Preliminary Drainage Report
for
# Rolling Hills Ranch PUD
**at**
## Meridian Ranch

EL PASO COUNTY, COLORADO

February 2020

Prepared For:

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PCD Project No. PUDSP-19-009

CERTIFICATIONS

**Design Engineer's Statement:**

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

______________________________________ ________________

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

**Owner/Developer's Statement:**

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

______________________________________ ________________

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

**El Paso County:**

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

______________________________________ ________________

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

# Rolling Hills Ranch at Meridian Ranch PUD
# Preliminary Drainage Report

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## *EXECUTIVE SUMMARY*

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

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

Rolling Hills Ranch PUD encompasses 252± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

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

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

## ***INTRODUCTION***

### *Purpose*

The purpose of the following Preliminary Drainage Report (PDR) is to present proposed changes to the drainage patterns as a result of the development of Rolling Hills Ranch PUD. The report outlines the proposed drainage mitigation based on calculated developed flows in excess of allowable exiting runoff discharge.

### *Scope*

The scope of this report includes:

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

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

### *Background*

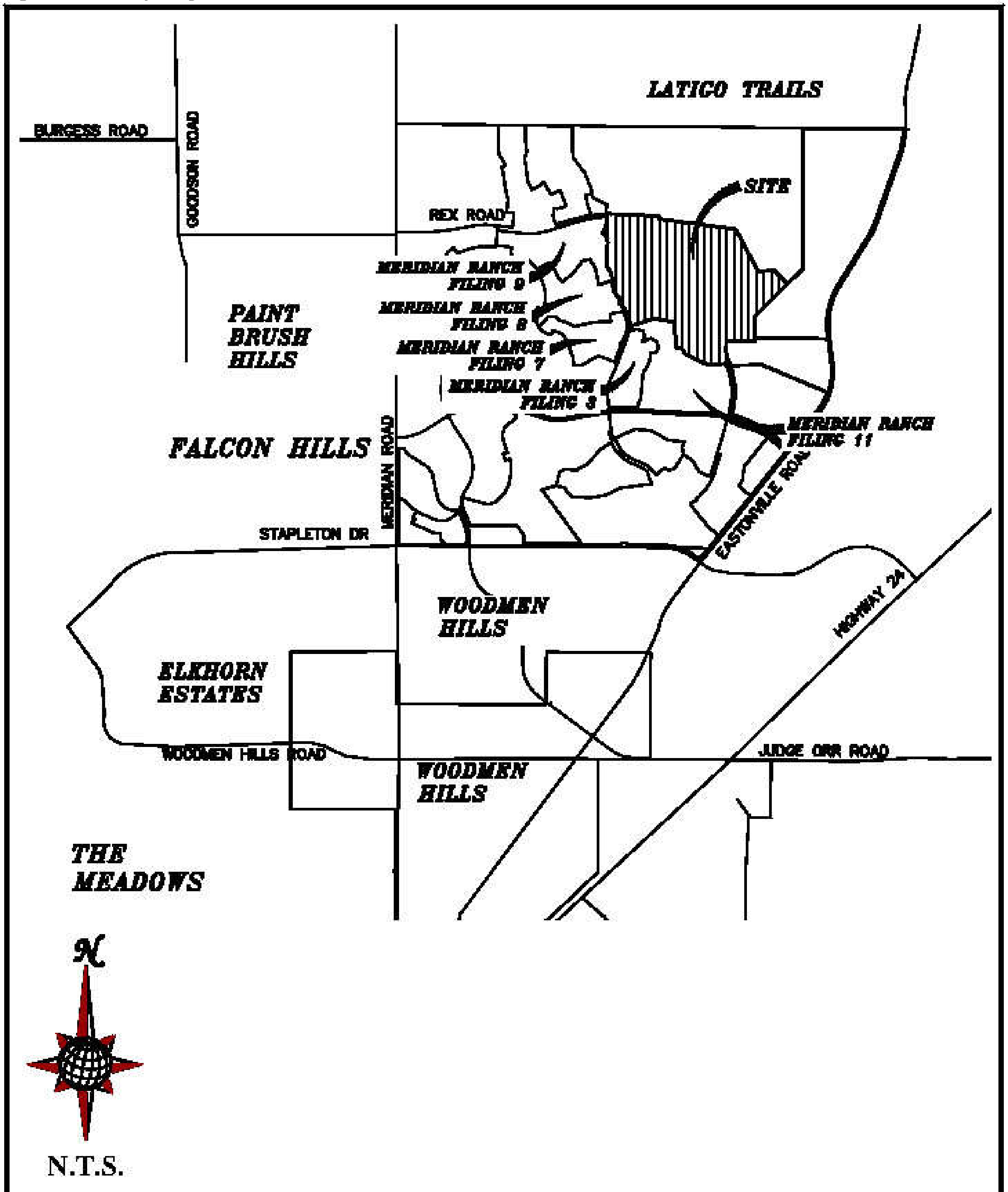
On November 16, 2000 the El Paso County Board of County Commissioners approved the rezoning of the Meridian Ranch project (PUD-00-010) from A-35 to PUD with several conditions. Condition number seven stated in part that “drainage plans shall release and/or retain at approximately eight percent (80%)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

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

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

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

**Figure 1: Vicinity Map**




| MERIDIAN RANCH<br>ROLLING HILLS RANCH<br>VICINITY MAP | TECH CONTRACTORS<br>11886 STAPLETON DRIVE<br>FALCON, CO 80831<br>TELEPHONE: 719.495.7444<br>FAX: 719.495.2457 |
|---|---|
| FIGURE 1 | |

## ***EXISTING CONDITIONS***

### *General Location*

Rolling Hills Ranch PUD project encompasses 252± acres and is located in Sections 20 and 29, Township 12 South, Range 64 West of the 6th Principal Meridian. It is approximately 12 miles northeast of the city of Colorado Springs, 2.5 miles north of the unincorporated town of Falcon, and immediately north of the Woodmen Hills development.

### *Land Use*

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

### *Climate*

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

### *Topography and Floodplains*

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

The Flood Insurance Rate Maps (FIRM No. 08041C0552G, dated 12/07/2018) indicates there is a portion of the project located within a designated floodplain. Please see Figure 2: Rolling Hills Ranch PUD Federal Emergency Management Agency (FEMA) Floodplain Map.

The designated floodplain is located within a drainage open space identified as Tract C. The floodplain is identified as a Zone AE with an elevation of 7060 based on the NAVD88 Datum. The topography is based on the NGVD29 Datum, therefore an adjustment of 3.9-ft. to the base flood elevation shown in the map is required. The net result is a base flood elevation of 7056 for this location.

### *Geology*

The National Resources Conservation Service (NRCS) soil survey records indicate that the service area is predominately covered by soils classified in the Columbine (65 ac.) and Stapleton series (188 ac.). These series are categorized in the Hydrological Soil Groups A & B.

The Columbine (19) gravelly sandy loam is a deep, well-drained to excessively drained soil formed in coarse textured material on alluvial terraces, fans and flood plains. Permeability of

**Figure 2: FEMA Floodplain Map**

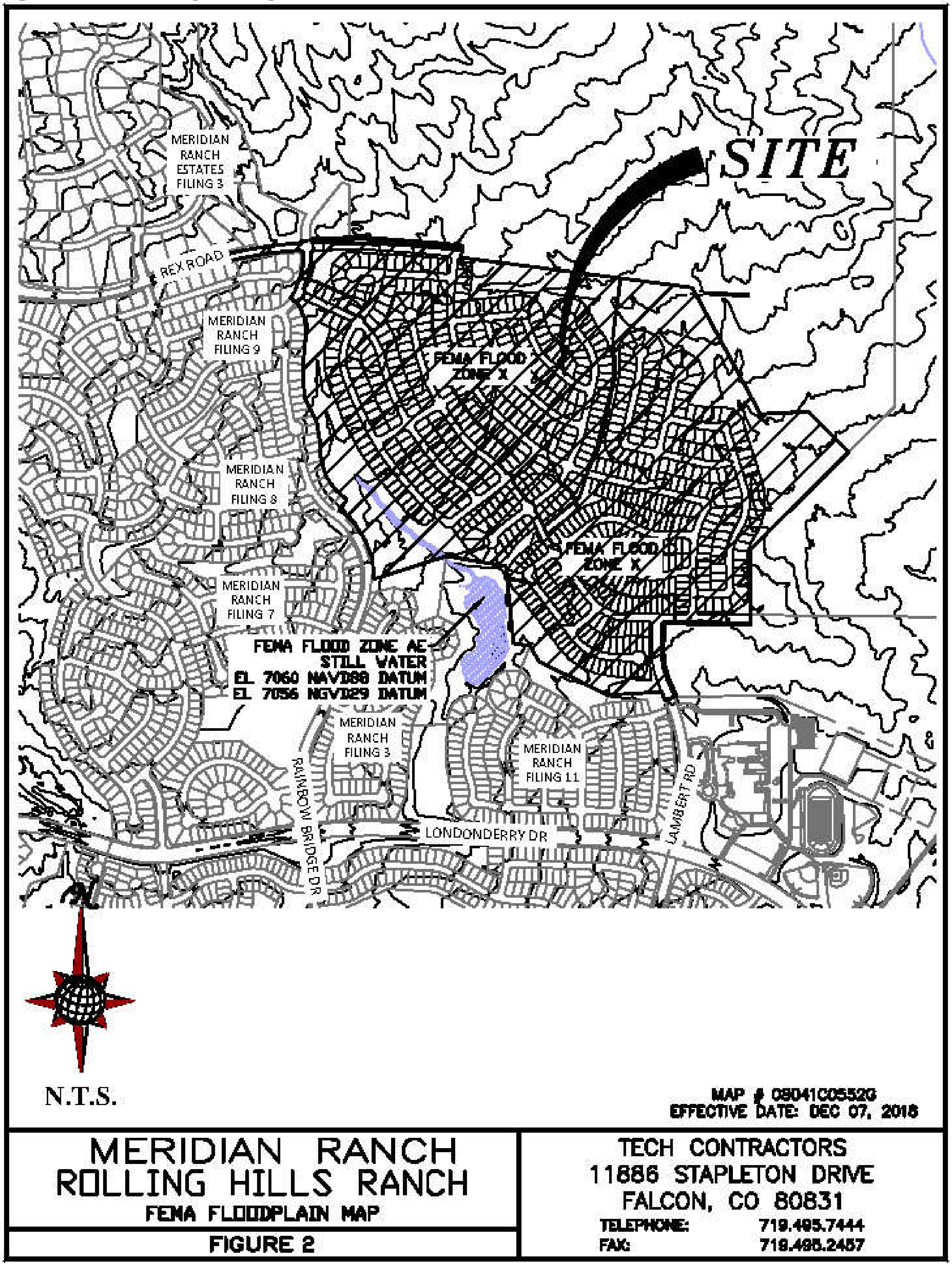
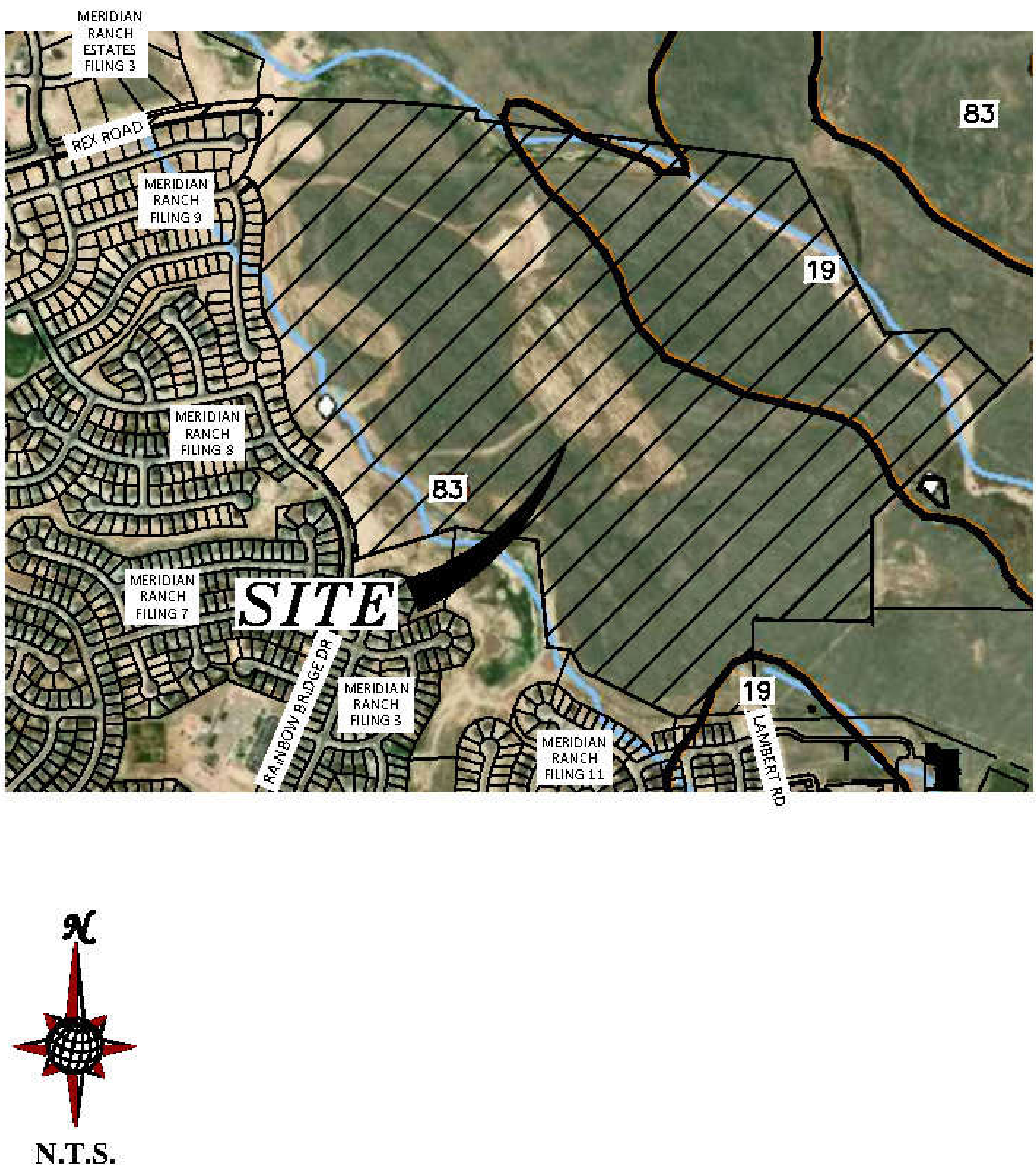


**Figure 3: Soils Map**




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

this soil is very rapid. Available water capacity is low to moderate, surface runoff is slow, and the hazard of erosion is slight to moderate. The Columbine series is categorized as a Hydrological Soil Group A.

This soil is used mainly for grazing livestock, for wildlife habitat and for home sites. The main limitation of this soil for urban development is a hazard of flooding in some areas.

The Stapleton (83) sandy loam is a deep, non-calcareous, well-drained soil formed in alluvium derived from arkosic bedrock on uplands. Permeability of this soil is rapid. Available water capacity is moderate, surface runoff is slow, and the hazard of erosion and soil blowing is moderate. The Stapleton series is categorized as a Hydrological Soil Group B.

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

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

Note: (#) indicates Soil Conservation Survey soil classification number. See Figure 3 Rolling Hills Ranch PUD – Soils Map.

