.3                         |
| G2                      | 0.2813                  | 166                       | 01Jul2015, 12:18 | 21.4                        |
| G2-G3                   | 0.2813                  | 163                       | 01Jul2015, 12:18 | 21.2                        |
| FG03                    | 0.0203                  | 24                        | 01Jul2015, 12:06 | 2.0                         |
| FG04                    | 0.0172                  | 22                        | 01Jul2015, 12:00 | 1.7                         |
| G3                      | 0.3188                  | 184                       | 01Jul2015, 12:18 | 24.9                        |
| G3-POND F               | 0.3188                  | 183                       | 01Jul2015, 12:18 | 24.9                        |
| FG06                    | 0.0677                  | 51                        | 01Jul2015, 12:18 | 6.1                         |
| FG05                    | 0.0580                  | 45                        | 01Jul2015, 12:24 | 6.1                         |
| OS07a                   | 0.0170                  | 14                        | 01Jul2015, 12:06 | 1.3                         |
| OS07a-POND F            | 0.0170                  | 13                        | 01Jul2015, 12:18 | 1.3                         |
| POND F IN               | 0.4615                  | 291                       | 01Jul2015, 12:18 | 38.4                        |
| POND F                  | 0.4615                  | 178                       | 01Jul2015, 12:42 | 36.0                        |
| POND F-G7               | 0.4615                  | 177                       | 01Jul2015, 12:42 | 35.7                        |
| OS07b                   | 0.0156                  | 15                        | 01Jul2015, 12:06 | 1.2                         |
| OS07b-G4                | 0.0156                  | 14                        | 01Jul2015, 12:12 | 1.2                         |
| FG21a                   | 0.0095                  | 6                         | 01Jul2015, 12:18 | 0.8                         |
| G4                      | 0.0251                  | 20                        | 01Jul2015, 12:12 | 2.0                         |
| G4-G7                   | 0.0251                  | 20                        | 01Jul2015, 12:18 | 1.9                         |
| FG21b                   | 0.0150                  | 21                        | 01Jul2015, 12:06 | 1.8                         |
| G7                      | 0.5016                  | 190                       | 01Jul2015, 12:42 | 39.5                        |
| G7-G8                   | 0.5016                  | 190                       | 01Jul2015, 12:48 | 39.1                        |
| FG22                    | 0.1397                  | 119                       | 01Jul2015, 12:12 | 13.6                        |
| OS08                    | 0.0397                  | 35                        | 01Jul2015, 12:12 | 3.5                         |
| OS08-G8                 | 0.0397                  | 34                        | 01Jul2015, 12:12 | 3.5                         |
| FG23a                   | 0.0177                  | 18                        | 01Jul2015, 12:12 | 1.9                         |
| G8                      | 0.6987                  | 261                       | 01Jul2015, 12:36 | 58.1                        |
| G8-G10                  | 0.6987                  | 260                       | 01Jul2015, 12:42 | 57.5                        |
| OS09                    | 0.1527                  | 90                        | 01Jul2015, 12:24 | 13.0                        |
| OS09-G9                 | 0.1527                  | 88                        | 01Jul2015, 12:36 | 12.8                        |
| FG24                    | 0.1394                  | 63                        | 01Jul2015, 12:30 | 10.1                        |
| G9                      | 0.2921                  | 150                       | 01Jul2015, 12:30 | 22.9                        |
| G9-G10                  | 0.2921                  | 149                       | 01Jul2015, 12:36 | 22.8                        |
| FG23b                   | 0.0359                  | 21                        | 01Jul2015, 12:18 | 2.6                         |
| G10                     | 1.0267                  | 413                       | 01Jul2015, 12:42 | 82.9                        |
| G10-G11                 | 1.0267                  | 413                       | 01Jul2015, 12:42 | 82.8                        |
| FG23c                   | 0.0081                  | 6                         | 01Jul2015, 12:12 | 0.8                         |
| G11                     | 1.0348                  | 415                       | 01Jul2015, 12:42 | 83.5                        |
| FG28                    | 0.0673                  | 38                        | 01Jul2015, 12:18 | 5.2                         |
| FG25a                   | 0.0583                  | 50                        | 01Jul2015, 12:12 | 5.5                         |



| INTERIM MDDP (100-YEAR) |                         |                           |                  |                             |
|-------------------------|-------------------------|---------------------------|------------------|-----------------------------|
| HYDROLOGIC ELEMENT      | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q100 (AC. FT.) |
| FG25a-POND G            | 0.0583                  | 48                        | 01Jul2015, 12:18 | 5.5                         |
| FG25b                   | 0.0506                  | 52                        | 01Jul2015, 12:12 | 5.9                         |
| POND G IN               | 1.2110                  | 491                       | 01Jul2015, 12:36 | 100.1                       |
| POND G                  | 1.2110                  | 369                       | 01Jul2015, 13:06 | 90.8                        |
| G12                     | 1.2110                  | 369                       | 01Jul2015, 13:06 | 90.8                        |
| G12-G06                 | 1.2110                  | 368                       | 01Jul2015, 13:06 | 90.2                        |
| FG29                    | 0.0997                  | 60                        | 01Jul2015, 12:12 | 7.1                         |
| FG32                    | 0.0402                  | 29                        | 01Jul2015, 12:06 | 2.9                         |
| FG32-G06                | 0.0402                  | 28                        | 01Jul2015, 12:12 | 2.8                         |
| G06                     | 1.3509                  | 388                       | 01Jul2015, 13:06 | 100.1                       |
| FG10A                   | 0.0806                  | 103                       | 01Jul2015, 12:06 | 9.7                         |
| FG08A                   | 0.0750                  | 116                       | 01Jul2015, 12:06 | 10.2                        |
| FG08A-G05               | 0.0750                  | 110                       | 01Jul2015, 12:12 | 10.2                        |
| FG08B                   | 0.0630                  | 86                        | 01Jul2015, 12:12 | 8.5                         |
| FG08B-G05               | 0.0630                  | 84                        | 01Jul2015, 12:12 | 8.5                         |
| FG11                    | 0.0625                  | 75                        | 01Jul2015, 12:18 | 8.9                         |
| FG09                    | 0.0484                  | 48                        | 01Jul2015, 12:12 | 5.5                         |
| FG09-G05                | 0.0484                  | 48                        | 01Jul2015, 12:18 | 5.5                         |
| FG10B                   | 0.0416                  | 42                        | 01Jul2015, 12:12 | 4.7                         |
| G05                     | 0.3711                  | 455                       | 01Jul2015, 12:12 | 47.3                        |
| FG13                    | 0.0534                  | 34                        | 01Jul2015, 12:24 | 4.8                         |
| FG12                    | 0.0328                  | 50                        | 01Jul2015, 12:12 | 5.0                         |
| POND D IN               | 0.4573                  | 531                       | 01Jul2015, 12:12 | 57.1                        |
| POND D                  | 0.4573                  | 134                       | 01Jul2015, 12:54 | 46.3                        |
| POND D-G17              | 0.4573                  | 133                       | 01Jul2015, 13:00 | 46.3                        |
| FG15                    | 0.0103                  | 15                        | 01Jul2015, 12:06 | 1.5                         |
| FG15-G17A               | 0.0103                  | 15                        | 01Jul2015, 12:12 | 1.5                         |
| G17A                    | 0.4676                  | 136                       | 01Jul2015, 12:54 | 47.8                        |
| FG14                    | 0.1000                  | 98                        | 01Jul2015, 12:18 | 12.5                        |
| G17                     | 0.5676                  | 201                       | 01Jul2015, 12:30 | 60.3                        |
| G17-G18                 | 0.5676                  | 199                       | 01Jul2015, 12:30 | 60.3                        |
| FG16                    | 0.0791                  | 133                       | 01Jul2015, 12:06 | 11.5                        |
| G18                     | 0.6467                  | 247                       | 01Jul2015, 12:24 | 71.8                        |
| G18-POND E              | 0.6467                  | 247                       | 01Jul2015, 12:24 | 71.7                        |
| FG31                    | 0.0922                  | 116                       | 01Jul2015, 12:18 | 13.9                        |
| FG30                    | 0.0389                  | 30                        | 01Jul2015, 12:06 | 2.8                         |
| FG30-PONDHS             | 0.0389                  | 28                        | 01Jul2015, 12:18 | 2.7                         |
| POND HS                 | 0.1311                  | 112                       | 01Jul2015, 12:30 | 16.6                        |
| FG17a                   | 0.0694                  | 101                       | 01Jul2015, 12:06 | 9.4                         |
| FG17a-POND E            | 0.0694                  | 99                        | 01Jul2015, 12:06 | 9.4                         |
| FG18                    | 0.0644                  | 56                        | 01Jul2015, 12:24 | 7.8                         |
| FG18-POND E             | 0.0644                  | 56                        | 01Jul2015, 12:24 | 7.8                         |
| FG19                    | 0.0527                  | 84                        | 01Jul2015, 12:06 | 8.1                         |
| FG17c                   | 0.0313                  | 31                        | 01Jul2015, 12:06 | 2.7                         |
| FG17b                   | 0.0214                  | 39                        | 01Jul2015, 12:06 | 3.2                         |
| POND E IN               | 1.0170                  | 556                       | 01Jul2015, 12:12 | 119.4                       |
| POND E                  | 1.0170                  | 231                       | 01Jul2015, 13:36 | 94.6                        |
| H08                     | 1.0170                  | 198                       | 01Jul2015, 13:36 | 82.9                        |
| H09                     | 0.0000                  | 33                        | 01Jul2015, 13:36 | 11.7                        |

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

| INTERIM MDDP (50-YEAR) |                         |                          |                  |                            |
|------------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q50 (AC. FT.) |
| OS06                   | 0.1313                  | 52                       | 01Jul2015, 12:12 | 6.5                        |
| G1a                    | 0.1313                  | 52                       | 01Jul2015, 12:12 | 6.5                        |
| G1a-G2                 | 0.1313                  | 52                       | 01Jul2015, 12:18 | 6.5                        |
| OS05                   | 0.0578                  | 26                       | 01Jul2015, 12:12 | 2.9                        |
| OS05-G1                | 0.0578                  | 25                       | 01Jul2015, 12:12 | 2.9                        |
| FG01                   | 0.0531                  | 22                       | 01Jul2015, 12:30 | 3.5                        |
| FG01-G1                | 0.0531                  | 22                       | 01Jul2015, 12:30 | 3.5                        |
| G1                     | 0.1109                  | 41                       | 01Jul2015, 12:18 | 6.4                        |
| G1-G2                  | 0.1109                  | 41                       | 01Jul2015, 12:18 | 6.4                        |
| FG02                   | 0.0391                  | 22                       | 01Jul2015, 12:12 | 2.4                        |
| G2                     | 0.2813                  | 112                      | 01Jul2015, 12:18 | 15.2                       |
| G2-G3                  | 0.2813                  | 108                      | 01Jul2015, 12:24 | 15.1                       |
| FG03                   | 0.0203                  | 17                       | 01Jul2015, 12:06 | 1.5                        |
| FG04                   | 0.0172                  | 16                       | 01Jul2015, 12:00 | 1.3                        |
| G3                     | 0.3188                  | 123                      | 01Jul2015, 12:18 | 17.8                       |
| G3-POND F              | 0.3188                  | 121                      | 01Jul2015, 12:18 | 17.8                       |
| FG06                   | 0.0677                  | 36                       | 01Jul2015, 12:18 | 4.5                        |
| FG05                   | 0.0580                  | 33                       | 01Jul2015, 12:24 | 4.6                        |
| OS07a                  | 0.0170                  | 9                        | 01Jul2015, 12:12 | 1.0                        |
| OS07a-POND F           | 0.0170                  | 9                        | 01Jul2015, 12:18 | 0.9                        |
| POND F IN              | 0.4615                  | 198                      | 01Jul2015, 12:18 | 27.8                       |
| POND F                 | 0.4615                  | 121                      | 01Jul2015, 12:42 | 25.8                       |
| POND F-G7              | 0.4615                  | 120.6                    | 01Jul2015, 12:48 | 25.6                       |
| OS07b                  | 0.0156                  | 10                       | 01Jul2015, 12:06 | 0.9                        |
| OS07b-G4               | 0.0156                  | 10                       | 01Jul2015, 12:12 | 0.9                        |
| FG21a                  | 0.0095                  | 4                        | 01Jul2015, 12:18 | 0.5                        |
| G4                     | 0.0251                  | 14                       | 01Jul2015, 12:12 | 1.4                        |
| G4-G7                  | 0.0251                  | 13                       | 01Jul2015, 12:24 | 1.4                        |
| FG21b                  | 0.0150                  | 15                       | 01Jul2015, 12:06 | 1.4                        |
| G7                     | 0.5016                  | 129                      | 01Jul2015, 12:48 | 28.3                       |
| G7-G8                  | 0.5016                  | 129                      | 01Jul2015, 12:54 | 28.0                       |
| FG22                   | 0.1397                  | 85                       | 01Jul2015, 12:12 | 10.0                       |
| OS08                   | 0.0397                  | 24                       | 01Jul2015, 12:12 | 2.6                        |
| OS08-G8                | 0.0397                  | 23                       | 01Jul2015, 12:12 | 2.6                        |
| FG23a                  | 0.0177                  | 13                       | 01Jul2015, 12:12 | 1.4                        |
| G8                     | 0.6987                  | 170                      | 01Jul2015, 12:48 | 42.1                       |
| G8-G10                 | 0.6987                  | 169.6                    | 01Jul2015, 12:54 | 41.5                       |
| OS09                   | 0.1527                  | 62                       | 01Jul2015, 12:24 | 9.4                        |
| OS09-G9                | 0.1527                  | 62                       | 01Jul2015, 12:36 | 9.3                        |
| FG24                   | 0.1394                  | 42                       | 01Jul2015, 12:30 | 7.1                        |
| G9                     | 0.2921                  | 102                      | 01Jul2015, 12:36 | 16.4                       |
| G9-G10                 | 0.2921                  | 101                      | 01Jul2015, 12:36 | 16.3                       |
| FG23b                  | 0.0359                  | 14                       | 01Jul2015, 12:18 | 1.9                        |
| G10                    | 1.0267                  | 261                      | 01Jul2015, 12:48 | 59.7                       |
| G10-G11                | 1.0267                  | 257                      | 01Jul2015, 12:54 | 59.6                       |
| FG23c                  | 0.0081                  | 5                        | 01Jul2015, 12:18 | 0.6                        |
| G11                    | 1.0348                  | 259                      | 01Jul2015, 12:54 | 60.1                       |
| FG28                   | 0.0673                  | 26                       | 01Jul2015, 12:24 | 3.7                        |
| FG25a                  | 0.0583                  | 35                       | 01Jul2015, 12:12 | 4.0                        |

| INTERIM MDDP (50-YEAR) |                         |                          |                  |                            |
|------------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q50 (AC. FT.) |
| FG25a-POND G           | 0.0583                  | 34                       | 01Jul2015, 12:18 | 4.0                        |
| FG25b                  | 0.0506                  | 38                       | 01Jul2015, 12:12 | 4.5                        |
| POND G IN              | 1.2110                  | 309                      | 01Jul2015, 12:30 | 72.3                       |
| POND G                 | 1.2110                  | 218                      | 01Jul2015, 13:18 | 63.6                       |
| G12                    | 1.2110                  | 218                      | 01Jul2015, 13:18 | 63.6                       |
| G12-G06                | 1.2110                  | 217                      | 01Jul2015, 13:24 | 63.2                       |
| FG29                   | 0.0997                  | 39                       | 01Jul2015, 12:18 | 5.0                        |
| FG32                   | 0.0402                  | 19                       | 01Jul2015, 12:12 | 2.0                        |
| FG32-G06               | 0.0402                  | 19                       | 01Jul2015, 12:12 | 2.0                        |
| G06                    | 1.3509                  | 228                      | 01Jul2015, 13:24 | 70.1                       |
| FG10A                  | 0.0806                  | 77                       | 01Jul2015, 12:06 | 7.4                        |
| FG08A                  | 0.0750                  | 90                       | 01Jul2015, 12:06 | 7.9                        |
| FG08A-G05              | 0.0750                  | 86                       | 01Jul2015, 12:12 | 7.9                        |
| FG08B                  | 0.0630                  | 67                       | 01Jul2015, 12:12 | 6.6                        |
| FG08B-G05              | 0.0630                  | 65                       | 01Jul2015, 12:12 | 6.6                        |
| FG11                   | 0.0625                  | 59                       | 01Jul2015, 12:18 | 7.0                        |
| FG09                   | 0.0484                  | 36                       | 01Jul2015, 12:12 | 4.1                        |
| FG09-G05               | 0.0484                  | 36                       | 01Jul2015, 12:18 | 4.1                        |
| FG10B                  | 0.0416                  | 31                       | 01Jul2015, 12:12 | 3.5                        |
| G05                    | 0.3711                  | 347                      | 01Jul2015, 12:12 | 36.4                       |
| FG13                   | 0.0534                  | 24                       | 01Jul2015, 12:24 | 3.5                        |
| FG12                   | 0.0328                  | 40                       | 01Jul2015, 12:12 | 3.9                        |
| POND D IN              | 0.4573                  | 405                      | 01Jul2015, 12:12 | 43.9                       |
| POND D                 | 0.4573                  | 90                       | 01Jul2015, 13:06 | 34.2                       |
| POND D-G17             | 0.4573                  | 90                       | 01Jul2015, 13:06 | 34.2                       |
| FG15                   | 0.0103                  | 12                       | 01Jul2015, 12:12 | 1.2                        |
| FG15-G17A              | 0.0103                  | 12                       | 01Jul2015, 12:12 | 1.2                        |
| G17A                   | 0.4676                  | 92                       | 01Jul2015, 13:06 | 35.3                       |
| FG14                   | 0.1000                  | 74                       | 01Jul2015, 12:18 | 9.6                        |
| G17                    | 0.5676                  | 134                      | 01Jul2015, 12:36 | 45.0                       |
| G17-G18                | 0.5676                  | 134                      | 01Jul2015, 12:36 | 44.9                       |
| FG16                   | 0.0791                  | 104                      | 01Jul2015, 12:06 | 9.0                        |
| G18                    | 0.6467                  | 179                      | 01Jul2015, 12:12 | 54.0                       |
| G18-POND E             | 0.6467                  | 177                      | 01Jul2015, 12:12 | 53.9                       |
| FG31                   | 0.0922                  | 92                       | 01Jul2015, 12:18 | 11.0                       |
| FG30                   | 0.0389                  | 20                       | 01Jul2015, 12:06 | 1.9                        |
| FG30-PONDHS            | 0.0389                  | 19                       | 01Jul2015, 12:18 | 1.9                        |
| POND HS                | 0.1311                  | 63                       | 01Jul2015, 12:36 | 12.9                       |
| FG17a                  | 0.0694                  | 78                       | 01Jul2015, 12:06 | 7.3                        |
| FG17a-POND E           | 0.0694                  | 76                       | 01Jul2015, 12:06 | 7.3                        |
| FG18                   | 0.0644                  | 42                       | 01Jul2015, 12:24 | 5.9                        |
| FG18-POND E            | 0.0644                  | 42                       | 01Jul2015, 12:24 | 5.9                        |
| FG19                   | 0.0527                  | 66                       | 01Jul2015, 12:06 | 6.4                        |
| FG17c                  | 0.0313                  | 22                       | 01Jul2015, 12:06 | 2.0                        |
| FG17b                  | 0.0214                  | 31                       | 01Jul2015, 12:06 | 2.6                        |
| POND E IN              | 1.0170                  | 424                      | 01Jul2015, 12:12 | 90.8                       |
| POND E                 | 1.0170                  | 141                      | 01Jul2015, 14:06 | 66.9                       |
| H08                    | 1.0170                  | 127                      | 01Jul2015, 14:06 | 58.8                       |
| H09                    | 0.0000                  | 14                       | 01Jul2015, 14:06 | 8.1                        |
|                        |                         |                          |                  |                            |

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

| INTERIM MDDP (10-YEAR) |                         |                          |                  |                            |
|------------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q10 (AC. FT.) |
| OS06                   | 0.1313                  | 12                       | 01Jul2015, 12:18 | 2.2                        |
| G1a                    | 0.1313                  | 12                       | 01Jul2015, 12:18 | 2.2                        |
| G1a-G2                 | 0.1313                  | 11                       | 01Jul2015, 12:24 | 2.1                        |
| OS05                   | 0.0578                  | 6                        | 01Jul2015, 12:12 | 1.0                        |
| OS05-G1                | 0.0578                  | 6                        | 01Jul2015, 12:18 | 1.0                        |
| FG01                   | 0.0531                  | 7                        | 01Jul2015, 12:36 | 1.4                        |
| FG01-G1                | 0.0531                  | 7                        | 01Jul2015, 12:36 | 1.4                        |
| G1                     | 0.1109                  | 11                       | 01Jul2015, 12:24 | 2.3                        |
| G1-G2                  | 0.1109                  | 11                       | 01Jul2015, 12:30 | 2.3                        |
| FG02                   | 0.0391                  | 6                        | 01Jul2015, 12:12 | 0.9                        |
| G2                     | 0.2813                  | 27                       | 01Jul2015, 12:24 | 5.3                        |
| G2-G3                  | 0.2813                  | 27                       | 01Jul2015, 12:30 | 5.3                        |
| FG03                   | 0.0203                  | 6                        | 01Jul2015, 12:06 | 0.6                        |
| FG04                   | 0.0172                  | 6                        | 01Jul2015, 12:06 | 0.5                        |
| G3                     | 0.3188                  | 31                       | 01Jul2015, 12:30 | 6.4                        |
| G3-POND F              | 0.3188                  | 31                       | 01Jul2015, 12:30 | 6.4                        |
| FG06                   | 0.0677                  | 11                       | 01Jul2015, 12:18 | 1.7                        |
| FG05                   | 0.0580                  | 12                       | 01Jul2015, 12:24 | 2.0                        |
| OS07a                  | 0.0170                  | 2                        | 01Jul2015, 12:12 | 0.3                        |
| OS07a-POND F           | 0.0170                  | 2                        | 01Jul2015, 12:24 | 0.3                        |
| POND F IN              | 0.4615                  | 54                       | 01Jul2015, 12:30 | 10.4                       |
| POND F                 | 0.4615                  | 16                       | 01Jul2015, 13:48 | 9.1                        |
| POND F-G7              | 0.4615                  | 16                       | 01Jul2015, 14:00 | 9.0                        |
| OS07b                  | 0.0156                  | 2.6                      | 01Jul2015, 12:06 | 0.3                        |
| OS07b-G4               | 0.0156                  | 2                        | 01Jul2015, 12:18 | 0.3                        |
| FG21a                  | 0.0095                  | 1                        | 01Jul2015, 12:18 | 0.2                        |
| G4                     | 0.0251                  | 3.6                      | 01Jul2015, 12:18 | 0.5                        |
| G4-G7                  | 0.0251                  | 3                        | 01Jul2015, 12:30 | 0.5                        |
| FG21b                  | 0.0150                  | 6                        | 01Jul2015, 12:06 | 0.6                        |
| G7                     | 0.5016                  | 18                       | 01Jul2015, 13:42 | 10.1                       |
| G7-G8                  | 0.5016                  | 18                       | 01Jul2015, 13:48 | 9.9                        |
| FG22                   | 0.1397                  | 29                       | 01Jul2015, 12:18 | 4.1                        |
| OS08                   | 0.0397                  | 7.5                      | 01Jul2015, 12:12 | 1.0                        |
| OS08-G8                | 0.0397                  | 7.3                      | 01Jul2015, 12:18 | 1.0                        |
| FG23a                  | 0.0177                  | 5                        | 01Jul2015, 12:12 | 0.6                        |
| G8                     | 0.6987                  | 46                       | 01Jul2015, 12:18 | 15.6                       |
| G8-G10                 | 0.6987                  | 45.2                     | 01Jul2015, 12:30 | 15.2                       |
| OS09                   | 0.1527                  | 18                       | 01Jul2015, 12:30 | 3.5                        |
| OS09-G9                | 0.1527                  | 18                       | 01Jul2015, 12:42 | 3.5                        |
| FG24                   | 0.1394                  | 9.9                      | 01Jul2015, 12:36 | 2.4                        |
| G9                     | 0.2921                  | 28                       | 01Jul2015, 12:42 | 5.9                        |
| G9-G10                 | 0.2921                  | 28                       | 01Jul2015, 12:48 | 5.8                        |
| FG23b                  | 0.0359                  | 3                        | 01Jul2015, 12:24 | 0.6                        |
| G10                    | 1.0267                  | 65                       | 01Jul2015, 12:36 | 21.6                       |
| G10-G11                | 1.0267                  | 64.5                     | 01Jul2015, 12:42 | 21.5                       |
| FG23c                  | 0.0081                  | 2                        | 01Jul2015, 12:18 | 0.2                        |
| G11                    | 1.0348                  | 65                       | 01Jul2015, 12:42 | 21.8                       |
| FG28                   | 0.0673                  | 7                        | 01Jul2015, 12:24 | 1.3                        |
| FG25a                  | 0.0583                  | 12                       | 01Jul2015, 12:18 | 1.6                        |

| INTERIM MDDP (10-YEAR) |                         |                          |                  |                            |
|------------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q10 (AC. FT.) |
| FG25a-POND G           | 0.0583                  | 11                       | 01Jul2015, 12:18 | 1.6                        |
| FG25b                  | 0.0506                  | 16                       | 01Jul2015, 12:18 | 2.0                        |
| POND G IN              | 1.2110                  | 87                       | 01Jul2015, 12:36 | 26.7                       |
| POND G                 | 1.2110                  | 32                       | 01Jul2015, 15:12 | 19.5                       |
| G12                    | 1.2110                  | 32                       | 01Jul2015, 15:12 | 19.5                       |
| G12-G06                | 1.2110                  | 32                       | 01Jul2015, 15:24 | 19.3                       |
| FG29                   | 0.0997                  | 9                        | 01Jul2015, 12:18 | 1.6                        |
| FG32                   | 0.0402                  | 4                        | 01Jul2015, 12:12 | 0.7                        |
| FG32-G06               | 0.0402                  | 4                        | 01Jul2015, 12:18 | 0.7                        |
| G06                    | 1.3509                  | 33.9                     | 01Jul2015, 15:18 | 21.6                       |
| FG10A                  | 0.0806                  | 32                       | 01Jul2015, 12:12 | 3.3                        |
| FG08A                  | 0.0750                  | 41                       | 01Jul2015, 12:06 | 3.8                        |
| FG08A-G05              | 0.0750                  | 41                       | 01Jul2015, 12:12 | 3.8                        |
| FG08B                  | 0.0630                  | 31                       | 01Jul2015, 12:12 | 3.2                        |
| FG08B-G05              | 0.0630                  | 29.5                     | 01Jul2015, 12:18 | 3.2                        |
| FG11                   | 0.0625                  | 28.1                     | 01Jul2015, 12:18 | 3.4                        |
| FG09                   | 0.0484                  | 14                       | 01Jul2015, 12:18 | 1.8                        |
| FG09-G05               | 0.0484                  | 14                       | 01Jul2015, 12:18 | 1.8                        |
| FG10B                  | 0.0416                  | 12                       | 01Jul2015, 12:18 | 1.5                        |
| G05                    | 0.3711                  | 153                      | 01Jul2015, 12:12 | 17.1                       |
| FG13                   | 0.0534                  | 7                        | 01Jul2015, 12:30 | 1.4                        |
| FG12                   | 0.0328                  | 20                       | 01Jul2015, 12:12 | 2.0                        |
| POND D IN              | 0.4573                  | 177                      | 01Jul2015, 12:12 | 20.5                       |
| POND D                 | 0.4573                  | 18                       | 01Jul2015, 14:24 | 13.9                       |
| POND D-G17             | 0.4573                  | 18                       | 01Jul2015, 14:30 | 13.9                       |
| FG15                   | 0.0103                  | 6                        | 01Jul2015, 12:12 | 0.6                        |
| FG15-G17A              | 0.0103                  | 6                        | 01Jul2015, 12:12 | 0.6                        |
| G17A                   | 0.4676                  | 18                       | 01Jul2015, 14:18 | 14.4                       |
| FG14                   | 0.1000                  | 32                       | 01Jul2015, 12:24 | 4.5                        |
| G17                    | 0.5676                  | 42                       | 01Jul2015, 12:24 | 18.9                       |
| G17-G18                | 0.5676                  | 42                       | 01Jul2015, 12:30 | 18.9                       |
| FG16                   | 0.0791                  | 50                       | 01Jul2015, 12:06 | 4.5                        |
| G18                    | 0.6467                  | 78.4                     | 01Jul2015, 12:12 | 23.4                       |
| G18-POND E             | 0.6467                  | 77                       | 01Jul2015, 12:12 | 23.4                       |
| FG31                   | 0.0922                  | 45                       | 01Jul2015, 12:18 | 5.6                        |
| FG30                   | 0.0389                  | 4                        | 01Jul2015, 12:12 | 0.7                        |
| FG30-PONDHS            | 0.0389                  | 4                        | 01Jul2015, 12:24 | 0.6                        |
| POND HS                | 0.1311                  | 28                       | 01Jul2015, 12:42 | 6.2                        |
| FG17a                  | 0.0694                  | 35                       | 01Jul2015, 12:06 | 3.5                        |
| FG17a-POND E           | 0.0694                  | 35                       | 01Jul2015, 12:12 | 3.5                        |
| FG18                   | 0.0644                  | 18                       | 01Jul2015, 12:24 | 2.7                        |
| FG18-POND E            | 0.0644                  | 17                       | 01Jul2015, 12:30 | 2.7                        |
| FG19                   | 0.0527                  | 33                       | 01Jul2015, 12:12 | 3.3                        |
| FG17c                  | 0.0313                  | 7                        | 01Jul2015, 12:06 | 0.8                        |
| FG17b                  | 0.0214                  | 16                       | 01Jul2015, 12:06 | 1.3                        |
| POND E IN              | 1.0170                  | 189.7                    | 01Jul2015, 12:12 | 41.1                       |
| POND E                 | 1.0170                  | 26                       | 01Jul2015, 18:24 | 20.7                       |
| H08                    | 1.0170                  | 20                       | 01Jul2015, 18:24 | 16.0                       |
| H09                    | 0.0000                  | 6                        | 01Jul2015, 18:24 | 4.7                        |
|                        |                         |                          |                  |                            |

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

| INTERIM MDDP (5-YEAR) |                         |                         |                  |                           |
|-----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q5 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q5 (AC. FT.) |
| OS06                  | 0.1313                  | 3.8                     | 01Jul2015, 12:24 | 1.1                       |
| G1a                   | 0.1313                  | 3.8                     | 01Jul2015, 12:24 | 1.1                       |
| G1a-G2                | 0.1313                  | 3.6                     | 01Jul2015, 12:36 | 1.1                       |
| OS05                  | 0.0578                  | 1.8                     | 01Jul2015, 12:18 | 0.5                       |
| OS05-G1               | 0.0578                  | 1.7                     | 01Jul2015, 12:24 | 0.5                       |
| FG01                  | 0.0531                  | 3.3                     | 01Jul2015, 12:36 | 0.8                       |
| FG01-G1               | 0.0531                  | 3.3                     | 01Jul2015, 12:36 | 0.8                       |
| G1                    | 0.1109                  | 4.8                     | 01Jul2015, 12:36 | 1.3                       |
| G1-G2                 | 0.1109                  | 4.8                     | 01Jul2015, 12:36 | 1.3                       |
| FG02                  | 0.0391                  | 2.6                     | 01Jul2015, 12:18 | 0.5                       |
| G2                    | 0.2813                  | 10                      | 01Jul2015, 12:30 | 2.9                       |
| G2-G3                 | 0.2813                  | 10                      | 01Jul2015, 12:42 | 2.8                       |
| FG03                  | 0.0203                  | 3.0                     | 01Jul2015, 12:06 | 0.4                       |
| FG04                  | 0.0172                  | 3.1                     | 01Jul2015, 12:06 | 0.3                       |
| G3                    | 0.3188                  | 12                      | 01Jul2015, 12:36 | 3.5                       |
| G3-POND F             | 0.3188                  | 12                      | 01Jul2015, 12:42 | 3.5                       |
| FG06                  | 0.0677                  | 5.3                     | 01Jul2015, 12:24 | 1.0                       |
| FG05                  | 0.0580                  | 6.7                     | 01Jul2015, 12:30 | 1.2                       |
| OS07a                 | 0.0170                  | 0.9                     | 01Jul2015, 12:12 | 0.2                       |
| OS07a-POND F          | 0.0170                  | 0.9                     | 01Jul2015, 12:36 | 0.2                       |
| POND F IN             | 0.4615                  | 23.1                    | 01Jul2015, 12:36 | 5.9                       |
| POND F                | 0.4615                  | 8.1                     | 01Jul2015, 14:18 | 4.8                       |
| POND F-G7             | 0.4615                  | 8.1                     | 01Jul2015, 14:24 | 4.8                       |
| OS07b                 | 0.0156                  | 1.0                     | 01Jul2015, 12:12 | 0.2                       |
| OS07b-G4              | 0.0156                  | 0.9                     | 01Jul2015, 12:24 | 0.2                       |
| FG21a                 | 0.0095                  | 0.4                     | 01Jul2015, 12:24 | 0.1                       |
| G4                    | 0.0251                  | 1.4                     | 01Jul2015, 12:24 | 0.3                       |
| G4-G7                 | 0.0251                  | 1.3                     | 01Jul2015, 12:36 | 0.3                       |
| FG21b                 | 0.0150                  | 3.8                     | 01Jul2015, 12:06 | 0.4                       |
| G7                    | 0.5016                  | 8.8                     | 01Jul2015, 14:18 | 5.4                       |
| G7-G8                 | 0.5016                  | 8.8                     | 01Jul2015, 14:30 | 5.3                       |
| FG22                  | 0.1397                  | 14.9                    | 01Jul2015, 12:18 | 2.5                       |
| OS08                  | 0.0397                  | 3.4                     | 01Jul2015, 12:12 | 0.6                       |
| OS08-G8               | 0.0397                  | 3.4                     | 01Jul2015, 12:18 | 0.6                       |
| FG23a                 | 0.0177                  | 3                       | 01Jul2015, 12:18 | 0.4                       |
| G8                    | 0.6987                  | 24                      | 01Jul2015, 12:24 | 8.7                       |
| G8-G10                | 0.6987                  | 23.3                    | 01Jul2015, 12:36 | 8.5                       |
| OS09                  | 0.1527                  | 8                       | 01Jul2015, 12:36 | 2.0                       |
| OS09-G9               | 0.1527                  | 8                       | 01Jul2015, 12:54 | 2.0                       |
| FG24                  | 0.1394                  | 3.7                     | 01Jul2015, 12:42 | 1.3                       |
| G9                    | 0.2921                  | 12                      | 01Jul2015, 12:48 | 3.2                       |
| G9-G10                | 0.2921                  | 12                      | 01Jul2015, 13:00 | 3.2                       |
| FG23b                 | 0.0359                  | 1                       | 01Jul2015, 12:30 | 0.3                       |
| G10                   | 1.0267                  | 29                      | 01Jul2015, 12:48 | 12.0                      |
| G10-G11               | 1.0267                  | 28.8                    | 01Jul2015, 12:48 | 11.9                      |
| FG23c                 | 0.0081                  | 1                       | 01Jul2015, 12:18 | 0.1                       |
| G11                   | 1.0348                  | 29                      | 01Jul2015, 12:48 | 12.0                      |
| FG28                  | 0.0673                  | 3                       | 01Jul2015, 12:30 | 0.7                       |
| FG25a                 | 0.0583                  | 6                       | 01Jul2015, 12:18 | 1.0                       |

| INTERIM MDDP (5-YEAR) |                         |                         |                  |                           |
|-----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q5 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q5 (AC. FT.) |
| FG25a-POND G          | 0.0583                  | 5                       | 01Jul2015, 12:18 | 0.9                       |
| FG25b                 | 0.0506                  | 9                       | 01Jul2015, 12:18 | 1.3                       |
| POND G IN             | 1.2110                  | 40                      | 01Jul2015, 12:42 | 15.0                      |
| POND G                | 1.2110                  | 12                      | 01Jul2015, 18:24 | 8.4                       |
| G12                   | 1.2110                  | 12                      | 01Jul2015, 18:24 | 8.4                       |
| G12-G06               | 1.2110                  | 12                      | 01Jul2015, 18:36 | 8.2                       |
| FG29                  | 0.0997                  | 3                       | 01Jul2015, 12:24 | 0.9                       |
| FG32                  | 0.0402                  | 1                       | 01Jul2015, 12:18 | 0.3                       |
| FG32-G06              | 0.0402                  | 1                       | 01Jul2015, 12:24 | 0.3                       |
| G06                   | 1.3509                  | 13                      | 01Jul2015, 18:30 | 9.4                       |
| FG10A                 | 0.0806                  | 20                      | 01Jul2015, 12:12 | 2.2                       |
| FG08A                 | 0.0750                  | 27                      | 01Jul2015, 12:06 | 2.6                       |
| FG08A-G05             | 0.0750                  | 27                      | 01Jul2015, 12:12 | 2.6                       |
| FG08B                 | 0.0630                  | 20                      | 01Jul2015, 12:12 | 2.2                       |
| FG08B-G05             | 0.0630                  | 19                      | 01Jul2015, 12:18 | 2.2                       |
| FG11                  | 0.0625                  | 19                      | 01Jul2015, 12:18 | 2.4                       |
| FG09                  | 0.0484                  | 8                       | 01Jul2015, 12:18 | 1.2                       |
| FG09-G05              | 0.0484                  | 8                       | 01Jul2015, 12:24 | 1.2                       |
| FG10B                 | 0.0416                  | 7                       | 01Jul2015, 12:18 | 1.0                       |
| G05                   | 0.3711                  | 95                      | 01Jul2015, 12:12 | 11.4                      |
| FG13                  | 0.0534                  | 4                       | 01Jul2015, 12:30 | 0.8                       |
| FG12                  | 0.0328                  | 14                      | 01Jul2015, 12:12 | 1.4                       |
| POND D IN             | 0.4573                  | 111                     | 01Jul2015, 12:12 | 13.6                      |
| POND D                | 0.4573                  | 11                      | 01Jul2015, 14:48 | 8.2                       |
| POND D-G17            | 0.4573                  | 11                      | 01Jul2015, 14:48 | 8.2                       |
| FG15                  | 0.0103                  | 4                       | 01Jul2015, 12:12 | 0.4                       |
| FG15-G17A             | 0.0103                  | 4                       | 01Jul2015, 12:12 | 0.4                       |
| G17A                  | 0.4676                  | 11                      | 01Jul2015, 14:42 | 8.6                       |
| FG14                  | 0.1000                  | 20                      | 01Jul2015, 12:24 | 3.0                       |
| G17                   | 0.5676                  | 25                      | 01Jul2015, 12:24 | 11.6                      |
| G17-G18               | 0.5676                  | 25                      | 01Jul2015, 12:24 | 11.6                      |
| FG16                  | 0.0791                  | 34                      | 01Jul2015, 12:06 | 3.1                       |
| G18                   | 0.6467                  | 50                      | 01Jul2015, 12:12 | 14.7                      |
| G18-POND E            | 0.6467                  | 50                      | 01Jul2015, 12:12 | 14.7                      |
| FG31                  | 0.0922                  | 31                      | 01Jul2015, 12:18 | 3.9                       |
| FG30                  | 0.0389                  | 1                       | 01Jul2015, 12:12 | 0.3                       |
| FG30-PONDHS           | 0.0389                  | 1                       | 01Jul2015, 12:36 | 0.3                       |
| POND HS               | 0.1311                  | 19                      | 01Jul2015, 12:42 | 4.3                       |
| FG17a                 | 0.0694                  | 23                      | 01Jul2015, 12:12 | 2.4                       |
| FG17a-POND E          | 0.0694                  | 23                      | 01Jul2015, 12:12 | 2.4                       |
| FG18                  | 0.0644                  | 11                      | 01Jul2015, 12:30 | 1.8                       |
| FG18-POND E           | 0.0644                  | 11                      | 01Jul2015, 12:30 | 1.8                       |
| FG19                  | 0.0527                  | 23                      | 01Jul2015, 12:12 | 2.3                       |
| FG17c                 | 0.0313                  | 3                       | 01Jul2015, 12:12 | 0.4                       |
| FG17b                 | 0.0214                  | 11                      | 01Jul2015, 12:06 | 0.9                       |
| POND E IN             | 1.0170                  | 122                     | 01Jul2015, 12:12 | 26.7                      |
| POND E                | 1.0170                  | 13                      | 01Jul2015, 21:54 | 10.1                      |
| H08                   | 1.0170                  | 9                       | 01Jul2015, 21:54 | 7.1                       |
| H09                   | 0.0000                  | 4                       | 01Jul2015, 21:54 | 3.1                       |
|                       |                         |                         |                  |                           |

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

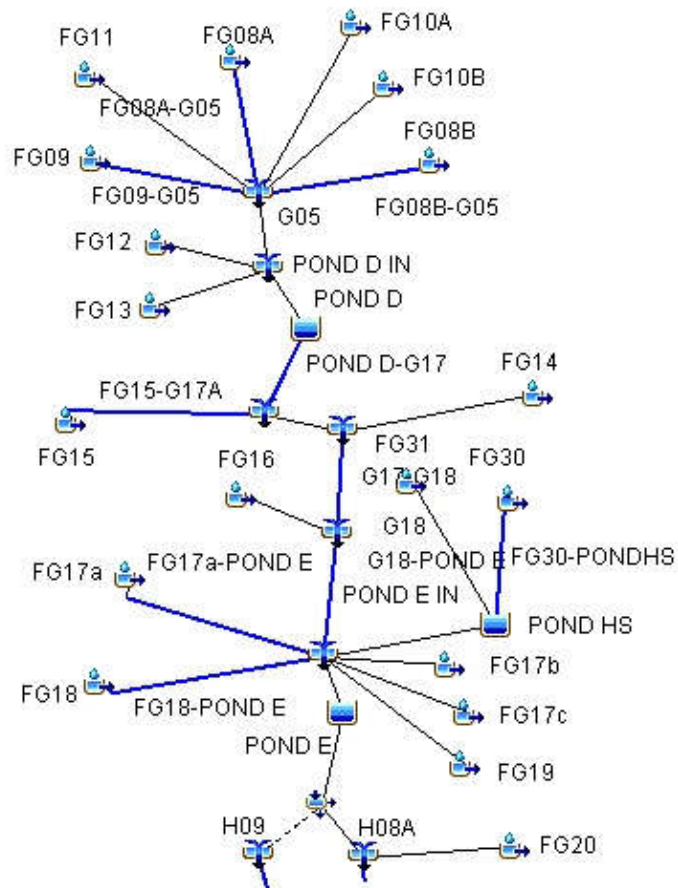
| INTERIM MDDP (2-YEAR) |                         |                         |                  |                           |
|-----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q2 (AC. FT.) |
| OS06                  | 0.1313                  | 0.5                     | 01Jul2015, 13:30 | 0.3                       |
| G1a                   | 0.1313                  | 0.5                     | 01Jul2015, 13:30 | 0.3                       |
| G1a-G2                | 0.1313                  | 0.5                     | 01Jul2015, 13:48 | 0.3                       |
| OS05                  | 0.0578                  | 0.2                     | 01Jul2015, 13:24 | 0.2                       |
| OS05-G1               | 0.0578                  | 0.2                     | 01Jul2015, 13:30 | 0.2                       |
| FG01                  | 0.0531                  | 0.9                     | 01Jul2015, 12:48 | 0.3                       |
| FG01-G1               | 0.0531                  | 0.9                     | 01Jul2015, 12:48 | 0.3                       |
| G1                    | 0.1109                  | 1.1                     | 01Jul2015, 12:54 | 0.5                       |
| G1-G2                 | 0.1109                  | 1.1                     | 01Jul2015, 13:00 | 0.5                       |
| FG02                  | 0.0391                  | 0.5                     | 01Jul2015, 12:36 | 0.2                       |
| G2                    | 0.2813                  | 1.9                     | 01Jul2015, 13:18 | 1.0                       |
| G2-G3                 | 0.2813                  | 1.9                     | 01Jul2015, 13:30 | 1.0                       |
| FG03                  | 0.0203                  | 0.8                     | 01Jul2015, 12:12 | 0.2                       |
| FG04                  | 0.0172                  | 0.9                     | 01Jul2015, 12:06 | 0.1                       |
| G3                    | 0.3188                  | 2.4                     | 01Jul2015, 13:24 | 1.3                       |
| G3-POND F             | 0.3188                  | 2.4                     | 01Jul2015, 13:30 | 1.3                       |
| FG06                  | 0.0677                  | 1.3                     | 01Jul2015, 12:30 | 0.4                       |
| FG05                  | 0.0580                  | 2.4                     | 01Jul2015, 12:30 | 0.6                       |
| OS07a                 | 0.0170                  | 0.1                     | 01Jul2015, 12:48 | 0.1                       |
| OS07a-POND F          | 0.0170                  | 0.1                     | 01Jul2015, 13:24 | 0.1                       |
| POND F IN             | 0.4615                  | 5.0                     | 01Jul2015, 12:54 | 2.4                       |
| POND F                | 0.4615                  | 2.1                     | 01Jul2015, 17:54 | 1.6                       |
| POND F-G7             | 0.4615                  | 2.1                     | 01Jul2015, 18:06 | 1.5                       |
| OS07b                 | 0.0156                  | 0.1                     | 01Jul2015, 12:48 | 0.1                       |
| OS07b-G4              | 0.0156                  | 0.1                     | 01Jul2015, 13:06 | 0.1                       |
| FG21a                 | 0.0095                  | 0.1                     | 01Jul2015, 13:00 | 0.0                       |
| G4                    | 0.0251                  | 0.2                     | 01Jul2015, 13:06 | 0.1                       |
| G4-G7                 | 0.0251                  | 0.2                     | 01Jul2015, 13:30 | 0.1                       |
| FG21b                 | 0.0150                  | 1.6                     | 01Jul2015, 12:12 | 0.2                       |
| G7                    | 0.5016                  | 2.3                     | 01Jul2015, 17:42 | 1.8                       |
| G7-G8                 | 0.5016                  | 2.3                     | 01Jul2015, 18:00 | 1.7                       |
| FG22                  | 0.1397                  | 4.3                     | 01Jul2015, 12:24 | 1.1                       |
| OS08                  | 0.0397                  | 0.7                     | 01Jul2015, 12:24 | 0.2                       |
| OS08-G8               | 0.0397                  | 0.7                     | 01Jul2015, 12:30 | 0.2                       |
| FG23a                 | 0.0177                  | 1.0                     | 01Jul2015, 12:18 | 0.2                       |
| G8                    | 0.6987                  | 6.9                     | 01Jul2015, 12:30 | 3.3                       |
| G8-G10                | 0.6987                  | 6.6                     | 01Jul2015, 12:54 | 3.1                       |
| OS09                  | 0.1527                  | 1.9                     | 01Jul2015, 12:54 | 0.8                       |
| OS09-G9               | 0.1527                  | 1.9                     | 01Jul2015, 13:18 | 0.8                       |
| FG24                  | 0.1394                  | 0.7                     | 01Jul2015, 13:42 | 0.4                       |
| G9                    | 0.2921                  | 2.5                     | 01Jul2015, 13:24 | 1.2                       |
| G9-G10                | 0.2921                  | 2.5                     | 01Jul2015, 13:36 | 1.1                       |
| FG23b                 | 0.0359                  | 0.2                     | 01Jul2015, 13:18 | 0.1                       |
| G10                   | 1.0267                  | 7.3                     | 01Jul2015, 13:18 | 4.4                       |
| G10-G11               | 1.0267                  | 7.2                     | 01Jul2015, 13:24 | 4.3                       |
| FG23c                 | 0.0081                  | 0                       | 01Jul2015, 12:24 | 0.1                       |
| G11                   | 1.0348                  | 7                       | 01Jul2015, 13:24 | 4.4                       |
| FG28                  | 0.0673                  | 0                       | 01Jul2015, 13:12 | 0.3                       |
| FG25a                 | 0.0583                  | 1.5                     | 01Jul2015, 12:24 | 0.4                       |



| INTERIM MDDP (2-YEAR) |                         |                         |                  |                           |
|-----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q2 (AC. FT.) |
| FG25a-POND G          | 0.0583                  | 1                       | 01Jul2015, 12:30 | 0.4                       |
| FG25b                 | 0.0506                  | 4                       | 01Jul2015, 12:18 | 0.7                       |
| POND G IN             | 1.2110                  | 10                      | 01Jul2015, 13:00 | 5.7                       |
| POND G                | 1.2110                  | 4                       | 02Jul2015, 00:00 | 2.9                       |
| G12                   | 1.2110                  | 4                       | 02Jul2015, 00:00 | 2.9                       |
| G12-G06               | 1.2110                  | 4                       | 02Jul2015, 00:00 | 2.8                       |
| FG29                  | 0.0997                  | 0                       | 01Jul2015, 13:36 | 0.3                       |
| FG32                  | 0.0402                  | 0                       | 01Jul2015, 13:18 | 0.1                       |
| FG32-G06              | 0.0402                  | 0                       | 01Jul2015, 13:30 | 0.1                       |
| G06                   | 1.3509                  | 4                       | 01Jul2015, 23:48 | 3.1                       |
| FG10A                 | 0.0806                  | 9                       | 01Jul2015, 12:12 | 1.2                       |
| FG08A                 | 0.0750                  | 13                      | 01Jul2015, 12:12 | 1.5                       |
| FG08A-G05             | 0.0750                  | 13                      | 01Jul2015, 12:18 | 1.5                       |
| FG08B                 | 0.0630                  | 10                      | 01Jul2015, 12:12 | 1.2                       |
| FG08B-G05             | 0.0630                  | 10                      | 01Jul2015, 12:18 | 1.2                       |
| FG11                  | 0.0625                  | 10                      | 01Jul2015, 12:18 | 1.4                       |
| FG09                  | 0.0484                  | 3                       | 01Jul2015, 12:18 | 0.6                       |
| FG09-G05              | 0.0484                  | 3                       | 01Jul2015, 12:24 | 0.6                       |
| FG10B                 | 0.0416                  | 3                       | 01Jul2015, 12:18 | 0.5                       |
| G05                   | 0.3711                  | 46                      | 01Jul2015, 12:18 | 6.3                       |
| FG13                  | 0.0534                  | 1                       | 01Jul2015, 12:42 | 0.3                       |
| FG12                  | 0.0328                  | 8                       | 01Jul2015, 12:12 | 0.8                       |
| POND D IN             | 0.4573                  | 53                      | 01Jul2015, 12:18 | 7.5                       |
| POND D                | 0.4573                  | 4                       | 01Jul2015, 19:54 | 3.0                       |
| POND D-G17            | 0.4573                  | 4                       | 01Jul2015, 19:54 | 3.0                       |
| FG15                  | 0.0103                  | 2                       | 01Jul2015, 12:12 | 0.2                       |
| FG15-G17A             | 0.0103                  | 2                       | 01Jul2015, 12:12 | 0.2                       |
| G17A                  | 0.4676                  | 4                       | 01Jul2015, 19:48 | 3.3                       |
| FG14                  | 0.1000                  | 9                       | 01Jul2015, 12:24 | 1.6                       |
| G17                   | 0.5676                  | 12                      | 01Jul2015, 12:24 | 4.9                       |
| G17-G18               | 0.5676                  | 12                      | 01Jul2015, 12:30 | 4.9                       |
| FG16                  | 0.0791                  | 18                      | 01Jul2015, 12:06 | 1.9                       |
| G18                   | 0.6467                  | 25                      | 01Jul2015, 12:12 | 6.7                       |
| G18-POND E            | 0.6467                  | 25                      | 01Jul2015, 12:12 | 6.7                       |
| FG31                  | 0.0922                  | 17                      | 01Jul2015, 12:18 | 2.4                       |
| FG30                  | 0.0389                  | 0                       | 01Jul2015, 13:18 | 0.1                       |
| FG30-PONDHS           | 0.0389                  | 0                       | 01Jul2015, 13:48 | 0.1                       |
| POND HS               | 0.1311                  | 10                      | 01Jul2015, 12:42 | 2.5                       |
| FG17a                 | 0.0694                  | 12                      | 01Jul2015, 12:12 | 1.3                       |
| FG17a-POND E          | 0.0694                  | 12                      | 01Jul2015, 12:12 | 1.3                       |
| FG18                  | 0.0644                  | 5                       | 01Jul2015, 12:30 | 0.9                       |
| FG18-POND E           | 0.0644                  | 5                       | 01Jul2015, 12:30 | 0.9                       |
| FG19                  | 0.0527                  | 13                      | 01Jul2015, 12:12 | 1.4                       |
| FG17c                 | 0.0313                  | 1                       | 01Jul2015, 12:18 | 0.2                       |
| FG17b                 | 0.0214                  | 6                       | 01Jul2015, 12:06 | 0.6                       |
| POND E IN             | 1.0170                  | 63                      | 01Jul2015, 12:12 | 13.5                      |
| POND E                | 1.0170                  | 6                       | 02Jul2015, 00:00 | 4.7                       |
| H08                   | 1.0170                  | 3                       | 02Jul2015, 00:00 | 2.8                       |
| H09                   | 0.0000                  | 2                       | 02Jul2015, 00:00 | 1.9                       |
|                       |                         |                         |                  |                           |

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

# INTERIM CONDITIONS POND D & E NETWORK





| FUTURE MDDP (100-YEAR) |                         |                           |                  |                             |
|------------------------|-------------------------|---------------------------|------------------|-----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q100 (AC. FT.) |
| OS06                   | 0.1313                  | 80                        | 01Jul2015, 12:12 | 9.3                         |
| G1a                    | 0.1313                  | 80                        | 01Jul2015, 12:12 | 9.3                         |
| G1a-G2                 | 0.1313                  | 79                        | 01Jul2015, 12:18 | 9.2                         |
| OS05                   | 0.0578                  | 39                        | 01Jul2015, 12:12 | 4.1                         |
| OS05-G1                | 0.0578                  | 39                        | 01Jul2015, 12:12 | 4.1                         |
| FG01                   | 0.0531                  | 31                        | 01Jul2015, 12:30 | 4.8                         |
| FG01-G1                | 0.0531                  | 31                        | 01Jul2015, 12:30 | 4.8                         |
| G1                     | 0.1109                  | 61                        | 01Jul2015, 12:18 | 8.9                         |
| G1-G2                  | 0.1109                  | 60                        | 01Jul2015, 12:18 | 8.9                         |
| FG02                   | 0.0391                  | 32                        | 01Jul2015, 12:12 | 3.3                         |
| G2                     | 0.2813                  | 166                       | 01Jul2015, 12:18 | 21.4                        |
| G2-G3                  | 0.2813                  | 163                       | 01Jul2015, 12:18 | 21.2                        |
| FG03                   | 0.0203                  | 24                        | 01Jul2015, 12:06 | 2.0                         |
| FG04                   | 0.0172                  | 22                        | 01Jul2015, 12:00 | 1.7                         |
| G3                     | 0.3188                  | 184                       | 01Jul2015, 12:18 | 24.9                        |
| G3-POND F              | 0.3188                  | 183                       | 01Jul2015, 12:18 | 24.9                        |
| FG06                   | 0.0677                  | 51                        | 01Jul2015, 12:18 | 6.1                         |
| FG05                   | 0.0580                  | 45                        | 01Jul2015, 12:24 | 6.1                         |
| OS07a                  | 0.0170                  | 14                        | 01Jul2015, 12:06 | 1.3                         |
| OS07a-POND F           | 0.0170                  | 13                        | 01Jul2015, 12:18 | 1.3                         |
| POND F IN              | 0.4615                  | 291                       | 01Jul2015, 12:18 | 38.4                        |
| POND F                 | 0.4615                  | 178                       | 01Jul2015, 12:42 | 36.0                        |
| POND F-G7              | 0.4615                  | 177                       | 01Jul2015, 12:42 | 35.7                        |
| OS07b-G4               | 0.0156                  | 14                        | 01Jul2015, 12:12 | 1.2                         |
| FG21a                  | 0.0095                  | 6                         | 01Jul2015, 12:18 | 0.8                         |
| G4                     | 0.0251                  | 20                        | 01Jul2015, 12:12 | 2.0                         |
| G4-G7                  | 0.0251                  | 20                        | 01Jul2015, 12:18 | 1.9                         |
| FG21b                  | 0.0150                  | 21                        | 01Jul2015, 12:06 | 1.8                         |
| G7                     | 0.5016                  | 190                       | 01Jul2015, 12:42 | 39.5                        |
| G7-G8                  | 0.5016                  | 189                       | 01Jul2015, 12:42 | 39.3                        |
| FG22                   | 0.1397                  | 119                       | 01Jul2015, 12:12 | 13.6                        |
| OS08                   | 0.0397                  | 35                        | 01Jul2015, 12:12 | 3.5                         |
| OS08-G8                | 0.0397                  | 34                        | 01Jul2015, 12:12 | 3.5                         |
| FG23a                  | 0.0216                  | 21                        | 01Jul2015, 12:12 | 2.2                         |
| G8                     | 0.7026                  | 271                       | 01Jul2015, 12:30 | 58.6                        |
| G8-G10                 | 0.7026                  | 271                       | 01Jul2015, 12:36 | 58.0                        |
| OS09                   | 0.1527                  | 90                        | 01Jul2015, 12:24 | 13.0                        |
| OS09-G9                | 0.1527                  | 88                        | 01Jul2015, 12:36 | 12.8                        |
| FG24                   | 0.1369                  | 101                       | 01Jul2015, 12:18 | 13.4                        |
| G9                     | 0.2896                  | 179                       | 01Jul2015, 12:30 | 26.2                        |
| G9-G10                 | 0.2896                  | 179                       | 01Jul2015, 12:30 | 26.1                        |
| FG23b                  | 0.0305                  | 27                        | 01Jul2015, 12:12 | 2.8                         |
| G10                    | 1.0227                  | 450                       | 01Jul2015, 12:36 | 86.9                        |
| G10-G11                | 1.0227                  | 450                       | 01Jul2015, 12:36 | 86.7                        |
| FG23c                  | 0.0122                  | 12                        | 01Jul2015, 12:06 | 1.2                         |
| G11                    | 1.0349                  | 453                       | 01Jul2015, 12:36 | 87.8                        |
| FG25                   | 0.1086                  | 112                       | 01Jul2015, 12:18 | 13.4                        |
| FG26                   | 0.0863                  | 78                        | 01Jul2015, 12:18 | 9.4                         |
| FG26-POND G            | 0.0863                  | 77                        | 01Jul2015, 12:18 | 9.4                         |

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

| FUTURE MDDP (100-YEAR) |                         |                           |                  |                             |
|------------------------|-------------------------|---------------------------|------------------|-----------------------------|
| HYDROLOGIC ELEMENT     | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q100 (AC. FT.) |
| FG27                   | 0.0500                  | 52                        | 01Jul2015, 12:18 | 6.3                         |
| FG28                   | 0.0245                  | 24                        | 01Jul2015, 12:06 | 2.3                         |
| POND G IN              | 1.3043                  | 653                       | 01Jul2015, 12:24 | 119.1                       |
| POND G                 | 1.3043                  | 465                       | 01Jul2015, 12:54 | 109.6                       |
| G12                    | 1.3043                  | 465                       | 01Jul2015, 12:54 | 109.6                       |
| G12-G06                | 1.3043                  | 464                       | 01Jul2015, 13:00 | 108.9                       |
| FG29                   | 0.0997                  | 60                        | 01Jul2015, 12:12 | 7.1                         |
| FG32                   | 0.0402                  | 72                        | 01Jul2015, 12:06 | 6.1                         |
| FG32-G06               | 0.0402                  | 69                        | 01Jul2015, 12:06 | 6.1                         |
| G06                    | 1.4442                  | 493                       | 01Jul2015, 12:54 | 122.0                       |
| FG08A                  | 0.0750                  | 116                       | 01Jul2015, 12:06 | 10.2                        |
| FG08A-G05              | 0.0750                  | 110                       | 01Jul2015, 12:12 | 10.2                        |
| FG08B                  | 0.0630                  | 86                        | 01Jul2015, 12:12 | 8.5                         |
| FG08B-G05              | 0.0630                  | 84                        | 01Jul2015, 12:12 | 8.5                         |
| FG09                   | 0.0484                  | 48                        | 01Jul2015, 12:12 | 5.5                         |
| FG09-G05               | 0.0484                  | 48                        | 01Jul2015, 12:18 | 5.5                         |
| FG10B                  | 0.0416                  | 42                        | 01Jul2015, 12:12 | 4.7                         |
| G05                    | 0.2280                  | 282                       | 01Jul2015, 12:12 | 28.8                        |
| FG10A                  | 0.0806                  | 103                       | 01Jul2015, 12:06 | 9.7                         |
| FG11                   | 0.0625                  | 75                        | 01Jul2015, 12:18 | 8.9                         |
| FG13                   | 0.0534                  | 34                        | 01Jul2015, 12:24 | 4.8                         |
| FG12                   | 0.0328                  | 50                        | 01Jul2015, 12:12 | 5.0                         |
| POND D IN              | 0.4573                  | 531                       | 01Jul2015, 12:12 | 57.1                        |
| POND D                 | 0.4573                  | 134                       | 01Jul2015, 12:54 | 46.3                        |
| POND D-G17             | 0.4573                  | 133                       | 01Jul2015, 13:00 | 46.3                        |
| FG15                   | 0.0103                  | 15                        | 01Jul2015, 12:06 | 1.5                         |
| FG15-G17A              | 0.0103                  | 15                        | 01Jul2015, 12:12 | 1.5                         |
| G17A                   | 0.4676                  | 136                       | 01Jul2015, 12:54 | 47.8                        |
| FG14                   | 0.1000                  | 98                        | 01Jul2015, 12:18 | 12.5                        |
| G17                    | 0.5676                  | 201                       | 01Jul2015, 12:30 | 60.3                        |
| G17-G18                | 0.5676                  | 199                       | 01Jul2015, 12:30 | 60.3                        |
| FG16                   | 0.0791                  | 133                       | 01Jul2015, 12:06 | 11.5                        |
| G18                    | 0.6467                  | 247                       | 01Jul2015, 12:24 | 71.8                        |
| G18-POND E             | 0.6467                  | 247                       | 01Jul2015, 12:24 | 71.7                        |
| FG31                   | 0.0922                  | 116                       | 01Jul2015, 12:18 | 13.9                        |
| FG30                   | 0.0389                  | 73                        | 01Jul2015, 12:06 | 5.9                         |
| FG30-PONDHS            | 0.0389                  | 70                        | 01Jul2015, 12:12 | 5.8                         |
| POND HS                | 0.1311                  | 153                       | 01Jul2015, 12:24 | 19.7                        |
| FG17a                  | 0.0694                  | 101                       | 01Jul2015, 12:06 | 9.4                         |
| FG17a-POND E           | 0.0694                  | 99                        | 01Jul2015, 12:06 | 9.4                         |
| FG18                   | 0.0644                  | 56                        | 01Jul2015, 12:24 | 7.8                         |
| FG18-POND E            | 0.0644                  | 56                        | 01Jul2015, 12:24 | 7.8                         |
| FG19                   | 0.0527                  | 84                        | 01Jul2015, 12:06 | 8.1                         |
| FG17c                  | 0.0313                  | 31                        | 01Jul2015, 12:06 | 2.7                         |
| FG17b                  | 0.0214                  | 39                        | 01Jul2015, 12:06 | 3.2                         |
| POND E IN              | 1.0170                  | 618                       | 01Jul2015, 12:18 | 122.5                       |
| POND E                 | 1.0170                  | 240                       | 01Jul2015, 13:30 | 97.7                        |
| H08                    | 1.0170                  | 204                       | 01Jul2015, 13:30 | 85.3                        |
| H09                    | 0.0000                  | 36                        | 01Jul2015, 13:30 | 12.3                        |
|                        |                         |                           |                  |                             |

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

| FUTURE MDDP (50-YEAR) |                         |                          |                  |                            |
|-----------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q50 (AC. FT.) |
| OS06                  | 0.1313                  | 52                       | 01Jul2015, 12:12 | 6.5                        |
| G1a                   | 0.1313                  | 52                       | 01Jul2015, 12:12 | 6.5                        |
| G1a-G2                | 0.1313                  | 52                       | 01Jul2015, 12:18 | 6.5                        |
| OS05                  | 0.0578                  | 26                       | 01Jul2015, 12:12 | 2.9                        |
| OS05-G1               | 0.0578                  | 25                       | 01Jul2015, 12:12 | 2.9                        |
| FG01                  | 0.0531                  | 22                       | 01Jul2015, 12:30 | 3.5                        |
| FG01-G1               | 0.0531                  | 22                       | 01Jul2015, 12:30 | 3.5                        |
| G1                    | 0.1109                  | 41                       | 01Jul2015, 12:18 | 6.4                        |
| G1-G2                 | 0.1109                  | 41                       | 01Jul2015, 12:18 | 6.4                        |
| FG02                  | 0.0391                  | 22                       | 01Jul2015, 12:12 | 2.4                        |
| G2                    | 0.2813                  | 112                      | 01Jul2015, 12:18 | 15.2                       |
| G2-G3                 | 0.2813                  | 108                      | 01Jul2015, 12:24 | 15.1                       |
| FG03                  | 0.0203                  | 17                       | 01Jul2015, 12:06 | 1.5                        |
| FG04                  | 0.0172                  | 16                       | 01Jul2015, 12:00 | 1.3                        |
| G3                    | 0.3188                  | 123                      | 01Jul2015, 12:18 | 17.8                       |
| G3-POND F             | 0.3188                  | 121                      | 01Jul2015, 12:18 | 17.8                       |
| FG06                  | 0.0677                  | 36                       | 01Jul2015, 12:18 | 4.5                        |
| FG05                  | 0.0580                  | 33                       | 01Jul2015, 12:24 | 4.6                        |
| OS07a                 | 0.0170                  | 9                        | 01Jul2015, 12:12 | 1.0                        |
| OS07a-POND F          | 0.0170                  | 9                        | 01Jul2015, 12:18 | 0.9                        |
| POND F IN             | 0.4615                  | 198                      | 01Jul2015, 12:18 | 27.8                       |
| POND F                | 0.4615                  | 121                      | 01Jul2015, 12:42 | 25.8                       |
| POND F-G7             | 0.4615                  | 121                      | 01Jul2015, 12:48 | 25.6                       |
| OS07b-G4              | 0.0156                  | 10                       | 01Jul2015, 12:12 | 0.9                        |
| FG21a                 | 0.0095                  | 4                        | 01Jul2015, 12:18 | 0.5                        |
| G4                    | 0.0251                  | 14                       | 01Jul2015, 12:12 | 1.4                        |
| G4-G7                 | 0.0251                  | 13                       | 01Jul2015, 12:24 | 1.4                        |
| FG21b                 | 0.0150                  | 15                       | 01Jul2015, 12:06 | 1.4                        |
| G7                    | 0.5016                  | 129                      | 01Jul2015, 12:48 | 28.3                       |
| G7-G8                 | 0.5016                  | 128                      | 01Jul2015, 12:48 | 28.2                       |
| FG22                  | 0.1397                  | 85                       | 01Jul2015, 12:12 | 10.0                       |
| OS08                  | 0.0397                  | 24                       | 01Jul2015, 12:12 | 2.6                        |
| OS08-G8               | 0.0397                  | 23                       | 01Jul2015, 12:12 | 2.6                        |
| FG23a                 | 0.0216                  | 15                       | 01Jul2015, 12:12 | 1.6                        |
| G8                    | 0.7026                  | 175                      | 01Jul2015, 12:42 | 42.4                       |
| G8-G10                | 0.7026                  | 174                      | 01Jul2015, 12:48 | 41.9                       |
| OS09                  | 0.1527                  | 62                       | 01Jul2015, 12:24 | 9.4                        |
| OS09-G9               | 0.1527                  | 62                       | 01Jul2015, 12:36 | 9.3                        |
| FG24                  | 0.1369                  | 72                       | 01Jul2015, 12:24 | 9.9                        |
| G9                    | 0.2896                  | 126                      | 01Jul2015, 12:30 | 19.2                       |
| G9-G10                | 0.2896                  | 125.0                    | 01Jul2015, 12:30 | 19.1                       |
| FG23b                 | 0.0305                  | 19                       | 01Jul2015, 12:12 | 2.0                        |
| G10                   | 1.0227                  | 281                      | 01Jul2015, 12:42 | 63.1                       |
| G10-G11               | 1.0227                  | 279                      | 01Jul2015, 12:42 | 62.9                       |
| FG23c                 | 0.0122                  | 9                        | 01Jul2015, 12:06 | 0.9                        |
| G11                   | 1.0349                  | 281                      | 01Jul2015, 12:42 | 63.7                       |
| FG25                  | 0.1086                  | 85                       | 01Jul2015, 12:18 | 10.3                       |
| FG26                  | 0.0863                  | 58                       | 01Jul2015, 12:18 | 7.1                        |
| FG26-POND G           | 0.0863                  | 57                       | 01Jul2015, 12:18 | 7.0                        |