***Natural Hazards Analysis***

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

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

The site is near the top of the Gieck Ranch Drainage Basin and accepts flow from areas north of the project site within portions of 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 Rolling Hills Ranch PUD in the proposed developed condition. The current existing conditions assume all approved projects tributary to Rolling Hills Ranch and the Rolling Hills Ranch PUD 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 Rolling Hills Ranch PUD 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 |
| Residential Lots (2.5 acre) | 66 |
| Residential Lots (1 acre) | 68 |
| Residential Lots (1/2 acre) | 70 |
| Residential Lots (1/3 acre) | 72 |
| Residential Lots (1/4 acre) | 75 |
| Residential Lots (1/5 acre) | 78 |
| Residential Lots (1/6 acre) | 80 |

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

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

### *Full Spectrum Design*

The City of Colorado Springs adopted a new Drainage Criteria Manual (DCM) in 2014 which incorporated the use of *Full Spectrum Design* for storm drainage analysis for projects located within the city limits. El Paso County adopted portions of the City's 2014 DCM by resolution in January 2015; the County resolution adopted Chapter 6 (Hydrology) and Section 3.2.1 of Chapter 13 (Full Spectrum Detention) for projects outside of the City of

Colorado Springs establishing a 1 year review period to analyze the impacts of the Full Spectrum Design on the storm drainage analysis of projects. This report has incorporated the use of full spectrum in the analysis using the SCS Method to determine the size requirements for the detention pond during the interim and future conditions.

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

**Table 2: Detention Pond Summary:**

| POND F | | | | |
|---|---|---|---|---|
| | PEAK INFLOW | PEAK OUTFLOW | PEAK STORAGE | PEAK ELEVATION |
| | CFS | CFS | AC-FT | FT |
| INTERIM CONDITIONS | | | | |
| 2-YEAR STORM | 4.6 | 2.2 | 0.9 | 7130.1 |
| 5-YEAR STORM | 21 | 7.9 | 1.8 | 7131.2 |
| 10-YEAR STORM | 53 | 17 | 3.4 | 7132.7 |
| 25-YEAR STORM | 120 | 61 | 5.3 | 7134.1 |
| 50-YEAR STORM | 193 | 122 | 6.7 | 7134.9 |
| 100-YEAR STORM | 285 | 178 | 8.8 | 7136.0 |
| FUTURE CONDITIONS | | | | |
| 2-YEAR STORM | 5.0 | 2.4 | 1.0 | 7130.2 |
| 5-YEAR STORM | 22 | 8.5 | 1.9 | 7131.3 |
| 10-YEAR STORM | 54 | 17 | 3.5 | 7132.8 |
| 25-YEAR STORM | 123 | 64 | 5.4 | 7134.2 |
| 50-YEAR STORM | 200 | 125 | 6.8 | 7135.0 |
| 100-YEAR STORM | 293 | 179 | 8.9 | 7136.0 |

## ***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. Those portions of the site tributary the existing Detention Pond D will be directed to an existing sedimentation pond to be located upstream of the pond then conveyed to the pond. Portions of the site are tributary the existing Detention Pond E; runoff will be directed to an existing sedimentation pond to be located upstream at the existing northern terminus of Lambert Road, collected then conveyed via an existing storm drain system to the pond. Portions of the site tributary to the proposed Detention Pond G will be directed to temporary sedimentation pond before being released into the existing natural channel and conveyed to the proposed 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 tributary to existing Pond E releasing the developed peak flows below the historic flow rates for the full spectrum of design storms using the newly adopted unit hydrograph from the City DCM-1.

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

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

***SCS Calculations***

Historic Drainage - SCS Calculation Method

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

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

| HISTORIC MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06 | 0.1313 | 81 | 53 | 31 | 12 | 3.9 | 0.5 |
| OS06-G02 | 0.1313 | 79 | 52 | 31 | 12 | 3.8 | 0.5 |
| OS05 | 0.0578 | 40 | 26 | 16 | 5.9 | 1.8 | 0.2 |
| OS05-G01 | 0.0578 | 38 | 26 | 16 | 5.7 | 1.8 | 0.2 |
| HG01 | 0.0547 | 33 | 21 | 13 | 4.8 | 1.6 | 0.2 |
| G01 | 0.1125 | 71 | 47 | 28 | 10 | 3.3 | 0.5 |
| G01-G02 | 0.1125 | 70 | 47 | 27 | 10 | 3.3 | 0.5 |
| HG02 | 0.0906 | 46 | 30 | 18 | 6.9 | 2.4 | 0.4 |
| G02 | 0.3344 | 194 | 129 | 76 | 28 | 9.4 | 1.4 |
| G02-G03 | 0.3344 | 192 | 127 | 75 | 28 | 9.3 | 1.4 |
| HG03 | 0.1828 | 79 | 51 | 31 | 12 | 4.4 | 0.8 |
| OS07 | 0.0328 | 25 | 17 | 11 | 4.6 | 1.7 | 0.3 |
| OS07-G03 | 0.0328 | 24 | 17 | 9.9 | 4.4 | 1.7 | 0.3 |

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

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

## Interim Drainage - SCS Calculation Method

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

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

| INTERIM MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06 | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a-G2 | 0.1313 | 79 | 52 | 30 | 11 | 3.6 | 0.5 |
| OS05 | 0.0578 | 39 | 26 | 15 | 5.6 | 1.8 | 0.2 |
| OS05-G1 | 0.0578 | 39 | 25 | 15 | 5.5 | 1.7 | 0.2 |
| FG01 | 0.0531 | 31 | 22 | 14 | 6.9 | 3.3 | 0.9 |
| FG01-G1 | 0.0531 | 31 | 22 | 14 | 6.9 | 3.3 | 0.9 |
| G1 | 0.1109 | 61 | 41 | 25 | 11 | 4.8 | 1.1 |
| G1-G2 | 0.1109 | 60 | 41 | 25 | 11 | 4.8 | 1.1 |
| FG02 | 0.0391 | 32 | 22 | 14 | 6.2 | 2.6 | 0.5 |
| | | | | | | | |

| INTERIM MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| G2 | 0.2813 | 166 | 112 | 67 | 27 | 10 | 1.9 |
| G2-G3 | 0.2813 | 163 | 108 | 66 | 27 | 10 | 1.9 |
| FG03 | 0.0203 | 24 | 17 | 12 | 5.9 | 0.8 | 0.8 |
| FG04 | 0.0172 | 22 | 16 | 11 | 5.8 | 3.1 | 0.9 |
| G3 | 0.3188 | 184 | 123 | 74 | 31 | 11 | 2.4 |
| G3-POND F | 0.3188 | 183 | 121 | 74 | 31 | 11 | 2.4 |
| FG06 | 0.0658 | 46 | 32 | 20 | 9.1 | 3.9 | 0.8 |
| OS07a-POND F | 0.0170 | 13 | 9.0 | 5.7 | 2.4 | 0.9 | 0.1 |
| POND F IN | 0.4596 | 285 | 193 | 120 | 53 | 21 | 4.6 |
| POND F | 0.4596 | 178 | 122 | 61 | 17 | 7.9 | 2.2 |
| POND F-G7 | 0.4596 | 177 | 121 | 61 | 17 | 7.9 | 2.2 |
| FG22 | 0.0658 | 51 | 36 | 24 | 12 | 5.6 | 1.4 |
| FG23a | 0.0177 | 18 | 13 | 9.0 | 4.9 | 2.7 | 1.0 |
| OS07b | 0.0156 | 15 | 10.0 | 6.2 | 2.6 | 1.0 | 0.1 |
| OS07b-G7 | 0.0156 | 13 | 9.2 | 5.4 | 2.3 | 0.9 | 0.1 |
| G7 | 0.5587 | 215 | 145 | 73 | 22 | 10 | 2.8 |
| G7-G10 | 0.5587 | 215 | 145 | 72 | 21 | 10 | 2.8 |
| FG24 | 0.2503 | 110 | 73 | 43 | 17 | 6.2 | 1.1 |
| OS09 | 0.1527 | 90 | 62 | 39 | 18 | 8.2 | 1.9 |
| OS09-G10 | 0.1527 | 88 | 61 | 39 | 18 | 8.2 | 1.9 |
| OS08 | 0.0397 | 35 | 24 | 16 | 7.5 | 3.4 | 0.7 |
| OS08-G8 | 0.0397 | 34 | 24 | 15 | 7.2 | 3.3 | 0.7 |
| G8 | 0.4427 | 227 | 154 | 94 | 41 | 17 | 3.4 |
| G8-G10 | 0.4427 | 225 | 151 | 94 | 41 | 17 | 3.4 |
| FG23b | 0.0359 | 21 | 14 | 8.4 | 3.3 | 1.2 | 0.2 |
| G10 | 1.0373 | 444 | 287 | 146 | 60 | 25 | 5.6 |
| G10-G11 | 1.0373 | 442 | 285 | 146 | 60 | 25 | 5.6 |
| FG23c | 0.0070 | 5.8 | 4.2 | 2.8 | 1.4 | 0.7 | 0.2 |
| G11 | 1.0443 | 446 | 287 | 147 | 60 | 25 | 5.7 |
| FG25 | 0.1086 | 85 | 64 | 46 | 27 | 17 | 7.5 |
| FG28 | 0.0673 | 38 | 26 | 16 | 6.7 | 2.7 | 0.5 |
| POND G IN | 1.2202 | 558 | 363 | 202 | 91 | 42 | 11 |
| POND G | 1.2202 | 394 | 238 | 118 | 34 | 13 | 4.1 |
| G12 | 1.2202 | 394 | 238 | 118 | 34 | 13 | 4.1 |
| G12-G06 | 1.2202 | 394 | 237 | 118 | 34 | 13 | 4.1 |
| FG29 | 0.0997 | 60 | 39 | 23 | 8.7 | 2.8 | 0.4 |
| FG32 | 0.0402 | 29 | 19 | 11 | 4.2 | 1.3 | 0.2 |
| FG32-G06 | 0.0402 | 28 | 19 | 11 | 4.1 | 1.3 | 0.2 |
| G06 | 1.3601 | 414 | 249 | 125 | 37 | 14 | 4.5 |
| FG10A | 0.0806 | 81 | 61 | 43 | 25 | 15 | 6.5 |
| FG08A | 0.0750 | 116 | 90 | 66 | 41 | 27 | 13 |
| FG08A-G05 | 0.0750 | 110 | 86 | 64 | 41 | 27 | 13 |
| FG08B | 0.0630 | 86 | 67 | 49 | 31 | 20 | 10 |
| FG08B-G05 | 0.0630 | 84 | 65 | 48 | 29 | 19 | 10 |
| FG11 | 0.0625 | 75 | 59 | 44 | 28 | 19 | 9.8 |
| FG09 | 0.0484 | 48 | 36 | 25 | 14 | 8.3 | 3.2 |
| FG09-G05 | 0.0484 | 48 | 36 | 25 | 14 | 8.0 | 3.2 |
| FG10B | 0.0416 | 42 | 31 | 22 | 12 | 7.0 | 2.7 |
| G05 | 0.3711 | 433 | 330 | 239 | 145 | 93 | 45 |
| FG13 | 0.0534 | 34 | 24 | 15 | 7.5 | 3.6 | 0.9 |
| FG12 | 0.0328 | 50 | 40 | 30 | 20 | 14 | 7.8 |
| POND D IN | 0.4573 | 509 | 387 | 280 | 168 | 107 | 52 |
| POND D | 0.4573 | 136 | 92 | 52 | 18 | 11 | 4.0 |
| POND D-G17 | 0.4573 | 135 | 92 | 52 | 18 | 11 | 4.0 |
| FG15 | 0.0103 | 15 | 12 | 9.0 | 5.8 | 3.9 | 2.1 |
| FG15-G17A | 0.0103 | 15 | 12 | 9.0 | 5.8 | 3.9 | 2.1 |
| G17A | 0.4676 | 138 | 94 | 53 | 19 | 12 | 4.1 |
| FG14 | 0.1000 | 98 | 74 | 53 | 32 | 20 | 9.2 |
| G17 | 0.5676 | 198 | 134 | 76 | 42 | 25 | 12 |
| G17-G18 | 0.5676 | 197 | 133 | 75 | 42 | 25 | 12 |
| FG16 | 0.0791 | 133 | 104 | 78 | 50 | 34 | 18 |
| G18 | 0.6467 | 242 | 179 | 129 | 78 | 51 | 25 |
| G18-POND E | 0.6467 | 242 | 177 | 127 | 77 | 50 | 25 |
| FG31 | 0.0922 | 116 | 92 | 69 | 45 | 31 | 17 |
| FG30 | 0.0389 | 30 | 20 | 12 | 4.3 | 1.3 | 0.2 |
| FG30-PONDHS | 0.0389 | 28 | 19 | 11 | 4.2 | 1.2 | 0.2 |

| INTERIM MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| POND HS | 0.1311 | 112 | 63 | 40 | 28 | 19 | 10.0 |
| FG17a | 0.0694 | 101 | 78 | 57 | 35 | 23 | 12 |
| FG17a-POND E | 0.0694 | 99 | 76 | 56 | 35 | 23 | 11.6 |
| FG18 | 0.0644 | 56 | 42 | 30 | 18 | 11 | 4.7 |
| FG18-POND E | 0.0644 | 56 | 42 | 30 | 17 | 11 | 4.6 |
| FG19 | 0.0527 | 84 | 66 | 50 | 33 | 23 | 13.1 |
| FG17c | 0.0313 | 31 | 22 | 14 | 6.5 | 2.9 | 0.5 |
| FG17b | 0.0214 | 39 | 31 | 24 | 16 | 11 | 6.1 |
| POND E IN | 1.0170 | 553 | 424 | 308 | 190 | 122 | 62.8 |
| POND E | 1.0170 | 237 | 148 | 77 | 27 | 14 | 5.8 |
| H08 | 1.0170 | 202 | 133 | 69 | 21 | 10 | 3.5 |
| H09 | 0.0000 | 35 | 15 | 8.0 | 5.6 | 3.8 | 2 |
| FG34 | 0.0836 | 48 | 32 | 19 | 7.0 | 2.3 | 0.3 |
| G14 | 0.0836 | 48 | 32 | 19 | 7.0 | 2.3 | 0.3 |
| G14-G15 | 0.0836 | 48 | 32 | 18 | 7.0 | 2.3 | 0.3 |
| FG35 | 0.0586 | 19 | 13 | 7.4 | 3.0 | 1.2 | 0.2 |
| G15 | 0.1422 | 60 | 39 | 23 | 8.9 | 3.1 | 0.6 |
| G15-G08 | 0.1422 | 59 | 39 | 23 | 8.8 | 3.1 | 0.6 |
| FG37 | 0.1203 | 44 | 29 | 17 | 6.8 | 2.5 | 0.5 |
| FG36 | 0.0281 | 16 | 10 | 6.0 | 2.4 | 0.9 | 0.1 |
| FG36-G08 | 0.0281 | 15 | 10 | 6.0 | 2.4 | 0.9 | 0.1 |
| G08 | 0.2906 | 114 | 75 | 44 | 18 | 6.4 | 1.1 |