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

| FUTURE MDDP (50-YEAR) |                         |                          |                  |                            |
|-----------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q50 (AC. FT.) |
| FG27                  | 0.0500                  | 40                       | 01Jul2015, 12:18 | 4.8                        |
| FG28                  | 0.0245                  | 17                       | 01Jul2015, 12:06 | 1.7                        |
| POND G IN             | 1.3043                  | 451                      | 01Jul2015, 12:24 | 87.5                       |
| POND G                | 1.3043                  | 307                      | 01Jul2015, 13:00 | 78.6                       |
| G12                   | 1.3043                  | 307                      | 01Jul2015, 13:00 | 78.6                       |
| G12-G06               | 1.3043                  | 306                      | 01Jul2015, 13:06 | 78.0                       |
| FG29                  | 0.0997                  | 39                       | 01Jul2015, 12:18 | 5.0                        |
| FG32                  | 0.0402                  | 57                       | 01Jul2015, 12:06 | 4.8                        |
| FG32-G06              | 0.0402                  | 54                       | 01Jul2015, 12:06 | 4.8                        |
| G06                   | 1.4442                  | 324                      | 01Jul2015, 13:06 | 87.8                       |
| FG08A                 | 0.0750                  | 90                       | 01Jul2015, 12:06 | 7.9                        |
| FG08A-G05             | 0.0750                  | 86                       | 01Jul2015, 12:12 | 7.9                        |
| FG08B                 | 0.0630                  | 67                       | 01Jul2015, 12:12 | 6.6                        |
| FG08B-G05             | 0.0630                  | 65                       | 01Jul2015, 12:12 | 6.6                        |
| FG09                  | 0.0484                  | 36                       | 01Jul2015, 12:12 | 4.1                        |
| FG09-G05              | 0.0484                  | 36                       | 01Jul2015, 12:18 | 4.1                        |
| FG10B                 | 0.0416                  | 31                       | 01Jul2015, 12:12 | 3.5                        |
| G05                   | 0.2280                  | 215                      | 01Jul2015, 12:12 | 22.1                       |
| FG10A                 | 0.0806                  | 77                       | 01Jul2015, 12:06 | 7.4                        |
| FG11                  | 0.0625                  | 59                       | 01Jul2015, 12:18 | 7.0                        |
| FG13                  | 0.0534                  | 24                       | 01Jul2015, 12:24 | 3.5                        |
| FG12                  | 0.0328                  | 40                       | 01Jul2015, 12:12 | 3.9                        |
| POND D IN             | 0.4573                  | 405                      | 01Jul2015, 12:12 | 43.9                       |
| POND D                | 0.4573                  | 90                       | 01Jul2015, 13:06 | 34.2                       |
| POND D-G17            | 0.4573                  | 90                       | 01Jul2015, 13:06 | 34.2                       |
| FG15                  | 0.0103                  | 12                       | 01Jul2015, 12:12 | 1.2                        |
| FG15-G17A             | 0.0103                  | 12                       | 01Jul2015, 12:12 | 1.2                        |
| G17A                  | 0.4676                  | 92                       | 01Jul2015, 13:06 | 35.3                       |
| FG14                  | 0.1000                  | 74                       | 01Jul2015, 12:18 | 9.6                        |
| G17                   | 0.5676                  | 134                      | 01Jul2015, 12:36 | 45.0                       |
| G17-G18               | 0.5676                  | 134                      | 01Jul2015, 12:36 | 44.9                       |
| FG16                  | 0.0791                  | 104                      | 01Jul2015, 12:06 | 9.0                        |
| G18                   | 0.6467                  | 179                      | 01Jul2015, 12:12 | 54.0                       |
| G18-POND E            | 0.6467                  | 177                      | 01Jul2015, 12:12 | 53.9                       |
| FG31                  | 0.0922                  | 92                       | 01Jul2015, 12:18 | 11.0                       |
| FG30                  | 0.0389                  | 57                       | 01Jul2015, 12:06 | 4.7                        |
| FG30-PONDHS           | 0.0389                  | 56                       | 01Jul2015, 12:12 | 4.6                        |
| POND HS               | 0.1311                  | 106                      | 01Jul2015, 12:30 | 15.5                       |
| FG17a                 | 0.0694                  | 78                       | 01Jul2015, 12:06 | 7.3                        |
| FG17a-POND E          | 0.0694                  | 76                       | 01Jul2015, 12:06 | 7.3                        |
| FG18                  | 0.0644                  | 42                       | 01Jul2015, 12:24 | 5.9                        |
| FG18-POND E           | 0.0644                  | 42                       | 01Jul2015, 12:24 | 5.9                        |
| FG19                  | 0.0527                  | 66                       | 01Jul2015, 12:06 | 6.4                        |
| FG17c                 | 0.0313                  | 22                       | 01Jul2015, 12:06 | 2.0                        |
| FG17b                 | 0.0214                  | 31                       | 01Jul2015, 12:06 | 2.6                        |
| POND E IN             | 1.0170                  | 433                      | 01Jul2015, 12:12 | 93.5                       |
| POND E                | 1.0170                  | 149                      | 01Jul2015, 14:00 | 69.5                       |
| H08                   | 1.0170                  | 134                      | 01Jul2015, 14:00 | 61.1                       |
| H09                   | 0.0000                  | 15                       | 01Jul2015, 14:00 | 8.3                        |

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

| FUTURE MDDP (10-YEAR) |                         |                          |                  |                            |
|-----------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q10 (AC. FT.) |
| OS06                  | 0.1313                  | 12                       | 01Jul2015, 12:18 | 2.2                        |
| G1a                   | 0.1313                  | 12                       | 01Jul2015, 12:18 | 2.2                        |
| G1a-G2                | 0.1313                  | 11                       | 01Jul2015, 12:24 | 2.1                        |
| OS05                  | 0.0578                  | 6                        | 01Jul2015, 12:12 | 1.0                        |
| OS05-G1               | 0.0578                  | 6                        | 01Jul2015, 12:18 | 1.0                        |
| FG01                  | 0.0531                  | 7                        | 01Jul2015, 12:36 | 1.4                        |
| FG01-G1               | 0.0531                  | 7                        | 01Jul2015, 12:36 | 1.4                        |
| G1                    | 0.1109                  | 11                       | 01Jul2015, 12:24 | 2.3                        |
| G1-G2                 | 0.1109                  | 11                       | 01Jul2015, 12:30 | 2.3                        |
| FG02                  | 0.0391                  | 6                        | 01Jul2015, 12:12 | 0.9                        |
| G2                    | 0.2813                  | 27                       | 01Jul2015, 12:24 | 5.3                        |
| G2-G3                 | 0.2813                  | 27                       | 01Jul2015, 12:30 | 5.3                        |
| FG03                  | 0.0203                  | 6                        | 01Jul2015, 12:06 | 0.6                        |
| FG04                  | 0.0172                  | 6                        | 01Jul2015, 12:06 | 0.5                        |
| G3                    | 0.3188                  | 31                       | 01Jul2015, 12:30 | 6.4                        |
| G3-POND F             | 0.3188                  | 31                       | 01Jul2015, 12:30 | 6.4                        |
| FG06                  | 0.0677                  | 11                       | 01Jul2015, 12:18 | 1.7                        |
| FG05                  | 0.0580                  | 12                       | 01Jul2015, 12:24 | 2.0                        |
| OS07a                 | 0.0170                  | 2                        | 01Jul2015, 12:12 | 0.3                        |
| OS07a-POND F          | 0.0170                  | 2                        | 01Jul2015, 12:24 | 0.3                        |
| POND F IN             | 0.4615                  | 54                       | 01Jul2015, 12:30 | 10.4                       |
| POND F                | 0.4615                  | 16                       | 01Jul2015, 13:48 | 9.1                        |
| POND F-G7             | 0.4615                  | 16                       | 01Jul2015, 14:00 | 9.0                        |
| OS07b-G4              | 0.0156                  | 2                        | 01Jul2015, 12:18 | 0.3                        |
| FG21a                 | 0.0095                  | 1                        | 01Jul2015, 12:18 | 0.2                        |
| G4                    | 0.0251                  | 4                        | 01Jul2015, 12:18 | 0.5                        |
| G4-G7                 | 0.0251                  | 3                        | 01Jul2015, 12:30 | 0.5                        |
| FG21b                 | 0.0150                  | 6                        | 01Jul2015, 12:06 | 0.6                        |
| G7                    | 0.5016                  | 18                       | 01Jul2015, 13:42 | 10.1                       |
| G7-G8                 | 0.5016                  | 18                       | 01Jul2015, 13:42 | 10.0                       |
| FG22                  | 0.1397                  | 29                       | 01Jul2015, 12:18 | 4.1                        |
| OS08                  | 0.0397                  | 8                        | 01Jul2015, 12:12 | 1.0                        |
| OS08-G8               | 0.0397                  | 7                        | 01Jul2015, 12:18 | 1.0                        |
| FG23a                 | 0.0216                  | 5                        | 01Jul2015, 12:12 | 0.7                        |
| G8                    | 0.7026                  | 48                       | 01Jul2015, 12:18 | 15.7                       |
| G8-G10                | 0.7026                  | 47                       | 01Jul2015, 12:24 | 15.4                       |
| OS09                  | 0.1527                  | 18                       | 01Jul2015, 12:30 | 3.5                        |
| OS09-G9               | 0.1527                  | 18                       | 01Jul2015, 12:42 | 3.5                        |
| FG24                  | 0.1369                  | 25                       | 01Jul2015, 12:24 | 4.0                        |
| G9                    | 0.2896                  | 38                       | 01Jul2015, 12:36 | 7.5                        |
| G9-G10                | 0.2896                  | 37.1                     | 01Jul2015, 12:36 | 7.5                        |
| FG23b                 | 0.0305                  | 6                        | 01Jul2015, 12:12 | 0.8                        |
| G10                   | 1.0227                  | 81                       | 01Jul2015, 12:30 | 23.6                       |
| G10-G11               | 1.0227                  | 80                       | 01Jul2015, 12:36 | 23.5                       |
| FG23c                 | 0.0122                  | 3                        | 01Jul2015, 12:12 | 0.3                        |
| G11                   | 1.0349                  | 82                       | 01Jul2015, 12:36 | 23.8                       |
| FG25                  | 0.1086                  | 36.0                     | 01Jul2015, 12:18 | 4.7                        |
| FG26                  | 0.0863                  | 22                       | 01Jul2015, 12:18 | 3.0                        |
| FG26-POND G           | 0.0863                  | 22                       | 01Jul2015, 12:24 | 3.0                        |

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



| FUTURE MDDP (10-YEAR) |                         |                          |                  |                            |
|-----------------------|-------------------------|--------------------------|------------------|----------------------------|
| HYDROLOGIC ELEMENT    | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q10 (AC. FT.) |
| FG27                  | 0.0500                  | 17                       | 01Jul2015, 12:18 | 2.3                        |
| FG28                  | 0.0245                  | 6                        | 01Jul2015, 12:12 | 0.7                        |
| POND G IN             | 1.3043                  | 149                      | 01Jul2015, 12:30 | 34.5                       |
| POND G                | 1.3043                  | 51                       | 01Jul2015, 14:00 | 27.1                       |
| G12                   | 1.3043                  | 51                       | 01Jul2015, 14:00 | 27.1                       |
| G12-G06               | 1.3043                  | 51                       | 01Jul2015, 14:12 | 26.8                       |
| FG29                  | 0.0997                  | 9                        | 01Jul2015, 12:18 | 1.6                        |
| FG32                  | 0.0402                  | 29                       | 01Jul2015, 12:06 | 2.5                        |
| FG32-G06              | 0.0402                  | 27                       | 01Jul2015, 12:06 | 2.4                        |
| G06                   | 1.4442                  | 55                       | 01Jul2015, 14:06 | 30.9                       |
| FG08A                 | 0.0750                  | 41                       | 01Jul2015, 12:06 | 3.8                        |
| FG08A-G05             | 0.0750                  | 41                       | 01Jul2015, 12:12 | 3.8                        |
| FG08B                 | 0.0630                  | 31                       | 01Jul2015, 12:12 | 3.2                        |
| FG08B-G05             | 0.0630                  | 29                       | 01Jul2015, 12:18 | 3.2                        |
| FG09                  | 0.0484                  | 14                       | 01Jul2015, 12:18 | 1.8                        |
| FG09-G05              | 0.0484                  | 14                       | 01Jul2015, 12:18 | 1.8                        |
| FG10B                 | 0.0416                  | 12                       | 01Jul2015, 12:18 | 1.5                        |
| G05                   | 0.2280                  | 94                       | 01Jul2015, 12:12 | 10.3                       |
| FG10A                 | 0.0806                  | 32                       | 01Jul2015, 12:12 | 3.3                        |
| FG11                  | 0.0625                  | 28                       | 01Jul2015, 12:18 | 3.4                        |
| FG13                  | 0.0534                  | 7                        | 01Jul2015, 12:30 | 1.4                        |
| FG12                  | 0.0328                  | 19.9                     | 01Jul2015, 12:12 | 2.0                        |
| POND D IN             | 0.4573                  | 177.4                    | 01Jul2015, 12:12 | 20.5                       |
| POND D                | 0.4573                  | 18                       | 01Jul2015, 14:24 | 13.9                       |
| POND D-G17            | 0.4573                  | 18                       | 01Jul2015, 14:30 | 13.9                       |
| FG15                  | 0.0103                  | 6                        | 01Jul2015, 12:12 | 0.6                        |
| FG15-G17A             | 0.0103                  | 6                        | 01Jul2015, 12:12 | 0.6                        |
| G17A                  | 0.4676                  | 18                       | 01Jul2015, 14:18 | 14.4                       |
| FG14                  | 0.1000                  | 32                       | 01Jul2015, 12:24 | 4.5                        |
| G17                   | 0.5676                  | 42                       | 01Jul2015, 12:24 | 18.9                       |
| G17-G18               | 0.5676                  | 42                       | 01Jul2015, 12:30 | 18.9                       |
| FG16                  | 0.0791                  | 50                       | 01Jul2015, 12:06 | 4.5                        |
| G18                   | 0.6467                  | 78                       | 01Jul2015, 12:12 | 23.4                       |
| G18-POND E            | 0.6467                  | 77                       | 01Jul2015, 12:12 | 23.4                       |
| FG31                  | 0.0922                  | 45                       | 01Jul2015, 12:18 | 5.6                        |
| FG30                  | 0.0389                  | 29                       | 01Jul2015, 12:06 | 2.4                        |
| FG30-PONDHS           | 0.0389                  | 27                       | 01Jul2015, 12:12 | 2.3                        |
| POND HS               | 0.1311                  | 36                       | 01Jul2015, 12:42 | 7.9                        |
| FG17a                 | 0.0694                  | 35                       | 01Jul2015, 12:06 | 3.5                        |
| FG17a-POND E          | 0.0694                  | 35                       | 01Jul2015, 12:12 | 3.5                        |
| FG18                  | 0.0644                  | 18                       | 01Jul2015, 12:24 | 2.7                        |
| FG18-POND E           | 0.0644                  | 17                       | 01Jul2015, 12:30 | 2.7                        |
| FG19                  | 0.0527                  | 33                       | 01Jul2015, 12:12 | 3.3                        |
| FG17c                 | 0.0313                  | 7                        | 01Jul2015, 12:06 | 0.8                        |
| FG17b                 | 0.0214                  | 16                       | 01Jul2015, 12:06 | 1.3                        |
| POND E IN             | 1.0170                  | 197                      | 01Jul2015, 12:12 | 42.8                       |
| POND E                | 1.0170                  | 28                       | 01Jul2015, 18:06 | 22.2                       |
| H08                   | 1.0170                  | 22                       | 01Jul2015, 18:06 | 17.3                       |
| H09                   | 0.0000                  | 6                        | 01Jul2015, 18:06 | 4.9                        |
|                       |                         |                          |                  |                            |

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

| FUTURE MDDP (5-YEAR) |                         |                         |                  |                           |
|----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT   | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q5 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q5 (AC. FT.) |
| OS06                 | 0.1313                  | 3.8                     | 01Jul2015, 12:24 | 1.1                       |
| G1a                  | 0.1313                  | 3.8                     | 01Jul2015, 12:24 | 1.1                       |
| G1a-G2               | 0.1313                  | 3.6                     | 01Jul2015, 12:36 | 1.1                       |
| OS05                 | 0.0578                  | 1.8                     | 01Jul2015, 12:18 | 0.5                       |
| OS05-G1              | 0.0578                  | 1.7                     | 01Jul2015, 12:24 | 0.5                       |
| FG01                 | 0.0531                  | 3.3                     | 01Jul2015, 12:36 | 0.8                       |
| FG01-G1              | 0.0531                  | 3.3                     | 01Jul2015, 12:36 | 0.8                       |
| G1                   | 0.1109                  | 4.8                     | 01Jul2015, 12:36 | 1.3                       |
| G1-G2                | 0.1109                  | 4.8                     | 01Jul2015, 12:36 | 1.3                       |
| FG02                 | 0.0391                  | 2.6                     | 01Jul2015, 12:18 | 0.5                       |
| G2                   | 0.2813                  | 10                      | 01Jul2015, 12:30 | 2.9                       |
| G2-G3                | 0.2813                  | 10                      | 01Jul2015, 12:42 | 2.8                       |
| FG03                 | 0.0203                  | 3.0                     | 01Jul2015, 12:06 | 0.4                       |
| FG04                 | 0.0172                  | 3.1                     | 01Jul2015, 12:06 | 0.3                       |
| G3                   | 0.3188                  | 12                      | 01Jul2015, 12:36 | 3.5                       |
| G3-POND F            | 0.3188                  | 12                      | 01Jul2015, 12:42 | 3.5                       |
| FG06                 | 0.0677                  | 5.3                     | 01Jul2015, 12:24 | 1.0                       |
| FG05                 | 0.0580                  | 6.7                     | 01Jul2015, 12:30 | 1.2                       |
| OS07a                | 0.0170                  | 0.9                     | 01Jul2015, 12:12 | 0.2                       |
| OS07a-POND F         | 0.0170                  | 0.9                     | 01Jul2015, 12:36 | 0.2                       |
| POND F IN            | 0.4615                  | 23.1                    | 01Jul2015, 12:36 | 5.9                       |
| POND F               | 0.4615                  | 8.1                     | 01Jul2015, 14:18 | 4.8                       |
| POND F-G7            | 0.4615                  | 8.1                     | 01Jul2015, 14:24 | 4.8                       |
| OS07b-G4             | 0.0156                  | 0.9                     | 01Jul2015, 12:24 | 0.2                       |
| FG21a                | 0.0095                  | 0.4                     | 01Jul2015, 12:24 | 0.1                       |
| G4                   | 0.0251                  | 1.4                     | 01Jul2015, 12:24 | 0.3                       |
| G4-G7                | 0.0251                  | 1                       | 01Jul2015, 12:36 | 0.3                       |
| FG21b                | 0.0150                  | 3.8                     | 01Jul2015, 12:06 | 0.4                       |
| G7                   | 0.5016                  | 8.8                     | 01Jul2015, 14:18 | 5.4                       |
| G7-G8                | 0.5016                  | 8.8                     | 01Jul2015, 14:24 | 5.4                       |
| FG22                 | 0.1397                  | 15                      | 01Jul2015, 12:18 | 2.5                       |
| OS08                 | 0.0397                  | 3                       | 01Jul2015, 12:12 | 0.6                       |
| OS08-G8              | 0.0397                  | 3.4                     | 01Jul2015, 12:18 | 0.6                       |
| FG23a                | 0.0216                  | 2.7                     | 01Jul2015, 12:18 | 0.4                       |
| G8                   | 0.7026                  | 25                      | 01Jul2015, 12:18 | 8.8                       |
| G8-G10               | 0.7026                  | 24                      | 01Jul2015, 12:30 | 8.6                       |
| OS09                 | 0.1527                  | 8                       | 01Jul2015, 12:36 | 2.0                       |
| OS09-G9              | 0.1527                  | 8.2                     | 01Jul2015, 12:48 | 2.0                       |
| FG24                 | 0.1369                  | 13                      | 01Jul2015, 12:24 | 2.4                       |
| G9                   | 0.2896                  | 17                      | 01Jul2015, 12:48 | 4.4                       |
| G9-G10               | 0.2896                  | 17.1                    | 01Jul2015, 12:48 | 4.4                       |
| FG23b                | 0.0305                  | 3                       | 01Jul2015, 12:18 | 0.5                       |
| G10                  | 1.0227                  | 39                      | 01Jul2015, 12:30 | 13.4                      |
| G10-G11              | 1.0227                  | 39.2                    | 01Jul2015, 12:36 | 13.3                      |
| FG23c                | 0.0122                  | 1.5                     | 01Jul2015, 12:12 | 0.2                       |
| G11                  | 1.0349                  | 39.9                    | 01Jul2015, 12:36 | 13.5                      |
| FG25                 | 0.1086                  | 21.9                    | 01Jul2015, 12:18 | 3.1                       |
| FG26                 | 0.0863                  | 12                      | 01Jul2015, 12:24 | 1.9                       |
| FG26-POND G          | 0.0863                  | 12                      | 01Jul2015, 12:24 | 1.9                       |

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

| FUTURE MDDP (5-YEAR) |                         |                         |                  |                           |
|----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT   | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q5 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q5 (AC. FT.) |
| FG27                 | 0.0500                  | 11                      | 01Jul2015, 12:18 | 1.5                       |
| FG28                 | 0.0245                  | 3                       | 01Jul2015, 12:12 | 0.4                       |
| POND G IN            | 1.3043                  | 75.1                    | 01Jul2015, 12:36 | 20.4                      |
| POND G               | 1.3043                  | 20                      | 01Jul2015, 15:48 | 13.6                      |
| G12                  | 1.3043                  | 20                      | 01Jul2015, 15:48 | 13.6                      |
| G12-G06              | 1.3043                  | 20                      | 01Jul2015, 15:54 | 13.4                      |
| FG29                 | 0.0997                  | 3                       | 01Jul2015, 12:24 | 0.9                       |
| FG32                 | 0.0402                  | 20                      | 01Jul2015, 12:06 | 1.7                       |
| FG32-G06             | 0.0402                  | 18                      | 01Jul2015, 12:12 | 1.7                       |
| G06                  | 1.4442                  | 22                      | 01Jul2015, 15:54 | 16.0                      |
| FG08A                | 0.0750                  | 27                      | 01Jul2015, 12:06 | 2.6                       |
| FG08A-G05            | 0.0750                  | 27                      | 01Jul2015, 12:12 | 2.6                       |
| FG08B                | 0.0630                  | 20.1                    | 01Jul2015, 12:12 | 2.2                       |
| FG08B-G05            | 0.0630                  | 19.5                    | 01Jul2015, 12:18 | 2.2                       |
| FG09                 | 0.0484                  | 8.3                     | 01Jul2015, 12:18 | 1.2                       |
| FG09-G05             | 0.0484                  | 8                       | 01Jul2015, 12:24 | 1.2                       |
| FG10B                | 0.0416                  | 7.0                     | 01Jul2015, 12:18 | 1.0                       |
| G05                  | 0.2280                  | 59                      | 01Jul2015, 12:18 | 6.9                       |
| FG10A                | 0.0806                  | 20                      | 01Jul2015, 12:12 | 2.2                       |
| FG11                 | 0.0625                  | 19                      | 01Jul2015, 12:18 | 2.4                       |
| FG13                 | 0.0534                  | 4                       | 01Jul2015, 12:30 | 0.8                       |
| FG12                 | 0.0328                  | 13.7                    | 01Jul2015, 12:12 | 1.4                       |
| POND D IN            | 0.4573                  | 110.8                   | 01Jul2015, 12:12 | 13.6                      |
| POND D               | 0.4573                  | 11                      | 01Jul2015, 14:48 | 8.2                       |
| POND D-G17           | 0.4573                  | 11                      | 01Jul2015, 14:48 | 8.2                       |
| FG15                 | 0.0103                  | 4                       | 01Jul2015, 12:12 | 0.4                       |
| FG15-G17A            | 0.0103                  | 4                       | 01Jul2015, 12:12 | 0.4                       |
| G17A                 | 0.4676                  | 11                      | 01Jul2015, 14:42 | 8.6                       |
| FG14                 | 0.1000                  | 20                      | 01Jul2015, 12:24 | 3.0                       |
| G17                  | 0.5676                  | 25                      | 01Jul2015, 12:24 | 11.6                      |
| G17-G18              | 0.5676                  | 25                      | 01Jul2015, 12:24 | 11.6                      |
| FG16                 | 0.0791                  | 34                      | 01Jul2015, 12:06 | 3.1                       |
| G18                  | 0.6467                  | 50                      | 01Jul2015, 12:12 | 14.7                      |
| G18-POND E           | 0.6467                  | 50                      | 01Jul2015, 12:12 | 14.7                      |
| FG31                 | 0.0922                  | 31                      | 01Jul2015, 12:18 | 3.9                       |
| FG30                 | 0.0389                  | 20                      | 01Jul2015, 12:06 | 1.7                       |
| FG30-PONDHS          | 0.0389                  | 18                      | 01Jul2015, 12:12 | 1.6                       |
| POND HS              | 0.1311                  | 26                      | 01Jul2015, 12:36 | 5.6                       |
| FG17a                | 0.0694                  | 23                      | 01Jul2015, 12:12 | 2.4                       |
| FG17a-POND E         | 0.0694                  | 22.9                    | 01Jul2015, 12:12 | 2.4                       |
| FG18                 | 0.0644                  | 11                      | 01Jul2015, 12:30 | 1.8                       |
| FG18-POND E          | 0.0644                  | 11                      | 01Jul2015, 12:30 | 1.8                       |
| FG19                 | 0.0527                  | 23                      | 01Jul2015, 12:12 | 2.3                       |
| FG17c                | 0.0313                  | 3                       | 01Jul2015, 12:12 | 0.4                       |
| FG17b                | 0.0214                  | 11                      | 01Jul2015, 12:06 | 0.9                       |
| POND E IN            | 1.0170                  | 126                     | 01Jul2015, 12:12 | 28.0                      |
| POND E               | 1.0170                  | 14                      | 01Jul2015, 20:36 | 11.1                      |
| H08                  | 1.0170                  | 10.2                    | 01Jul2015, 20:36 | 7.8                       |
| H09                  | 0.0000                  | 3.8                     | 01Jul2015, 20:36 | 3.2                       |
|                      |                         |                         |                  |                           |

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

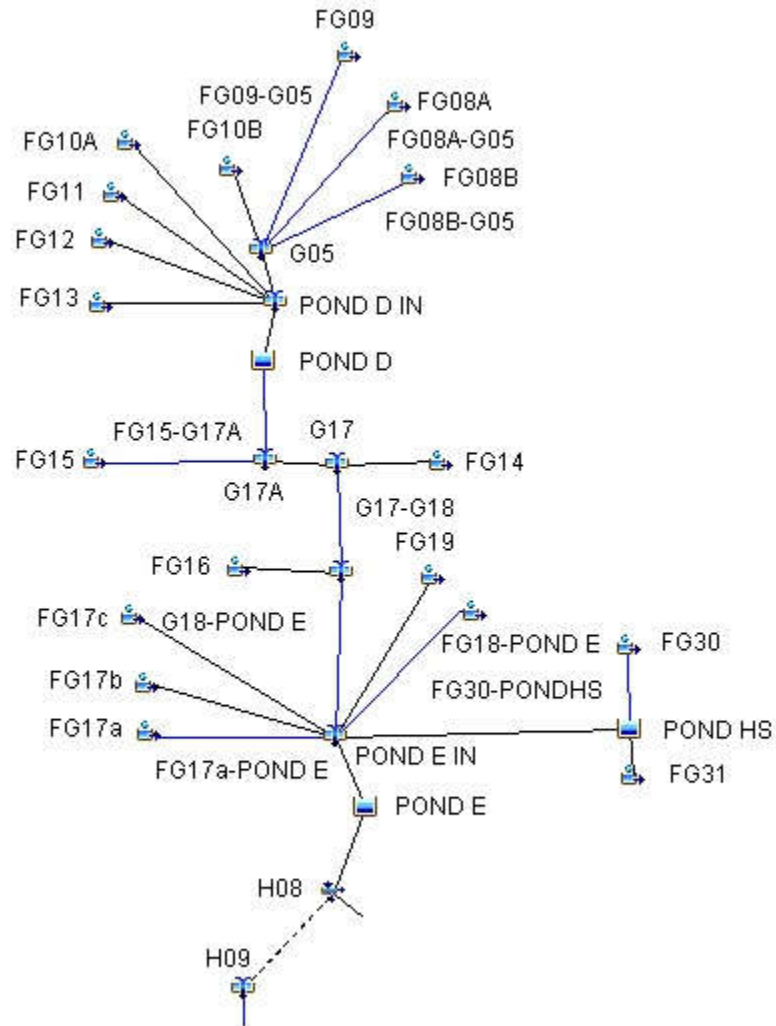
| FUTURE MDDP (2-YEAR) |                         |                         |                  |                           |
|----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT   | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q2 (AC. FT.) |
| OS06                 | 0.1313                  | 0.5                     | 01Jul2015, 13:30 | 0.3                       |
| G1a                  | 0.1313                  | 0.5                     | 01Jul2015, 13:30 | 0.3                       |
| G1a-G2               | 0.1313                  | 0.5                     | 01Jul2015, 13:48 | 0.3                       |
| OS05                 | 0.0578                  | 0.2                     | 01Jul2015, 13:24 | 0.2                       |
| OS05-G1              | 0.0578                  | 0.2                     | 01Jul2015, 13:30 | 0.2                       |
| FG01                 | 0.0531                  | 0.9                     | 01Jul2015, 12:48 | 0.3                       |
| FG01-G1              | 0.0531                  | 0.9                     | 01Jul2015, 12:48 | 0.3                       |
| G1                   | 0.1109                  | 1.1                     | 01Jul2015, 12:54 | 0.5                       |
| G1-G2                | 0.1109                  | 1.1                     | 01Jul2015, 13:00 | 0.5                       |
| FG02                 | 0.0391                  | 0.5                     | 01Jul2015, 12:36 | 0.2                       |
| G2                   | 0.2813                  | 1.9                     | 01Jul2015, 13:18 | 1.0                       |
| G2-G3                | 0.2813                  | 1.9                     | 01Jul2015, 13:30 | 1.0                       |
| FG03                 | 0.0203                  | 0.8                     | 01Jul2015, 12:12 | 0.2                       |
| FG04                 | 0.0172                  | 0.9                     | 01Jul2015, 12:06 | 0.1                       |
| G3                   | 0.3188                  | 2.4                     | 01Jul2015, 13:24 | 1.3                       |
| G3-POND F            | 0.3188                  | 2.4                     | 01Jul2015, 13:30 | 1.3                       |
| FG06                 | 0.0677                  | 1.3                     | 01Jul2015, 12:30 | 0.4                       |
| FG05                 | 0.0580                  | 2.4                     | 01Jul2015, 12:30 | 0.6                       |
| OS07a                | 0.0170                  | 0.1                     | 01Jul2015, 12:48 | 0.1                       |
| OS07a-POND F         | 0.0170                  | 0.1                     | 01Jul2015, 13:24 | 0.1                       |
| POND F IN            | 0.4615                  | 5.0                     | 01Jul2015, 12:54 | 2.4                       |
| POND F               | 0.4615                  | 2.1                     | 01Jul2015, 17:54 | 1.6                       |
| POND F-G7            | 0.4615                  | 2.1                     | 01Jul2015, 18:06 | 1.5                       |
| OS07b-G4             | 0.0156                  | 0.1                     | 01Jul2015, 13:06 | 0.1                       |
| FG21a                | 0.0095                  | 0.1                     | 01Jul2015, 13:00 | 0.0                       |
| G4                   | 0.0251                  | 0.2                     | 01Jul2015, 13:06 | 0.1                       |
| G4-G7                | 0.0251                  | 0.2                     | 01Jul2015, 13:30 | 0.1                       |
| FG21b                | 0.0150                  | 1.6                     | 01Jul2015, 12:12 | 0.2                       |
| G7                   | 0.5016                  | 2.3                     | 01Jul2015, 17:42 | 1.8                       |
| G7-G8                | 0.5016                  | 2.3                     | 01Jul2015, 17:48 | 1.8                       |
| FG22                 | 0.1397                  | 4.3                     | 01Jul2015, 12:24 | 1.1                       |
| OS08                 | 0.0397                  | 0.7                     | 01Jul2015, 12:24 | 0.2                       |
| OS08-G8              | 0.0397                  | 0.7                     | 01Jul2015, 12:30 | 0.2                       |
| FG23a                | 0.0216                  | 0.8                     | 01Jul2015, 12:18 | 0.2                       |
| G8                   | 0.7026                  | 7.3                     | 01Jul2015, 12:24 | 3.3                       |
| G8-G10               | 0.7026                  | 7.1                     | 01Jul2015, 12:42 | 3.2                       |
| OS09                 | 0.1527                  | 1.9                     | 01Jul2015, 12:54 | 0.8                       |
| OS09-G9              | 0.1527                  | 1.9                     | 01Jul2015, 13:18 | 0.8                       |
| FG24                 | 0.1369                  | 4                       | 01Jul2015, 12:30 | 1.1                       |
| G9                   | 0.2896                  | 4                       | 01Jul2015, 13:12 | 1.9                       |
| G9-G10               | 0.2896                  | 4.5                     | 01Jul2015, 13:12 | 1.9                       |
| FG23b                | 0.0305                  | 1                       | 01Jul2015, 12:24 | 0.2                       |
| G10                  | 1.0227                  | 11.4                    | 01Jul2015, 12:42 | 5.2                       |
| G10-G11              | 1.0227                  | 11.3                    | 01Jul2015, 12:48 | 5.2                       |
| FG23c                | 0.0122                  | 0.4                     | 01Jul2015, 12:18 | 0.1                       |
| G11                  | 1.0349                  | 11.5                    | 01Jul2015, 12:48 | 5.2                       |
| FG25                 | 0.1086                  | 9.9                     | 01Jul2015, 12:24 | 1.7                       |
| FG26                 | 0.0863                  | 5                       | 01Jul2015, 12:24 | 1.0                       |
| FG26-POND G          | 0.0863                  | 4.5                     | 01Jul2015, 12:30 | 0.9                       |

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

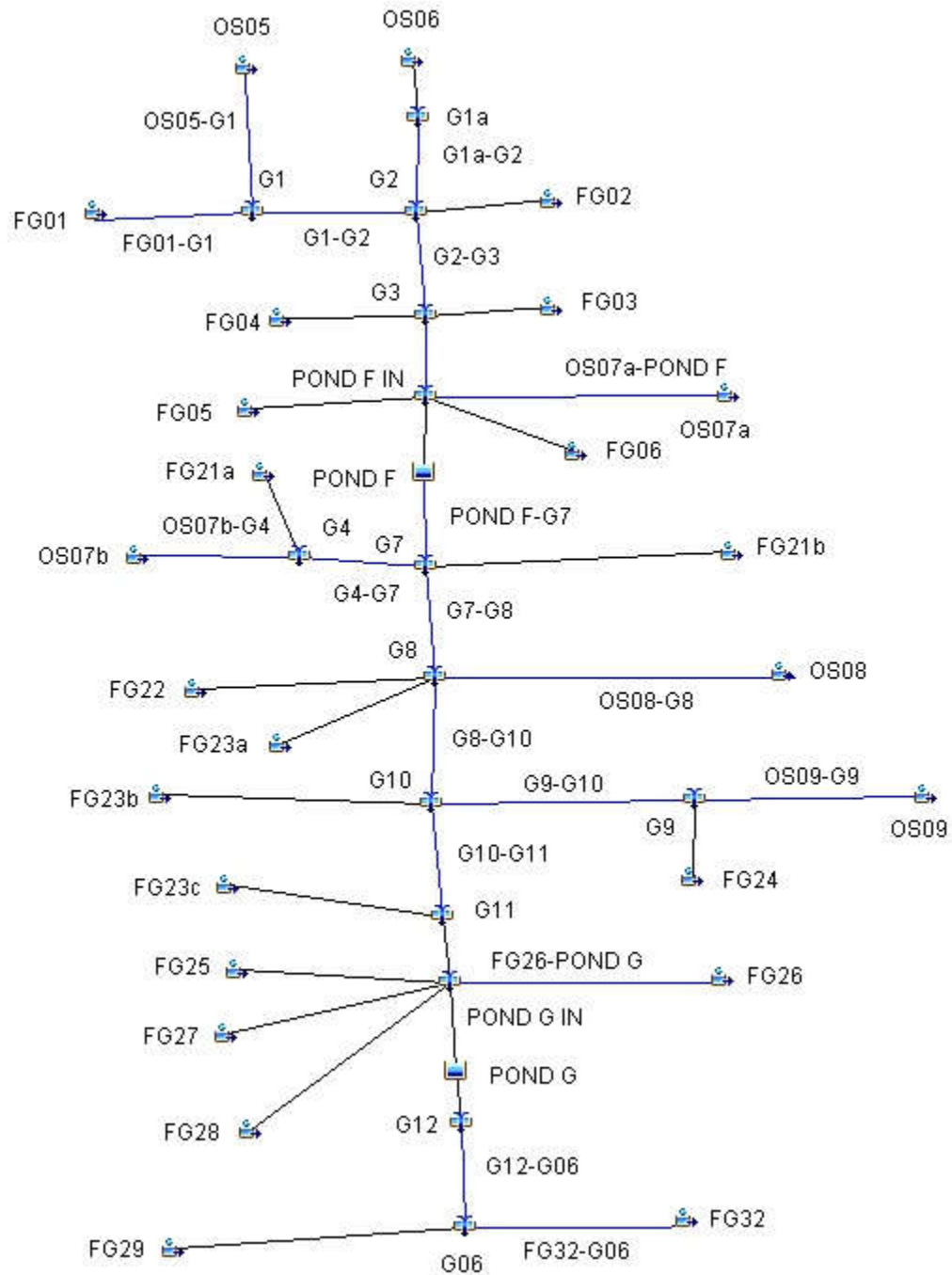
| FUTURE MDDP (2-YEAR) |                         |                         |                  |                           |
|----------------------|-------------------------|-------------------------|------------------|---------------------------|
| HYDROLOGIC ELEMENT   | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK     | TOTAL VOLUME Q2 (AC. FT.) |
| FG27                 | 0.0500                  | 5.0                     | 01Jul2015, 12:24 | 0.8                       |
| FG28                 | 0.0245                  | 0.6                     | 01Jul2015, 12:18 | 0.2                       |
| POND G IN            | 1.3043                  | 24.1                    | 01Jul2015, 12:48 | 8.8                       |
| POND G               | 1.3043                  | 5                       | 02Jul2015, 00:00 | 4.2                       |
| G12                  | 1.3043                  | 5                       | 02Jul2015, 00:00 | 4.2                       |
| G12-G06              | 1.3043                  | 5                       | 02Jul2015, 00:00 | 4.1                       |
| FG29                 | 0.0997                  | 0.4                     | 01Jul2015, 13:36 | 0.3                       |
| FG32                 | 0.0402                  | 11                      | 01Jul2015, 12:06 | 1.0                       |
| FG32-G06             | 0.0402                  | 11                      | 01Jul2015, 12:12 | 1.0                       |
| G06                  | 1.4442                  | 11                      | 01Jul2015, 12:12 | 5.4                       |
| FG08A                | 0.0750                  | 13                      | 01Jul2015, 12:12 | 1.5                       |
| FG08A-G05            | 0.0750                  | 13.1                    | 01Jul2015, 12:18 | 1.5                       |
| FG08B                | 0.0630                  | 10.2                    | 01Jul2015, 12:12 | 1.2                       |
| FG08B-G05            | 0.0630                  | 10.0                    | 01Jul2015, 12:18 | 1.2                       |
| FG09                 | 0.0484                  | 3.2                     | 01Jul2015, 12:18 | 0.6                       |
| FG09-G05             | 0.0484                  | 3                       | 01Jul2015, 12:24 | 0.6                       |
| FG10B                | 0.0416                  | 2.7                     | 01Jul2015, 12:18 | 0.5                       |
| G05                  | 0.2280                  | 28.7                    | 01Jul2015, 12:18 | 3.8                       |
| FG10A                | 0.0806                  | 9                       | 01Jul2015, 12:12 | 1.2                       |
| FG11                 | 0.0625                  | 9.8                     | 01Jul2015, 12:18 | 1.4                       |
| FG13                 | 0.0534                  | 0.9                     | 01Jul2015, 12:42 | 0.3                       |
| FG12                 | 0.0328                  | 7.8                     | 01Jul2015, 12:12 | 0.8                       |
| POND D IN            | 0.4573                  | 53.4                    | 01Jul2015, 12:18 | 7.5                       |
| POND D               | 0.4573                  | 3.7                     | 01Jul2015, 19:54 | 3.0                       |
| POND D-G17           | 0.4573                  | 3.7                     | 01Jul2015, 19:54 | 3.0                       |
| FG15                 | 0.0103                  | 2                       | 01Jul2015, 12:12 | 0.2                       |
| FG15-G17A            | 0.0103                  | 2                       | 01Jul2015, 12:12 | 0.2                       |
| G17A                 | 0.4676                  | 4                       | 01Jul2015, 19:48 | 3.3                       |
| FG14                 | 0.1000                  | 9                       | 01Jul2015, 12:24 | 1.6                       |
| G17                  | 0.5676                  | 12                      | 01Jul2015, 12:24 | 4.9                       |
| G17-G18              | 0.5676                  | 12                      | 01Jul2015, 12:30 | 4.9                       |
| FG16                 | 0.0791                  | 18                      | 01Jul2015, 12:06 | 1.9                       |
| G18                  | 0.6467                  | 25                      | 01Jul2015, 12:12 | 6.7                       |
| G18-POND E           | 0.6467                  | 25                      | 01Jul2015, 12:12 | 6.7                       |
| FG31                 | 0.0922                  | 17                      | 01Jul2015, 12:18 | 2.4                       |
| FG30                 | 0.0389                  | 11                      | 01Jul2015, 12:06 | 1.0                       |
| FG30-PONDHS          | 0.0389                  | 10.9                    | 01Jul2015, 12:18 | 1.0                       |
| POND HS              | 0.1311                  | 14.8                    | 01Jul2015, 12:42 | 3.3                       |
| FG17a                | 0.0694                  | 12                      | 01Jul2015, 12:12 | 1.3                       |
| FG17a-POND E         | 0.0694                  | 11.6                    | 01Jul2015, 12:12 | 1.3                       |
| FG18                 | 0.0644                  | 4.7                     | 01Jul2015, 12:30 | 0.9                       |
| FG18-POND E          | 0.0644                  | 5                       | 01Jul2015, 12:30 | 0.9                       |
| FG19                 | 0.0527                  | 13.1                    | 01Jul2015, 12:12 | 1.4                       |
| FG17c                | 0.0313                  | 0.5                     | 01Jul2015, 12:18 | 0.2                       |
| FG17b                | 0.0214                  | 6.1                     | 01Jul2015, 12:06 | 0.6                       |
| POND E IN            | 1.0170                  | 63.6                    | 01Jul2015, 12:12 | 14.4                      |
| POND E               | 1.0170                  | 5.8                     | 02Jul2015, 00:00 | 4.9                       |
| H08                  | 1.0170                  | 3.5                     | 02Jul2015, 00:00 | 3.0                       |
| H09                  | 0.0000                  | 2.3                     | 02Jul2015, 00:00 | 2.0                       |
|                      |                         |                         |                  |                           |

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

# FUTURE CONDITIONS POND D & E NETWORK



# FUTURE CONDITIONS POND F & G NETWORK



## Appendix C - Detention Pond Information



# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

## Meridian Ranch Proposed Detention Pond D - Interim AS-BUILT

Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 710    |
| embankment elev =       | 7060   |
| spillway length =       | 100    |
| spillway elevation =    | 7058   |
| 100 year storage elev.= | 7057.0 |
| 100 year storage vol.=  | 25.3   |
| 100 year discharge=     | 134    |
| 5 year storage elev.=   | 7053.8 |
| 5 year storage vol.=    | 7.1    |
| 5 year discharge=       | 11     |
| WQCV storage vol.=      | 1.0    |
| WQCV depth =            | 2.42   |
| 1/2 WQCV storage vol.=  | 0.50   |

Data for outlet pipe and grate:

|                           |            | Dimensions  |                |            |          |        |                        |         |  |
|---------------------------|------------|-------------|----------------|------------|----------|--------|------------------------|---------|--|
| Type                      |            | Width (ft.) | X Height (ft.) | Dia.(in)   |          | (sqft) |                        |         |  |
| Rectangular               | Orifice 1: | 0.03        | 2.42           |            | Area =   | 0.072  | Elev to cl =           | 7050.21 |  |
| Circular                  | Orifice 2: |             |                | 8          | Area =   | 0.349  | Elev to cl =           | 7051.42 |  |
| Rectangular               | Orifice 3: | 5           | 0.5            |            | Area =   | 2.500  | Elev to cl =           | 7053.35 |  |
| None Selected             | Orifice 4: |             |                |            | Area =   | 0.000  | Elev to cl =           |         |  |
| Stand Pipe Dimensions     |            |             |                |            |          |        |                        |         |  |
| Rec Grate                 |            | 6           | x              | 4.25       | Elev =   | 7054.9 | 50 year storage elev.= | 7056.3  |  |
| Circ. Grate               |            |             | dia.           |            | Elev =   |        | 50 year discharge=     | 90      |  |
| Outlet Culvert Dimensions |            |             |                |            |          |        |                        |         |  |
| Outlet Culvert            |            | Width (ft.) | Height (ft.)   | Dia. (ft.) | Type     |        | 50 year storage vol.=  | 20.0    |  |
| Area                      |            | 12.6        | TOP            |            | Circular |        | 10 year storage elev.= | 7054.6  |  |
| Outlet I. E.              |            | 7048.1      | 7052.5         |            |          |        | 10 year discharge=     | 18      |  |
| Wall Thick.               |            | 5           | in.            |            |          |        | 10 year storage vol.=  | 10.7    |  |
|                           |            |             |                |            |          |        | 2 year storage elev.=  | 7053.1  |  |
|                           |            |             |                |            |          |        | 2 year discharge=      | 3.7     |  |
|                           |            |             |                |            |          |        | 2 year storage vol.=   | 4.6     |  |

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

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

## STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

Gieck Basin - El Paso County, Colorado

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974.5 |
| 100 year storage elev.= | 6973.5 |
| 100 year storage vol.=  | 41.5   |
| 100 year discharge=     | 231    |
| 5 year storage elev.=   | 6971.2 |
| 5 year storage vol.=    | 16.6   |
| 5 year discharge=       | 13     |
| WQCV storage elev.=     | 6968.9 |
| WQCV storage vol.=      | 1.5    |
| WQCV depth =            | 1.9    |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.=  | 0.75   |

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 6973.0 |
| 50 year storage vol.=  | 35.6   |
| 50 year discharge=     | 141    |
| 10 year storage elev.= | 6971.8 |
| 10 year storage vol.=  | 21.8   |
| 10 year discharge=     | 26     |
| 2 year storage elev.=  | 6970.3 |
| 2 year storage vol.=   | 8.8    |
| 2 year discharge=      | 5.6    |

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

## Meridian Ranch Existing Detention Pond E-INTERIM FUTURE (H08)

### Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974   |
| 100 year storage elev.= | 6973.5 |
| 100 year storage vol.=  | 41.5   |
| 100 year discharge=     | 198    |
| 5 year storage elev.=   | 6971.2 |
| 5 year storage vol.=    | 16.6   |
| 5 year discharge=       | 9      |
| 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:

|                       |            | Dimensions  |                |          |                |                               |       |                       |
|-----------------------|------------|-------------|----------------|----------|----------------|-------------------------------|-------|-----------------------|
| Type                  | H or V     | Width (ft.) | X Height (ft.) | Dia.(in) | (sqft)         |                               |       |                       |
| Rectangular           | Orifice 1: | V           | 0.0248         | 1.65     |                | Area =                        | 0.041 | Invert Elev = 6967.18 |
| Rectangular           | Orifice 2: | V           | 2              | 0.8      |                | Area =                        | 1.600 | Invert Elev = 6970.40 |
| Circular              | Orifice 3: | H           |                | 10       |                | Area =                        | 0.545 | Invert Elev = 6969.00 |
| Rectangular           | Orifice 4: | V           | 6              | 0.7      |                | Area =                        | 4.200 | Invert Elev = 6971.20 |
| Stand Pipe Dimensions |            |             |                |          |                |                               |       |                       |
| Rec Grate             |            | 11          | x              | 7        | Elev = 6971.90 | 50 year storage elev.= 6973.0 |       |                       |
| Circ. Grate           |            |             | dia.           |          | Elev = 6971.90 | 50 year discharge= 127        |       |                       |
|                       |            |             |                |          |                | 10 year storage elev.= 6971.8 |       |                       |
|                       |            |             |                |          |                | 10 year discharge= 20         |       |                       |
|                       |            |             |                |          |                | 2 year storage elev.= 6970.3  |       |                       |
|                       |            |             |                |          |                | 2 year discharge= 3.4         |       |                       |

Outlet Culvert Dimensions

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

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

- Notes:
- 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM.  $Q=CLH^{1.5}$  (C=3.0)
  - 2) Orifice flows are also from section 11.3.1.  $Q=CA(2gH)^{0.5}$  (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-INTERIM FUTURE (H09)

#### Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974.5 |
| 100 year storage elev.= | 6973.5 |
| 100 year storage vol.=  | 41.5   |
| 100 year discharge=     | 33     |
| 5 year storage elev.=   | 6971.2 |
| 5 year storage vol.=    | 16.6   |
| 5 year discharge=       | 3.7    |
| WQCV storage elev.=     | 6968.9 |
| WQCV storage vol.=      | 1.5    |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.=  | 0.75   |

Data for outlet pipe and grate:

|                       |            | Dimensions  |                |          |        |         |                               |
|-----------------------|------------|-------------|----------------|----------|--------|---------|-------------------------------|
| Type                  | H or V     | Width (ft.) | X Height (ft.) | Dia.(in) |        | (sqft)  |                               |
| Rectangular           | Orifice 1: | V           | 0.0248         | 1.65     | Area = | 0.041   | Invert Elev = 6967.18         |
| Rectangular           | Orifice 2: | V           | 0.75           | 1        | Area = | 0.750   | Invert Elev = 6970.75         |
| Circular              | Orifice 3: | H           |                | 8        | Area = | 0.349   | Invert Elev = 6969.00         |
| Rectangular           | Orifice 4: | V           | 3.5            | 1.25     | Area = | 4.375   | Invert Elev = 6971.75         |
| Stand Pipe Dimensions |            |             |                |          |        |         |                               |
| Rec Grate             |            | 4.25        | x              | 3        | Elev = | 6973.00 | 50 year storage elev.= 6973.0 |
| Circ. Grate           |            |             | dia.           |          | Elev = | 6973.00 | 50 year discharge= 14         |
|                       |            |             |                |          |        |         | 10 year storage elev.= 6971.8 |
|                       |            |             |                |          |        |         | 10 year discharge= 5.5        |
|                       |            |             |                |          |        |         | 2 year storage elev.= 6970.3  |
|                       |            |             |                |          |        |         | 2 year discharge= 2.2         |

Outlet Culvert Dimensions

|                | Width (ft.) | Height (ft.) | Dia. (ft.) | Type     |
|----------------|-------------|--------------|------------|----------|
| Outlet Culvert | x           | 3            | 3.5        | Circular |
| Area           | 9.6         | TOP          |            |          |
| Outlet I. E.   | 6966.8      | 6970.7       |            |          |
| Wall Thick.    | 5           | in.          |            |          |

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

## Meridian Ranch Proposed Detention Pond F INTERIM-Final

Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 285    |
| embankment elev =       | 7138.5 |
| spillway length =       | 87     |
| spillway elevation =    | 7137.5 |
| 100 year storage elev.= | 7136.0 |
| 100 year storage vol.=  | 8.9    |
| 100 year discharge=     | 178    |
| 5 year storage elev.=   | 7131.2 |
| 5 year storage vol.=    | 1.8    |
| 5 year discharge=       | 8.1    |
| WQCV storage elev.=     | 7129.1 |
| WQCV storage vol.=      | 0.3    |
| 1/2 WQCV storage elev.= | 7128.6 |
| 1/2 WQCV storage vol.=  | 0.15   |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 7134.9 |
| 50 year storage vol.=  | 6.7    |
| 50 year discharge=     | 121    |
| 10 year storage elev.= | 7132.6 |
| 10 year storage vol.=  | 3.3    |
| 10 year discharge=     | 16     |
| 2 year storage elev.=  | 7130.1 |
| 2 year storage vol.=   | 0.9    |
| 2 year discharge=      | 2.1    |

Outlet Culvert Dimensions

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

| STAGE  |        | STORAGE |      |        |          | DISCHARGE      |          |                          |      |     |   |                        |             |   |       | REALIZED<br>CULVERT<br>OUTFLOW |  | TOTAL<br>FLOW |
|--------|--------|---------|------|--------|----------|----------------|----------|--------------------------|------|-----|---|------------------------|-------------|---|-------|--------------------------------|--|---------------|
| ELEV   | HEIGHT | AREA    |      | VOLUME |          | TOP OF<br>BANK | SPILLWAY | ORIFICE<br>(max outflow) |      |     | 4 | GRATE<br>(max outflow) | PIPE        |   |       |                                |  |               |
|        |        | sqft    | acre | acft   | cum acft |                |          | (max outflow)            | 1    | 2   |   | 3                      | Rectangular | 1 | 2     |                                |  |               |
| 7127.7 | 0      | 0       | 0.00 | 0.00   | 0.00     | -              | -        | -                        | -    | -   | - | -                      | -           | - | -     | -                              |  |               |
| 7128   | 0.3    | 2170    | 0.05 | 0.01   | 0.01     | -              | -        | 0.0                      | -    | -   | - | -                      | 11          | - | 0.003 | 0.003                          |  |               |
| 7129   | 1.3    | 17730   | 0.41 | 0.23   | 0.24     | -              | -        | 0.1                      | -    | -   | - | -                      | 31          | - | 0.050 | 0.050                          |  |               |
| 7130   | 2.3    | 33290   | 0.76 | 0.59   | 0.82     | -              | -        | 0.1                      | -    | 1.5 | - | -                      | 57          | - | 1.6   | 1.6                            |  |               |
| 7131   | 3.3    | 39060   | 0.90 | 0.83   | 1.65     | -              | -        | 0.1                      | 4.2  | 2.3 | - | -                      | 117         | - | 6.6   | 6.6                            |  |               |
| 7132   | 4.3    | 44830   | 1.03 | 0.96   | 2.61     | -              | -        | 0.1                      | 10.8 | 2.8 | - | -                      | 117         | - | 14    | 14                             |  |               |
| 7133   | 5.3    | 55137.5 | 1.27 | 1.15   | 3.76     | -              | -        | 0.2                      | 14.4 | 3.3 | - | -                      | 142         | - | 18    | 18                             |  |               |
| 7134   | 6.3    | 65445   | 1.50 | 1.38   | 5.15     | -              | -        | 0.2                      | 17.4 | 3.7 | - | 36                     | 162         | - | 57    | 57                             |  |               |
| 7135   | 7.3    | 79535   | 1.83 | 1.66   | 6.81     | -              | -        | 0.2                      | 19.9 | 4.0 | - | 102                    | 175         | - | 126   | 126                            |  |               |
| 7136   | 8.3    | 93625   | 2.15 | 1.99   | 8.80     | -              | -        | 0.2                      | 22.1 | 4.4 | - | 150                    | 187         | - | 177   | 177                            |  |               |
| 7137   | 9.3    | 111620  | 2.56 | 2.36   | 11.15    | -              | -        | 0.2                      | 24.1 | 4.7 | - | 173                    | 200         | - | 200   | 200                            |  |               |
| 7138   | 10.3   | 129615  | 2.98 | 2.77   | 13.92    | -              | 92.3     | 0.2                      | 25.9 | 5.0 | - | 194                    | 211         | - | 211   | 303                            |  |               |
| 7138.5 | 10.8   |         |      |        |          | -              | 261.0    | 0.3                      | 26.8 | 5.1 | - | 203                    | 211         | - | -     | 261                            |  |               |

- Notes:
- 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM.  $Q = CLH^{1.5}$  (C=3.0)
  - 2) Orifice flows are also from section 11.3.1.  $Q = CA(2gH)^{0.5}$  (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 Proposed Detention Pond G-FINAL INTERIM DESIGN (G12)

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 500    |
| embankment elev =       | 7034   |
| spillway length =       | 130    |
| spillway elevation =    | 7031.5 |
| 100 year storage elev.= | 7029.7 |
| 100 year storage vol.=  | 21.4   |
| 100 year discharge=     | 369    |
| 5 year storage elev.=   | 7027.2 |
| 5 year storage vol.=    | 7.1    |
| 5 year discharge=       | 12     |
| WQCV storage elev.=     | 7025.8 |
| WQCV storage vol.=      | 0.9    |
| 1/2 WQCV storage elev.= | 7024.9 |
| 1/2 WQCV storage vol.=  | 0.45   |

Data for outlet pipe and grate:

|                       |            | Dimensions  |                |          |        |         |       |              |         |
|-----------------------|------------|-------------|----------------|----------|--------|---------|-------|--------------|---------|
| Type                  | H or V     | Width (ft.) | X Height (ft.) | Dia.(in) |        | (sqft)  |       |              |         |
| Rectangular           | Orifice 1: | V           | 0.0263         | 1.90     |        | Area =  | 0.050 | Elev to cl = | 7024.25 |
| Rectangular           | Orifice 2: | V           | 8.5            | 1.1      |        | Area =  | 9.350 | Elev to cl = | 7027.55 |
| Rectangular           | Orifice 3: | V           | 2              | 0.43     |        | Area =  | 0.860 | Elev to cl = | 7025.34 |
| Rectangular           | Orifice 4: | V           | 4              | 0.6      |        | Area =  | 2.400 | Elev to cl = | 7027.80 |
| Rectangular           | Orifice 5: | V           | 8.5            | 1.1      |        | Area =  | 9.350 | Elev to cl = | 7027.55 |
| Stand Pipe Dimensions |            |             |                |          |        |         |       |              |         |
| Rec Grate             |            | 20          | x              | 8        | Elev = | 7028.10 |       |              |         |
| Circ. Grate           |            |             | dia.           |          | Elev = | 7028.10 |       |              |         |

Outlet Culvert Dimensions

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

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 7029.0 |
| 50 year storage vol.=  | 17.4   |
| 50 year discharge=     | 218    |
| 10 year storage elev.= | 7027.6 |
| 10 year storage vol.=  | 9.2    |
| 10 year discharge=     | 32     |
| 2 year storage elev.=  | 7026.1 |
| 2 year storage vol.=   | 2.8    |
| 2 year discharge=      | 4.0    |

| STAGE  |        | STORAGE |      |        |          | DISCHARGE   |          |                       |       |      |      |       |                     |      |   | REALIZED CULVERT OUTFLOW |   | TOTAL FLOW |
|--------|--------|---------|------|--------|----------|-------------|----------|-----------------------|-------|------|------|-------|---------------------|------|---|--------------------------|---|------------|
| ELEV   | HEIGHT | AREA    |      | VOLUME |          | TOP OF BANK | SPILLWAY | ORIFICE (max outflow) |       |      |      |       | GRATE (max outflow) | PIPE |   | 1                        | 2 |            |
|        |        | sqft    | acre | acft   | cum acft |             |          | 1                     | 2     | 3    | 4    | 5     |                     | 1    | 2 |                          |   |            |
| 7023.3 | 0      | 0       | 0.00 | 0.0    | 0.00     | -           | -        | -                     | -     | -    | -    | -     | -                   | 12   |   | -                        |   | -          |
| 7024   | 0.7    | 2232    | 0.05 | 0.0    | 0.02     | -           | -        | 0.05                  | -     | -    | -    | -     | -                   | 51   |   | 0.0                      |   | 0.05       |
| 7025   | 1.7    | 39917   | 0.92 | 0.5    | 0.50     | -           | -        | 0.17                  | -     | -    | -    | -     | -                   | 111  |   | 0.2                      |   | 0.17       |
| 7026   | 2.7    | 126469  | 2.90 | 1.9    | 2.41     | -           | -        | 0.32                  | -     | 3.4  | -    | -     | -                   | 184  |   | 3.7                      |   | 3.7        |
| 7026.5 | 3.2    | 166675  | 3.83 | 3.6    | 4.06     | -           | -        | 0.36                  | -     | 4.5  | -    | -     | -                   | 224  |   | 4.8                      |   | 4.8        |
| 7027   | 3.7    | 206880  | 4.75 | 2.1    | 6.20     | -           | -        | 0.40                  | -     | 5.3  | -    | -     | -                   | 268  |   | 5.7                      |   | 5.7        |
| 7027.5 | 4.2    | 232032  | 5.33 | 4.6    | 8.64     | -           | -        | 0.43                  | 9.0   | 6.1  | -    | 9.0   | -                   | 304  |   | 25                       |   | 25         |
| 7028   | 4.7    | 257183  | 5.90 | 5.3    | 11.53    | -           | -        | 0.47                  | 25.5  | 6.8  | 4.2  | 25.5  | -                   | 337  |   | 62                       |   | 62         |
| 7028.5 | 5.2    | 264196  | 6.07 | 5.7    | 14.33    | -           | -        | 0.50                  | 43.9  | 7.4  | 9.7  | 43.9  | 27                  | 373  |   | 133                      |   | 133        |
| 7029   | 5.7    | 271209  | 6.23 | 6.1    | 17.59    | -           | -        | 0.52                  | 54.2  | 7.9  | 12.7 | 54.2  | 92                  | 406  |   | 222                      |   | 222        |
| 7029.5 | 6.2    | 276106  | 6.34 | 11.7   | 20.30    | -           | -        | 0.58                  | 62.9  | 8.5  | 15.1 | 62.9  | 179                 | 436  |   | 329                      |   | 329        |
| 7030   | 6.7    | 281003  | 6.45 | 9.4    | 23.72    | -           | -        | 0.60                  | 70.5  | 8.9  | 17.1 | 70.5  | 283                 | 464  |   | 450                      |   | 450        |
| 7030.5 | 7.2    | 286003  | 6.57 | 6.5    | 26.75    | -           | -        | 0.60                  | 77.3  | 9.4  | 19.0 | 77.3  | 402                 | 491  |   | 491                      |   | 491        |
| 7031   | 7.7    | 291002  | 6.68 | 6.6    | 30.28    | -           | -        | 0.63                  | 83.6  | 9.9  | 20.7 | 83.6  | 533                 | 516  |   | 516                      |   | 516        |
| 7031.5 | 8.2    | 296443  | 6.81 | 6.7    | 33.44    | -           | -        | 0.65                  | 89.5  | 10.3 | 22.2 | 89.5  | 677                 | 540  |   | 540                      |   | 540        |
| 7032   | 8.7    | 301883  | 6.93 | 3.4    | 36.87    | 137.9       | 137.9    | 0.67                  | 95.0  | 10.7 | 23.7 | 95.0  | 832                 | 563  |   | 563                      |   | 701        |
| 7032.5 | 9.2    | 309236  | 7.10 | 7.0    | 40.39    | 390.0       | 390.0    | 0.69                  | 100.2 | 11.1 | 25.1 | 100.2 | 997                 | 586  |   | 586                      |   | 976        |
| 7033   | 9.7    | 316589  | 7.27 | 3.6    | 44.0     | 716.5       | 716.5    | 0.71                  | 105.1 | 11.5 | 26.4 | 105.1 | 1,171               | 607  |   | 607                      |   | 1,323      |

- Notes:
- 1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM.  $Q = CLH^{1.5}$  (C=3.0)
  - 2) Orifice flows are also from section 11.3.1.  $Q = CA(2gH)^{0.5}$  (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 Proposed Detention Pond D - Future AS-BUILT Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 710    |
| embankment elev =       | 7060   |
| spillway length =       | 100    |
| spillway elevation =    | 7058   |
| 100 year storage elev.= | 7057.0 |
| 100 year storage vol.=  | 25.3   |
| 100 year discharge=     | 134    |
| 5 year storage elev.=   | 7053.8 |
| 5 year storage vol.=    | 7.1    |
| 5 year discharge=       | 11     |
| WQCV storage vol.=      | 1.0    |
| WQCV depth =            | 2.42   |
| 1/2 WQCV storage vol.=  | 0.50   |

Data for outlet pipe and grate:

|                           |  | Dimensions                 |          |              |            |          |       |                        |         |
|---------------------------|--|----------------------------|----------|--------------|------------|----------|-------|------------------------|---------|
| Type                      |  | Width (ft.) X Height (ft.) | Dia.(in) |              |            | (sqft)   |       |                        |         |
| Rectangular               |  | Orifice 1:                 | 0.03     | 2.42         |            | Area =   | 0.072 | Elev to cl =           | 7050.21 |
| Circular                  |  | Orifice 2:                 |          |              | 8          | Area =   | 0.349 | Elev to cl =           | 7051.42 |
| Rectangular               |  | Orifice 3:                 | 5        | 0.5          |            | Area =   | 2.500 | Elev to cl =           | 7053.35 |
| None Selected             |  | Orifice 4:                 |          |              |            | Area =   | 0.000 | Elev to cl =           |         |
| Stand Pipe Dimensions     |  |                            |          |              |            |          |       |                        |         |
| Rec Grate                 |  | 6                          | x        | 4.25         | Elev =     | 7054.9   |       | 50 year storage elev.= | 7056.3  |
| Circ. Grate               |  |                            | dia.     |              | Elev =     |          |       | 50 year storage vol.=  | 20.0    |
| Outlet Culvert Dimensions |  |                            |          |              |            |          |       |                        |         |
| Outlet Culvert            |  | Width (ft.)                | x        | Height (ft.) | Dia. (ft.) | Type     |       | 50 year discharge=     | 90      |
| Area                      |  | 12.6                       |          | TOP          |            | Circular |       | 10 year storage elev.= | 7054.6  |
| Outlet I. E.              |  | 7048.1                     |          | 7052.5       |            |          |       | 10 year storage vol.=  | 10.7    |
| Wall Thick.               |  | 5                          | in.      |              |            |          |       | 10 year discharge=     | 18      |
|                           |  |                            |          |              |            |          |       | 2 year storage elev.=  | 7053.1  |
|                           |  |                            |          |              |            |          |       | 2 year storage vol.=   | 4.6     |
|                           |  |                            |          |              |            |          |       | 2 year discharge=      | 3.7     |

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

- 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 (TOTAL FLOWS)

Gieck Basin - El Paso County, Colorado

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974.5 |
| 100 year storage elev.= | 6973.6 |
| 100 year storage vol.=  | 42.2   |
| 100 year discharge=     | 240    |
| 5 year storage elev.=   | 6971.3 |
| 5 year storage vol.=    | 17.2   |
| 5 year discharge=       | 14     |
| WQCV storage elev.=     | 6968.9 |
| WQCV storage vol.=      | 1.5    |
| WQCV depth =            | 1.9    |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.=  | 0.75   |

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 6973.0 |
| 50 year storage vol.=  | 36.2   |
| 50 year discharge=     | 150    |
| 10 year storage elev.= | 6971.8 |
| 10 year storage vol.=  | 22.4   |
| 10 year discharge=     | 28     |
| 2 year storage elev.=  | 6970.4 |
| 2 year storage vol.=   | 9.5    |
| 2 year discharge=      | 5.8    |

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

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



# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974   |
| 100 year storage elev.= | 6973.6 |
| 100 year storage vol.=  | 42.2   |
| 100 year discharge=     | 204    |
| 5 year storage elev.=   | 6971.3 |
| 5 year storage vol.=    | 17.2   |
| 5 year discharge=       | 10     |
| WQCV storage elev.=     | 6968.9 |
| WQCV storage vol.=      | 1.5    |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.=  | 0.75   |