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

## Future Drainage - SCS Calculation Method

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

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

| FUTURE MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06 | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a-G2 | 0.1313 | 79 | 52 | 30 | 11 | 3.6 | 0.5 |
| OS05 | 0.0578 | 39 | 26 | 15 | 5.6 | 1.8 | 0.2 |
| OS05-G1 | 0.0578 | 39 | 25 | 15 | 5.5 | 1.7 | 0.2 |
| FG01 | 0.0538 | 31 | 22 | 14 | 7.0 | 3.4 | 0.9 |
| FG01-G1 | 0.0538 | 31 | 22 | 14 | 7.0 | 3.4 | 0.9 |
| G1 | 0.1116 | 61 | 41 | 25 | 11 | 4.9 | 1.1 |
| G1-G2 | 0.1116 | 61 | 41 | 25 | 11 | 4.8 | 1.1 |
| FG02 | 0.0391 | 32 | 22 | 14 | 6.4 | 2.7 | 0.5 |
| G2 | 0.2820 | 167 | 112 | 67 | 27 | 10 | 1.9 |
| G2-G3 | 0.2820 | 163 | 109 | 66 | 27 | 10 | 1.9 |
| FG03 | 0.0203 | 24 | 17 | 12 | 5.9 | 0.8 | 0.8 |
| FG04 | 0.0172 | 22 | 16 | 11 | 5.8 | 3.1 | 0.9 |
| G3 | 0.3195 | 185 | 123 | 74 | 31 | 11 | 2.4 |
| G3-POND F | 0.3195 | 183 | 121 | 74 | 31 | 11 | 2.4 |
| FG06 | 0.0675 | 56 | 40 | 26 | 12 | 5.8 | 1.3 |
| FG05 | 0.0580 | 45 | 33 | 23 | 12 | 6.7 | 2.4 |
| OS07a | 0.0170 | 14 | 9.2 | 5.7 | 2.5 | 0.9 | 0.1 |
| OS07a-POND F | 0.0170 | 13 | 9.0 | 5.7 | 2.4 | 0.9 | 0.1 |
| POND F IN | 0.4620 | 293 | 200 | 123 | 54 | 22 | 5.0 |
| POND F | 0.4620 | 179 | 125 | 64 | 17 | 8.5 | 2.4 |
| POND F-G7 | 0.4620 | 179 | 124 | 63 | 17 | 8.5 | 2.4 |

| FUTURE MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| FG21b | 0.0170 | 26 | 20 | 16 | 10.2 | 7.0 | 4.0 |
| FG21a | 0.0072 | 6.1 | 4.1 | 2.4 | 0.9 | 0.3 | 0.0 |
| FG21a-G7 | 0.0072 | 5.8 | 3.4 | 2.2 | 0.8 | 0.3 | 0.0 |
| G7 | 0.4862 | 188 | 130 | 67 | 18 | 9.2 | 4.0 |
| G7-G8 | 0.4862 | 188 | 130 | 67 | 18 | 9.2 | 3.9 |
| FG22 | 0.1380 | 102 | 73 | 47 | 24 | 12 | 3.3 |
| OS08 | 0.0406 | 35 | 25 | 16 | 7.7 | 3.4 | 0.7 |
| OS08-G8 | 0.0406 | 34 | 24 | 15 | 7.5 | 3.4 | 0.7 |
| FG23a | 0.0216 | 21 | 15 | 10 | 5.2 | 2.7 | 0.8 |
| OS07b | 0.0156 | 15 | 10 | 6.2 | 2.6 | 1.0 | 0.1 |
| OS07b-G7 | 0.0156 | 14 | 9.7 | 6.0 | 2.4 | 0.9 | 0.1 |
| G8 | 0.7020 | 297 | 192 | 97 | 48 | 25 | 7.9 |
| G8-G10 | 0.7020 | 294 | 191 | 96 | 47 | 24 | 7.9 |
| OS09 | 0.1527 | 90 | 62 | 39 | 18 | 8.2 | 1.9 |
| OS09-G10 | 0.1527 | 88 | 62 | 39 | 18 | 8.2 | 1.9 |
| FG24 | 0.1373 | 105 | 76 | 50 | 26 | 13 | 4.0 |
| G9 | 0.2900 | 180 | 125 | 81 | 38 | 17 | 4.4 |
| G9-G10 | 0.2900 | 178 | 125 | 79 | 37 | 17 | 4.4 |
| FG23b | 0.0286 | 23 | 16 | 10 | 4.6 | 2.0 | 0.4 |
| G10 | 1.0206 | 484 | 313 | 176 | 80 | 39 | 12 |
| G10-G11 | 1.0206 | 480 | 311 | 174 | 80 | 39 | 12 |
| FG23c | 0.0122 | 12 | 8.7 | 5.7 | 3.0 | 1.5 | 0.4 |
| G11 | 1.0328 | 485 | 314 | 177 | 81 | 40 | 12 |
| FG25 | 0.1086 | 85 | 64 | 46 | 27 | 17 | 7.5 |
| FG26 | 0.0863 | 78 | 58 | 40 | 22 | 12 | 4.6 |
| FG26-POND G | 0.0863 | 77 | 57 | 39 | 22 | 12 | 4.5 |
| FG27 | 0.0500 | 52 | 40 | 29 | 17 | 11 | 5.0 |
| FG28 | 0.0245 | 18 | 13 | 8.5 | 4.1 | 2.0 | 0.5 |
| POND G IN | 1.3022 | 691 | 459 | 288 | 146 | 79 | 28 |
| POND G | 1.3022 | 478 | 331 | 173 | 56 | 22 | 5.3 |
| G12 | 1.3022 | 478 | 331 | 173 | 56 | 22 | 5.3 |
| G12-G06 | 1.3022 | 477 | 329 | 173 | 56 | 22 | 5.3 |
| FG29 | 0.0997 | 60 | 39 | 23 | 8.7 | 2.8 | 0.4 |
| FG32 | 0.0402 | 72 | 57 | 44 | 29 | 20 | 11 |
| FG32-G06 | 0.0402 | 69 | 54 | 41 | 27 | 18 | 11 |
| G06 | 1.4421 | 505 | 348 | 184 | 61 | 24 | 11 |
| FG08A | 0.0750 | 116 | 90 | 66 | 41 | 27 | 13.4 |
| FG08A-G05 | 0.0750 | 110 | 86 | 64 | 41 | 27 | 13 |
| FG08B | 0.0630 | 86 | 67 | 49 | 31 | 20 | 10 |
| FG08B-G05 | 0.0630 | 84 | 65 | 48 | 29 | 19 | 10 |
| FG09 | 0.0484 | 48 | 36 | 25 | 14 | 8 | 3 |
| FG09-G05 | 0.0484 | 48 | 36 | 25 | 14 | 8 | 3.2 |
| FG10B | 0.0416 | 42 | 31 | 22 | 12 | 7.0 | 2.7 |
| G05 | 0.2280 | 282 | 215 | 156 | 94 | 58.8 | 28.7 |
| FG10A | 0.0806 | 81 | 61 | 43 | 25 | 15.0 | 6.5 |
| FG11 | 0.0625 | 75 | 59 | 44 | 28 | 19 | 10 |
| FG13 | 0.0534 | 34 | 24 | 15 | 7.5 | 3.6 | 0.9 |
| FG12 | 0.0328 | 50 | 40 | 30 | 20 | 14 | 7.8 |
| POND D IN | 0.4573 | 509 | 387 | 280 | 168 | 107 | 52 |
| POND D | 0.4573 | 134 | 91 | 50 | 19 | 12 | 4.3 |
| POND D-G17 | 0.4573 | 134 | 91 | 50 | 19 | 12 | 4.3 |
| FG15 | 0.0103 | 15 | 12 | 9.0 | 5.8 | 3.9 | 2.1 |
| FG15-G17A | 0.0103 | 15 | 12 | 9.0 | 5.8 | 3.9 | 2.1 |
| G17A | 0.4676 | 137 | 93 | 51 | 19 | 12 | 4.4 |
| FG14 | 0.1000 | 98 | 74 | 53 | 32 | 20 | 9.2 |
| G17 | 0.5676 | 196 | 132 | 75 | 43 | 25 | 12 |
| G17-G18 | 0.5676 | 196 | 131 | 75 | 43 | 25 | 12 |
| FG16 | 0.0791 | 133 | 104 | 78 | 50 | 34 | 18 |
| G18 | 0.6467 | 240 | 178 | 128 | 79 | 51 | 26 |
| G18-POND E | 0.6467 | 240 | 176 | 126 | 78 | 50 | 25 |
| FG31 | 0.0922 | 116 | 92 | 69 | 45 | 31 | 17 |
| FG30 | 0.0389 | 73 | 57 | 44 | 29 | 20 | 11 |
| FG30-PONDHS | 0.0389 | 70 | 56 | 42 | 27 | 18 | 11 |

| FUTURE MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| POND HS | 0.1311 | 153 | 106 | 53 | 36 | 26 | 15 |
| FG17a | 0.0694 | 101 | 78 | 57 | 35 | 23 | 12 |
| FG17a-POND E | 0.0694 | 99 | 76 | 56 | 35 | 23 | 12 |
| FG18 | 0.0644 | 56 | 42 | 30 | 18 | 11 | 4.7 |
| FG18-POND E | 0.0644 | 56 | 42 | 30 | 17 | 11 | 4.6 |
| FG19 | 0.0527 | 84 | 66 | 50 | 33 | 23 | 13 |
| FG17c | 0.0313 | 31 | 22 | 14 | 6.5 | 2.9 | 0.5 |
| FG17b | 0.0214 | 39 | 31 | 24 | 16 | 11 | 6.1 |
| POND E IN | 1.0170 | 610 | 432 | 318 | 197 | 126 | 64 |
| POND E | 1.0170 | 242 | 153 | 80 | 30 | 16 | 6.6 |
| H08 | 1.0170 | 205 | 137 | 72 | 24 | 12 | 4.1 |
| H09 | 0.0000 | 37 | 16 | 8.3 | 5.9 | 4.1 | 2.4 |
| FG34 | 0.0600 | 34 | 23 | 13 | 5.5 | 2.0 | 0.3 |
| G14 | 0.0600 | 34 | 23 | 13 | 5.5 | 2.0 | 0.3 |
| G14-G15 | 0.0600 | 34 | 22 | 13 | 5.4 | 2.0 | 0.3 |
| FG35 | 0.0344 | 20 | 13 | 8.3 | 3.5 | 1.5 | 0.3 |
| G15 | 0.0944 | 53 | 36 | 21 | 8.7 | 3.3 | 0.6 |
| G15-G08 | 0.0944 | 52 | 35 | 21 | 8.7 | 3.3 | 0.6 |
| FG37 | 0.0797 | 41 | 27 | 16 | 6.0 | 2.0 | 0.3 |
| FG36 | 0.0281 | 14 | 9.4 | 5.5 | 2.1 | 0.7 | 0.1 |
| FG36-G08 | 0.0281 | 14 | 9.3 | 5.4 | 2.1 | 0.7 | 0.1 |
| G08 | 0.2022 | 106 | 69 | 41 | 16 | 5.8 | 1.0 |

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

### *Rational Calculations*

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

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

Rational hydrologic calculations were performed for the entire PUD area and hydraulic calculations will be provided in the final drainage report at final plat. The storm drain runoff will be collected by a series of inlets and storm drain pipe then conveyed through the project and discharged either into an existing storm drain system located within Lambert Road discharged into the existing Pond E, directly into Pond D or into the proposed Pond G.

*Rational Narrative*

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

Offsite Storm Drain System

- Basin OS1 (4.4 acres, $Q_5$= 1.3 CFS, $Q_{100}$ = 8.6 CFS) is located north the existing Meridian Service Metropolitan District Water Filtration Building on land that will remain in undeveloped. Underlying the land are major transmission watermains and the master plan for this area is to remain undeveloped in its natural condition. The area will receive no developed runoff and the surface runoff will sheet flow will collect in an existing swale and traverse the area in a southerly direction toward a proposed Type C inlet CB4. All of the runoff is captured by the inlet and conveyed toward the future rip-rap lined channel to be constructed with Rolling Hills Ranch Filing 1 located adjacent and south of the filtration building. The captured flow is conveyed downstream via a 24” RCP.

Storm Drain System A

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

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

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

- Basin A03 (0.8 acres, $Q_5$= 1.0 CFS, $Q_{100}$ = 3.1 CFS) contains lots in Rolling Hills 3 along the east side of Rolling Ranch Dr. The surface runoff will sheet flow off of the residential lots and be directed to the street then to a 5' Type R sump inlet located at I03. All of the flow is captured by this inlet and the combined flow ($Q_5$= 11 CFS, $Q_{100}$ = 30 CFS) is conveyed downstream via a 24" RCP to a permanent sedimentation/WQCV BMP prior to releasing to the natural arroyo.

  Should the sump inlets (I02 & I03) become blocked and cannot take capture all the runoff at the sump inlets, the surface flow will travel overland within lots 595 & 596.

<u>Storm Drain System B</u>

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Storm Drain System C

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

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

- Basin C02 (3.5 acres, $Q_5$= 3.4 CFS, $Q_{100}$ = 10 CFS) contains lots in Rolling Hills Ranch 1 along west side of Rolling Peaks Dr. The surface runoff will sheet flow off of the residential lots and directed to the street then to a 15' Type R forced sump inlet located at I14. All of the flow is captured by this inlet and conveyed downstream via an 18” RCP to Storm Manhole 11.

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

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

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

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

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

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

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

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

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

<u>Storm Drain System D</u>

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

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

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

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

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

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

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

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

- Basin D06 (3.2 acres, $Q_5$= 3.2 CFS, $Q_{100}$ = 9.0 CFS) contains lots along the east side of Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off of 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, $Q_5$= 6.9 CFS, $Q_{100}$ = 20 CFS) contains lots along the west side of Rolling Ranch Dr in Rolling Hills Ranch 31. The surface runoff will sheet flow off of the residential lots and be conveyed to a 10' Type R forced sump inlet located at I23. All of the 5-year storm flow is captured by this inlet ($Q_5$= 6.9 CFS) and most of the 100-yr storm flow is captured ($Q_{100}$ = 9.9 CFS) with the remaining flow ($Q_{100}$ = 9.6 CFS) continuing downstream to inlet I24. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 18.

- The total pipe flow conveyed from MH18 to Storm Manhole 19 via a 24" RCP is $Q_5$= 9.1 CFS, $Q_{100}$ = 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 Rolling Hills Ranch 3. The surface runoff will sheet flow off of 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 ($Q_{100}$ = 3.5 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, $Q_{100}$ = 64 CFS.

- Basin D09 (0.9 acres, $Q_5$= 1.2 CFS, $Q_{100}$ = 3.4 CFS) contains runoff from an open space tract in Rolling Hills Ranch 3. The surface runoff will sheet flow off of the adjacent residential lots and be conveyed to a Type C grated inlet located at CB2. All of the flow is captured by this inlet and conveyed downstream via an 18" RCP to inlet I25.

- Basin D10 (0.8 acres, $Q_5$= 0.9 CFS, $Q_{100}$ = 2.5 CFS) contains lots along Crooked Hill Dr and Rolling Ranch Dr in Rolling Hills Ranch 3. The surface runoff will sheet flow off of 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 an open space in Rolling Hills Ranch 3. The surface runoff will sheet flow off of 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 Rolling Hills Ranch 3. The surface runoff will sheet flow off of the residential lots, combine with flow-by ($Q_{100}$ = 9.5 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 of 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 of 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 of 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 28” 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 of 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

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- The total pipe flow conveyed from MH24 to Storm Manhole 25 then to Storm Manhole 26 via a 48” RCP is $Q_5$= 37 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 of the residential lots combined with additional surface flow from I28 and I30, 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, $Q_{100}$ = 106 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 of 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, $Q_{100}$ = 106 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 113 CFS, then conveyed to the proposed Pond G.