Data for outlet pipe and grate:

|                       |            | Dimensions                 |          |      |        |         |       |
|-----------------------|------------|----------------------------|----------|------|--------|---------|-------|
| Type                  | H or V     | Width (ft.) X Height (ft.) | Dia.(in) |      | (sqft) |         |       |
| Rectangular           | Orifice 1: | V                          | 0.0248   | 1.65 |        | Area =  | 0.041 |
| Rectangular           | Orifice 2: | V                          | 2        | 0.8  |        | Area =  | 1.600 |
| Circular              | Orifice 3: | H                          |          | 10   |        | Area =  | 0.545 |
| Rectangular           | Orifice 4: | V                          | 6        | 0.7  |        | Area =  | 4.200 |
| Stand Pipe Dimensions |            |                            |          |      |        |         |       |
| Rec Grate             |            | 11                         | x        | 7    | Elev = | 6971.90 |       |
| Circ. Grate           |            |                            | dia.     |      | Elev = | 6971.90 |       |

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

Outlet Culvert Dimensions

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

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 1860   |
| embankment elev =       | 6976   |
| spillway length =       | 200    |
| spillway elevation =    | 6974.5 |
| 100 year storage elev.= | 6973.6 |
| 100 year storage vol.=  | 42.2   |
| 100 year discharge=     | 36     |
| 5 year storage elev.=   | 6971.3 |
| 5 year storage vol.=    | 17.2   |
| 5 year discharge=       | 3.8    |
| WQCV storage elev.=     | 6968.9 |
| WQCV storage vol.=      | 1.5    |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.=  | 0.8    |

Data for outlet pipe and grate:

|                       |            | Dimensions  |                |          |        |         |       |
|-----------------------|------------|-------------|----------------|----------|--------|---------|-------|
| Type                  | H or V     | Width (ft.) | X Height (ft.) | Dia.(in) |        | (sqft)  |       |
| Rectangular           | Orifice 1: | V           | 0.0248         | 1.65     |        | Area =  | 0.041 |
| Rectangular           | Orifice 2: | V           | 0.75           | 1        |        | Area =  | 0.750 |
| Circular              | Orifice 3: | H           |                | 8        |        | Area =  | 0.349 |
| Rectangular           | Orifice 4: | V           | 3.5            | 1.25     |        | Area =  | 4.375 |
| Stand Pipe Dimensions |            |             |                |          |        |         |       |
| Rec Grate             |            | 4.25        | x              | 3        | Elev = | 6973.00 |       |
| Circ. Grate           |            |             | dia.           |          | Elev = | 6973.00 |       |

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

Outlet Culvert Dimensions

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

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

## Meridian Ranch Proposed Detention Pond F-Final Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 285    |
| embankment elev =       | 7138.5 |
| spillway length =       | 87     |
| spillway elevation =    | 7137.5 |
| 100 year storage elev.= | 7136.0 |
| 100 year storage vol.=  | 8.9    |
| 100 year discharge=     | 178    |
| 5 year storage elev.=   | 7131.2 |
| 5 year storage vol.=    | 1.8    |
| 5 year discharge=       | 8.1    |
| WQCV storage elev.=     | 7129.1 |
| WQCV storage vol.=      | 0.3    |
| 1/2 WQCV storage elev.= | 7128.6 |
| 1/2 WQCV storage vol.=  | 0.15   |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 7134.9 |
| 50 year storage vol.=  | 6.7    |
| 50 year discharge=     | 121    |
| 10 year storage elev.= | 7132.6 |
| 10 year storage vol.=  | 3.3    |
| 10 year discharge=     | 16     |
| 2 year storage elev.=  | 7130.1 |
| 2 year storage vol.=   | 0.9    |
| 2 year discharge=      | 2.1    |

Outlet Culvert Dimensions

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

| STAGE  |        | STORAGE |      |        |          | DISCHARGE      |          |                          |      |     |   |   |      |   |     | REALIZED<br>CULVERT<br>OUTFLOW | TOTAL<br>FLOW |
|--------|--------|---------|------|--------|----------|----------------|----------|--------------------------|------|-----|---|---|------|---|-----|--------------------------------|---------------|
| ELEV   | HEIGHT | AREA    |      | VOLUME |          | TOP OF<br>BANK | SPILLWAY | ORIFICE<br>(max outflow) |      |     | 4 | GRATE<br>(max outflow)<br><br>Rectangular | PIPE |   |     |                                |               |
|        |        | sqft    | acre | acft   | cum acft |                |          | 1                        | 2    | 3   |   |   | 1    | 2 |     |                                |               |
| 7127.7 | 0      | 0       | 0.00 | 0.00   | 0.00     |                |          | -                        | -    | -   | - | -   |      |   |     |                                |               |
| 7128   | 0.3    | 2170    | 0.05 | 0.01   | 0.01     | -              | -        | 0.0                      | -    | -   | - | -   | 11   |   | 0.0 | 0.003                          |               |
| 7129   | 1.3    | 17730   | 0.41 | 0.23   | 0.24     | -              | -        | 0.1                      | -    | -   | - | -   | 31   |   | 0.1 | 0.050                          |               |
| 7130   | 2.3    | 33290   | 0.76 | 0.59   | 0.82     | -              | -        | 0.1                      | -    | 1.5 | - | -   | 57   |   | 1.6 | 1.6                            |               |
| 7131   | 3.3    | 39060   | 0.90 | 0.83   | 1.65     | -              | -        | 0.1                      | 4.2  | 2.3 | - | -   | 117  |   | 6.6 | 6.6                            |               |
| 7132   | 4.3    | 44830   | 1.03 | 0.96   | 2.61     | -              | -        | 0.1                      | 10.8 | 2.8 | - | -   | 117  |   | 14  | 14                             |               |
| 7133   | 5.3    | 55137.5 | 1.27 | 1.15   | 3.76     | -              | -        | 0.2                      | 14.4 | 3.3 | - | -   | 142  |   | 18  | 18                             |               |
| 7134   | 6.3    | 65445   | 1.50 | 1.38   | 5.15     | -              | -        | 0.2                      | 17.4 | 3.7 | - | 36  | 162  |   | 57  | 57                             |               |
| 7135   | 7.3    | 79535   | 1.83 | 1.66   | 6.81     | -              | -        | 0.2                      | 19.9 | 4.0 | - | 102                                       | 175  |   | 126 | 126                            |               |
| 7136   | 8.3    | 93625   | 2.15 | 1.99   | 8.80     | -              | -        | 0.2                      | 22.1 | 4.4 | - | 150                                       | 187  |   | 177 | 177                            |               |
| 7137   | 9.3    | 111620  | 2.56 | 2.36   | 11.15    | -              | -        | 0.2                      | 24.1 | 4.7 | - | 173                                       | 200  |   | 200 | 200                            |               |
| 7138   | 10.3   | 129615  | 2.98 | 2.77   | 13.92    | -              | 92.3     | 0.2                      | 25.9 | 5.0 | - | 194                                       | 211  |   | 211 | 303                            |               |
| 7138.5 | 10.8   |         |      |        |          | -              | 261.0    | 0.3                      | 26.8 | 5.1 | - | 203                                       | 211  |   | -   | 261                            |               |

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

|                         |        |
|-------------------------|--------|
| embankment length =     | 500    |
| embankment elev =       | 7033.5 |
| spillway length =       | 130    |
| spillway elevation =    | 7031.5 |
| 100 year storage elev.= | 7030.2 |
| 100 year storage vol.=  | 24.8   |
| 100 year discharge=     | 465    |
| 5 year storage elev.=   | 7027.4 |
| 5 year storage vol.=    | 8.0    |
| 5 year discharge=       | 20     |
| WQCV storage elev.=     | 7025.2 |
| WQCV storage vol.=      | 0.9    |
| 1/2 WQCV storage elev.= | 7024.9 |
| 1/2 WQCV storage vol.=  | 0.45   |

Data for outlet pipe and grate:

|                       |            | Dimensions  |                |          |        |         |       |              |         |
|-----------------------|------------|-------------|----------------|----------|--------|---------|-------|--------------|---------|
| Type                  | H or V     | Width (ft.) | X Height (ft.) | Dia.(in) |        | (sqft)  |       |              |         |
| Rectangular           | Orifice 1: | V           | 0.0263         | 1.90     |        | Area =  | 0.050 | Elev to cl = | 7024.25 |
| Rectangular           | Orifice 2: | V           | 8.5            | 1.1      |        | Area =  | 9.350 | Elev to cl = | 7027.55 |
| Rectangular           | Orifice 3: | V           | 2              | 0.43     |        | Area =  | 0.860 | Elev to cl = | 7025.34 |
| Rectangular           | Orifice 4: | V           | 4              | 0.6      |        | Area =  | 2.400 | Elev to cl = | 7027.80 |
| Rectangular           | Orifice 5: | V           | 8.5            | 1.1      |        | Area =  | 9.350 | Elev to cl = | 7027.55 |
| Stand Pipe Dimensions |            |             |                |          |        |         |       |              |         |
| Rec Grate             |            | 20          | x              | 8        | Elev = | 7028.10 |       |              |         |
| Circ. Grate           |            |             | dia.           |          | Elev = | 7028.10 |       |              |         |

Outlet Culvert Dimensions

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

|                        |        |
|------------------------|--------|
| 50 year storage elev.= | 7029.4 |
| 50 year storage vol.=  | 19.7   |
| 50 year discharge=     | 307    |
| 10 year storage elev.= | 7027.8 |
| 10 year storage vol.=  | 10.7   |
| 10 year discharge=     | 51     |
| 2 year storage elev.=  | 7026.6 |
| 2 year storage vol.=   | 4.6    |
| 2 year discharge=      | 5.1    |

| STAGE  |        | STORAGE |      |        |          | DISCHARGE      |          |                          |       |      |      |       |                        |      |   |     |       | REALIZED<br>CULVERT<br>OUTFLOW | TOTAL<br>FLOW |
|--------|--------|---------|------|--------|----------|----------------|----------|--------------------------|-------|------|------|-------|------------------------|------|---|-----|-------|--------------------------------|---------------|
| ELEV   | HEIGHT | AREA    |      | VOLUME |          | TOP OF<br>BANK | SPILLWAY | ORIFICE<br>(max outflow) |       |      |      |       | GRATE<br>(max outflow) | PIPE |   |     |       |                                |               |
|        |        | sqft    | acre | acft   | cum acft |                |          | 1                        | 2     | 3    | 4    | 5     | Rectangular            | 1    | 2 |     |       |                                |               |
| 7023.3 | 0      | 0       | 0.00 | 0.0    | 0.00     |                |          | -                        | -     | -    | -    | -     | -                      | 12   |   | -   | -     |                                |               |
| 7024   | 0.7    | 2232    | 0.05 | 0.0    | 0.02     | -              | -        | 0.05                     | -     | -    | -    | -     | -                      | 51   |   | 0.0 | 0.05  |                                |               |
| 7025   | 1.7    | 39917   | 0.92 | 0.5    | 0.50     | -              | -        | 0.17                     | -     | -    | -    | -     | -                      | 111  |   | 0.2 | 0.17  |                                |               |
| 7026   | 2.7    | 126469  | 2.90 | 1.9    | 2.41     | -              | -        | 0.32                     | -     | 3.4  | -    | -     | -                      | 184  |   | 3.7 | 3.7   |                                |               |
| 7026.5 | 3.2    | 166675  | 3.83 | 3.6    | 4.06     | -              | -        | 0.36                     | -     | 4.5  | -    | -     | -                      | 224  |   | 4.8 | 4.8   |                                |               |
| 7027   | 3.7    | 206880  | 4.75 | 2.1    | 6.20     | -              | -        | 0.40                     | -     | 5.3  | -    | -     | -                      | 268  |   | 5.7 | 5.7   |                                |               |
| 7027.5 | 4.2    | 232032  | 5.33 | 4.6    | 8.64     | -              | -        | 0.43                     | 9.0   | 6.1  | -    | 9.0   | -                      | 304  |   | 25  | 25    |                                |               |
| 7028   | 4.7    | 257183  | 5.90 | 5.3    | 11.5     | -              | -        | 0.47                     | 25.5  | 6.8  | 4.2  | 25.5  | -                      | 337  |   | 62  | 62    |                                |               |
| 7028.5 | 5.2    | 264196  | 6.07 | 5.7    | 14.3     | -              | -        | 0.50                     | 43.9  | 7.4  | 9.7  | 43.9  | 27                     | 373  |   | 133 | 133   |                                |               |
| 7029   | 5.7    | 271209  | 6.23 | 6.1    | 17.6     | -              | -        | 0.52                     | 54.2  | 7.9  | 12.7 | 54.2  | 92                     | 406  |   | 222 | 222   |                                |               |
| 7029.5 | 6.2    | 276106  | 6.34 | 11.7   | 20.3     | -              | -        | 0.58                     | 62.9  | 8.5  | 15.1 | 62.9  | 179                    | 436  |   | 329 | 329   |                                |               |
| 7030   | 6.7    | 281003  | 6.45 | 9.4    | 23.7     | -              | -        | 0.60                     | 70.5  | 8.9  | 17.1 | 70.5  | 283                    | 464  |   | 450 | 450   |                                |               |
| 7030.5 | 7.2    | 286003  | 6.57 | 6.5    | 26.8     | -              | -        | 0.60                     | 77.3  | 9.4  | 19.0 | 77.3  | 402                    | 491  |   | 491 | 491   |                                |               |
| 7031   | 7.7    | 291002  | 6.68 | 6.6    | 30.3     | -              | -        | 0.63                     | 83.6  | 9.9  | 20.7 | 83.6  | 533                    | 516  |   | 516 | 516   |                                |               |
| 7031.5 | 8.2    | 296443  | 6.81 | 6.7    | 33.4     | -              | -        | 0.65                     | 89.5  | 10.3 | 22.2 | 89.5  | 677                    | 540  |   | 540 | 540   |                                |               |
| 7032   | 8.7    | 301883  | 6.93 | 3.4    | 36.9     | 137.9          | 137.9    | 0.67                     | 95.0  | 10.7 | 23.7 | 95.0  | 832                    | 563  |   | 563 | 701   |                                |               |
| 7032.5 | 9.2    | 309236  | 7.10 | 7.0    | 40.4     | 390.0          | 390.0    | 0.69                     | 100.2 | 11.1 | 25.1 | 100.2 | 997                    | 586  |   | 586 | 976   |                                |               |
| 7033   | 9.7    | 316589  | 7.27 | 3.6    | 44.0     | 716.5          | 716.5    | 0.71                     | 105.1 | 11.5 | 26.4 | 105.1 | 1,171                  | 607  |   | 607 | 1,323 |                                |               |

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

## **RHR FILING 2 INTERIM CONDITION**

### **Simulation Run: RHRF2-100 YR Reservoir: POND D**

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

Volume Units: AC-FT

#### **Computed Results:**

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

### **Simulation Run: RHRF2-005 YR Reservoir: POND D**

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

Volume Units: AC-FT

#### **Computed Results:**

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

### **Simulation Run: RHRF2-100 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:   | 556 (CFS)     | Date/Time of Peak Inflow:  | 01Jul2015, 12:18 |
| Peak Outflow:  | 231 (CFS)     | Date/Time of Peak Outflow: | 01Jul2015, 13:30 |
| Total Inflow : | 119.4 (AC-FT) | Peak Storage:              | 41.5 (AC-FT)     |
| Total Outflow: | 94.6 (AC-FT)  | Peak Elevation:            | 6973.5 (FT)      |

**Simulation Run: RHRF2-005 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: 122 (CFS)      | Date/Time of Peak Inflow: 01Jul2015, 12:12  |
| Peak Outflow: 13 (CFS)      | Date/Time of Peak Outflow: 01Jul2015, 20:00 |
| Total Inflow : 26.7 (AC-FT) | Peak Storage: 16.6 (AC-FT)                  |
| Total Outflow: 10.1 (AC-FT) | Peak Elevation: 6971.2 (FT)                 |

**Simulation Run: RHRF2-100 YR Reservoir: POND G**

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: 491 (CFS)       | Date/Time of Peak Inflow: 01Jul2015, 12:18  |
| Peak Outflow: 369 (CFS)      | Date/Time of Peak Outflow: 01Jul2015, 13:30 |
| Total Inflow : 100.1 (AC-FT) | Peak Storage: 21.4 (AC-FT)                  |
| Total Outflow: 90.8 (AC-FT)  | Peak Elevation: 7029.7 (FT)                 |

**Simulation Run: RHRF2-005 YR Reservoir: POND G**

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: 40 (CFS)       | Date/Time of Peak Inflow: 01Jul2015, 12:12  |
| Peak Outflow: 13 (CFS)      | Date/Time of Peak Outflow: 01Jul2015, 20:00 |
| Total Inflow : 15.0 (AC-FT) | Peak Storage: 7.1 (AC-FT)                   |
| Total Outflow: 8.4 (AC-FT)  | Peak Elevation: 7025.8 (FT)                 |

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

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

Volume Units: AC-FT

Computed Results:

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

**Simulation Run: F-005 YR Reservoir: POND D**

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

Volume Units: AC-FT

Computed Results:

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

**Simulation Run: F-100 YR Reservoir: POND E**

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

Volume Units: AC-FT

Computed Results:

|                |               |                            |                  |
|----------------|---------------|----------------------------|------------------|
| Peak Inflow:   | 618 (CFS)     | Date/Time of Peak Inflow:  | 01Jul2015, 12:18 |
| Peak Outflow:  | 240 (CFS)     | Date/Time of Peak Outflow: | 01Jul2015, 13:30 |
| Total Inflow : | 122.5 (AC-FT) | Peak Storage:              | 42.2 (AC-FT)     |
| Total Outflow: | 97.7 (AC-FT)  | Peak Elevation:            | 6973.6 (FT)      |

### Simulation Run: F-005 YR Reservoir: POND E

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

Volume Units: AC-FT

#### Computed Results:

|                |              |                            |                  |
|----------------|--------------|----------------------------|------------------|
| Peak Inflow:   | 126 (CFS)    | Date/Time of Peak Inflow:  | 01Jul2015, 12:12 |
| Peak Outflow:  | 14 (CFS)     | Date/Time of Peak Outflow: | 01Jul2015, 20:00 |
| Total Inflow : | 28.0 (AC-FT) | Peak Storage:              | 17.2 (AC-FT)     |
| Total Outflow: | 11.1 (AC-FT) | Peak Elevation:            | 6971.3 (FT)      |

### Simulation Run: F-100 YR Reservoir: POND G

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

Volume Units: AC-FT

#### Computed Results:

|                |               |                            |                  |
|----------------|---------------|----------------------------|------------------|
| Peak Inflow:   | 653 (CFS)     | Date/Time of Peak Inflow:  | 01Jul2015, 12:06 |
| Peak Outflow:  | 465 (CFS)     | Date/Time of Peak Outflow: | 01Jul2015, 12:32 |
| Total Inflow : | 119.1 (AC-FT) | Peak Storage:              | 24.8 (AC-FT)     |
| Total Outflow: | 109.6 (AC-FT) | Peak Elevation:            | 7030.2 (FT)      |

### Simulation Run: F-005 YR Reservoir: POND G

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

Volume Units: AC-FT

#### Computed Results:

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



## **Appendix D – Outlet Protection Design**

## TYPE VI IMPACT BASIN

Urban Drainage & Flood Control District Pipe Outlet Design

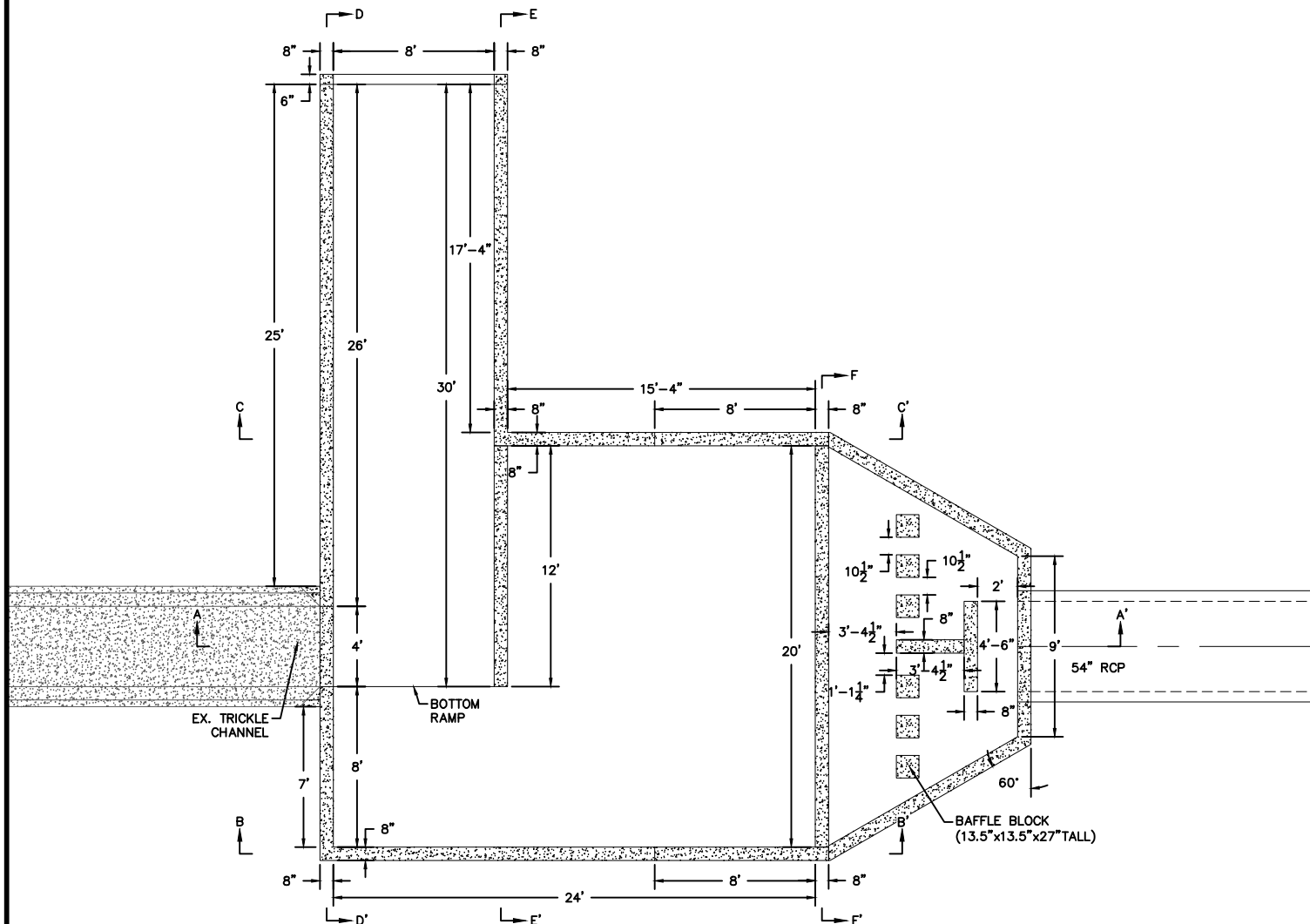
OUTLET # OS-4

Outlet Size (D) : 54 in.  
Capacity (Q): 153 CFS  
(full flow)

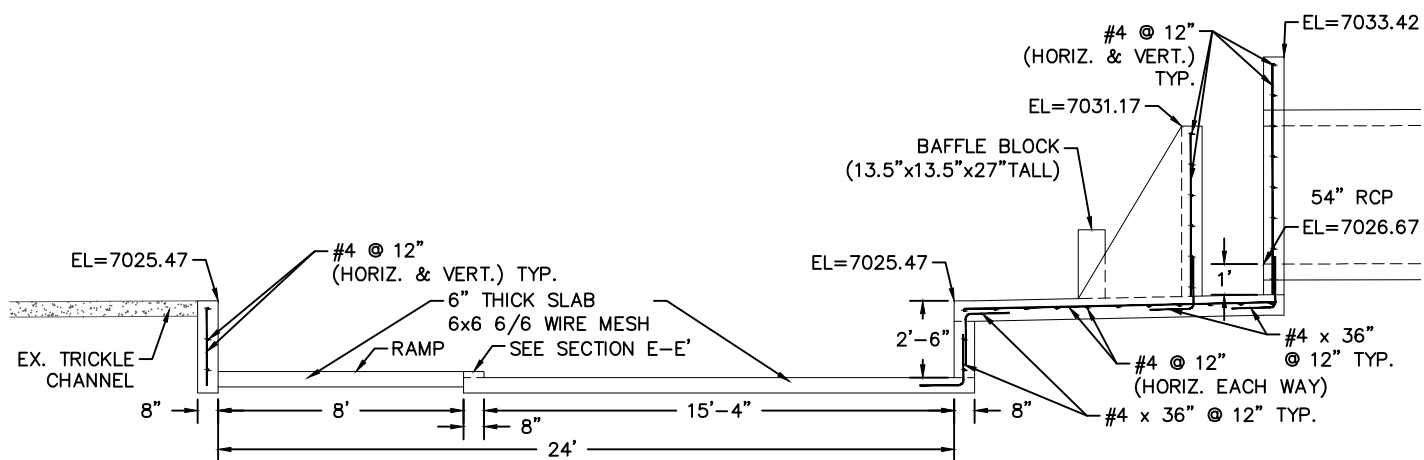
Discharge (q): 115 CFS  
Flow Depth (d): 32.8 in.  
Slope: 0.0073 in/in  
Mannings (n) 0.013

$\theta =$  155.2 DEGREES  
 $WP =$  8.04 FT  
 $R =$  1.26 FT  
 $A_{FLOW} =$  10.11 SF  
 $V_{FLOW} =$  11.38 FPS  
 $D = (A)^{0.5}$  3.18  
 $W$  9.98  $W = 2.94d[V/(gD)^{0.5}]^{0.556}$   
Use 10.00 FT  
H 7.50 FT  
L 13.33 FT  
a 5.00 FT  
b 3.75 FT  
c 5 FT  
d 1.667 FT  
e 0.833 FT  
f 1.25 FT  
t 0.833 FT Suggested Min

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## MODIFIED IMPACT STILLING BASIN



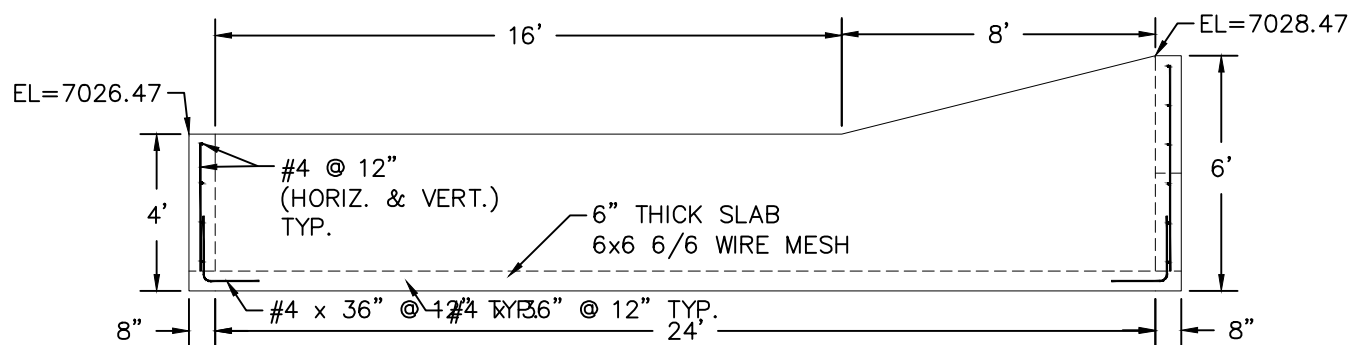
## SECTION A-A

1

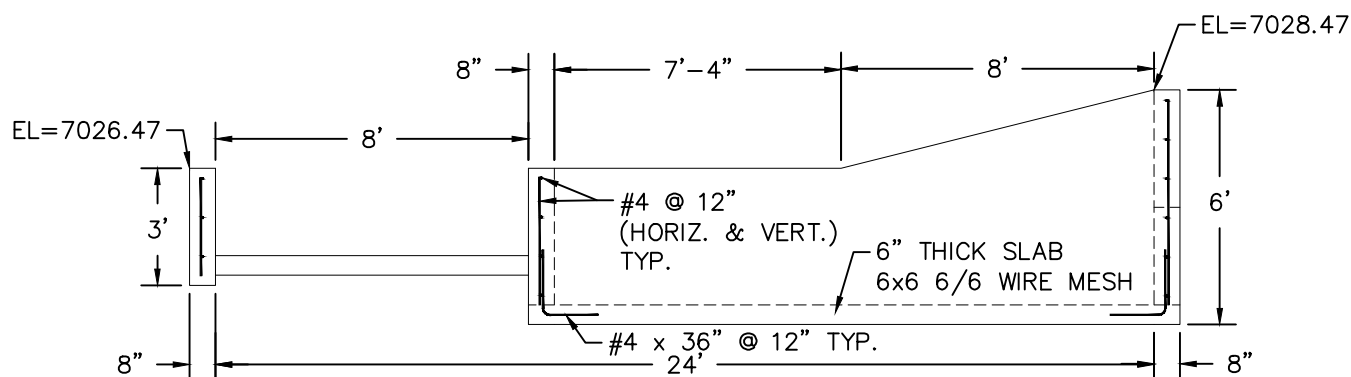
SCALE: N.T.S.  
DATE: NOV 2020  
DRAWN: LCG  
CHECK: TAK

**IMPACT STILLING BASIN**  
MILE HIGH FLOOD DISTRICT  
Modified for 54" RCP, Fig 9-43, 44

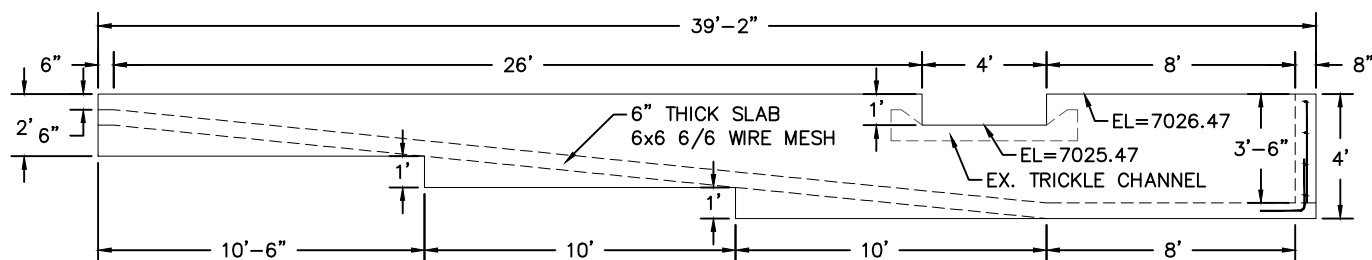
TECH CONTRACTORS  
11886 STAPLETON DRIVE  
FALCON, CO 80831  
TELEPHONE: 719.495.7444



## SECTION B-B



## SECTION C-C



# SECTION D-D

2

SCALE: N.T.S.

DATE: NOV 2020

DRAWN: LCG

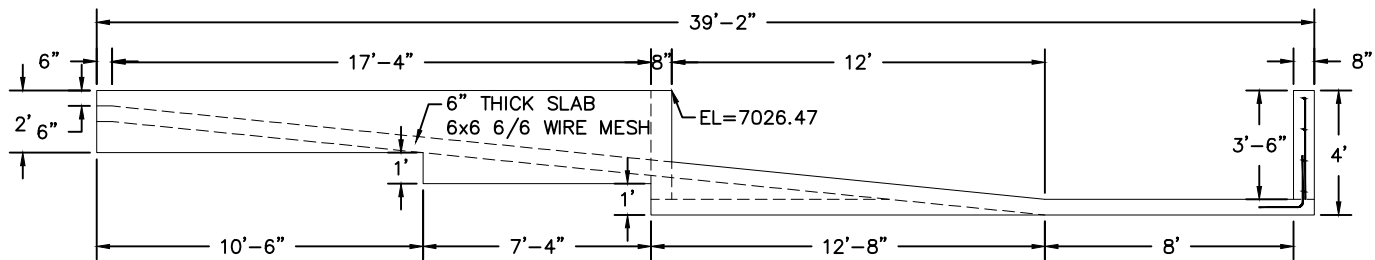
CHECK: TAK

## IMPACT STILLING BASIN

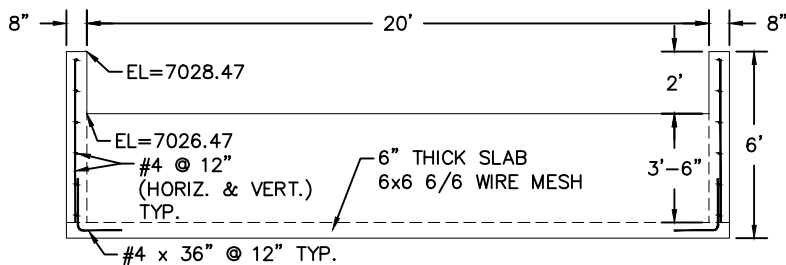
MILE HIGH FLOOD DISTRICT  
Modified for 54" RCP, Fig 9-43, 44

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

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SECTION E-E



SECTION F-F

3

SCALE: N.T.S.  
DATE: NOV 2020  
DRAWN: LCG  
CHECK: TAK

**IMPACT STILLING BASIN**  
MILE HIGH FLOOD DISTRICT  
Modified for 54" RCP, Fig 9-43, 44

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

## **Appendix E – Regional Water Quality Analysis**

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

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

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

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

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

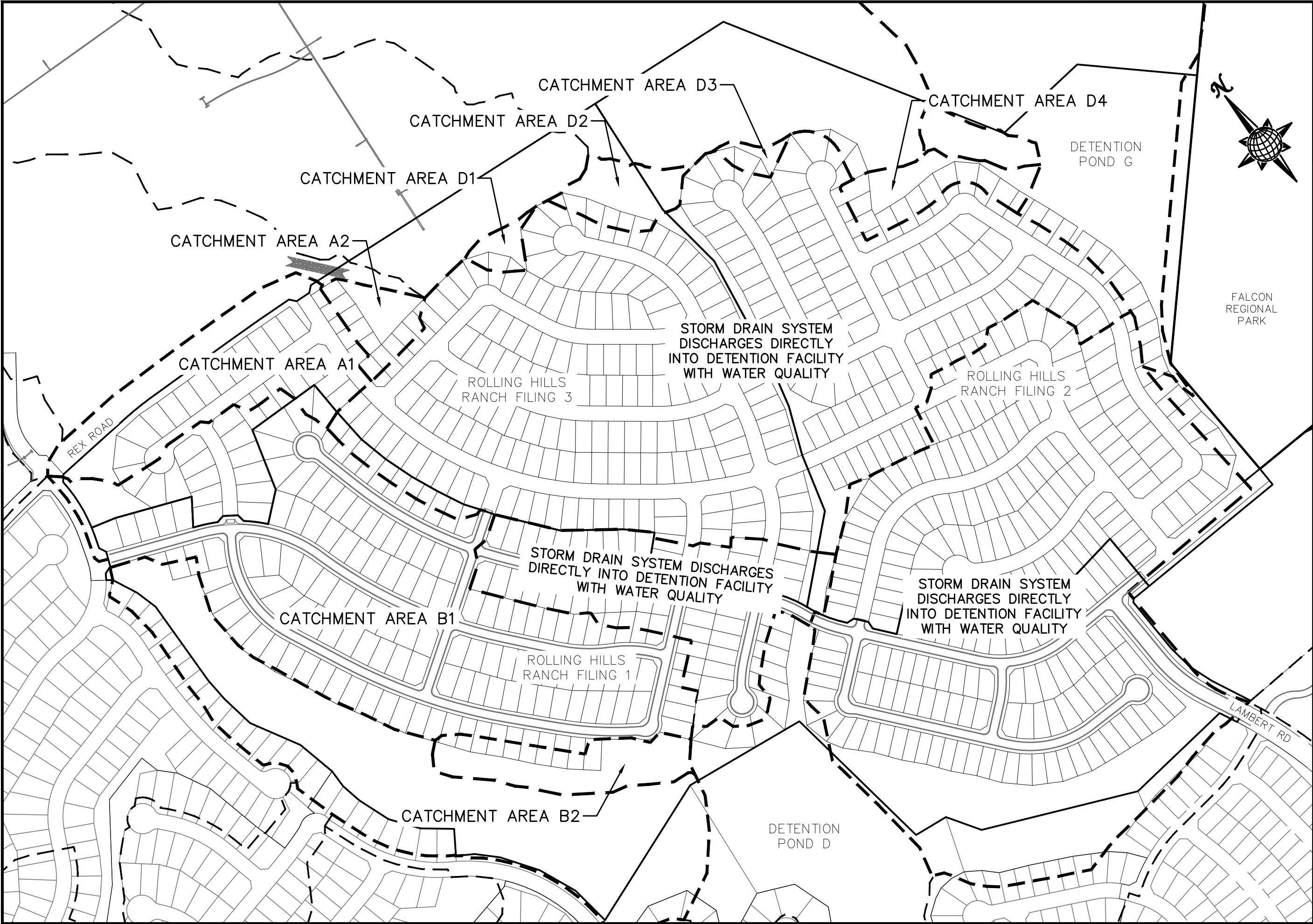
structural control measures and include, but are not limited to, control measures that prevent or reduce pollutants being introduced to water or that prevent or reduce the generation of runoff or illicit discharges.

- iii. Documentation of operation and maintenance procedures to ensure the long-term observation, maintenance, and operation of the control measures. The documentation shall include frequencies for routine inspections and maintenance activities.
- iv. Documentation regarding easements or other legal means for access of the control measure sites for operation, maintenance, and inspection of control measures.
- v. Confirmation that control measures meet the requirements of section I.7.C.
- vi. Confirmation that site plans meet the requirements of County's Site plan review and approval requirements.
- g. The regional WQCV facility must be subject to the County's authority consistent with requirements and actions for a Control Measure in accordance with a base design standard.
- h. Regional Facilities must be designed and implemented with flood control or water quality as the primary use. Recreational ponds and reservoirs may not be considered Regional Facilities. Water bodies listed by name in surface water quality classifications and standards regulations (5CCR1002-32 through 5CCR1002-38) may not be considered regional facilities.

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

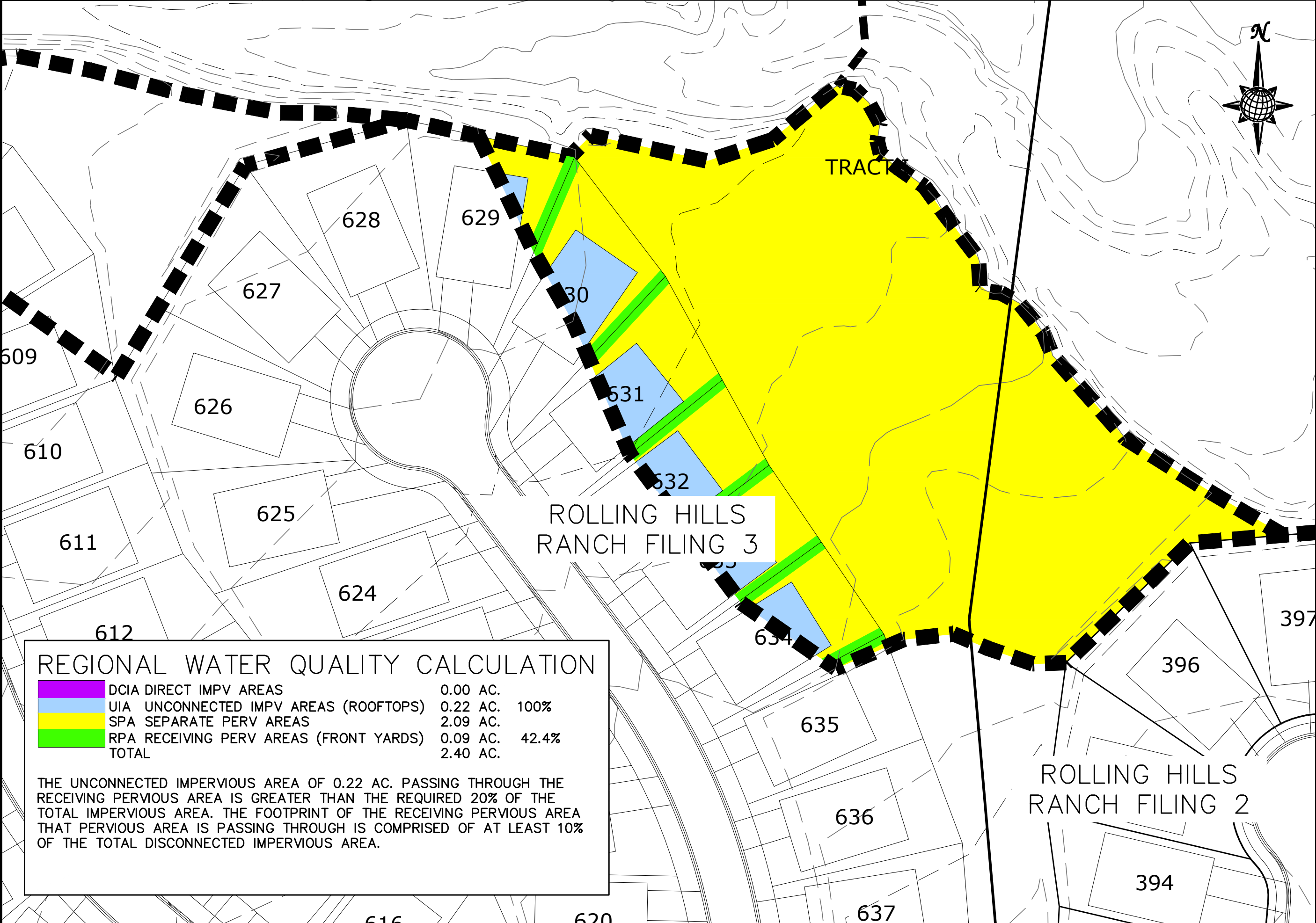


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|       |  |                 |  |   |
|-------|--|-----------------|--|---|
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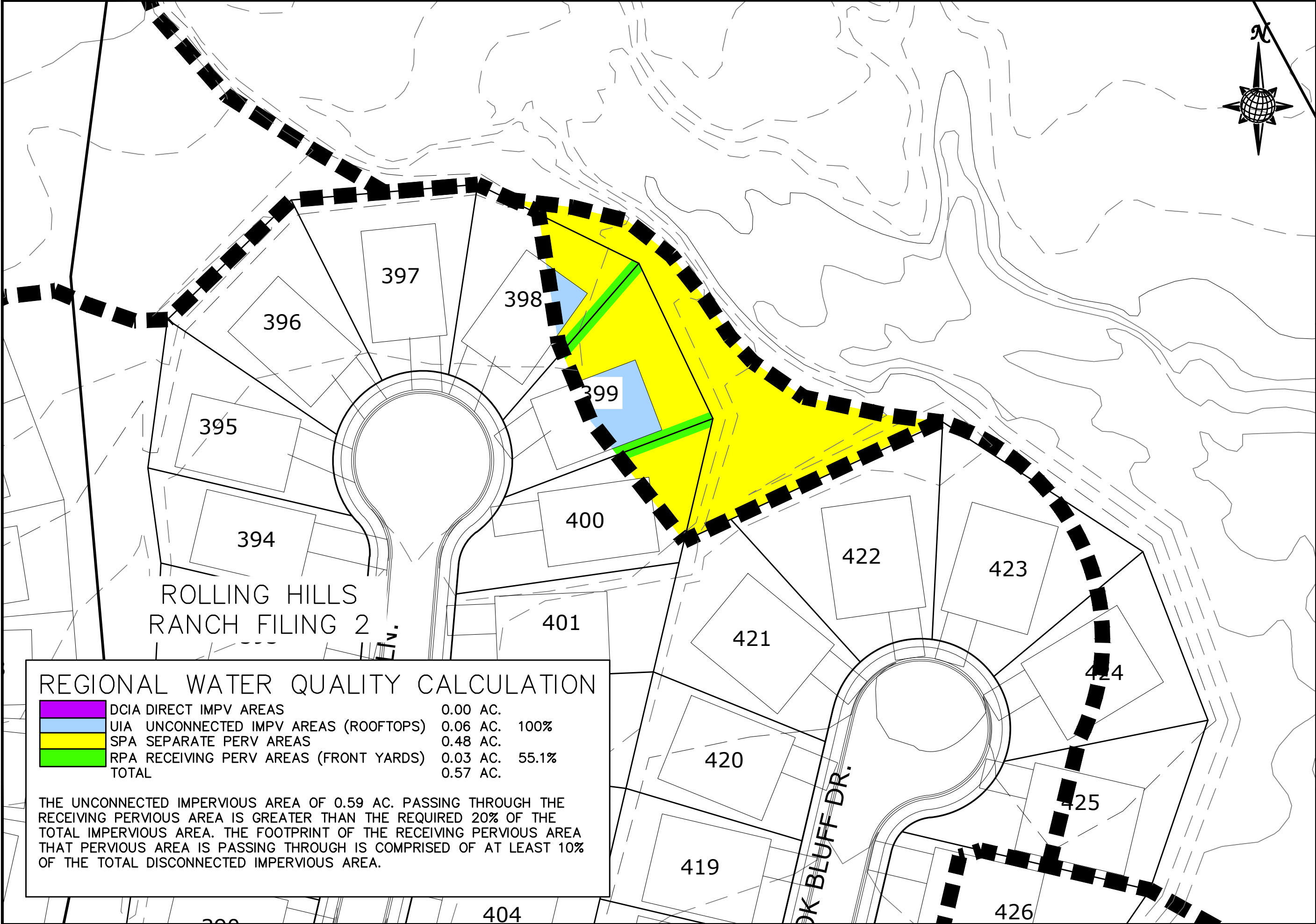
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| REGIONAL WATER QUALITY CALCULATION  |  |          |       |
|---|--|----------|-------|
| <div></div>   | DCIA DIRECT IMPV AREAS                 | 0.00 AC. |       |
| <div></div>   | UIA UNCONNECTED IMPV AREAS (ROOFTOPS)  | 0.22 AC. | 100%  |
| <div></div>   | SPA SEPARATE PERV AREAS                | 2.09 AC. |       |
| <div></div>   | RPA RECEIVING PERV AREAS (FRONT YARDS) | 0.09 AC. | 42.4% |
| <div></div>   | TOTAL                                  | 2.40 AC. |       |
| THE UNCONNECTED IMPERVIOUS AREA OF 0.22 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA. |  |          |       |

|   |     |                 |                 |
|---|-----|-----------------|-----------------|
| TECH CONTRACTORS<br>11886 STAPLETON DRIVE<br>FALCON, CO 80831<br>TELEPHONE: 719.495.7444<br>FAX: 719.495.3349 |     |                 |                 |
| REGIONAL WATER QUALITY<br>CATCHMENT AREA D2<br>ROLLING HILLS RANCH  |     |                 |                 |
| Scale   | NTS | Drawn by<br>TAK | Checked by<br>- |
| Sheet Number  | 2   | Date            | AUG 2020        |

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DCIA DIRECT IMPV AREAS

0.00 AC.

UIA UNCONNECTED IMPV AREAS (ROOFTOPS)

0.06 AC. 100%

SPA SEPARATE PERV AREAS

0.48 AC.

RPA RECEIVING PERV AREAS (FRONT YARDS)

0.03 AC. 55.1%

TOTAL

0.57 AC.

THE UNCONNECTED IMPERVIOUS AREA OF 0.59 AC. PASSING THROUGH THE RECEIVING PERVIOUS AREA IS GREATER THAN THE REQUIRED 20% OF THE TOTAL IMPERVIOUS AREA. THE FOOTPRINT OF THE RECEIVING PERVIOUS AREA THAT PERVIOUS AREA IS PASSING THROUGH IS COMPRISED OF AT LEAST 10% OF THE TOTAL DISCONNECTED IMPERVIOUS AREA.

Scale

NTS.

Sheet Number

3

Drawn by

TAK

Checked by

Date

AUG 2020

REGIONAL WATER QUALITY

CATCHMENT AREA D3

ROLLING HILLS RANCH

TECH CONTRACTORS

11886 STAPLETON DRIVE

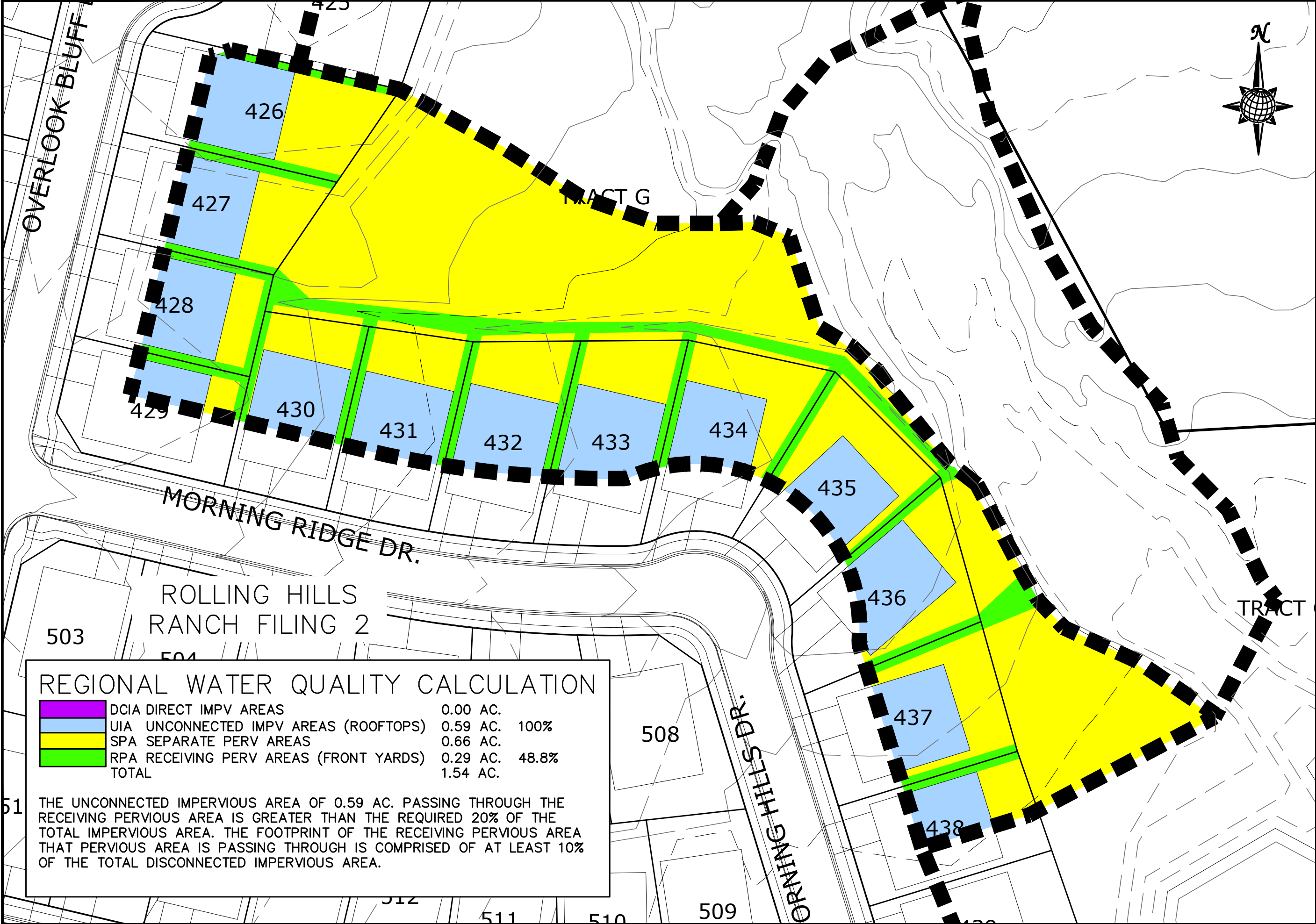
FALCON, CO 80831

TELEPHONE: 719.495.7444

FAX: 719.495.3349



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

**REGIONAL WATER QUALITY**  
CATCHMENT AREA D4  
ROLLING HILLS RANCH

|            |          |
|------------|----------|
| Drawn by   | TAK      |
| Checked by | -        |
| Date       | AUG 2020 |

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| Scale        | NTS |
| Sheet Number | 4   |

## **Appendix F – Soil Resource Report**



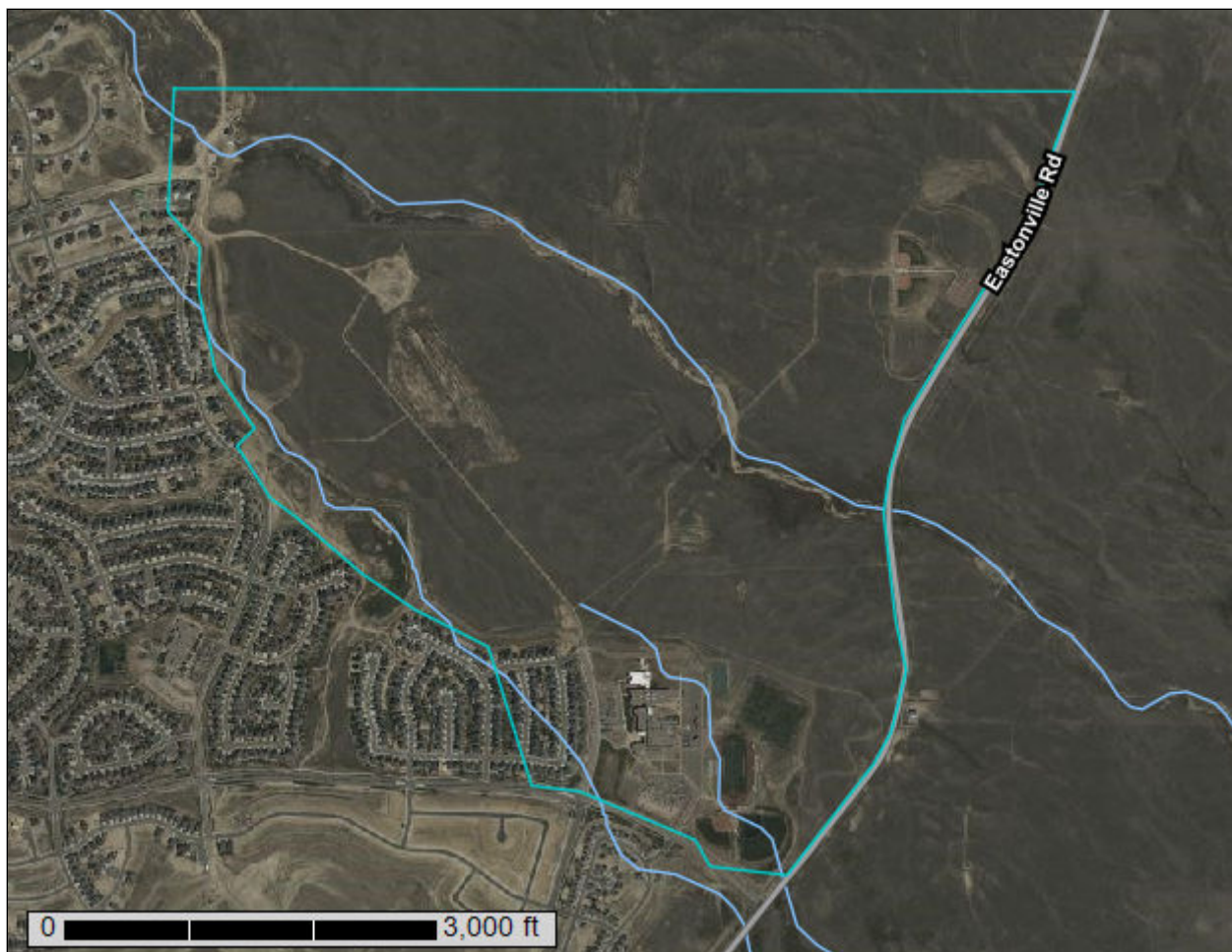
United States  
Department of  
Agriculture

**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**



August 3, 2020

# Preface

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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](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

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

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

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

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

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

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

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

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

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

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

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

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

## Custom Soil Resource Report

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

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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



## Custom Soil Resource Report


### MAP LEGEND

#### Area of Interest (AOI)

 Area of Interest (AOI)

#### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

#### Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

#### Water Features

 Streams and Canals

#### Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

#### Background

 Aerial Photography

### MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 18, Jun 5, 2020

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

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

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

## Map Unit Legend

| Map Unit Symbol                    | Map Unit Name   | Acres in AOI | Percent of AOI |
|------------------------------------|---|--------------|----------------|
| 19                                 | Columbine gravelly sandy loam,<br>0 to 3 percent slopes | 272.0        | 39.4%          |
| 83                                 | Stapleton sandy loam, 3 to 8<br>percent slopes          | 417.9        | 60.6%          |
| <b>Totals for Area of Interest</b> |   | <b>689.9</b> | <b>100.0%</b>  |

## Map Unit Descriptions

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

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

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

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



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

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

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

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

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

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

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

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

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

## El Paso County Area, Colorado

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

#### Map Unit Setting

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

#### Map Unit Composition

*Columbine and similar soils:* 97 percent  
*Minor components:* 3 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Columbine

##### Setting

*Landform:* Fans, flood plains, fan terraces  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium

##### Typical profile

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

##### Properties and qualities

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

##### Interpretive groups

*Land capability classification (irrigated):* 4e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* R049XB215CO - Gravelly Foothill  
*Hydric soil rating:* No

#### Minor Components

##### Pleasant

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

**Other soils**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

**Fluvaquentic haplaquolls**

*Percent of map unit:* 1 percent

*Landform:* Swales

*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:* 97 percent

*Minor components:* 3 percent

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

**Description of Stapleton**

**Setting**

*Landform:* Hills

*Landform position (three-dimensional):* Side slope

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Sandy alluvium derived from arkose

**Typical profile**

*A - 0 to 11 inches:* sandy loam

*Bw - 11 to 17 inches:* gravelly sandy loam

*C - 17 to 60 inches:* gravelly loamy sand

**Properties and qualities**

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Well drained

*Runoff class:* Low

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

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Available water capacity:* Low (about 4.7 inches)

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### **Interpretive groups**

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e

*Hydrologic Soil Group:* B

*Ecological site:* R049XB215CO - Gravelly Foothill

*Hydric soil rating:* No

### **Minor Components**

#### **Pleasant**

*Percent of map unit:* 1 percent

*Landform:* Depressions

*Hydric soil rating:* Yes

#### **Other soils**

*Percent of map unit:* 1 percent

*Hydric soil rating:* No

#### **Fluvaquentic haplaquolls**

*Percent of map unit:* 1 percent

*Landform:* Swales

*Hydric soil rating:* Yes

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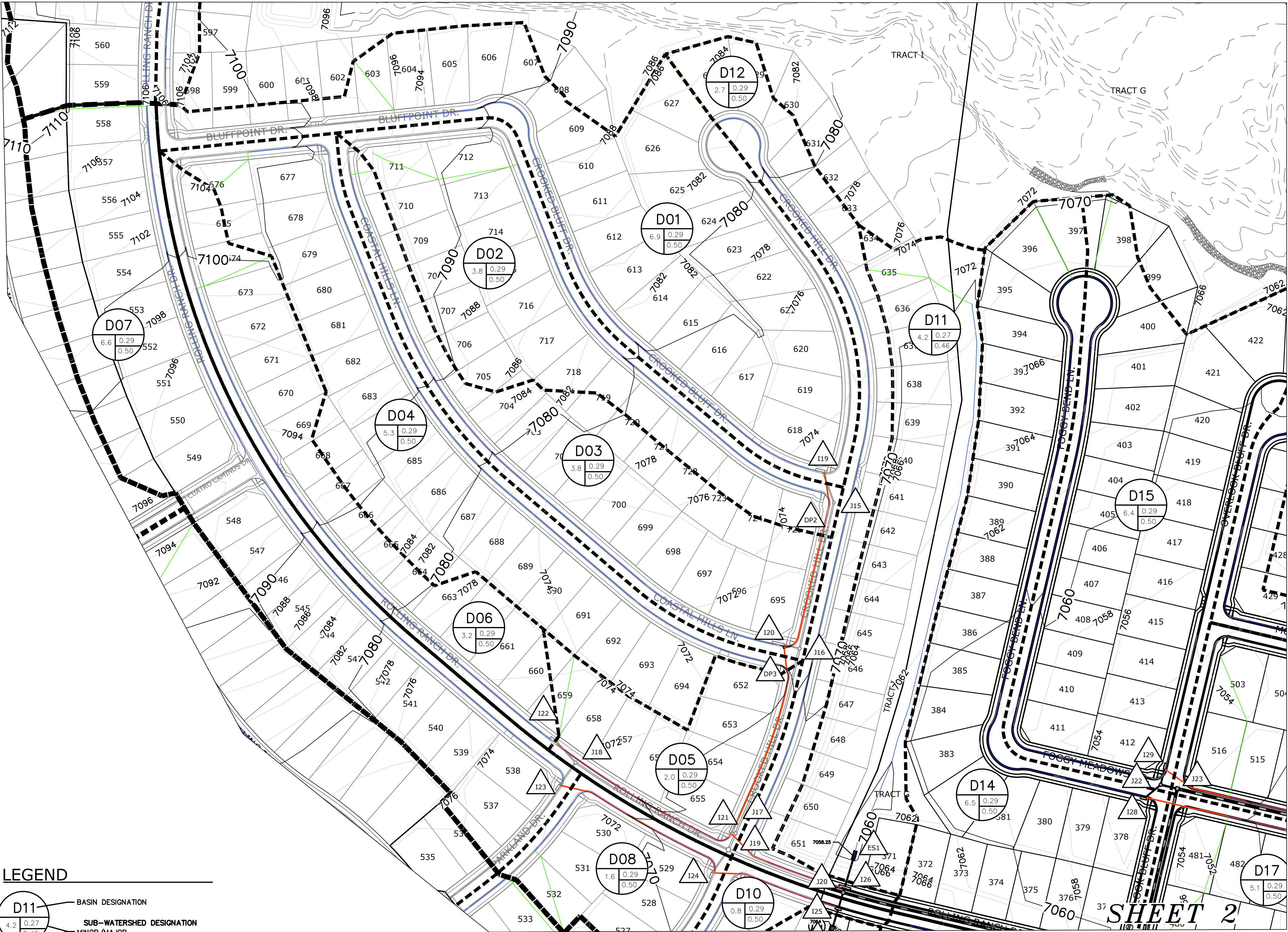
United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

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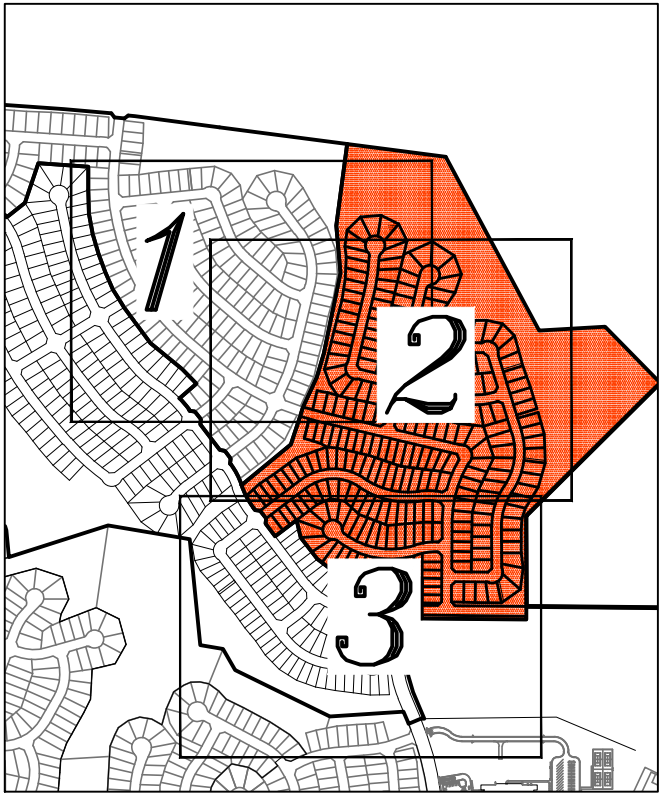
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## **Appendix G – Drainage Maps**





| DP  | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | INLET              | Q(5) (CFS) | Q(100) (CFS) | PIPE    |
|-----|-------|-----------|------------|--------------|--------------------|------------|--------------|---------|
| I19 | D01   | 6.87      | 6.8        | 19           | PR 15' FORCED SUMP | 6.8        | 14           | 18" RCP |
| J15 |       |           |            |              |                    | 6.8        | 14           | 24" RCP |
| DP2 | D02   | 3.83      | 3.8        | 16           |                    |            |              |         |
| I20 | D03   | 3.84      | 7.1        | 20           | PR 20' FORCED SUMP | 7.1        | 17           | 18" RCP |
| J16 |       |           |            |              |                    | 13.4       | 30           | 30" RCP |
| DP3 | D04   | 5.30      | 5.0        | 16           |                    |            |              |         |
| I21 | D05   | 2.00      | 6.7        | 23           | PR 15' FORCED SUMP | 6.7        | 14           | 18" RCP |
| J17 |       |           |            |              |                    | 19.0       | 41           | 30" RCP |
| I22 | D06   | 3.20      | 3.2        | 9            | PR 15' FLOW-BY     | 2.6        | 6.2          | 18" RCP |
| I23 | D07   | 6.59      | 6.1        | 17           | PR 10' FORCED SUMP | 6.1        | 9.9          | 18" RCP |
| J18 |       |           |            |              |                    | 8.5        | 16           | 24" RCP |
| I24 | D08   | 1.64      | 1.8        | 11           | PR 10' FORCED SUMP | 1.8        | 9.9          | 18" RCP |
| J19 |       |           |            |              |                    | 28.6       | 65           | 42" RCP |
| CB2 | D09   | 1.63      | 1.2        | 3.4          | PR Type C          | 1.2        | 3.4          | 18" RCP |
| I25 | D10   | 0.81      | 0.9        | 2.9          | PR 10' SUMP        | 2.1        | 6.4          | 18" RCP |
| ES1 | D11   | 4.16      | 2.4        | 6.9          | " FES              | 2.4        | 6.9          | 18" RCP |
| I26 | D12   | 2.67      | 2.4        | 15           | PR 20' SUMP        | 4.3        | 18           | 24" RCP |
| J20 |       |           |            |              |                    | 28.6       | 71           | 42" RCP |
| I27 | D13   | 1.79      | 2.2        | 5.8          | PR 15' FLOW-BY     | 1.7        | 3.9          | 18" RCP |
| J21 |       |           |            |              |                    | 28.6       | 72           | 42" RCP |
| I28 | D14   | 6.45      | 6.3        | 18           | PR 10' FORCED SUMP | 6.3        | 9.9          | 18" RCP |
| I29 | D15   | 6.35      | 6.2        | 18           | PR 10' FORCED SUMP | 6.2        | 9.9          | 18" RCP |
| J22 |       |           |            |              |                    | 12.5       | 20           | 24" RCP |
| J23 |       |           |            |              |                    | 35.2       | 84           | 48" RCP |
| I30 | D16   | 4.02      | 4.2        | 17           | PR 10' FORCED SUMP | 4.2        | 9.9          | 18" RCP |
| J24 |       |           |            |              |                    | 37.7       | 90           | 48" RCP |
| J25 |       |           |            |              |                    | 37.6       | 90           | 48" RCP |
| I31 | D17   | 5.13      | 5.3        | 27           | PR 15' SUMP        | 5.3        | 24           | 30" RCP |
| J26 |       |           |            |              |                    | 41.2       | 107          | 54" RCP |
| I32 | D18   | 3.13      | 3.0        | 10           | PR 15' SUMP        | 43.3       | 114          | 54" RCP |
| I33 | E01   | 5.38      | 6.2        | 17           | PR 20' FORCED SUMP | 6.2        | 17           | 18" RCP |
| J27 |       |           |            |              |                    | 6.2        | 17           | 18" RCP |
| I34 | E02   | 6.48      | 7.3        | 19           | PR 20' FORCED SUMP | 7.3        | 17           | 18" RCP |
| J28 |       |           |            |              |                    | 13.0       | 33           | 30" RCP |
| I35 | E03   | 5.82      | 6.5        | 17           | PR 15' FORCED SUMP | 6.5        | 14           | 24" RCP |
| J29 |       |           |            |              |                    | 19.1       | 46           | 30" RCP |
| I36 | E04   | 3.14      | 3.9        | 13           | PR 15' FORCED SUMP | 3.9        | 13           | 18" RCP |
| I37 | E05   | 2.55      | 2.7        | 9.3          | PR 20' FLOW-BY     | 2.6        | 7.1          | 18" RCP |
| J30 |       |           |            |              |                    | 25.4       | 66           | 36" RCP |
| J31 |       |           |            |              |                    | 25.3       | 65           | 42" RCP |
| I38 | E06   | 1.27      | 1.6        | 4.2          | PR 5' FORCED SUMP  | 1.6        | 4.2          | 18" RCP |
| J32 |       |           |            |              |                    | 1.5        | 4.1          | 18" RCP |
| I39 | E07   | 2.05      | 2.5        | 6.7          | PR 15' FLOW-BY     | 2.0        | 4.5          | 18" RCP |
| J33 |       |           |            |              |                    | 3.5        | 8.5          | 18" RCP |
| I40 | E08   | 4.17      | 4.8        | 13           | PR 10' FORCED SUMP | 4.8        | 9.9          | 18" RCP |
| J34 |       |           |            |              |                    | 8.0        | 18           | 24" RCP |
| J35 |       |           |            |              |                    | 8.0        | 18           | 24" RCP |
| I41 | E09   | 5.44      | 6.2        | 18           | PR 15' FORCED SUMP | 6.2        | 14           | 24" RCP |
| J36 |       |           |            |              |                    | 37.0       | 91           | 42" RCP |
| I42 | E10   | 6.98      | 7.0        | 19           | PR 20' SUMP        | 7.0        | 19           | 24" RCP |
| J37 |       |           |            |              |                    | 43.4       | 108          | 48" RCP |
| CB3 | E11   | 13.04     | 6.3        | 18           | PR Type C          | 6.3        | 18           | 24" RCP |
| I43 | E12   | 1.60      | 3.8        | 9.7          | PR 20' FLOW-BY     | 3.4        | 7.4          | 18" RCP |
| J38 |       |           |            |              |                    | 52.7       | 133          | 54" RCP |
| E11 | E13   | 6.02      | 8.2        | 19           | EX 15' FORCED SUMP | 8.2        | 13           | 18" RCP |