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. Please see Appendix F for information and exhibits.

- 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 of 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 of the residential lots and be conveyed to a 20' Type R forced sump inlet located at I30. 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 $Q_5$= 14 CFS, $Q_{100}$ = 35 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 of 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 $Q_5$= 20 CFS, $Q_{100}$ = 47 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 of 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 Storm Manhole 30.

- Basin E05 (2.6 acres, $Q_5$= 2.7 CFS, $Q_{100}$ = 7.2 CFS) contains lots along Woods Grove Dr and Savannah Falls Ct in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 15' Type R flow-by inlet located at I37. Most of the flow is captured by this inlet ($Q_5$= 2.3 CFS, $Q_{100}$ = 6.0 CFS) with the remaining ($Q_5$= 0.4 CFS, $Q_{100}$ = 2.7 CFS) continuing downstream to Inlet I41. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 30.

- The total pipe flow conveyed from MH30 to Storm Manhole 31 and Storm Manhole 36 via a 36" RCP is $Q_5$= 24 CFS, $Q_{100}$ = 61 CFS.

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

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

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

- Basin E08 (4.2 acres, $Q_5$= 4.8 CFS, $Q_{100}$ = 13 CFS) contains lots surrounded by Rolling Peaks Dr, Valley Peak Dr, Summer Ridge Dr and Bridge Way in Rolling Hills Ranch 2. The surface runoff will sheet flow off of the residential lots and be conveyed to a 10' Type R forced sump inlet located at I40. All of the 5-year storm flow is captured by this inlet ($Q_5$=4.8 CFS) and most of the 100-yr storm flow is captured ($Q_{100}$ = 10 CFS) with the remaining flow ($Q_{100}$ = 2.8 CFS) continuing downstream to an existing inlet located at the intersection of Park Gate Dr. with Lambert Rd. The captured flow is conveyed downstream via an 18" RCP to Storm Manhole 34.

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

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

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

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

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

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

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

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

- Basin E13 (6.0 acres, $Q_5$= 8.2 CFS, $Q_{100}$ = 19 CFS) contains runoff from Park Gate Rd, Lambert Rd. found in Meridian Ranch Filing 11A and Rolling Peaks Dr in Rolling Hills Ranch 2 The surface runoff will sheet flow off of the residential lots and be conveyed to an existing 15' Type R forced sump inlet constructed with the improvements associated with Meridian Ranch Filing 11A located at EI1. All of the 5-year storm flow is captured by this inlet ($Q_5$=6.0 CFS) and most of the 100-yr storm flow is captured ($Q_{100}$ = 13 CFS) with the remaining flow ($Q_{100}$ = 6.5 CFS) continuing downstream to an existing inlet located along the west side of Lambert Rd. The captured flow is conveyed downstream via an 18" RCP to existing manhole EJ01.

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

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

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

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

## ***<u>DETENTION PONDS</u>***

### *Existing Pond D Detention Storage Criteria*

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

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

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

Water quality (WQCV) was added to the required storage volume when the pond was designed and constructed in 2012. The pond was constructed to meet the final build out condition. The WQCV of 1.0 ac-ft. was added to the detention of the minor storm and half (0.5 ac-ft.) was added to the detention volume of the major storm. This was accomplished with respect to the HEC-HMS computer run by providing a starting detention volume of 1.0 ft. for the 5-year storm and 0.5 ft. for the 100-year storm. The resulting storage elevations remain well below the emergency spillway elevation. See Appendix B for more information.

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

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

| EXISTING POND D | | | | |
|---|---|---|---|---|
| | PEAK INFLOW | PEAK OUTFLOW | PEAK STORAGE | PEAK ELEVATION |
| | CFS | CFS | AC-FT | FT |
| INTERIM CONDITIONS | | | | |
| 2-YEAR STORM | 52 | 4.0 | 4.8 | 7053.2 |
| 5-YEAR STORM | 107 | 11 | 7.4 | 7053.9 |
| 10-YEAR STORM | 168 | 18 | 11.1 | 7054.7 |
| 25-YEAR STORM | 280 | 52 | 15.9 | 7055.6 |
| 50-YEAR STORM | 387 | 92 | 20.1 | 7056.3 |
| 100-YEAR STORM | 509 | 136 | 25.5 | 7057.1 |
| FUTURE CONDITIONS | | | | |
| 2-YEAR STORM | 52 | 4.3 | 4.8 | 7053.2 |
| 5-YEAR STORM | 107 | 12 | 7.3 | 7053.9 |
| 10-YEAR STORM | 168 | 19 | 11.1 | 7054.7 |
| 25-YEAR STORM | 280 | 50 | 15.9 | 7055.6 |
| 50-YEAR STORM | 387 | 91 | 20.1 | 7056.3 |
| 100-YEAR STORM | 509 | 134 | 25.5 | 7057.1 |

### *Existing Pond E Detention Storage Criteria*

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

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

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

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

| EXISTING POND E | | | | |
|---|---|---|---|---|
| | PEAK INFLOW | PEAK OUTFLOW | PEAK STORAGE | PEAK ELEVATION |
| | CFS | CFS | AC-FT | FT |
| INTERIM CONDITIONS | | | | |
| 2-YEAR STORM | 63 | 5.8 | 10.3 | 6970.5 |
| 5-YEAR STORM | 122 | 14 | 17.5 | 6971.3 |
| 10-YEAR STORM | 190 | 27 | 22.4 | 6971.8 |
| 25-YEAR STORM | 308 | 77 | 29.4 | 6972.5 |
| 50-YEAR STORM | 424 | 148 | 35.8 | 6973.0 |
| 100-YEAR STORM | 553 | 237 | 41.7 | 6973.5 |
| FUTURE CONDITIONS | | | | |
| 2-YEAR STORM | 64 | 6.6 | 10.9 | 6970.6 |
| 5-YEAR STORM | 126 | 16 | 18.0 | 6971.4 |
| 10-YEAR STORM | 197 | 30 | 23.0 | 6971.9 |
| 25-YEAR STORM | 318 | 80 | 30.0 | 6972.5 |
| 50-YEAR STORM | 432 | 153 | 36.4 | 6973.1 |
| 100-YEAR STORM | 610 | 242 | 42.4 | 6973.6 |

Water quality (WQCV) was added to the required storage volume when the pond was designed and constructed in 2013. The pond was constructed to meet the final build out condition. 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.

***Pond G Detention Storage Criteria***

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

**Table 8: Pond G Summary Data**

| POND G | | | | |
|---|---|---|---|---|
| | PEAK INFLOW | PEAK OUTFLOW | PEAK STORAGE | PEAK ELEVATION |
| | CFS | CFS | AC-FT | FT |
| INTERIM CONDITIONS | | | | |
| 2-YEAR STORM | 11 | 4.1 | 3.0 | 7026.2 |
| 5-YEAR STORM | 42 | 13 | 7.1 | 7027.2 |
| 10-YEAR STORM | 91 | 34 | 13.8 | 7027.6 |
| 25-YEAR STORM | 202 | 118 | 18.0 | 7028.4 |
| 50-YEAR STORM | 363 | 238 | 18.0 | 7029.1 |
| 100-YEAR STORM | 558 | 394 | 22.1 | 7029.8 |
| FUTURE CONDITIONS | | | | |
| 2-YEAR STORM | 28 | 5.3 | 5.3 | 7026.8 |
| 5-YEAR STORM | 79 | 22 | 8.3 | 7027.4 |
| 10-YEAR STORM | 146 | 56 | 11.1 | 7027.9 |
| 25-YEAR STORM | 288 | 173 | 15.8 | 7028.7 |
| 50-YEAR STORM | 459 | 331 | 20.4 | 7029.5 |
| 100-YEAR STORM | 691 | 478 | 25.8 | 7030.3 |

Pond G and existing Pond F located upstream of Rolling Hills Ranch work in series such that the peak flow rates from the Meridian Ranch development do not adversely affect the drainage patterns downstream of the Meridian Ranch project. The pond is designed to accommodate the developed final inflow from all of the remaining areas to be developed within Meridian Ranch minus the areas tributary to Ponds D and E. Permanent concrete control structure has been designed to handle full build out of the tributary area and reduce the developed flows to approximate the historic peak flow rates for the full spectrum of design storms.

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

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

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

***Downstream Analysis***

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

The outlet (DP G12) for Pond G is located west of the Falcon Regional Park, upstream of Eastonville Rd (DP G06). Pond G will discharge 479 CFS during the 100-yr storm event into an existing natural drainage course that traverses the regional park. The 100-year historical peak flow rate at the western boundary of the regional park is 544 CFS. The calculated 100-year developed flow rate will be 88% of the historic flow rate. The developed peak flow rate for the full spectrum of design storms are calculated to be below that of the corresponding historic peak flow rates. See Table 9 for a complete comparative list of the peak flow rates for the key design points impacted by the development of Rolling Hills Ranch.

**Table 9: Key Design Point Comparison - SCS**

| MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS (FUTURE) | | | | | | |
|---|---|---|---|---|---|---|
| | | PEAK DISCHARGE $Q_{100}$ (CFS) | PEAK DISCHARGE $Q_{50}$ (CFS) | PEAK DISCHARGE $Q_{25}$ (CFS) | PEAK DISCHARGE $Q_{10}$ (CFS) | PEAK DISCHARGE $Q_{5}$ (CFS) |
| G12 - POND G OUTLET REGIONAL PARK (G05 - HISTORIC) | Historic | 544 | 355 | 212 | 86 | 31 |
| | Future | 478 | 331 | 173 | 56 | 22 |
| | % of Historic | 88% | 93% | 82% | 66% | 72% |
| G06 - EASTONVILLE ROAD[1] | Historic | 561 | 375 | 225 | 91 | 33 |
| | Future | 505 | 348 | 184 | 60.9 | 24 |
| | % of Historic | 90% | 93% | 82% | 67% | 75% |
| H08 - EASTONVILLE ROAD (POND E NORTH OUTLET) | Historic | 216 | 142 | 85 | 34 | 12 |
| | Future | 205 | 137 | 72 | 24 | 12 |
| | % of Historic | 95% | 96% | 85% | 72% | 97% |
| H09 - EASTONVILLE ROAD (POND E SOUTH OUTLET) | Historic | 77 | 51 | 30 | 12 | 4.5 |
| | Future | 37 | 16 | 8.3 | 5.9 | 4.1 |
| | % of Historic | 48% | 31% | 27% | 49% | 92% |
| G14 - REGIONAL PARK (G07 - HISTORIC) | Historic | 55 | 37 | 23 | 9.8 | 3.9 |
| | Future | 34 | 23 | 13 | 5.5 | 2.0 |
| | % of Historic | 62% | 61% | 58% | 56% | 51% |
| G08 - EASTONVILLE ROAD[1] | Historic | 119 | 78 | 48 | 20 | 7.6 |
| | Future | 106 | 69 | 41 | 16 | 5.8 |
| | % of Historic | 90% | 89% | 87% | 82% | 77% |

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

## ***POND F – POND G CHANNEL***

### *Methodology and Background*

The drainage way within the proposed development is best characterized as wide sandy bottom natural arroyo, with some amounts of vegetation along the side embankments. The drainage way conveys the storm runoff released from existing Pond F and surrounding areas easterly to the proposed Pond G. The drainage course conveys water only during runoff events. The arroyo will require relocation and shaping immediately downstream of Pond F as it runs along the north side of future Rex Road. The channel will remain in its natural condition between Rex Road and Pond G. A HecRas hydraulic analysis for this drainage course will be included within the Rolling Hills Ranch Filing 1 Final Drainage Report for the purpose of demonstrating the stability of the sandy bottom channel after development occurs in the surrounding area.

Due to the nature and conditions of the existing channel, efforts will be made to preserve it as close to the natural conditions outside the limits of the development. This natural drainage way can be defined as a 'straight' channel, it does not follow sinuous course. It is not braided or excessively meandering. The drainage path does have some minor meanderings but does not have multiple channels divided by bars and islands or large alternating S-shaped bends with deep scour pools.

Development will always alter the natural drainage system, such as increasing the peak flow rates, decreasing the sediment load, encroaching into the floodplain, etc. This drainage way has experienced a decreased sediment load with the construction of Pond F at the upstream end. The flow rates at the upper end are slightly less than historic and higher at the lower end prior to entering the proposed Pond G detention pond. The flow rates are then lowered as they are released from Pond G.

## ***EROSION CONTROL DESIGN***

### *General Concept*

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

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

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

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

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

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

### *Four Step Process*

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

**Step 1: Employ Runoff Reduction Practices**

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

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

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

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

**Step 2: Stabilize Drainageways**

The drainage swale located on the west side of the project was designed to have a wide flat bottom and slope reducing the velocity of the concentrated flow traveling along the drainageway. The construction of the swale also included erosion control mat along the entire length of the swale. At steeper sections of the swale straw logs or rip-rap has been installed to reduce velocities and erosion. This swale discharges directly into an existing extended detention pond with WQCV built into the design.

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

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

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

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

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

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

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

***Temporary Sedimentation Pond***

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

***Detention Pond***

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

***Silt Fence***

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

***Erosion Bales***

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

***Miscellaneous***

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

## ***REFERENCES***

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17. Preliminary and Final Drainage Report for Meridian Ranch Filing 4B. April 2014. Prepared by Tech Contractors.