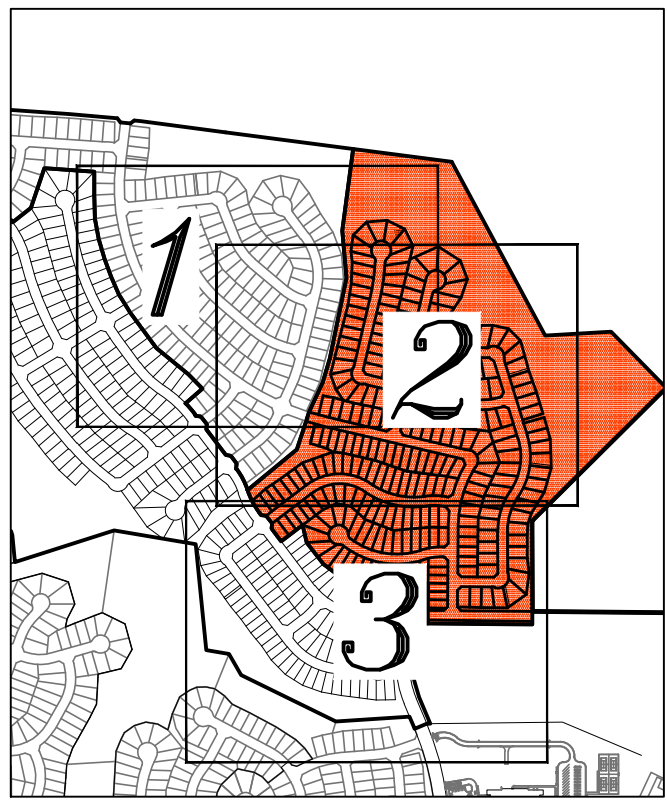
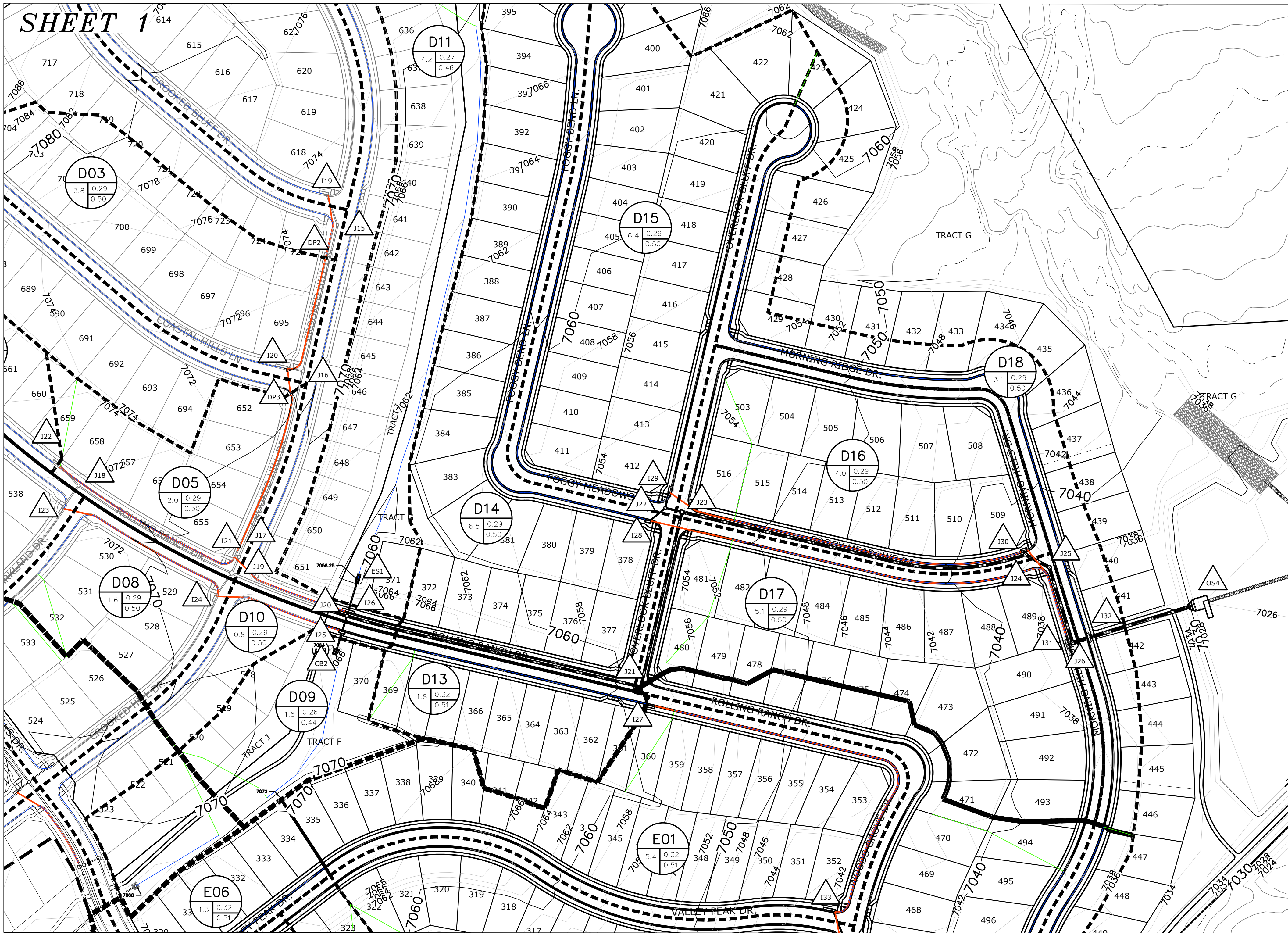


INDEX MAP  
N.T.S.

|  |  |          |  |                 |  |                   |  |                  |  |           |  |      |  |       |  |      |  |
|--|--|----------|--|-----------------|--|-------------------|--|------------------|--|-----------|--|------|--|-------|--|------|--|
| 1  |  | 2        |  | 3               |  | 4                 |  | No.              |  | Revisions |  | Date |  | Appr. |  | Date |  |
| <div>TECH CONTRACTORS<br/>11886 STAPLETON DRIVE<br/>FALCON, CO 80831<br/>TELEPHONE: 719.495.7444<br/>FAX: 719.495.2457</div> |  |          |  |                 |  |                   |  |                  |  |           |  |      |  |       |  |      |  |
| <div>MERIDIAN RANCH</div>  |  |          |  |                 |  |                   |  |                  |  |           |  |      |  |       |  |      |  |
| <div>ROLLING HILLS RANCH FLING 2<br/>AT MERIDIAN RANCH<br/>RATIONAL MAPS</div>   |  |          |  |                 |  |                   |  |                  |  |           |  |      |  |       |  |      |  |
| Scale  |  | AS SHOWN |  | Drawn by<br>CJT |  | Checked by<br>TAK |  | Date<br>OCT 2020 |  |           |  |      |  |       |  |      |  |

FIGURE 4





| DP  | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | INLET               | Q(5) (CFS) | Q(100) (CFS) | PIPE     |
|-----|-------|-----------|------------|--------------|---------------------|------------|--------------|----------|
| I19 | D01   | 6.87      | 6.8        | 19           | PR 15 ' FORCED SUMP | 6.8        | 14           | 18 " RCP |
| J15 |       |           |            |              |                     | 6.8        | 14           | 24 " RCP |
| DP2 | D02   | 3.83      | 3.8        | 16           |                     |            |              |          |
| I20 | D03   | 3.84      | 7.1        | 20           | PR 20 ' FORCED SUMP | 7.1        | 17           | 18 " RCP |
| J16 |       |           |            |              |                     | 13.4       | 30           | 30 " RCP |
| DP3 | D04   | 5.30      | 5.0        | 16           |                     |            |              |          |
| I21 | D05   | 2.00      | 6.7        | 23           | PR 15 ' FORCED SUMP | 6.7        | 14           | 18 " RCP |
| J17 |       |           |            |              |                     | 19.0       | 41           | 30 " RCP |
| I22 | D06   | 3.20      | 3.2        | 9            | PR 15 ' FLOW-BY     | 2.6        | 6.2          | 18 " RCP |
| I23 | D07   | 6.59      | 6.1        | 17           | PR 10 " FORCED SUMP | 6.1        | 9.9          | 18 " RCP |
| J18 |       |           |            |              |                     | 8.5        | 16           | 24 " RCP |
| I24 | D08   | 1.64      | 1.8        | 11           | PR 10 " FORCED SUMP | 1.8        | 9.9          | 18 " RCP |
| J19 |       |           |            |              |                     | 28.6       | 65           | 42 " RCP |
| CB2 | D09   | 1.63      | 1.2        | 3.4          | PR Type C           | 1.2        | 3.4          | 18 " RCP |
| I25 | D10   | 0.81      | 0.9        | 2.9          | PR 10 " SUMP        | 2.1        | 6.4          | 18 " RCP |
| ES1 | D11   | 4.16      | 2.4        | 6.9          | " FES               | 2.4        | 6.9          | 18 " RCP |
| I26 | D12   | 2.67      | 2.4        | 15           | PR 20 " SUMP        | 4.3        | 18           | 24 " RCP |
| J20 |       |           |            |              |                     | 28.6       | 71           | 42 " RCP |
| I27 | D13   | 1.79      | 2.2        | 5.8          | PR 15 " FLOW-BY     | 1.7        | 3.9          | 18 " RCP |
| J21 |       |           |            |              |                     | 28.6       | 72           | 42 " RCP |
| I28 | D14   | 6.45      | 6.3        | 18           | PR 10 " FORCED SUMP | 6.3        | 9.9          | 18 " RCP |
| I29 | D15   | 6.35      | 6.2        | 18           | PR 10 " FORCED SUMP | 6.2        | 9.9          | 18 " RCP |
| J22 |       |           |            |              |                     | 12.5       | 20           | 24 " RCP |
| I23 |       |           |            |              |                     | 35.2       | 84           | 48 " RCP |
| I30 | D16   | 4.02      | 4.2        | 17           | PR 10 " FORCED SUMP | 4.2        | 9.9          | 18 " RCP |
| J24 |       |           |            |              |                     | 37.7       | 90           | 48 " RCP |
| J25 |       |           |            |              |                     | 37.6       | 90           | 48 " RCP |
| I31 | D17   | 5.13      | 5.3        | 27           | PR 15 " SUMP        | 5.3        | 24           | 30 " RCP |
| J26 |       |           |            |              |                     | 41.2       | 107          | 54 " RCP |
| I32 | D18   | 3.13      | 3.0        | 10           | PR 15 " SUMP        | 43.3       | 114          | 54 " RCP |
| I33 | E01   | 5.38      | 6.2        | 17           | PR 20 " FORCED SUMP | 6.2        | 17           | 18 " RCP |
| J27 |       |           |            |              |                     | 6.2        | 17           | 18 " RCP |
| I34 | E02   | 6.48      | 7.3        | 19           | PR 20 " FORCED SUMP | 7.3        | 17           | 18 " RCP |
| J28 |       |           |            |              |                     | 13.0       | 33           | 30 " RCP |
| I35 | E03   | 5.82      | 6.5        | 17           | PR 15 " FORCED SUMP | 6.5        | 14           | 24 " RCP |
| J29 |       |           |            |              |                     | 19.1       | 46           | 30 " RCP |
| I36 | E04   | 3.14      | 3.9        | 13           | PR 15 " FORCED SUMP | 3.9        | 13           | 18 " RCP |
| I37 | E05   | 2.55      | 2.7        | 9.3          | PR 20 " FLOW-BY     | 2.6        | 7.1          | 18 " RCP |
| J30 |       |           |            |              |                     | 25.4       | 66           | 36 " RCP |
| J31 |       |           |            |              |                     | 25.3       | 65           | 42 " RCP |
| I38 | E06   | 1.27      | 1.6        | 4.2          | PR 5 " FORCED SUMP  | 1.6        | 4.2          | 18 " RCP |
| J32 |       |           |            |              |                     | 1.5        | 4.1          | 18 " RCP |
| I39 | E07   | 2.05      | 2.5        | 6.7          | PR 15 " FLOW-BY     | 2.0        | 4.5          | 18 " RCP |
| J33 |       |           |            |              |                     | 3.5        | 8.5          | 18 " RCP |
| I40 | E08   | 4.17      | 4.8        | 13           | PR 10 " FORCED SUMP | 4.8        | 9.9          | 18 " RCP |
| J34 |       |           |            |              |                     | 8.0        | 18           | 24 " RCP |
| J35 |       |           |            |              |                     | 8.0        | 18           | 24 " RCP |
| I41 | E09   | 5.44      | 6.2        | 18           | PR 15 " FORCED SUMP | 6.2        | 14           | 24 " RCP |
| J36 |       |           |            |              |                     | 37.0       | 91           | 42 " RCP |
| I42 | E10   | 6.98      | 7.0        | 19           | PR 20 " SUMP        | 7.0        | 19           | 24 " RCP |
| J37 |       |           |            |              |                     | 43.4       | 108          | 48 " RCP |
| CB3 | E11   | 13.04     | 6.3        | 18           | PR Type C           | 6.3        | 18           | 24 " RCP |
| I43 | E12   | 1.60      | 3.8        | 9.7          | PR 20 " FLOW-BY     | 3.4        | 7.4          | 18 " RCP |
| J38 |       |           |            |              |                     | 52.7       | 133          | 54 " RCP |
| E11 | E13   | 6.02      | 8.2        | 19           | EX 15 " FORCED SUMP | 8.2        | 13           | 18 " RCP |

LEGEND

D11

4.2 0.27 0.46

SUB-WATERSHED DESIGNATION

MINOR/MAJOR

STORM COEFFICIENT

BASIN AREA IN ACRES

DP2

DESIGN POINT DESIGNATION

---

MAJOR BASIN BOUNDARY

---

SUB-BASIN BOUNDARY

---

EXISTING CONTOUR

---

PROPOSED COUNTOUR

---

PROPOSED STORM SEWER

---

INITIAL OVERLAND TIME (Ti)

---

TRAVEL TIME (Tt)

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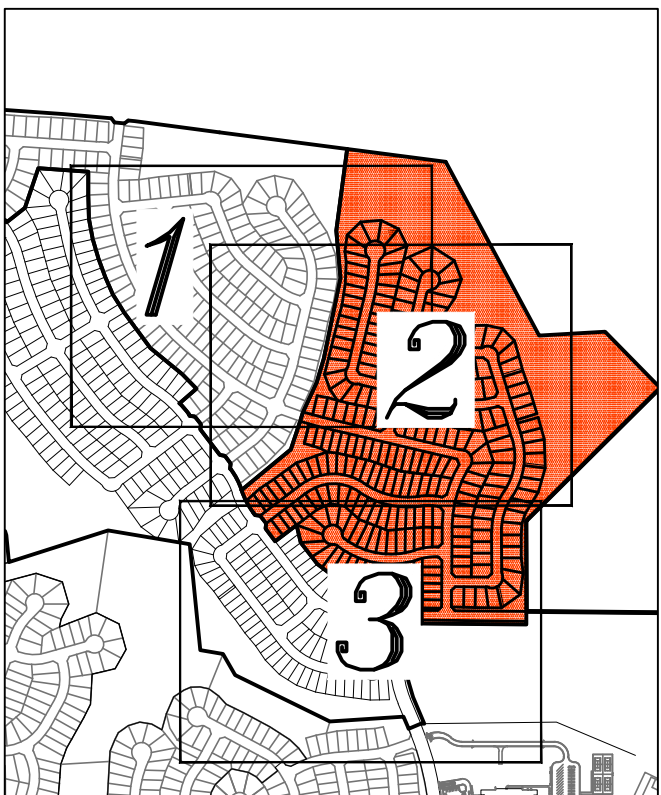
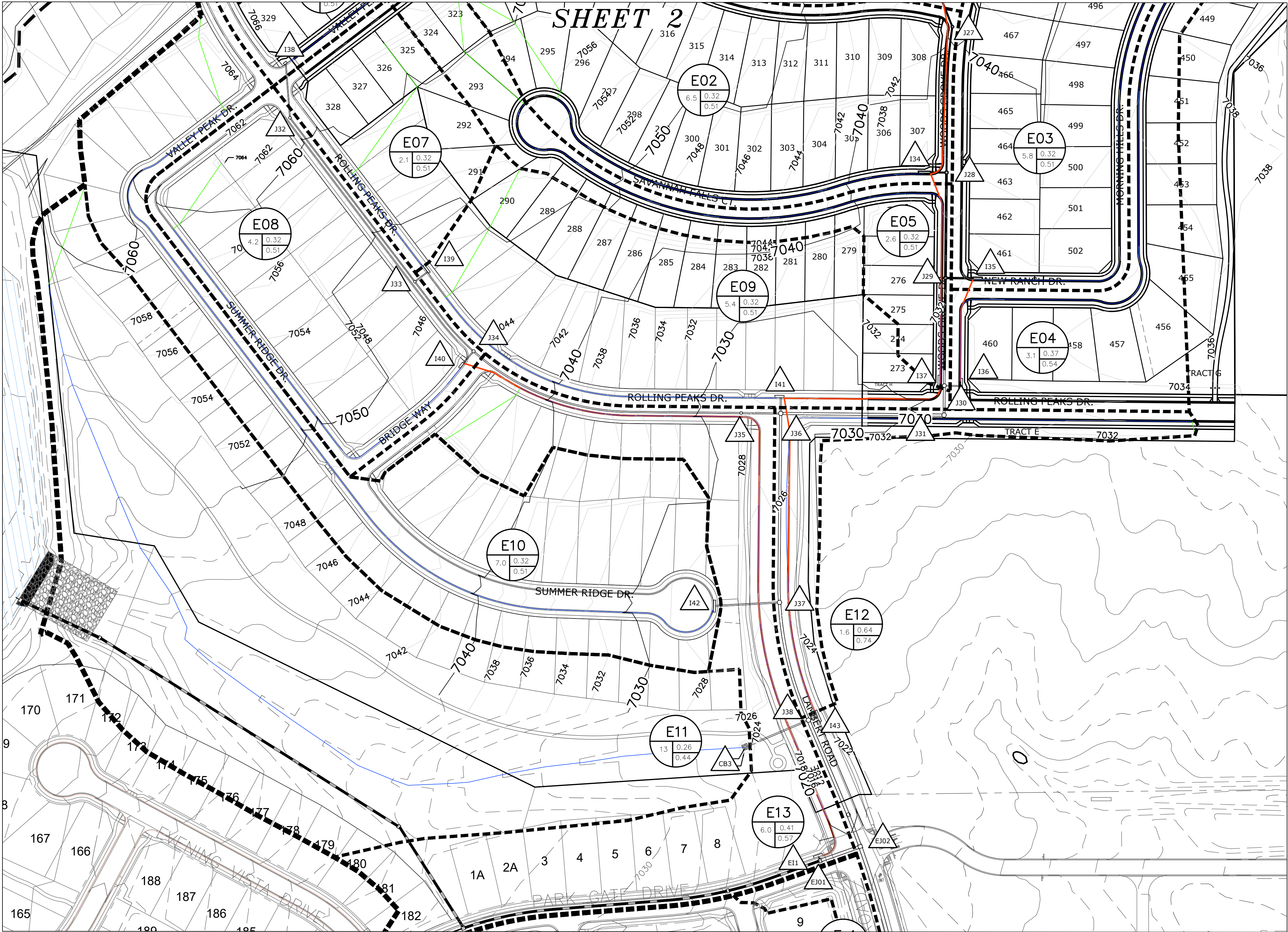
OVERLAND TIME (To)

FIGURE 4

|                  |  |                             |  |                   |  |                         |  |                   |  |           |  |            |  |       |  |          |  |
|------------------|--|-----------------------------|--|-------------------|--|-------------------------|--|-------------------|--|-----------|--|------------|--|-------|--|----------|--|
| 1                |  | 2                           |  | 3                 |  | 4                       |  | No.               |  | Revisions |  | Date       |  | Appr. |  | Date     |  |
| TECH CONTRACTORS |  | 11886 STAPLETON DRIVE       |  | FALCON, CO 80831  |  | TELEPHONE: 719.495.7444 |  | FAX: 719.495.2457 |  |           |  |            |  |       |  |          |  |
| MERIDIAN RANCH   |  | ROLLING HILLS RANCH FLING 2 |  | AT MERIDIAN RANCH |  | RATIONAL MAPS           |  |                   |  | Drawn by  |  | Checked by |  | Date  |  | OCT 2020 |  |
| Scale            |  | AS SHOWN                    |  |                   |  |                         |  |                   |  |           |  |            |  |       |  |          |  |
|                  |  | SHEET 2                     |  |                   |  |                         |  |                   |  |           |  |            |  |       |  |          |  |

P02 PROJECT NO. EGP-XX-XXX





INDEX MAP  
N.T.S.

| DP  | BASIN | AREA<br>(AC) | Q(5)<br>(CFS) | Q(100)<br>(CFS) | INLET               | Q(5)<br>(CFS) | Q(100)<br>(CFS) | PIPE     |
|-----|-------|--------------|---------------|-----------------|---------------------|---------------|-----------------|----------|
| I19 | D01   | 6.87         | 6.8           | 19              | PR 15 ' FORCED SUMP | 6.8           | 14              | 18 " RCP |
| I15 |       |              |               |                 |                     | 6.8           | 14              | 24 " RCP |
| DP2 | D02   | 3.83         | 3.8           | 16              |                     |               |                 |          |
| I20 | D03   | 3.84         | 7.1           | 20              | PR 20 ' FORCED SUMP | 7.1           | 17              | 18 " RCP |
| I16 |       |              |               |                 |                     | 13.4          | 30              | 30 " RCP |
| DP3 | D04   | 5.30         | 5.0           | 16              |                     |               |                 |          |
| I21 | D05   | 2.00         | 6.7           | 23              | PR 15 ' FORCED SUMP | 6.7           | 14              | 18 " RCP |
| I17 |       |              |               |                 |                     | 19.0          | 41              | 30 " RCP |
| I22 | D06   | 3.20         | 3.2           | 9               | PR 15 ' FLOW-BY     | 2.6           | 6.2             | 18 " RCP |
| I23 | D07   | 6.59         | 6.1           | 17              | PR 10 ' FORCED SUMP | 6.1           | 9.9             | 18 " RCP |
| I18 |       |              |               |                 |                     | 8.5           | 16              | 24 " RCP |
| I24 | D08   | 1.64         | 1.8           | 11              | PR 10 ' FORCED SUMP | 1.8           | 9.9             | 18 " RCP |
| I19 |       |              |               |                 |                     | 28.6          | 65              | 42 " RCP |
| CB2 | D09   | 1.63         | 1.2           | 3.4             | PR Type C           | 1.2           | 3.4             | 18 " RCP |
| I25 | D10   | 0.81         | 0.9           | 2.9             | PR 10 ' SUMP        | 2.1           | 6.4             | 18 " RCP |
| E51 | D11   | 4.16         | 2.4           | 6.9             | " FES               | 2.4           | 6.9             | 18 " RCP |
| I26 | D12   | 2.67         | 2.4           | 15              | PR 20 ' SUMP        | 4.3           | 18              | 24 " RCP |
| I20 |       |              |               |                 |                     | 28.6          | 71              | 42 " RCP |
| I27 | D13   | 1.79         | 2.2           | 5.8             | PR 15 ' FLOW-BY     | 1.7           | 3.9             | 18 " RCP |
| I21 |       |              |               |                 |                     | 28.6          | 72              | 42 " RCP |
| I28 | D14   | 6.45         | 6.3           | 18              | PR 10 ' FORCED SUMP | 6.3           | 9.9             | 18 " RCP |
| I29 | D15   | 6.35         | 6.2           | 18              | PR 10 ' FORCED SUMP | 6.2           | 9.9             | 18 " RCP |
| I22 |       |              |               |                 |                     | 12.5          | 20              | 24 " RCP |
| I23 |       |              |               |                 |                     | 35.2          | 84              | 48 " RCP |
| I30 | D16   | 4.02         | 4.2           | 17              | PR 10 ' FORCED SUMP | 4.2           | 9.9             | 18 " RCP |
| I24 |       |              |               |                 |                     | 37.7          | 90              | 48 " RCP |
| I25 |       |              |               |                 |                     | 37.6          | 90              | 48 " RCP |
| I31 | D17   | 5.13         | 5.3           | 27              | PR 15 ' SUMP        | 5.3           | 24              | 30 " RCP |
| I26 |       |              |               |                 |                     | 41.2          | 107             | 54 " RCP |
| I32 | D18   | 3.13         | 3.0           | 10              | PR 15 ' SUMP        | 43.3          | 114             | 54 " RCP |
| I33 | E01   | 5.38         | 6.2           | 17              | PR 20 ' FORCED SUMP | 6.2           | 17              | 18 " RCP |
| I27 |       |              |               |                 |                     | 6.2           | 17              | 18 " RCP |
| I34 | E02   | 6.48         | 7.3           | 19              | PR 20 ' FORCED SUMP | 7.3           | 17              | 18 " RCP |
| I28 |       |              |               |                 |                     | 13.0          | 33              | 30 " RCP |
| I35 | E03   | 5.82         | 6.5           | 17              | PR 15 ' FORCED SUMP | 6.5           | 14              | 24 " RCP |
| I29 |       |              |               |                 |                     | 19.1          | 46              | 30 " RCP |
| I36 | E04   | 3.14         | 3.9           | 13              | PR 15 ' FORCED SUMP | 3.9           | 13              | 18 " RCP |
| I37 | E05   | 2.55         | 2.7           | 9.3             | PR 20 ' FLOW-BY     | 2.6           | 7.1             | 18 " RCP |
| I30 |       |              |               |                 |                     | 25.4          | 66              | 36 " RCP |
| I31 |       |              |               |                 |                     | 25.3          | 65              | 42 " RCP |
| I38 | E06   | 1.27         | 1.6           | 4.2             | PR 5 ' FORCED SUMP  | 1.6           | 4.2             | 18 " RCP |
| I32 |       |              |               |                 |                     | 1.5           | 4.1             | 18 " RCP |
| I39 | E07   | 2.05         | 2.5           | 6.7             | PR 15 ' FLOW-BY     | 2.0           | 4.5             | 18 " RCP |
| I33 |       |              |               |                 |                     | 3.5           | 8.5             | 18 " RCP |
| I40 | E08   | 4.17         | 4.8           | 13              | PR 10 ' FORCED SUMP | 4.8           | 9.9             | 18 " RCP |
| I34 |       |              |               |                 |                     | 8.0           | 18              | 24 " RCP |
| I35 |       |              |               |                 |                     | 8.0           | 18              | 24 " RCP |
| I41 | E09   | 5.44         | 6.2           | 18              | PR 15 ' FORCED SUMP | 6.2           | 14              | 24 " RCP |
| I36 |       |              |               |                 |                     | 37.0          | 91              | 42 " RCP |
| I42 | E10   | 6.98         | 7.0           | 19              | PR 20 ' SUMP        | 7.0           | 19              | 24 " RCP |
| I37 |       |              |               |                 |                     | 43.4          | 108             | 48 " RCP |
| CB3 | E11   | 13.04        | 6.3           | 18              | PR Type C           | 6.3           | 18              | 24 " RCP |
| I43 | E12   | 1.60         | 3.8           | 9.7             | PR 20 ' FLOW-BY     | 3.4           | 7.4             | 18 " RCP |
| I38 |       |              |               |                 |                     | 52.7          | 133             | 54 " RCP |
| E11 | E13   | 6.02         | 8.2           | 19              | EX 15 ' FORCED SUMP | 8.2           | 13              | 18 " RCP |

LEGEND

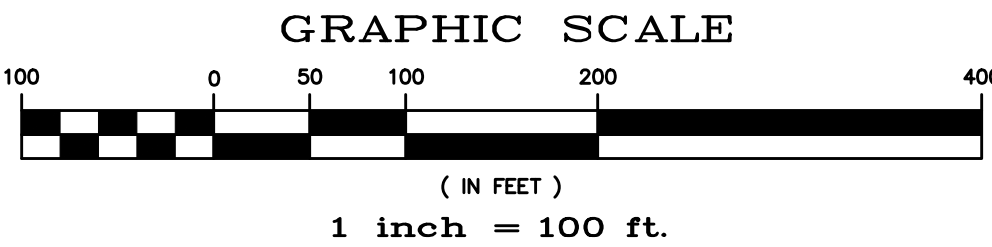
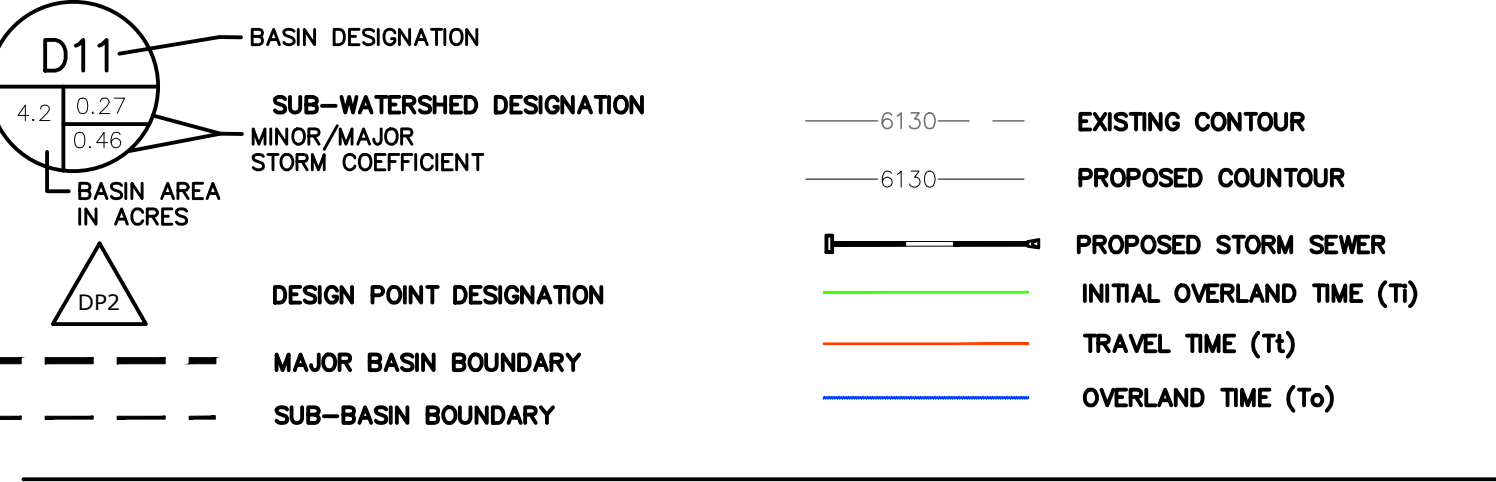


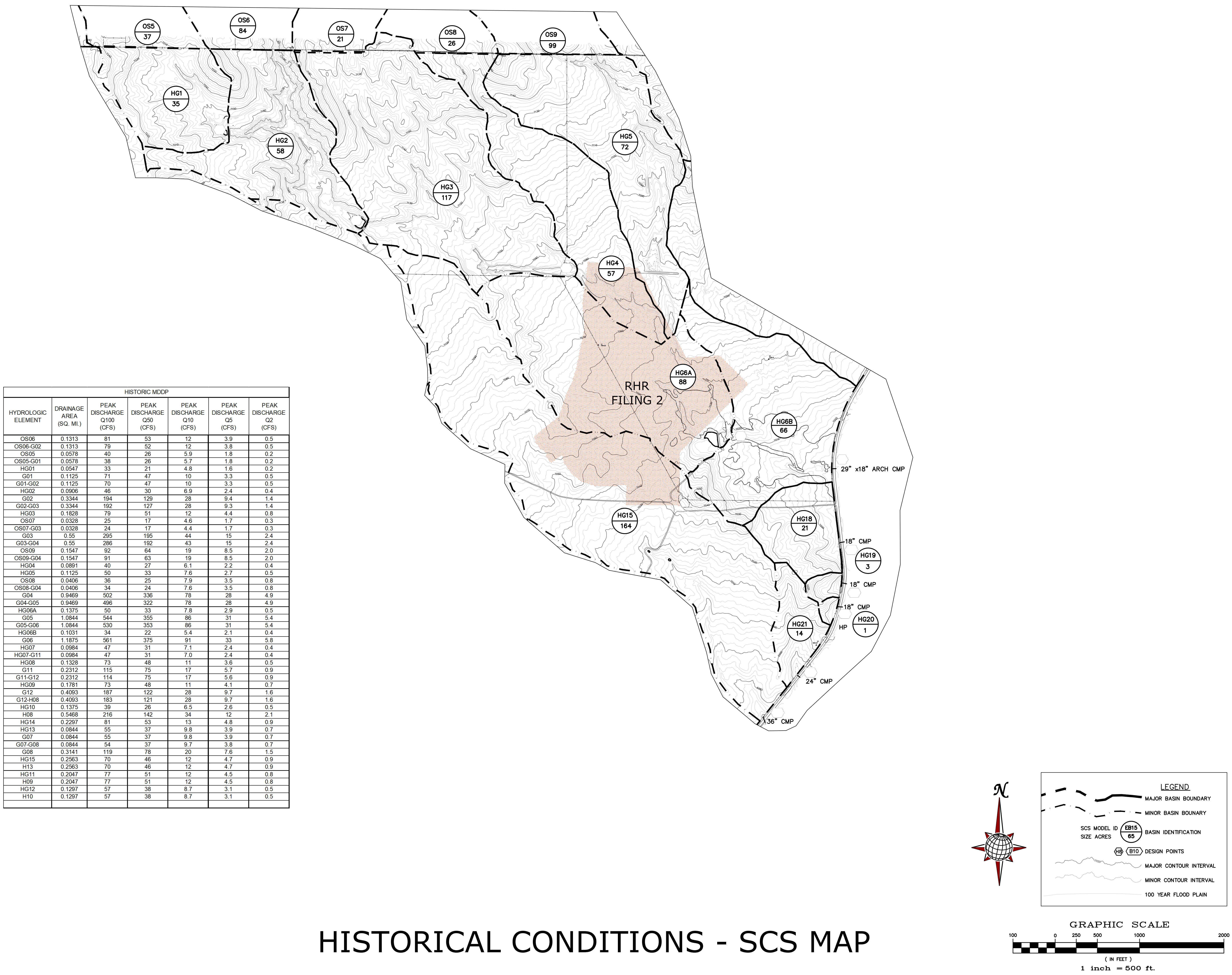
FIGURE 4

|                  |  |                             |  |                   |  |               |  |              |  |           |  |      |  |       |  |      |  |
|------------------|--|-----------------------------|--|-------------------|--|---------------|--|--------------|--|-----------|--|------|--|-------|--|------|--|
| 1                |  | 2                           |  | 3                 |  | 4             |  | No.          |  | Revisions |  | Date |  | Appr. |  | Date |  |
| TECH CONTRACTORS |  | 11886 STAPLETON DRIVE       |  | FALCON, CO 80831  |  | 719.495.7444  |  | 719.495.2457 |  |           |  |      |  |       |  |      |  |
| MERIDIAN RANCH   |  | ROLLING HILLS RANCH FLING 2 |  | AT MERIDIAN RANCH |  | RATIONAL MAPS |  |              |  |           |  |      |  |       |  |      |  |
| Scale            |  | AS SHOWN                    |  | Drawn by          |  | Checked by    |  | Date         |  | SHEET 3   |  |      |  |       |  |      |  |