18. Final Drainage Report for Stonebridge Filing 1 at Meridian Ranch. June 2014. Prepared by Tech Contractors.

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

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

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

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

23. Final Drainage Report for Stonebridge Filing 2 at Meridian Ranch. September 2016. Prepared by Tech Contractors.

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

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

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

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

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

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

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

31. Design Guidelines & Criteria – Channels & Hydraulic Structures on Sandy Soil, June 1981 by Simons, Li & Associates.

# Appendices

# Appendix A – Rational Calculations

INSERT RATIONAL APPENDIX STANDARD INSERT

RUNOFF COEFFICIENTS

INTENSITY CURVES

## COMPOSITE 'C' FACTORS

PROJECT: **Rolling Hills Ranch PUD** 2/3/2020

| BASIN DESIGNATION | AREA (AC.) | | | | | | | | COMPOSITE FACTOR | | Percent Impervious |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | UNDEV | 2 DU/AC | 3 DU/AC | 4 DU/AC | 5 DU/AC | STREETS | OPEN SPACE PARKS/GC | TOTAL | 5-year | 100-year | |
| **OS1** | 4.4 | | | | | | | 4.4 | **0.09** | **0.36** | **0.0%** |
| | | | | | | | | | | | |
| **A01** | | 1.2 | 2.2 | | | 1.1 | 2.9 | 7.5 | **0.34** | **0.52** | **28.8%** |
| **A02** | | 0.8 | 1.4 | | | | | 2.2 | **0.24** | **0.47** | **28.2%** |
| **A03** | | 0.3 | 0.5 | | | 0.1 | | 0.8 | **0.29** | **0.50** | **33.7%** |
| | | | | | | | | | | | |
| **B01** | | | 1.1 | 1.2 | | | | 2.3 | **0.28** | **0.49** | **35.1%** |
| **B02** | | | 2.8 | 2.9 | | | | 5.6 | **0.28** | **0.49** | **35.1%** |
| **B03** | | | 1.8 | 1.9 | | | 0.7 | 4.3 | **0.27** | **0.47** | **29.6%** |
| **B04** | | | 1.5 | 1.6 | | | | 3.0 | **0.28** | **0.49** | **35.1%** |
| **B05** | | | 1.6 | 1.7 | | | | 3.2 | **0.28** | **0.49** | **35.1%** |
| **B06** | | | 1.5 | 1.6 | | | | 3.1 | **0.28** | **0.49** | **35.1%** |
| **B07** | | | 2.3 | 2.4 | | | | 4.8 | **0.28** | **0.49** | **35.1%** |
| **B08** | | | 1.2 | 1.3 | | | | 2.5 | **0.28** | **0.49** | **35.1%** |
| **B09** | | | 1.3 | 1.4 | | | | 2.7 | **0.28** | **0.49** | **35.1%** |
| **B10** | | | 1.6 | 1.7 | | | | 3.3 | **0.28** | **0.49** | **35.1%** |
| **B11** | | | 1.5 | 1.6 | | | | 3.1 | **0.28** | **0.49** | **35.1%** |
| | | | | | | | | | | | |
| **C01** | | | 1.5 | 1.6 | | | | 3.2 | **0.28** | **0.49** | **35.1%** |
| **C02** | | | 1.7 | 1.8 | | | | 3.5 | **0.28** | **0.49** | **35.1%** |
| **C03** | | | 0.7 | 0.7 | | | | 1.3 | **0.28** | **0.49** | **35.1%** |
| **C04** | | | 1.5 | 1.6 | | | | 3.1 | **0.28** | **0.49** | **35.1%** |
| **C05** | | | 0.3 | 0.3 | | | | 0.6 | **0.28** | **0.49** | **35.2%** |
| **C06** | | | 0.5 | 0.5 | | | | 1.0 | **0.28** | **0.49** | **35.1%** |
| **C07** | | | 0.2 | 0.2 | | | 0.6 | 0.9 | **0.25** | **0.44** | **14.4%** |
| | | | | | | | | | | | |
| **D01** | | | 1.0 | 5.9 | | | | 6.9 | **0.29** | **0.50** | **38.6%** |
| **D02** | | | 0.6 | 3.3 | | | | 3.8 | **0.29** | **0.50** | **38.6%** |
| **D03** | | | 0.6 | 3.3 | | | | 3.8 | **0.29** | **0.50** | **38.6%** |
| **D04** | | | 0.8 | 4.5 | | | | 5.3 | **0.29** | **0.50** | **38.6%** |
| **D05** | | | 0.3 | 1.7 | | | | 2.0 | **0.29** | **0.50** | **38.6%** |
| **D06** | | | 0.5 | 2.7 | | | | 3.2 | **0.29** | **0.50** | **38.6%** |
| **D07** | | | 0.9 | 5.7 | | | | 6.6 | **0.29** | **0.50** | **38.6%** |
| **D08** | | | 0.2 | 1.4 | | | | 1.6 | **0.29** | **0.50** | **38.6%** |
| **D09** | | | 0.1 | 0.5 | | | 1.1 | 1.6 | **0.26** | **0.44** | **13.9%** |
| **D10** | | | 0.1 | 0.7 | | | | 0.8 | **0.29** | **0.50** | **38.5%** |
| **D11** | | | 0.4 | 2.2 | | | 1.6 | 4.2 | **0.27** | **0.46** | **24.6%** |
| **D12** | | | 0.4 | 2.3 | | | | 2.7 | **0.29** | **0.50** | **38.6%** |
| **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%** |
| **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%** |
| | | | | | | | | | | | |
| | | | | | | | | 72.2 | | **Composite:** | **34.7%** |
| **TOTAL** | 4 | 3 | 39 | 107 | 26 | 3 | 20 | 202.1 | **0.30** | **0.49** | **34.7%** |

**TIME OF CONCENTRATION**

PROJECT: **Rolling Hills Ranch PUD** DATE: 2/3/2020

| TIME OF CONCENTRATION | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUBBASIN DATA | | | INIT./OVERLAND TIME ($T_i$) | | | | TRAVEL TIME ($T_t$) | | | | | | | TOTAL | Tc Check (Urbanized Basins) | | FINAL $T_c$ |
| BASIN DESIGNATION | $C_5$ | AREA (AC) | LENGTH (FT) | ΔH | SLOPE % | Ti (Min.)* | LENGTH (FT) | ΔH | SLOPE % | CONVEYANCE TYPE | CONVEYANCE COEF. | VEL. (FPS) | Tt(Min.)** | Ti+Tt(Min.) | L (FT) | Tc = (L/180) + 10 | (min) |
| **OS1** | 0.09 | 4.4 | 185 | 6.0 | 3.2% | 17.0 | 1275 | 34 | 2.7% | L | 7 | 1.1 | 18.6 | 35.6 | 1460.00 | 18.1 | **18.1** |
| | | | | | | | | | | | | | | | | | |
| **A01** | 0.34 | 7.5 | 185 | 9.0 | 4.9% | 11.2 | 985 | 25 | 2.5% | P | 20 | 3.2 | 5.2 | 16.4 | 1170.00 | 16.5 | **16.4** |
| **A02** | 0.24 | 2.2 | 214 | 4.5 | 2.1% | 18.0 | 230 | 4 | 1.7% | P | 20 | 2.6 | 1.5 | 19.5 | 444.00 | 12.5 | **12.5** |
| **A03** | 0.29 | 0.8 | 25 | 0.5 | 2.0% | 5.9 | 230 | 4 | 1.7% | P | 20 | 2.6 | 1.5 | 7.4 | 255.00 | 11.4 | **7.4** |
| | | | | | | | | | | | | | | | | | |
| **B01** | 0.28 | 2.3 | 242 | 6.0 | 2.5% | 17.4 | 838 | 16 | 1.9% | P | 20 | 2.8 | 5.1 | 22.4 | 1080.00 | 16.0 | **16.0** |
| **B02** | 0.28 | 5.6 | 300 | 9.0 | 3.0% | 18.2 | 902 | 17 | 1.9% | P | 20 | 2.7 | 5.5 | 23.6 | 1202.00 | 16.7 | **16.7** |
| **B03** | 0.27 | 4.3 | 280 | 10.0 | 3.6% | 16.7 | 494 | 11 | 2.1% | P | 20 | 2.9 | 2.8 | 19.5 | 774.00 | 14.3 | **14.3** |
| **B04** | 0.28 | 3.0 | 43 | 0.9 | 2.0% | 7.9 | 1352 | 26 | 1.9% | P | 20 | 2.8 | 8.1 | 16.0 | 1395.00 | 17.8 | **16.0** |
| **B05** | 0.28 | 3.2 | 130 | 2.6 | 2.0% | 13.7 | 845 | 20 | 2.4% | P | 20 | 3.1 | 4.6 | 18.3 | 975.00 | 15.4 | **15.4** |
| **B06** | 0.28 | 3.1 | 30 | 0.6 | 2.0% | 6.6 | 914 | 19 | 2.1% | P | 20 | 2.9 | 5.3 | 11.9 | 944.00 | 15.2 | **11.9** |
| **B07** | 0.28 | 4.8 | 67 | 1.3 | 2.0% | 9.8 | 1380 | 25 | 1.8% | P | 20 | 2.7 | 8.5 | 18.4 | 1447.00 | 18.0 | **18.0** |
| **B08** | 0.28 | 2.5 | 155 | 3.2 | 2.1% | 14.8 | 731 | 16 | 2.2% | P | 20 | 3.0 | 4.1 | 18.9 | 886.00 | 14.9 | **14.9** |
| **B09** | 0.28 | 2.7 | 155 | 3.2 | 2.1% | 14.8 | 916 | 18 | 1.9% | P | 20 | 2.8 | 5.5 | 20.3 | 1071.00 | 16.0 | **16.0** |
| **B10** | 0.28 | 3.3 | 160 | 3.2 | 2.0% | 15.2 | 962 | 18 | 1.8% | P | 20 | 2.7 | 5.9 | 21.1 | 1122.00 | 16.2 | **16.2** |
| **B11** | 0.28 | 3.1 | 155 | 3.2 | 2.1% | 14.8 | 843 | 18 | 2.1% | P | 20 | 2.9 | 4.9 | 19.7 | 998.00 | 15.5 | **15.5** |
| | | | | | | | | | | | | | | | | | |
| **C01** | 0.28 | 3.2 | 155 | 3.2 | 2.1% | 14.8 | 745 | 20 | 2.7% | P | 20 | 3.3 | 3.8 | 18.6 | 900.00 | 15.0 | **15.0** |
| **C02** | 0.28 | 3.5 | 160 | 4.2 | 2.6% | 13.9 | 745 | 20 | 2.7% | P | 20 | 3.3 | 3.8 | 17.6 | 905.00 | 15.0 | **15.0** |
| **C03** | 0.28 | 1.3 | 135 | 2.7 | 2.0% | 13.9 | 404 | 4 | 1.0% | P | 20 | 2.0 | 3.4 | 17.3 | 539.00 | 13.0 | **13.0** |
| **C04** | 0.28 | 3.1 | 217 | 4.5 | 2.1% | 17.5 | 346 | 3 | 0.9% | P | 20 | 1.9 | 3.1 | 20.6 | 563.00 | 13.1 | **13.1** |
| **C05** | 0.28 | 0.6 | 80 | 1.6 | 2.0% | 10.7 | 334 | 3 | 0.9% | P | 20 | 1.9 | 2.9 | 13.7 | 414.00 | 12.3 | **12.3** |
| **C06** | 0.28 | 1.0 | 50 | 1.0 | 2.0% | 8.5 | 602 | 5 | 0.8% | P | 20 | 1.8 | 5.5 | 14.0 | 652.00 | 13.6 | **13.6** |
| **C07** | 0.25 | 0.9 | 160 | 3.0 | 1.9% | 15.9 | 167 | 2 | 1.0% | G | 15 | 1.5 | 1.8 | 17.8 | 327.00 | 11.8 | **11.8** |
| **D01** | 0.29 | 6.9 | 125 | 2.5 | 2.0% | 13.1 | 1060 | 23 | 2.2% | P | 20 | 2.9 | 6.0 | 19.1 | 1185.00 | 16.6 | **16.6** |
| **D02** | 0.29 | 3.8 | 260 | 10.0 | 3.8% | 15.2 | 880 | 16 | 1.8% | P | 20 | 2.7 | 5.4 | 20.7 | 1140.00 | 16.3 | **16.3** |
| **D03** | 0.29 | 3.8 | 40 | 0.8 | 2.0% | 7.4 | 1140 | 28 | 2.4% | P | 20 | 3.1 | 6.1 | 13.5 | 1180.00 | 16.6 | **13.5** |

| TIME OF CONCENTRATION | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUBBASIN DATA | | | INIT./OVERLAND TIME ($T_i$) | | | | TRAVEL TIME ($T_t$) | | | | | | | TOTAL | Tc Check (Urbanized Basins) | | FINAL $T_c$ |
| BASIN DESIGNATION | $C_5$ | AREA (AC) | LENGTH (FT) | ΔH | SLOPE % | Ti (Min.)* | LENGTH (FT) | ΔH | SLOPE % | CONVEYANCE TYPE | CONVEYANCE COEF. | VEL. (FPS) | Tt(Min.)** | Ti+Tt(Min.) | L (FT) | Tc = (L/180) + 10 | (min) |
| **D04** | 0.29 | 5.3 | 90 | 1.8 | 2.0% | 11.1 | 1350 | 32 | 2.4% | P | 20 | 3.1 | 7.3 | 18.4 | 1440.00 | 18.0 | **18.0** |
| **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 | 160 | 3.2 | 2.0% | 14.9 | 675 | 20 | 3.0% | P | 20 | 3.4 | 3.3 | 18.1 | 835.00 | 14.6 | **14.6** |
| **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 | 795 | 6 | 0.8% | P | 20 | 1.7 | 7.6 | 24.3 | 1042.00 | 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 | 1140 | 26 | 2.3% | P | 20 | 3.0 | 6.3 | 19.3 | 1382.00 | 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 | 1350 | 12 | 0.9% | P | 20 | 1.9 | 11.9 | 15.3 | 1375.00 | 17.6 | **15.3** |
| **E13** | 0.41 | 6.0 | 161 | 6.0 | 3.7% | 10.3 | 1188 | 22 | 1.9% | P | 20 | 2.7 | 7.3 | 17.6 | 1349.00 | 17.5 | **17.5** |

| TIME OF CONCENTRATION | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUBBASIN DATA | | | INIT./OVERLAND TIME ($T_i$) | | | | TRAVEL TIME ($T_t$) | | | | | |
| BASIN DESIGNATION | $C_5$ | AREA (AC) | LENGTH (FT) | ΔH | SLOPE % | Ti (Min.)* | LENGTH (FT) | ΔH | SLOPE % | CONVEYANCE TYPE | CONVEYANCE COEF. | VE (FT |
| | | | 11A Designation | | | | | | | | | |
| Ex1 | 0.61 | 1.1 | 4 | | FROM APPROVED MERIDIAN RANCH FILING 11A FINAL D | | | | | | | |
| Ex2 | 0.55 | 1.3 | 5 | | | | | | | | | |
| Ex3 | 0.77 | 1.7 | 20 | | | | | | | | | |
| Ex4 | 0.53 | 1.8 | 15 | | | | | | | | | |
| Ex5 | 0.57 | 2.3 | 14 | | | | | | | | | |
| Ex6 | 0.47 | 1.4 | 16 | | | | | | | | | |
| Ex7 | 0.44 | 1.4 | 17 | | | | | | | | | |
| Ex8 | 0.38 | 2.2 | 18 | | | | | | | | | |
| | | | | | | | | | | | | |

| TYPE O |
|---|
| HEAVY MEADOW |
| TILLAGE/FIELD |
| RIPRAP (not buried) |
| SHORT PASTURE AND |
| NEARLY BARE GROUN |
| GRASSED WATERWAY |
| PAVED AREAS |

Notes:

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

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

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

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

PROJECT: **Rolling Hills Ranch PUD** Date: 2/3/2020

| 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 $C_V$ | SLOPE % | VEL. (FPS) | LENGTH (FT) | 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) | **(5 YR)** | **(100 YR)** | | | | | | | |
| | DEVELOPED | | | | | | | | | | | | | | | | | | | | | | | | |
| CB4 | OS1 | 4.4 | 18.1 | 3.24 | 5.44 | 0.09 | 0.36 | 0.40 | 1.58 | 1.3 | 9 | | | | | | **1.3** | **8.6** | | | | | | | |
| I01 | A01 | 7.5 | 16.4 | 3.39 | 5.68 | 0.34 | 0.52 | 2.55 | 3.90 | 8.6 | 22 | | | | | | **8.6** | **22** | I02 | P | 20.0 | 1.00% | 2.0 | 61 | 0.5 |
| I02 | A02 | 2.2 | 12.5 | 3.80 | 6.38 | 0.24 | 0.47 | 0.53 | 1.03 | 2.0 | 6.5 | 16.9 | 3.34 | 5.61 | 0.53 | 2.54 | **2.0** | **14** | | | | | | | |
| I03 | A03 | 0.8 | 7.4 | 4.59 | 7.71 | 0.29 | 0.50 | 0.23 | 0.40 | 1.0 | 3.1 | | | | | | **1.0** | **3.1** | | | | | | | |
| I04 | B01 | 2.3 | 16.0 | 3.42 | 5.75 | 0.28 | 0.49 | 0.63 | 1.11 | 2.2 | 6.4 | | | | | | **2.2** | **6.4** | | | | | | | |
| I05 | B02 | 5.6 | 16.7 | 3.36 | 5.64 | 0.28 | 0.49 | 1.55 | 2.73 | 5.2 | 15 | | | | | | **5.2** | **15** | I14 | P | 20.0 | 2.54% | 3.2 | 865 | 4.5 |
| DP1 | B03 | 4.3 | 14.3 | 3.59 | 6.03 | 0.27 | 0.47 | 1.17 | 2.05 | 4.2 | 12 | | | | | | **4.2** | **12** | I06 | P | 20.0 | 2.23% | 3.0 | 963 | 5.4 |
| I06 | B04 | 3.0 | 16.0 | 3.42 | 5.75 | 0.28 | 0.49 | 0.84 | 1.47 | 2.9 | 8.5 | 19.7 | 3.11 | 5.23 | 2.01 | 3.52 | **6.2** | **18** | I10 | P | 20.0 | 2.00% | 2.8 | 852 | 5.0 |
| I07 | B05 | 3.2 | 15.4 | 3.48 | 5.84 | 0.28 | 0.49 | 0.89 | 1.56 | 3.1 | 9.1 | | | | | | **3.1** | **9.1** | | | | | | | |
| I08 | B06 | 3.1 | 11.9 | 3.87 | 6.50 | 0.28 | 0.49 | 0.86 | 1.52 | 3.3 | 9.9 | | | | | | **3.3** | **9.9** | | | | | | | |
| I09 | B07 | 4.8 | 18.0 | 3.24 | 5.45 | 0.28 | 0.49 | 1.31 | 2.31 | 4.3 | 13 | | | | | | **4.3** | **13** | I12 | P | 20.0 | 1.86% | 2.7 | 970 | 5.9 |
| I10 | B08 | 2.5 | 14.9 | 3.53 | 5.92 | 0.28 | 0.49 | 0.70 | 1.23 | 2.5 | 7.3 | 19.9 | 3.09 | 5.19 | 0.70 | 1.46 | **2.5** | **7.6** | | | | | | | |
| I11 | B09 | 2.7 | 16.0 | 3.43 | 5.76 | 0.28 | 0.49 | 0.76 | 1.33 | 2.6 | 7.7 | | | | | | **2.6** | **7.7** | | | | | | | |
| I12 | B10 | 3.3 | 16.2 | 3.40 | 5.71 | 0.28 | 0.49 | 0.92 | 1.62 | 3.1 | 9.2 | | | | | | **3.1** | **9.2** | | | | | | | |
| I12 | B11 | 3.1 | 15.5 | 3.47 | 5.82 | 0.28 | 0.49 | 0.84 | 1.48 | 2.9 | 8.6 | 24.0 | 2.82 | 4.73 | 1.92 | 3.73 | **5.4** | **18** | | | | | | | |
| I13 | C01 | 3.2 | 15.0 | 3.52 | 5.91 | 0.28 | 0.49 | 0.87 | 1.53 | 3.1 | 9.0 | | | | | | **3.1** | **9.0** | | | | | | | |
| I14 | C02 | 3.5 | 15.0 | 3.52 | 5.91 | 0.28 | 0.49 | 0.98 | 1.72 | 3.4 | 10 | 21.2 | 3.00 | 5.04 | 0.98 | 2.04 | **3.4** | **10** | | | | | | | |
| I15 | C03 | 1.3 | 13.0 | 3.74 | 6.27 | 0.28 | 0.49 | 0.37 | 0.65 | 1.4 | 4.0 | | | | | | **1.4** | **4.0** | | | | | | | |
| I16 | C04 | 3.1 | 13.1 | 3.72 | 6.25 | 0.28 | 0.49 | 0.85 | 1.50 | 3.2 | 9.4 | | | | | | **3.2** | **9.4** | I18 | P | 20.0 | 1.00% | 2.0 | 165 | 1.4 |
| I17 | C05 | 0.6 | 12.3 | 3.82 | 6.41 | 0.28 | 0.49 | 0.16 | 0.28 | 0.6 | 1.8 | | | | | | **0.6** | **1.8** | | | | | | | |
| I18 | C06 | 1.0 | 13.6 | 3.67 | 6.15 | 0.28 | 0.49 | 0.28 | 0.50 | 1.0 | 3.1 | 14.5 | 3.57 | 6.00 | 0.28 | 1.00 | **1.0** | **6.0** | | | | | | | |
| CB1 | C07 | 0.9 | 11.8 | 3.88 | 6.51 | 0.25 | 0.44 | 0.22 | 0.39 | 0.9 | 2.5 | | | | | | **0.9** | **2.5** | | | | | | | |
| I19 | D01 | 6.9 | 16.6 | 3.37 | 5.66 | 0.29 | 0.50 | 2.01 | 3.41 | 6.8 | 19 | | | | | | **6.8** | **19** | DP2 | P | 20.0 | 9.50% | 6.2 | 110 | 0.3 |
| DP2 | D02 | 3.8 | 16.3 | 3.39 | 5.70 | 0.29 | 0.50 | 1.12 | 1.90 | 3.8 | 11 | 16.9 | 3.34 | 5.61 | 1.12 | 2.90 | **3.8** | **16** | I20 | P | 20.0 | 0.95% | 1.9 | 210 | 1.8 |
| I20 | D03 | 3.8 | 13.5 | 3.67 | 6.17 | 0.29 | 0.50 | 1.12 | 1.90 | 4.1 | 12 | 18.1 | 3.24 | 5.43 | 2.25 | 3.80 | **7.3** | **21** | DP3 | P | 20.0 | 0.50% | 1.4 | 40 | 0.5 |
| DP3 | D04 | 5.3 | 18.0 | 3.25 | 5.45 | 0.29 | 0.50 | 1.55 | 2.63 | 5.0 | 14 | 18.6 | 3.20 | 5.37 | 1.55 | 3.26 | **5.0** | **17** | I24 | P | 20.0 | 0.70% | 1.7 | 285 | 2.8 |
| I21 | D05 | 2.0 | 12.8 | 3.76 | 6.31 | 0.29 | 0.50 | 0.59 | 0.99 | 2.2 | 6.3 | 21.4 | 2.99 | 5.01 | 2.31 | 4.75 | **6.9** | **24** | I26 | P | 20.0 | 0.95% | 1.9 | 215 | 1.8 |
| I22 | D06 | 3.2 | 16.4 | 3.39 | 5.69 | 0.29 | 0.50 | 0.94 | 1.59 | 3.2 | 9.0 | | | | | | **3.2** | **9.0** | I24 | P | 20.0 | 1.40% | 2.4 | 350 | 2.5 |
| I23 | D07 | 6.6 | 14.6 | 3.56 | 5.97 | 0.29 | 0.50 | 1.93 | 3.27 | 6.9 | 20 | | | | | | **6.9** | **20** | I23 | P | 20.0 | 0.95% | 1.9 | 315 | 2.7 |
| I24 | D08 | 1.6 | 13.1 | 3.73 | 6.26 | 0.29 | 0.50 | 0.48 | 0.81 | 1.8 | 5.1 | 17.3 | 3.30 | 5.55 | 0.48 | 2.42 | **1.8** | **13** | 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 | 19.2 | 3.15 | 5.29 | 0.24 | 1.03 | **0.9** | **5.4** | | | | | | | |
| ES1 | D11 | 4.2 | 37.5 | 2.15 | 3.60 | 0.27 | 0.46 | 1.13 | 1.93 | 2.4 | 6.9 | | | | | | **2.4** | **6.9** | | | | | | | |
| I26 | D12 | 2.7 | 19.5 | 3.13 | 5.25 | 0.29 | 0.50 | 0.78 | 1.32 | 2.4 | 6.9 | 23.3 | 2.86 | 4.80 | 0.78 | 3.36 | **2.4** | **16** | | | | | | | |
| 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 |

| DESIGN POINT | DIRECT RUNOFF | | | | | | | | | | | TOTAL RUNOFF | | | | | | | OVERLAND TRAVEL TIME | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | I (in./ hr.) | | COEFF. © | | CA | | Q | | | I (in./ hr.) | | CA | | Q | | | | | | | | |
| | BASIN | AREA (AC) | Tc (Min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | Sum Tc (min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | **(5 YR)** | **(100 YR)** | DESTINATION DP | CONVEYANCE TYPE | COEFFICIENT $C_V$ | SLOPE % | VEL. (FPS) | LENGTH (FT) | TRAVEL TIME Tt |
| | DEVELOPED | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 315 | 1.9 |
| I34 | E02 | 6.5 | 15.4 | 3.48 | 5.85 | 0.32 | 0.51 | 2.10 | 3.33 | 7.3 | 19 | 18.8 | 3.19 | 5.35 | 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 | 5.78 | 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 | 5.54 | 1.15 | 2.35 | **3.9** | **13** | | | | | | | |
| I37 | E05 | 2.6 | 17.7 | 3.27 | 5.50 | 0.32 | 0.51 | 0.83 | 1.31 | 2.7 | 7.2 | 21.3 | 3.00 | 5.03 | 0.83 | 1.73 | **2.7** | **8.7** | 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 | 23.8 | 2.83 | 4.75 | 2.05 | 3.69 | **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 | 15.3 | 3.49 | 5.86 | 0.64 | 0.74 | 1.02 | 1.19 | 3.6 | 7.0 | 25.6 | 2.72 | 4.56 | 1.02 | 2.02 | **3.6** | **9.2** | 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 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| EI2 | Ex1 | 1.1 | 11.2 | 3.96 | 6.65 | 0.61 | 0.72 | 0.65 | 0.76 | 2.6 | 5.1 | 21.7 | 2.97 | 4.98 | 0.65 | 2.07 | **2.6** | **10** | EI9 | P | 20.0 | 1.25% | 2.2 | 565 | 4.2 |
| EI9 | Ex2 | 1.3 | 10.6 | 4.04 | 6.79 | 0.55 | 0.67 | 0.69 | 0.84 | 2.8 | 5.7 | 25.9 | 2.70 | 4.54 | 1.16 | 2.39 | **3.1** | **11** | | | | | | | |
| EI3 | Ex3 | 1.7 | 15.5 | 3.47 | 5.83 | 0.77 | 0.85 | 1.31 | 1.45 | 4.6 | 8.5 | 24.1 | 2.81 | 4.71 | 1.45 | 1.92 | **4.6** | **9.1** | EX | | | | | | |
| EI4 | Ex4 | 1.8 | 11.8 | 3.88 | 6.52 | 0.53 | 0.65 | 0.96 | 1.18 | 3.7 | 7.7 | | | | | | **3.7** | **7.7** | [2] $Q_5$=1.2 CFS, $Q_{100}$=3.1 TO STONEBRIDGE FILING 3 | | | | | | |
| EI5 | Ex5 | 2.3 | 14.8 | 3.54 | 5.94 | 0.57 | 0.68 | 1.28 | 1.54 | 4.5 | 9.1 | | | | | | **4.5** | **9.1** | EI6 | P | 20.0 | 4.00% | 4.0 | 805 | 3.4 |
| EI6 | Ex6 | 1.4 | 10.4 | 4.07 | 6.83 | 0.47 | 0.60 | 0.65 | 0.83 | 2.6 | 5.7 | 18.2 | 3.23 | 5.43 | 0.94 | 1.32 | **3.0** | **7.2** | EI7 | P | 20.0 | 4.00% | 4.0 | 700 | 2.9 |
| EI7 | Ex7 | 1.4 | 10.0 | 4.13 | 6.93 | 0.44 | 0.58 | 0.63 | 0.83 | 2.6 | 5.8 | 21.1 | 3.01 | 5.05 | 0.83 | 1.25 | **2.6** | **6.3** | EI8 | P | 20.0 | 2.00% | 2.8 | 410 | 2.4 |
| EI8 | Ex8 | 2.2 | 12.0 | 3.86 | 6.47 | 0.38 | 0.54 | 0.85 | 1.21 | 3.3 | 7.8 | 23.5 | 2.85 | 4.78 | 1.01 | 1.59 | **3.3** | **7.8** | EI9 | P | 20.0 | 2.00% | 2.8 | 50 | 0.3 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

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

**STORM DRAINAGE SYSTEM DESIGN**

**INLET CALCULATIONS**

PROJECT: **Rolling Hills Ranch PUD** Date: 2/3/2020

| | | | | | | | | $Q_{Total}$ | | $Q_{Capture}$ | | | | $Q_{Flow\text{-}by}$ | | | | DEPTH (max) | | SPREAD | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP | BASIN | Inlet size L(i) | Proposed or Existing | INLET TYPE | CROSS SLOPE | STREET SLOPE | $T_c$ | $Q_5$ (cfs) | $Q_{100}$ (cfs) | $Q_5$ (cfs) | $Q_{100}$ (cfs) | $CA_{eqv.}$ (5-yr) | $CA_{eqv.}$ (100-yr) | $Q_5$ (cfs) | $Q_{100}$ (cfs) | $CA_{eqv.}$ (5-yr) | $CA_{eqv.}$ (100-yr) | $Q_5$ (ft) | $Q_{100}$ (ft) | $Q_5$ (ft) | $Q_{100}$ (ft) |
| CB4 | OS1 | Type C | PROP | SUMP | 2.0% | | 18.1 | 1.3 | 9 | 1.3 | 8.6 | 0.40 | 1.58 | - | - | - | - | 0.18 | 0.51 | | |
| | | | | | | | | | | | | | | | | | | | | | |
| I01 | A01 | 15 | PROP | SUMP[1] | 2.0% | | 16.4 | 8.6 | 22 | 8.6 | 14 | 2.55 | 2.39 | - | 8.6 | - | 1.51 | 0.47 | 0.47 | | |
| I02 | A02 | 10 | PROP | SUMP | 2.0% | | 16.9 | 2.0 | 14 | 2.0 | 14 | 0.60 | 2.54 | - | - | - | - | 0.50 | 0.70 | | |
| I03 | A03 | 5 | PROP | SUMP | 2.0% | | 7.4 | 1.0 | 3.1 | 1.0 | 3.1 | 0.23 | 0.40 | - | - | - | - | 0.50 | 0.70 | | |
| | | | | | | | | | | | | | | | | | | | | | |
| I04 | B01 | 10 | PROP | SUMP[1] | 2.0% | | 16.0 | 2.2 | 6.4 | 2.2 | 6.4 | 0.63 | 1.11 | - | - | - | - | 0.47 | 0.47 | | |
| I05 | B02 | 15 | PROP | SUMP[1] | 2.0% | | 16.7 | 5.2 | 15 | 5.2 | 14 | 1.55 | 2.41 | - | 1.8 | - | 0.33 | 0.47 | 0.47 | | |
| I06 | B04 | 20 | PROP | SUMP[1] | 2.0% | | 19.7 | 6.2 | 18 | 6.2 | 17 | 2.01 | 3.30 | - | 1.2 | - | 0.23 | 0.47 | 0.47 | | |
| I07 | B05 | 10 | PROP | SUMP[1] | 2.0% | | 15.4 | 3.1 | 9.1 | 3.1 | 9.1 | 0.89 | 1.56 | - | - | - | - | 0.47 | 0.47 | | |
| I08 | B06 | 10 | PROP | SUMP[1] | 2.0% | | 11.9 | 3.3 | 9.9 | 3.3 | 9.9 | 0.86 | 1.52 | - | - | - | - | 0.47 | 0.47 | | |
| I09 | B07 | 20 | PROP | FLOW-BY | 2.0% | 1.0% | 18.0 | 4.3 | 13 | 3.7 | 9.2 | 1.15 | 1.68 | 0.5 | 3.4 | 0.16 | 0.63 | 0.33 | 0.46 | 12.4 | 18.6 |
| I10 | B08 | 10 | PROP | SUMP[1] | 2.0% | | 19.9 | 2.5 | 7.6 | 2.5 | 7.6 | 0.80 | 1.46 | - | - | - | - | 0.47 | 0.47 | | |
| I11 | B09 | 10 | PROP | SUMP | 2.0% | | 16.0 | 2.6 | 7.7 | 2.6 | 7.7 | 0.76 | 1.33 | - | - | - | - | 0.50 | 0.70 | | |
| I12 | B10 B11 | 20 | PROP | SUMP | 2.0% | | 24.0 | 5.4 | 18 | 5.4 | 18 | 1.92 | 3.73 | - | - | - | - | 0.50 | 0.70 | | |
| | | | | | | | | | | | | | | | | | | | | | |
| I13 | C01 | 10 | PROP | SUMP[1] | 2.0% | | 15.0 | 3.1 | 9.0 | 3.1 | 9.0 | 0.87 | 1.53 | - | - | - | - | 0.47 | 0.47 | | |
| I14 | C02 | 15 | PROP | SUMP[1] | 2.0% | | 21.2 | 3.4 | 10 | 3.4 | 10 | 1.14 | 2.04 | - | - | - | - | 0.47 | 0.47 | | |
| I15 | C03 | 5 | PROP | SUMP[1] | 2.0% | | 13.0 | 1.4 | 4.0 | 1.4 | 4.0 | 0.37 | 0.65 | - | - | - | - | 0.47 | 0.47 | | |
| I16 | C04 | 5 | PROP | SUMP[1] | 2.0% | | 13.1 | 3.2 | 9.4 | 3.2 | 6.3 | 0.85 | 1.01 | - | 3.1 | - | 0.50 | 0.47 | 0.47 | | |
| I17 | C05 | 5 | PROP | SUMP | 2.0% | | 12.3 | 0.6 | 1.8 | 0.6 | 1.8 | 0.16 | 0.28 | - | - | - | - | 0.50 | 0.70 | | |
| I18 | C06 | 5 | PROP | SUMP | 2.0% | | 14.5 | 1.0 | 6.0 | 1.0 | 6.0 | 0.29 | 1.00 | - | - | - | - | 0.50 | 0.70 | | |
| CB1 | C07 | Type C | PROP | SUMP | 2.0% | | 11.8 | 0.9 | 2.5 | 0.9 | 2.5 | 0.22 | 0.39 | - | - | - | - | 0.13 | 0.27 | | |
| | | | | | | | | | | | | | | | | | | | | | |
| I19 | D01 | 15 | PROP | SUMP[1] | 2.0% | | 16.6 | 6.8 | 19 | 6.8 | 14 | 2.01 | 2.40 | - | 5.7 | - | 1.00 | 0.47 | 0.47 | | |
| I20 | D03 | 20 | PROP | SUMP[1] | 2.0% | | 18.1 | 7.3 | 21 | 7.3 | 17 | 2.25 | 3.17 | - | 3.4 | - | 0.63 | 0.47 | 0.47 | | |
| I21 | D05 | 15 | PROP | SUMP[1] | 2.0% | | 21.4 | 6.9 | 24 | 6.9 | 14 | 2.31 | 2.71 | - | 10 | - | 2.04 | 0.47 | 0.47 | | |
| I22 | D06 | 15 | PROP | FLOW-BY | 2.0% | 1.0% | 16.4 | 3.2 | 9.0 | 2.6 | 6.2 | 0.77 | 1.09 | 0.6 | 2.8 | 0.17 | 0.50 | 0.31 | 0.41 | 11.1 | 16.5 |
| I23 | D07 | 10 | PROP | SUMP[1] | 2.0% | | 14.6 | 6.9 | 20 | 6.9 | 9.9 | 1.93 | 1.66 | - | 9.6 | - | 1.60 | 0.47 | 0.47 | | |
| I24 | D08 | 10 | PROP | SUMP[1] | 2.0% | | 17.3 | 1.8 | 13 | 1.8 | 9.9 | 0.54 | 1.79 | - | 3.5 | - | 0.63 | 0.47 | 0.47 | | |
| | | | | | | | | | | | | | | | | | | | | | |

[1] Forced sump at intersection

| DP | BASIN | Inlet size L(i) | Proposed or Existing | INLET TYPE | CROSS SLOPE | STREET SLOPE | $T_c$ | $Q_{Total}$ $Q_5$ (cfs) | $Q_{Total}$ $Q_{100}$ (cfs) | $Q_{Capture}$ $Q_5$ (cfs) | $Q_{Capture}$ $Q_{100}$ (cfs) | $Q_{Capture}$ $CA_{eqv.}$ (5-yr) | $Q_{Capture}$ $CA_{eqv.}$ (100-yr) | $Q_{Flow-by}$ $Q_5$ (cfs) | $Q_{Flow-by}$ $Q_{100}$ (cfs) | $Q_{Flow-by}$ $CA_{eqv.}$ (5-yr) | $Q_{Flow-by}$ $CA_{eqv.}$ (100-yr) | DEPTH (max) $Q_5$ (ft) | DEPTH (max) $Q_{100}$ (ft) | SPREAD $Q_5$ (ft) | SPREAD $Q_{100}$ (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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% | | 19.2 | 0.9 | 5.4 | 0.9 | 5.4 | 0.28 | 1.03 | - | - | - | - | 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% | | 23.3 | 2.4 | 16 | 2.4 | 16 | 0.85 | 3.36 | - | - | - | - | 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[1] | 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[1] | 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[1] | 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 | | |
| | | | | | | | 0.0 | | | | | | | | | | | | | | |
| I33 | E01 | 20 | PROP | SUMP[1] | 2.0% | | 16.9 | 6.2 | 17 | 6.2 | 17 | 1.85 | 3.06 | - | - | - | - | 0.47 | 0.47 | | |
| I34 | E02 | 20 | PROP | SUMP[1] | 2.0% | | 18.8 | 7.3 | 19 | 7.3 | 17 | 2.29 | 3.22 | - | 2.3 | - | 0.42 | 0.47 | 0.47 | | |
| I35 | E03 | 15 | PROP | SUMP[1] | 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[1] | 2.0% | | 17.4 | 3.9 | 13 | 3.9 | 13 | 1.18 | 2.35 | - | - | - | - | 0.47 | 0.47 | | |
| I37 | E05 | 15 | PROP | FLOW-BY | 2.0% | 1.0% | 21.3 | 2.7 | 8.7 | 2.3 | 6.0 | 0.76 | 1.20 | 0.4 | 2.7 | 0.14 | 0.54 | 0.29 | 0.41 | 10.5 | 16.2 |
| I38 | E06 | 5 | PROP | SUMP[1] | 2.0% | | 12.5 | 1.6 | 4.2 | 1.6 | 4.2 | 0.41 | 0.65 | - | - | - | - | 0.47 | 0.47 | | |
| I39 | E07 | 15 | PROP | FLOW-BY | 2.0% | 2.0% | 12.7 | 2.5 | 6.7 | 2.0 | 4.5 | 0.52 | 0.70 | 0.5 | 2.2 | 0.14 | 0.35 | 0.26 | 0.34 | 8.9 | 12.9 |
| I40 | E08 | 10 | PROP | SUMP[1] | 2.0% | | 14.9 | 4.8 | 13 | 4.8 | 9.9 | 1.35 | 1.67 | - | 2.8 | - | 0.47 | 0.47 | 0.47 | | |
| I41 | E09 | 15 | PROP | SUMP[1] | 2.0% | | 23.8 | 6.2 | 18 | 6.2 | 14 | 2.20 | 2.86 | - | 3.9 | - | 0.83 | 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% | 25.6 | 3.6 | 9.2 | 3.2 | 7.1 | 1.19 | 1.55 | 0.4 | 2.1 | 0.13 | 0.47 | 0.32 | 0.42 | 11.6 | 16.6 |
| EI1 | E13 | 15 | PROP | SUMP[1] | 2.0% | | 22.0 | 8.2 | 19 | 8.2 | 13 | 2.77 | 2.61 | - | 6.5 | - | 1.31 | 0.45 | 0.45 | | |
| | | | | | | | | | | | | | | | | | | | | | |
| EI2 | Ex1 | 10 | PROP | FLOW-BY | 2.0% | 1.3% | 21.7 | 2.6 | 10 | 1.8 | 5.1 | 0.61 | 1.01 | 0.8 | 5.3 | 0.26 | 1.06 | 0.28 | 0.41 | 9.8 | 16.5 |
| EI9 | Ex2 | 10 | PROP | SUMP | 2.0% | | 25.9 | 3.1 | 11 | 3.1 | 11 | 1.16 | 2.39 | - | - | - | - | 0.50 | 0.70 | | |
| EI3 | Ex3 | 15 | PROP | FLOW-BY | 2.0% | 1.0% | 24.1 | 4.6 | 9.1 | 3.5 | 6.2 | 1.25 | 1.32 | 1.0 | 2.8 | 0.37 | 0.60 | 0.34 | 0.41 | 12.7 | 16.5 |
| EI4 | Ex4 | 10 | PROP | FLOW-BY | 2.0% | 1.0% | 11.8 | 3.7 | 7.7 | 2.5 | 4.6 | 0.65 | 0.71 | 1.2 | 3.1 | 0.31 | 0.47 | 0.32 | 0.39 | 11.8 | 15.5 |
| EI5 | Ex5 | 15 | PROP | FLOW-BY | 2.0% | 1.0% | 14.8 | 4.5 | 9.1 | 3.5 | 6.3 | 0.99 | 1.05 | 1.0 | 2.9 | 0.29 | 0.48 | 0.34 | 0.42 | 12.7 | 16.5 |
| EI6 | Ex6 | 20 | PROP | FLOW-BY | 2.0% | 4.0% | 18.2 | 3.0 | 7.2 | 2.4 | 4.9 | 0.74 | 0.90 | 0.6 | 2.3 | 0.20 | 0.42 | 0.25 | 0.32 | 8.4 | 11.6 |
| EI7 | Ex7 | 20 | PROP | FLOW-BY | 2.0% | 4.0% | 21.1 | 2.6 | 6.3 | 2.1 | 4.4 | 0.70 | 0.87 | 0.5 | 1.9 | 0.17 | 0.38 | 0.24 | 0.31 | 8.0 | 11.1 |
| EI8 | Ex8 | 15 | PROP | FLOW-BY | 2.0% | 1.0% | 23.5 | 3.3 | 7.8 | 2.7 | 5.5 | 0.93 | 1.15 | 0.6 | 2.3 | 0.21 | 0.48 | 0.31 | 0.40 | 11.2 | 15.6 |

[1] Forced sump at intersection

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

PROJECT: **Rolling Hills Ranch PUD** Date: 2/3/2020

| UPSTREAM DESIGN POINT | UPSTREAM BASIN | INLET FLOW Tc (Min.) | INLET FLOW I (in./ hr.) (5 YR) | INLET FLOW I (in./ hr.) (100 YR) | INLET FLOW CA (5 YR) | INLET FLOW CA (100 YR) | INLET FLOW Q (5 YR) | INLET FLOW Q (100 YR) | SYSTEM FLOW Sum Tc (min.) | SYSTEM FLOW I (in./ hr.) (5 YR) | SYSTEM FLOW I (in./ hr.) (100 YR) | SYSTEM FLOW CA (5 YR) | SYSTEM FLOW CA (100 YR) | SYSTEM FLOW Q (5 YR) | SYSTEM FLOW Q (100 YR) | TRAVEL TIME PIPE DIA | TRAVEL TIME ROUGHNESS (n) | TRAVEL TIME DESTINATION DP | TRAVEL TIME SLOPE % | TRAVEL TIME LENGTH (FT) | TRAVEL TIME VEL. (FPS) (Estimate)* | TRAVEL TIME TRAVEL TIME Tt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CB4 | OS1 | 18.1 | 3.2 | 5.4 | 0.40 | 1.58 | 1.3 | 8.6 | | | | | | **1.3** | **8.6** | 24.0 | 0.013 | OSJ1 | 1.02% | 229 | 7.3 | 0.5 |
| OSJ1 | | | | | | | | | 18.6 | 3.20 | 5.36 | 0.40 | 1.58 | **1.3** | **8.5** | 24.0 | 0.013 | OSJ2 | 1.99% | 396 | 10.2 | 0.6 |
| OSJ2 | | | | | | | | | 19.3 | 3.14 | 5.28 | 0.40 | 1.58 | **1.2** | **8.4** | 24.0 | 0.013 | OS5 | 4.67% | 177 | 15.6 | 0.2 |
| OS5 | | | | | | | | | 19.5 | 3.13 | 5.25 | 0.40 | 1.58 | **1.2** | **8.3** | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| I01 | A01 | 16.4 | 3.39 | 5.68 | 2.55 | 2.39 | 8.6 | 14 | | | | | | **8.6** | **14** | 18 | 0.013 | J01 | 0.99% | 65 | 6 | 0.2 |
| I02 | A02 | 16.9 | 3.34 | 5.61 | 0.60 | 2.54 | 2.0 | 14 | | | | | | **2.0** | **14** | 18 | 0.013 | J01 | 8.57% | 4.7 | 17 | 0.0 |
| J01 | | | | | | | | | 16.9 | 3.34 | 5.61 | 3.15 | 4.93 | **11** | **28** | 24 | 0.013 | I03 | 1.01% | 25 | 7 | 0.1 |
| I03 | A03 | 7.4 | 4.59 | 7.71 | 0.23 | 0.40 | 1.0 | 3.1 | 17.0 | 3.34 | 5.60 | 3.37 | 5.32 | **11** | **30** | 24 | 0.013 | OS1 | 2.67% | 172 | 12 | 0.2 |
| | | | | | | | | | **17.2** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| I04 | B01 | 16.0 | 3.42 | 5.75 | 0.63 | 1.11 | 2.2 | 6.4 | | | | | | **2.2** | **6.4** | 18 | 0.013 | I05 | 0.53% | 75 | 4 | 0.3 |
| I05 | B02 | 16.7 | 3.36 | 5.64 | 1.55 | 2.41 | 5.2 | 14 | 16.7 | 3.36 | 5.64 | 2.18 | 3.52 | **7.3** | **20** | 24 | 0.013 | J02 | 0.97% | 5.2 | 7 | 0.0 |
| J02 | | | | | | | | | 16.7 | 3.36 | 5.64 | 2.18 | 3.52 | **7.3** | **20** | 24 | 0.013 | J03 | 0.51% | 215 | 5 | 0.7 |
| I06 | B04 | 19.7 | 3.11 | 5.23 | 2.01 | 3.30 | 6.2 | 17 | | | | | | **6.2** | **17** | 18 | 0.013 | J03 | 19.34% | 5.2 | 26 | 0.0 |
| J03 | | | | | | | | | 19.7 | 3.11 | 5.23 | 4.19 | 6.82 | **13** | **36** | 30 | 0.013 | J04 | 0.53% | 75 | 6 | 0.2 |
| I07 | B05 | 15.4 | 3.48 | 5.84 | 0.89 | 1.56 | 3.1 | 9.1 | | | | | | **3.1** | **9.1** | 18 | 0.013 | J04 | 19.34% | 5.2 | 26 | 0.0 |
| J04 | | | | | | | | | 19.9 | 3.10 | 5.20 | 5.08 | 8.38 | **16** | **44** | 36 | 0.013 | J05 | 0.51% | 225 | 7 | 0.6 |
| I08 | B06 | 11.9 | 3.87 | 6.50 | 0.86 | 1.52 | 3.3 | 9.9 | | | | | | **3.3** | **9.9** | 18 | 0.013 | J05 | 19.34% | 5.2 | 26 | 0.0 |
| J05 | | | | | | | | | 20.4 | 3.06 | 5.13 | 5.94 | 9.90 | **18** | **51** | 36 | 0.013 | J06 | 0.54% | 64 | 7 | 0.2 |
| I09 | B07 | 18.0 | 3.24 | 5.45 | 1.15 | 1.68 | 3.7 | 9.2 | | | | | | **3.7** | **9.2** | 18 | 0.013 | J06 | 9.67% | 5.2 | 19 | 0.0 |
| J06 | | | | | | | | | 20.6 | 3.05 | 5.11 | 7.08 | 11.58 | **22** | **59** | 36 | 0.013 | J07 | 1.29% | 448 | 11 | 0.7 |
| J07 | | | | | | | | | 21.3 | 3.00 | 5.03 | 7.08 | 11.58 | **21** | **58** | 36 | 0.013 | J10 | 2.46% | 407 | 15 | 0.5 |
| I10 | B08 | 19.9 | 3.09 | 5.19 | 0.80 | 1.46 | 2.5 | 7.6 | | | | | | **2.5** | **7.6** | 18 | 0.013 | J08 | 0.56% | 54 | 4 | 0.2 |
| J08 | | | | | | | | | 20.1 | 3.08 | 5.17 | 0.80 | 1.46 | **2.5** | **7.5** | 18 | 0.013 | J09 | 0.75% | 193 | 5 | 0.6 |
| I11 | B09 | 16.0 | 3.43 | 5.76 | 0.76 | 1.33 | 2.6 | 7.7 | | | | | | **2.6** | **7.7** | 18 | 0.013 | J09 | 0.99% | 25 | 6 | 0.1 |
| I12 | B10 B11 | 24.0 | 2.82 | 4.73 | 1.92 | 3.73 | 5.4 | 18 | | | | | | **5.4** | **18** | 18 | 0.013 | J09 | 4.84% | 5.2 | 13 | 0.0 |
| J09 | | | | | | | | | 24.0 | 2.82 | 4.73 | 3.48 | 6.51 | **9.8** | **31** | 24 | 0.013 | J10 | 0.60% | 83 | 6 | 0.2 |
| J10 | | | | | | | | | 24.2 | 2.80 | 4.70 | 10.56 | 18.09 | **30** | **85** | 42 | 0.013 | OS2 | 2.06% | 267 | 15 | 0.3 |
| | | | | | | | | | | | | | | | | | | | | | | |