# ROLLING HILL RANCH FILING 2

## MERIDIAN RANCH



HISTORICAL CONDITIONS - SCS MAP

FIGURE 5



# ROLLING HILL RANCH FILING 2

## MERIDIAN RANCH

| INTERIM MDDP (Full Spectrum) |                         |                           |                          |                          |                         |                         |
|------------------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
|                              | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06                         | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a                          | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a-G2                       | 0.1313                  | 79                        | 52                       | 11                       | 3.6                     | 0.5                     |
| OS05                         | 0.0578                  | 39                        | 26                       | 6                        | 1.8                     | 0.2                     |
| OS05-G1                      | 0.0578                  | 39                        | 25                       | 6                        | 1.7                     | 0.2                     |
| FG01                         | 0.0531                  | 31                        | 22                       | 7                        | 3.3                     | 0.9                     |
| FG01-G1                      | 0.0531                  | 31                        | 22                       | 7                        | 3.3                     | 0.9                     |
| G1                           | 0.1109                  | 61                        | 41                       | 11                       | 4.8                     | 1.1                     |
| G1-G2                        | 0.1109                  | 60                        | 41                       | 11                       | 4.8                     | 1.1                     |
| FG02                         | 0.0391                  | 32                        | 22                       | 8                        | 2.6                     | 0.5                     |
| G2                           | 0.2813                  | 166                       | 112                      | 27                       | 10.2                    | 1.9                     |
| G2-G3                        | 0.2813                  | 163                       | 108                      | 27                       | 10.1                    | 1.9                     |
| FG03                         | 0.0203                  | 24                        | 17                       | 6                        | 3.0                     | 0.8                     |
| FG04                         | 0.0172                  | 22                        | 16                       | 6                        | 3.1                     | 0.9                     |
| G3                           | 0.3188                  | 184                       | 123                      | 31                       | 12.0                    | 2.4                     |
| G3-POND F                    | 0.3188                  | 183                       | 121                      | 31                       | 11.9                    | 2.4                     |
| FG06                         | 0.0677                  | 51                        | 36                       | 11                       | 5.3                     | 1.3                     |
| FG05                         | 0.0580                  | 45                        | 33                       | 12                       | 6.7                     | 2.4                     |
| OS07a                        | 0.0170                  | 14                        | 9                        | 2                        | 0.9                     | 0.1                     |
| OS07a-POND F                 | 0.0170                  | 13                        | 9                        | 2                        | 0.9                     | 0.1                     |
| POND F IN                    | 0.4615                  | 291                       | 198                      | 54                       | 23.1                    | 5.0                     |
| POND F                       | 0.4615                  | 178                       | 121                      | 16                       | 8.1                     | 2.1                     |
| POND F-G7                    | 0.4615                  | 177                       | 121                      | 16                       | 8.1                     | 2.1                     |
| OS07b                        | 0.0156                  | 10                        | 10                       | 3                        | 1.0                     | 0.1                     |
| OS07b-G4                     | 0.0156                  | 14                        | 10                       | 2                        | 0.9                     | 0.1                     |
| FG21a                        | 0.0095                  | 6                         | 4                        | 1                        | 0.4                     | 0.1                     |
| G4                           | 0.0251                  | 20                        | 14                       | 4                        | 1.4                     | 0.2                     |
| G4-G7                        | 0.0251                  | 20                        | 13                       | 3                        | 1.3                     | 0.2                     |
| FG21b                        | 0.0150                  | 21                        | 15                       | 6                        | 3.8                     | 1.6                     |
| G7                           | 0.5016                  | 190                       | 129                      | 18                       | 8.8                     | 2.3                     |
| G7-G8                        | 0.5016                  | 190                       | 129                      | 18                       | 8.8                     | 2.3                     |
| FG22                         | 0.1397                  | 119                       | 85                       | 29                       | 14.9                    | 4.3                     |
| OS08                         | 0.0397                  | 35                        | 24                       | 8                        | 3.4                     | 0.7                     |
| OS08-G8                      | 0.0397                  | 34                        | 23                       | 7                        | 3.4                     | 0.7                     |
| FG23a                        | 0.0177                  | 18                        | 13                       | 5                        | 2.7                     | 1.0                     |
| G8                           | 0.6987                  | 261                       | 170                      | 46                       | 23.5                    | 6.9                     |
| OS8-G10                      | 0.6987                  | 170                       | 129                      | 45                       | 23.3                    | 6.6                     |
| OS09                         | 0.1527                  | 90                        | 62                       | 18                       | 8.2                     | 1.9                     |
| OS09-G9                      | 0.1527                  | 88                        | 62                       | 18                       | 8.1                     | 1.9                     |
| FG24                         | 0.1394                  | 63                        | 42                       | 10                       | 3.7                     | 0.7                     |
| G9                           | 0.2921                  | 150                       | 102                      | 28                       | 11.8                    | 2.5                     |
| G9-G10                       | 0.2921                  | 149                       | 101                      | 28                       | 11.6                    | 2.5                     |
| FG23b                        | 0.0359                  | 21                        | 14                       | 3                        | 1.2                     | 0.2                     |
| G10                          | 1.0267                  | 413                       | 261                      | 65                       | 29.1                    | 7.3                     |
| G10-G11                      | 1.0267                  | 413                       | 257                      | 64                       | 28.8                    | 7.2                     |
| FG23c                        | 0.0081                  | 6                         | 5                        | 2                        | 0.7                     | 0.2                     |
| G11                          | 1.0348                  | 415                       | 259                      | 65                       | 29.3                    | 7.3                     |
| FG28                         | 0.0673                  | 38                        | 26                       | 7                        | 2.7                     | 0.5                     |
| FG29a                        | 0.0583                  | 50                        | 35                       | 12                       | 5.7                     | 1.5                     |
| FG29b-POND G                 | 0.0583                  | 48                        | 34                       | 11                       | 5.5                     | 1.4                     |
| FG29b                        | 0.0506                  | 52                        | 38                       | 16                       | 9.3                     | 3.8                     |
| POND G IN                    | 1.2110                  | 491                       | 309                      | 87                       | 39.6                    | 10.2                    |
| POND G                       | 1.2110                  | 369                       | 218                      | 32                       | 12.5                    | 4.0                     |
| G12                          | 1.2110                  | 369                       | 218                      | 32                       | 12.5                    | 4.0                     |
| G12-G06                      | 1.2110                  | 368                       | 217                      | 32                       | 12.5                    | 4.0                     |
| FG29                         | 0.0997                  | 60                        | 39                       | 9                        | 2.8                     | 0.4                     |
| FG32                         | 0.0402                  | 29                        | 19                       | 4                        | 1.3                     | 0.2                     |
| FG32-G06                     | 0.0402                  | 28                        | 19                       | 4                        | 1.3                     | 0.2                     |
| G06                          | 1.3509                  | 388                       | 228                      | 34                       | 13.3                    | 4.3                     |
| FG10A                        | 0.0806                  | 103                       | 77                       | 32                       | 19.8                    | 8.6                     |
| FG08A                        | 0.0750                  | 116                       | 90                       | 41                       | 26.8                    | 13.4                    |
| FG08A-G05                    | 0.0750                  | 110                       | 86                       | 41                       | 26.5                    | 13.1                    |
| FG08B                        | 0.0630                  | 86                        | 67                       | 31                       | 20.1                    | 10.2                    |
| FG08B-G05                    | 0.0630                  | 84                        | 65                       | 29                       | 19.5                    | 10.0                    |
| FG11                         | 0.0625                  | 75                        | 59                       | 28                       | 18.6                    | 9.8                     |
| FG09                         | 0.0484                  | 48                        | 36                       | 14                       | 8.3                     | 3.2                     |
| FG09-G05                     | 0.0484                  | 48                        | 36                       | 14                       | 8.0                     | 3.2                     |
| FG10B                        | 0.0416                  | 42                        | 31                       | 12                       | 7.0                     | 2.7                     |
| G05                          | 0.3711                  | 455                       | 347                      | 153                      | 95.2                    | 46.1                    |
| FG13                         | 0.0534                  | 34                        | 24                       | 7                        | 3.6                     | 0.9                     |
| FG12                         | 0.0328                  | 50                        | 40                       | 20                       | 13.7                    | 7.8                     |
| POND D IN                    | 0.4573                  | 531                       | 405                      | 177                      | 110.8                   | 53.4                    |
| POND D                       | 0.4573                  | 134                       | 90                       | 18                       | 10.9                    | 3.7                     |
| POND D-G17                   | 0.4573                  | 133                       | 90                       | 18                       | 10.9                    | 3.7                     |
| FG15                         | 0.0103                  | 15                        | 12                       | 6                        | 3.9                     | 2.1                     |
| FG15-G17A                    | 0.0103                  | 15                        | 12                       | 6                        | 3.9                     | 2.1                     |
| G17A                         | 0.4676                  | 136                       | 92                       | 18                       | 11.2                    | 3.8                     |
| FG14                         | 0.1000                  | 98                        | 74                       | 32                       | 19.9                    | 9.2                     |
| G17                          | 0.5676                  | 201                       | 134                      | 42                       | 24.9                    | 11.8                    |
| G17-G18                      | 0.5676                  | 199                       | 134                      | 42                       | 24.8                    | 11.7                    |
| FG16                         | 0.0791                  | 133                       | 104                      | 50                       | 33.9                    | 18.3                    |
| G18                          | 0.6467                  | 247                       | 179                      | 78                       | 50.4                    | 25.3                    |
| G18-POND E                   | 0.6467                  | 247                       | 177                      | 77                       | 49.5                    | 24.7                    |
| FG31                         | 0.0922                  | 116                       | 92                       | 45                       | 31.0                    | 17.2                    |
| FG30                         | 0.0389                  | 30                        | 20                       | 4                        | 1.3                     | 0.2                     |
| FG30-PONDHS                  | 0.0389                  | 28                        | 19                       | 4                        | 1.2                     | 0.2                     |
| POND HS                      | 0.1311                  | 112                       | 63                       | 28                       | 18.8                    | 10.0                    |
| FG17a                        | 0.0694                  | 101                       | 78                       | 35                       | 23.0                    | 11.7                    |
| FG17a-POND E                 | 0.0694                  | 99                        | 76                       | 35                       | 22.9                    | 11.6                    |
| FG18                         | 0.0644                  | 56                        | 42                       | 18                       | 10.6                    | 4.7                     |
| FG18-POND E                  | 0.0644                  | 56                        | 42                       | 17                       | 10.6                    | 4.6                     |
| FG19                         | 0.0527                  | 84                        | 66                       | 33                       | 22.9                    | 13.1                    |
| FG17c                        | 0.0313                  | 31                        | 22                       | 7                        | 2.9                     | 0.5                     |
| FG17b                        | 0.0214                  | 39                        | 31                       | 16                       | 10.8                    | 6.1                     |
| POND E IN                    | 1.0170                  | 556                       | 424                      | 190                      | 122.3                   | 62.7                    |
| POND E                       | 1.0170                  | 231                       | 141                      | 26                       | 12.8                    | 5.6                     |
| H08                          | 1.0170                  | 198                       | 127                      | 20                       | 9.1                     | 3.4                     |
| H09                          | 0.0000                  | 33                        | 14                       | 6                        | 3.7                     | 2.2                     |



INTERIM CONDITIONS - SCS MAP

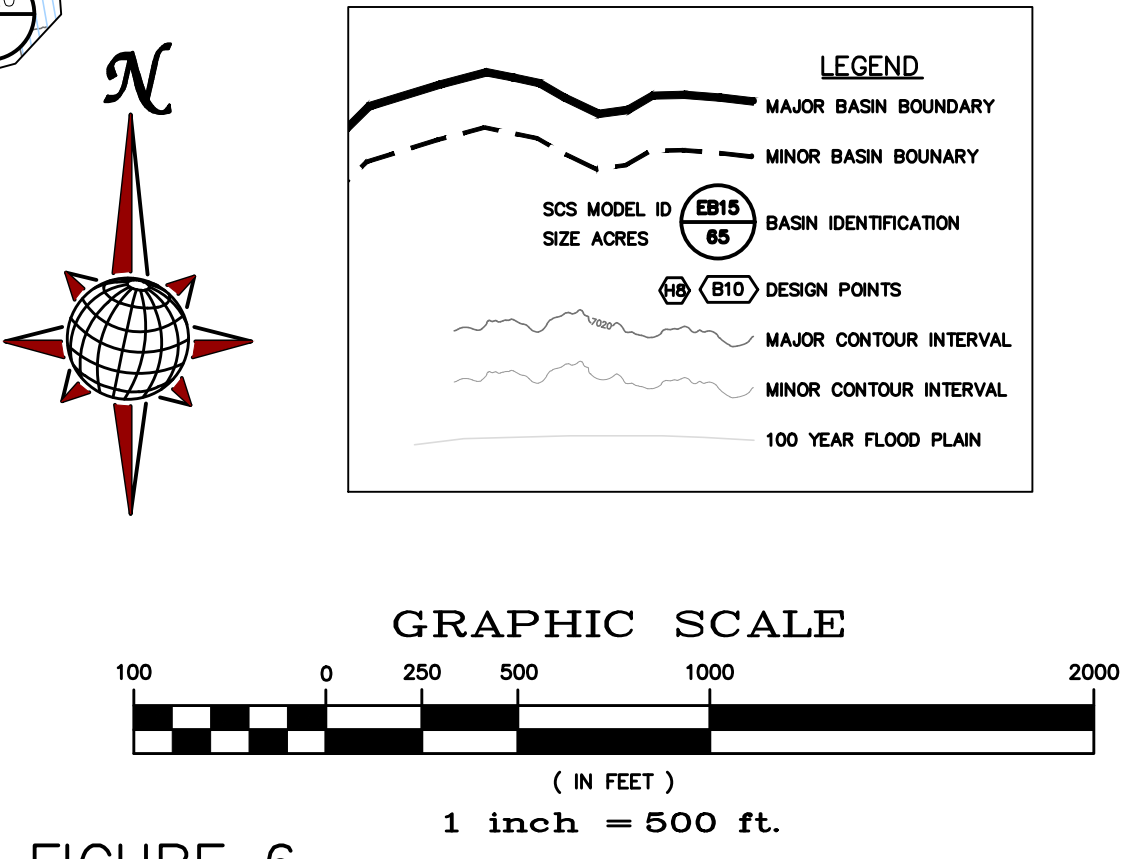


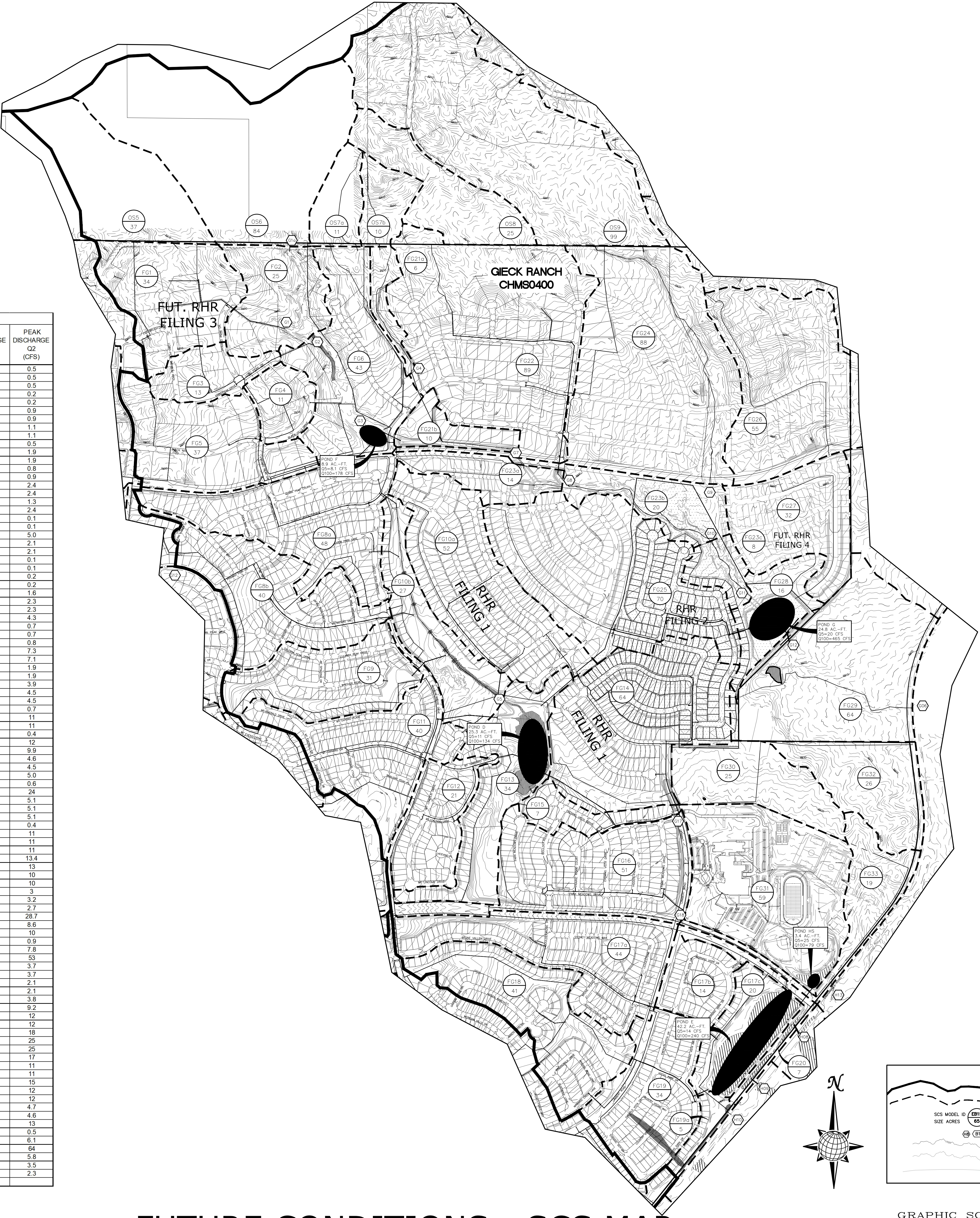
FIGURE 6



# ROLLING HILL RANCH FILING 2

## MERIDIAN RANCH

| FUTURE MDDP (Full Spectrum) |                         |                           |                          |                          |                         |                         |
|-----------------------------|-------------------------|---------------------------|--------------------------|--------------------------|-------------------------|-------------------------|
|                             | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06                        | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a                         | 0.1313                  | 80                        | 52                       | 12                       | 3.8                     | 0.5                     |
| G1a-G2                      | 0.1313                  | 79                        | 52                       | 11                       | 3.6                     | 0.5                     |
| OS05                        | 0.0578                  | 39                        | 25                       | 6                        | 1.8                     | 0.2                     |
| OS05-G1                     | 0.0578                  | 39                        | 25                       | 6                        | 1.7                     | 0.2                     |
| FG01                        | 0.0531                  | 31                        | 22                       | 7                        | 3.3                     | 0.9                     |
| FG01-G1                     | 0.0531                  | 31                        | 22                       | 7                        | 3.3                     | 0.9                     |
| G1                          | 0.1109                  | 61                        | 41                       | 11                       | 4.8                     | 1.1                     |
| G1-G2                       | 0.1109                  | 60                        | 41                       | 11                       | 4.8                     | 1.1                     |
| FG02                        | 0.0391                  | 32                        | 22                       | 6                        | 2.6                     | 0.5                     |
| G2                          | 0.2813                  | 166                       | 112                      | 27                       | 10                      | 1.9                     |
| G2-G3                       | 0.2813                  | 163                       | 108                      | 27                       | 10                      | 1.9                     |
| FG03                        | 0.0203                  | 24                        | 17                       | 6                        | 3.0                     | 0.8                     |
| FG04                        | 0.0172                  | 22                        | 16                       | 6                        | 3.1                     | 0.9                     |
| G3                          | 0.3188                  | 184                       | 123                      | 31                       | 12                      | 2.4                     |
| G3-POND F                   | 0.3188                  | 183                       | 121                      | 31                       | 12                      | 2.4                     |
| FG06                        | 0.0677                  | 51                        | 36                       | 11                       | 5.3                     | 1.3                     |
| FG05                        | 0.0680                  | 45                        | 33                       | 12                       | 6.7                     | 2.4                     |
| OS07a                       | 0.0170                  | 14                        | 9.2                      | 2.5                      | 0.9                     | 0.1                     |
| OS07a-POND F                | 0.0170                  | 13                        | 9.1                      | 2.3                      | 0.9                     | 0.1                     |
| POND F IN                   | 0.4615                  | 291                       | 198                      | 54                       | 23                      | 5.0                     |
| POND F                      | 0.4615                  | 178                       | 121                      | 16                       | 8.1                     | 2.1                     |
| POND F-G7                   | 0.4615                  | 177                       | 121                      | 16                       | 8.1                     | 2.1                     |
| OS07b-G4                    | 0.0156                  | 14                        | 10                       | 2                        | 0.9                     | 0.1                     |
| FG21a                       | 0.0065                  | 6.1                       | 4.2                      | 1.1                      | 0.4                     | 0.1                     |
| G4                          | 0.0251                  | 20.2                      | 13.5                     | 3.6                      | 1.4                     | 0.2                     |
| G4-G7                       | 0.0251                  | 20                        | 13                       | 3                        | 1.3                     | 0.2                     |
| FG21b                       | 0.0150                  | 21                        | 15                       | 6                        | 3.8                     | 1.6                     |
| G7                          | 0.5016                  | 190                       | 129                      | 18                       | 9                       | 2.3                     |
| G7-G8                       | 0.5016                  | 189                       | 128                      | 18                       | 8.8                     | 2.3                     |
| FG22                        | 0.1597                  | 119                       | 85                       | 29                       | 14.9                    | 4.3                     |
| OS08                        | 0.0397                  | 35                        | 24                       | 8                        | 3.4                     | 0.7                     |
| OS08-G8                     | 0.0397                  | 34                        | 23                       | 7.3                      | 3.4                     | 0.7                     |
| FG23a                       | 0.0216                  | 21                        | 14.9                     | 5.2                      | 2.7                     | 0.8                     |
| G8                          | 0.7026                  | 271                       | 175                      | 48                       | 25                      | 7.3                     |
| G8-G10                      | 0.7026                  | 271                       | 174                      | 47                       | 24                      | 7.1                     |
| OS09                        | 0.1527                  | 90                        | 62                       | 18                       | 8.2                     | 1.9                     |
| OS09-G9                     | 0.1527                  | 88                        | 62                       | 18                       | 8.2                     | 1.9                     |
| FG24                        | 0.1369                  | 101                       | 72                       | 25                       | 13                      | 3.9                     |
| G9                          | 0.2896                  | 179                       | 126                      | 38                       | 17                      | 4.5                     |
| G9-G10                      | 0.2896                  | 179                       | 125                      | 37                       | 17                      | 4.5                     |
| FG23b                       | 0.0305                  | 27                        | 19                       | 6                        | 2.8                     | 0.7                     |
| G10                         | 1.0227                  | 450                       | 281                      | 81                       | 39                      | 11                      |
| G10-G11                     | 1.0227                  | 450                       | 279                      | 80                       | 39                      | 11                      |
| FG23c                       | 0.0122                  | 12                        | 8.7                      | 3.0                      | 1.5                     | 0.4                     |
| G11                         | 1.0349                  | 453                       | 281                      | 82                       | 40                      | 12                      |
| FG25                        | 0.1086                  | 112                       | 85                       | 36                       | 22                      | 9.9                     |
| FG26                        | 0.0863                  | 78                        | 58                       | 22                       | 12                      | 4.6                     |
| FG26-POND G                 | 0.0863                  | 77                        | 57                       | 22                       | 12                      | 4.5                     |
| FG27                        | 0.0500                  | 52                        | 40                       | 17                       | 11                      | 5.0                     |
| FG28                        | 0.0245                  | 24                        | 17                       | 5.5                      | 2.7                     | 0.6                     |
| POND G IN                   | 1.3043                  | 653                       | 451                      | 149                      | 75                      | 24                      |
| POND G                      | 1.3043                  | 465                       | 307                      | 51                       | 20                      | 5.1                     |
| G12                         | 1.3043                  | 465                       | 307                      | 51                       | 20                      | 5.1                     |
| G12-G06                     | 1.3043                  | 464                       | 306                      | 51                       | 20                      | 5.1                     |
| FG29                        | 0.0997                  | 60                        | 39                       | 9                        | 2.8                     | 0.4                     |
| FG32                        | 0.0402                  | 72                        | 57                       | 29                       | 20                      | 11                      |
| FG32-G06                    | 0.0402                  | 69                        | 54                       | 27                       | 18                      | 11                      |
| G06                         | 1.4442                  | 493                       | 324                      | 55                       | 22                      | 11                      |
| FG08A                       | 0.0750                  | 116                       | 90                       | 41                       | 27                      | 13.4                    |
| FG08A-G05                   | 0.0750                  | 110                       | 86                       | 41                       | 27                      | 13                      |
| FG08B                       | 0.0630                  | 86                        | 67                       | 31                       | 20                      | 10                      |
| FG08B-G05                   | 0.0630                  | 84                        | 65                       | 29                       | 19                      | 10                      |
| FG09                        | 0.0494                  | 48                        | 36                       | 14                       | 8                       | 3                       |
| FG09-G05                    | 0.0494                  | 48                        | 36                       | 14                       | 8                       | 3.2                     |
| FG10B                       | 0.0416                  | 42                        | 31                       | 12                       | 7.0                     | 2.7                     |
| G05                         | 0.2280                  | 282                       | 215                      | 94                       | 58.8                    | 28.7                    |
| FG10A                       | 0.0806                  | 103                       | 77                       | 32                       | 19.8                    | 8.6                     |
| FG11                        | 0.0625                  | 75                        | 59                       | 28                       | 19                      | 10                      |
| FG13                        | 0.0534                  | 34                        | 24                       | 7                        | 3.6                     | 0.9                     |
| FG12                        | 0.0328                  | 50                        | 40                       | 20                       | 14                      | 7.8                     |
| POND D IN                   | 0.4573                  | 531                       | 405                      | 177                      | 111                     | 53                      |
| POND D                      | 0.4573                  | 134                       | 90                       | 18                       | 11                      | 3.7                     |
| POND D-G17                  | 0.4573                  | 133                       | 90                       | 18                       | 11                      | 3.7                     |
| FG15                        | 0.0103                  | 15                        | 12                       | 5.8                      | 3.9                     | 2.1                     |
| FG15-G17A                   | 0.0103                  | 15                        | 12                       | 5.8                      | 3.9                     | 2.1                     |
| FG17A                       | 0.1676                  | 136                       | 92                       | 18                       | 11                      | 3.8                     |
| FG14                        | 0.1000                  | 98                        | 74                       | 32                       | 20                      | 9.2                     |
| G17                         | 0.5676                  | 201                       | 134                      | 42                       | 25                      | 12                      |
| G17-G18                     | 0.5676                  | 199                       | 134                      | 42                       | 25                      | 12                      |
| FG16                        | 0.0791                  | 133                       | 104                      | 50                       | 34                      | 18                      |
| G18                         | 0.6467                  | 247                       | 179                      | 78                       | 50                      | 25                      |
| G18-POND E                  | 0.6467                  | 247                       | 177                      | 77                       | 50                      | 25                      |
| FG31                        | 0.0822                  | 116                       | 92                       | 45                       | 31                      | 17                      |
| FG30                        | 0.0389                  | 73                        | 57                       | 29                       | 20                      | 11                      |
| FG30-PONDHS                 | 0.0389                  | 70                        | 56                       | 27                       | 18                      | 11                      |
| POND HS                     | 0.1311                  | 153                       | 106                      | 36                       | 26                      | 15                      |
| FG17a                       | 0.0694                  | 101                       | 78                       | 35                       | 23                      | 12                      |
| FG17a-POND E                | 0.0694                  | 99                        | 76                       | 35                       | 23                      | 12                      |
| FG18                        | 0.0644                  | 56                        | 42                       | 18                       | 11                      | 4.7                     |
| FG18-POND E                 | 0.0644                  | 56                        | 42                       | 17                       | 11                      | 4.6                     |
| FG19                        | 0.0527                  | 84                        | 66                       | 33                       | 23                      | 13                      |
| FG17c                       | 0.0313                  | 31                        | 22                       | 7                        | 2.9                     | 0.5                     |
| FG17b                       | 0.0214                  | 39                        | 31                       | 16                       | 11                      | 6.1                     |
| POND E IN                   | 1.0170                  | 618                       | 433                      | 197                      | 126                     | 64                      |
| POND E                      | 1.0170                  | 240                       | 149                      | 28                       | 14                      | 5.8                     |
| H08                         | 1.0170                  | 204                       | 134                      | 22                       | 10                      | 3.5                     |
| H09                         | 0.0000                  | 36                        | 15                       | 6                        | 4                       | 2.3                     |



FUTURE CONDITIONS - SCS MAP  
(FULL BUILDOUT)

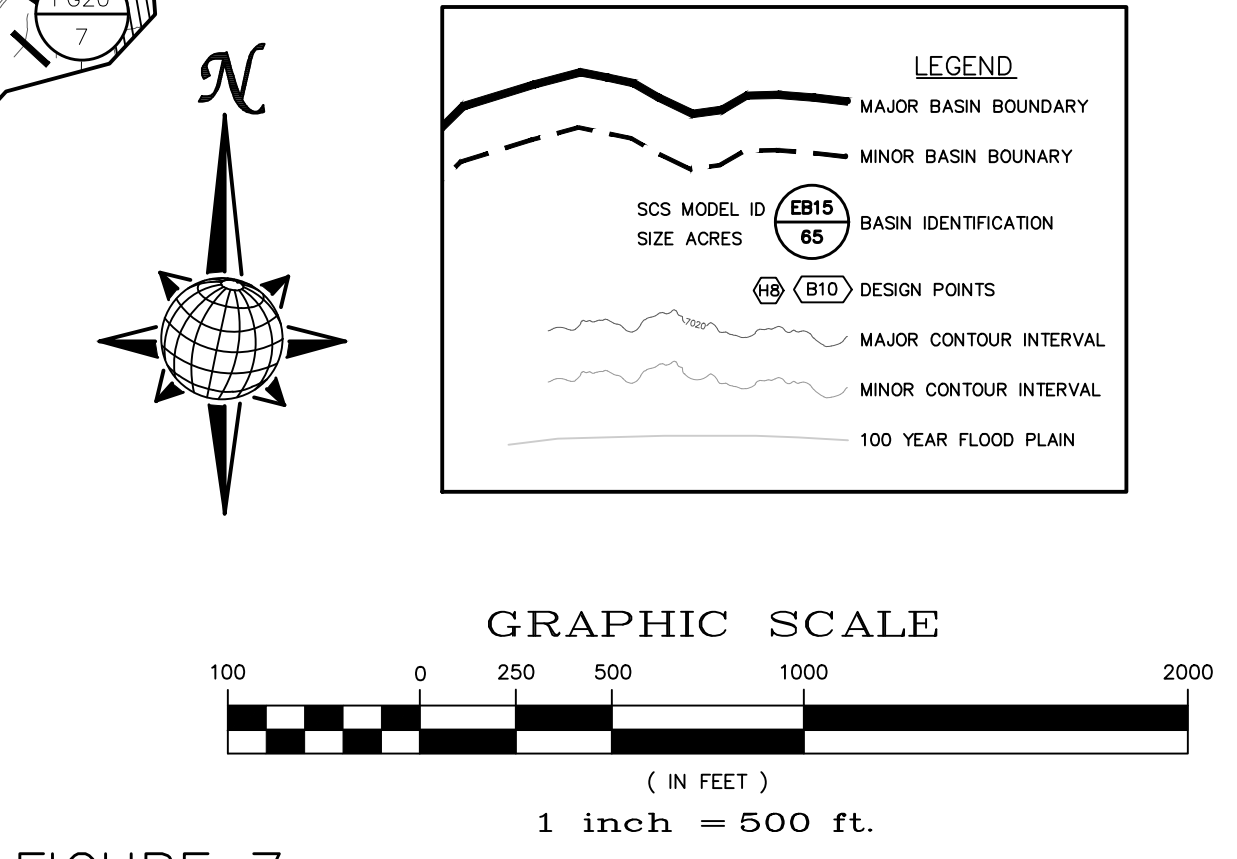


FIGURE 7