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

| UPSTREAM DESIGN POINT | UPSTREAM BASIN | INLET FLOW | | | | | | | SYSTEM FLOW | | | | | | | TRAVEL TIME | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | I (in./ hr.) | | CA | | Q | | | I (in./ hr.) | | CA | | Q | | | | | | | | |
| | | Tc (Min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | Sum Tc (min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | **(5 YR)** | **(100 YR)** | PIPE DIA | ROUGHNESS (n) | DESTINATION DP | SLOPE % | LENGTH (FT) | VEL. (FPS) (Estimate)* | TRAVEL TIME Tt |
| I13 | C01 | 15.0 | 3.52 | 5.91 | 0.87 | 1.53 | 3.1 | 9.0 | | | | | | **3.1** | **9.0** | 24 | 0.013 | J11 | 1.00% | 45 | 7 | 0.1 |
| I14 | C02 | 21.2 | 3.00 | 5.04 | 1.14 | 2.04 | 3.4 | 10 | | | | | | **3.4** | **10** | 24 | 0.013 | J11 | 2.58% | 25 | 12 | 0.0 |
| J11 | | | | | | | | | 21.2 | 3.00 | 5.03 | 2.01 | 3.57 | **6.0** | **18** | 24 | 0.013 | J12 | 1.02% | 295 | 7 | 0.7 |
| I15 | C03 | 13.0 | 3.74 | 6.27 | 0.37 | 0.65 | 1.4 | 4.0 | | | | | | **1.4** | **4.0** | 18 | 0.013 | J12 | 1.00% | 45 | 6 | 0.1 |
| I16 | C04 | 13.1 | 3.72 | 6.25 | 0.85 | 1.01 | 3.2 | 6.3 | | | | | | **3.2** | **6.3** | 18 | 0.013 | J12 | 1.59% | 25 | 8 | 0.1 |
| J12 | | | | | | | | | 21.9 | 2.95 | 4.96 | 3.23 | 5.22 | **9.5** | **26** | 30 | 0.013 | J13 | 0.64% | 165 | 7 | 0.4 |
| I17 | C05 | 12.3 | 3.82 | 6.41 | 0.16 | 0.28 | 0.6 | 1.8 | | | | | | **0.6** | **1.8** | 18 | 0.013 | J13 | 0.99% | 25 | 6 | 0.1 |
| I18 | C06 | 14.5 | 3.57 | 6.00 | 0.29 | 1.00 | 1.0 | 6.0 | | | | | | **1.0** | **6.0** | 18 | 0.013 | J13 | 4.84% | 5.2 | 13 | 0.0 |
| J13 | | | | | | | | | 22.3 | 2.92 | 4.91 | 3.68 | 6.50 | **11** | **32** | 36 | 0.013 | J14 | 0.98% | 77 | 9 | 0.1 |
| CB1 | C07 | 11.8 | 3.88 | 6.51 | 0.22 | 0.39 | 0.9 | 2.5 | | | | | | **0.9** | **2.5** | 18 | 0.013 | J14 | 2.81% | 68 | 10 | 0.1 |
| J14 | | | | | | | | | 22.5 | 2.92 | 4.89 | 3.91 | 6.89 | **11** | **34** | 36 | 0.013 | OS3 | 1.03% | 472 | 10 | 0.8 |
| | | | | | | | | | **23.3** | | | | | | | | | | | | | |
| 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 | 18.1 | 3.24 | 5.43 | 2.25 | 3.17 | 7.3 | 17 | | | | | | **7.3** | **17** | 18 | 0.013 | J16 | 0.99% | 25 | 6 | 0.1 |
| J16 | | | | | | | | | 18.1 | 3.24 | 5.43 | 4.26 | 5.57 | **14** | **30** | 30 | 0.013 | J17 | 0.57% | 331 | 6 | 0.9 |
| I21 | D05 | 21.4 | 2.99 | 5.01 | 2.31 | 2.71 | 6.9 | 14 | | | | | | **6.9** | **14** | 24 | 0.013 | J17 | 0.97% | 5.2 | 7 | 0.0 |
| J17 | | | | | | | | | 21.5 | 2.98 | 5.01 | 6.57 | 8.28 | **20** | **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 | 14.6 | 3.56 | 5.97 | 1.93 | 1.66 | 6.9 | 9.9 | | | | | | **6.9** | **9.9** | 18 | 0.013 | J18 | 1.00% | 45 | 6 | 0.1 |
| J18 | | | | | | | | | 16.4 | 3.38 | 5.68 | 2.70 | 2.75 | **9.1** | **16** | 24 | 0.013 | J19 | 0.98% | 296 | 7 | 0.7 |
| I24 | D08 | 17.3 | 3.30 | 5.55 | 0.54 | 1.79 | 1.8 | 9.9 | | | | | | **1.8** | **9.9** | 24 | 0.013 | J19 | 0.90% | 45 | 7 | 0.1 |
| J19 | | | | | | | | | 21.5 | 2.98 | 5.00 | 9.80 | 12.83 | **29** | **64** | 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 | 19.2 | 3.15 | 5.29 | 0.28 | 1.03 | 0.9 | 5.4 | 23.1 | 2.88 | 4.83 | 0.70 | 1.74 | **2.0** | **8.4** | 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 | 23.3 | 2.86 | 4.80 | 0.85 | 3.36 | 2.4 | 16 | 37.7 | 2.14 | 3.59 | 1.99 | 5.28 | **4.3** | **19** | 24 | 0.013 | J20 | 1.07% | 4.7 | 7 | 0.0 |
| J20 | | | | | | | | | 37.7 | 2.14 | 3.59 | 12.49 | 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 | 12.96 | 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 |

| UPSTREAM DESIGN POINT | UPSTREAM BASIN | INLET FLOW | | | | | | | SYSTEM FLOW | | | | | | | TRAVEL TIME | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | I (in./ hr.) | | CA | | Q | | | I (in./ hr.) | | CA | | Q | | | | | | | | |
| | | Tc (Min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | Sum Tc (min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | **(5 YR)** | **(100 YR)** | PIPE DIA | ROUGHNESS (n) | DESTINATION DP | SLOPE % | LENGTH (FT) | VEL. (FPS) (Estimate)* | TRAVEL TIME Tt |
| J23 | | | | | | | | | 38.9 | 2.09 | 3.51 | 16.71 | 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 | 18.10 | 25.97 | **37** | **90** | 48 | 0.013 | J25 | 1.00% | 40 | 11 | 0.1 |
| J25 | | | | | | | | | 39.6 | 2.07 | 3.47 | 18.10 | 25.97 | **37** | **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 | 19.88 | 30.86 | **41** | **107** | 48 | 0.013 | I32 | 1.03% | 24 | 12 | 0.0 |
| I32 | D18 | 22.2 | 2.93 | 4.92 | 1.01 | 2.06 | 3.0 | 10 | 39.7 | 2.06 | 3.45 | 20.89 | 32.91 | **43** | **114** | 54 | 0.013 | OS4 | 0.60% | 195 | 10 | 0.3 |
| | | | | | | | | | **40.1** | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 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 | 18.8 | 3.19 | 5.35 | 2.29 | 3.22 | 7.3 | 17.2 | | | | | | **7.3** | **17** | 18 | 0.013 | J28 | 0.99% | 25 | 6 | 0.1 |
| J28 | | | | | | | | | 17.5 | 3.29 | 5.53 | 4.15 | 6.28 | **14** | **35** | 30 | 0.013 | J29 | 1.91% | 175 | 12 | 0.3 |
| I35 | E03 | 15.8 | 3.44 | 5.78 | 1.88 | 2.35 | 6.5 | 13.6 | | | | | | **6.5** | **14** | 18 | 0.013 | J29 | 1.00% | 45 | 6 | 0.1 |
| J29 | | | | | | | | | 17.7 | 3.27 | 5.49 | 6.03 | 8.63 | **20** | **47** | 36 | 0.013 | J30 | 0.70% | 179 | 8 | 0.4 |
| I36 | E04 | 17.4 | 3.30 | 5.54 | 1.18 | 2.35 | 3.9 | 13.0 | | | | | | **3.9** | **13** | 18 | 0.013 | J30 | 1.01% | 25 | 6 | 0.1 |
| I37 | E05 | 21.3 | 3.00 | 5.03 | 0.76 | 1.20 | 2.3 | 6.0 | | | | | | **2.3** | **6.0** | 18 | 0.013 | J30 | 5.35% | 4.7 | 14 | 0.0 |
| J30 | | | | | | | | | 21.3 | 3.00 | 5.03 | 7.97 | 12.18 | **24** | **61** | 36 | 0.013 | J31 | 1.03% | 44 | 10 | 0.1 |
| J31 | | | | | | | | | 21.4 | 2.99 | 5.02 | 7.97 | 12.18 | **24** | **61** | 36 | 0.013 | J36 | 0.79% | 272 | 8 | 0.5 |
| I38 | E06 | 12.5 | 3.80 | 6.37 | 0.41 | 0.65 | 1.6 | 4.2 | | | | | | **1.6** | **4.2** | 18 | 0.013 | J32 | 1.16% | 90 | 6 | 0.2 |
| J32 | | | | | | | | | 12.7 | 3.77 | 6.33 | 0.41 | 0.65 | **1.5** | **4.1** | 18 | 0.013 | J33 | 4.61% | 348 | 13 | 0.5 |
| I39 | E07 | 12.7 | 3.77 | 6.34 | 0.52 | 0.70 | 2.0 | 4.5 | | | | | | **2.0** | **4.5** | 18 | 0.013 | J33 | 3.70% | 26 | 11 | 0.0 |
| J33 | | | | | | | | | 13.2 | 3.72 | 6.24 | 0.93 | 1.36 | **3.5** | **8.5** | 18 | 0.013 | J34 | 1.95% | 151 | 8 | 0.3 |
| I40 | E08 | 14.9 | 3.53 | 5.93 | 1.35 | 1.67 | 4.8 | 9.9 | | | | | | **4.8** | **9.9** | 18 | 0.013 | J34 | 1.04% | 24 | 6 | 0.1 |
| J34 | | | | | | | | | 15.0 | 3.53 | 5.92 | 2.28 | 3.03 | **8.0** | **18** | 24 | 0.013 | J35 | 3.02% | 478 | 13 | 0.6 |
| J35 | | | | | | | | | 15.6 | 3.46 | 5.81 | 2.28 | 3.03 | **8.0** | **18** | 24 | 0.013 | J36 | 1.29% | 62 | 8 | 0.1 |
| I41 | E09 | 23.8 | 2.83 | 4.75 | 2.20 | 2.86 | 6.2 | 14 | | | | | | **6.2** | **14** | 24 | 0.013 | J36 | 1.03% | 24 | 7 | 0.1 |
| J36 | | | | | | | | | 23.8 | 2.83 | 4.75 | 12.45 | 18.07 | **35** | **86** | 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 | | | | | | | | | 24.3 | 2.80 | 4.69 | 14.71 | 21.66 | **41** | **102** | 48 | 0.013 | J38 | 1.22% | 201 | 13 | 0.3 |
| CB3 | E11 | 45.6 | 1.85 | 3.11 | 3.42 | 5.69 | 6.3 | 18 | | | | | | **6.3** | **18** | 18 | 0.013 | J38 | 1.52% | 112 | 7 | 0.3 |
| I43 | E12 | 25.6 | 2.72 | 4.56 | 1.19 | 1.55 | 3.2 | 7.1 | | | | | | **3.2** | **7.1** | 18 | 0.013 | J38 | 1.14% | 13 | 6 | 0.0 |
| | | | | | | | | | | | | | | | | | | | | | | |

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

| UPSTREAM DESIGN POINT | UPSTREAM BASIN | INLET FLOW | | | | | | | SYSTEM FLOW | | | | | | | TRAVEL TIME | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | I (in./ hr.) | | CA | | Q | | | I (in./ hr.) | | CA | | Q | | | | | | | | |
| | | Tc (Min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | Sum Tc (min.) | (5 YR) | (100 YR) | (5 YR) | (100 YR) | **(5 YR)** | **(100 YR)** | PIPE DIA | ROUGHNESS (n) | DESTINATION DP | SLOPE % | LENGTH (FT) | VEL. (FPS) (Estimate)* | TRAVEL TIME Tt |
| J38 | | | | | | | | | 25.7 | 2.72 | 4.56 | 19.32 | 28.90 | **52** | **132** | 54 | 0.013 | EJ01 | 2.39% | 227 | 19 | 0.2 |
| EI1 | E13 | 22.0 | 2.95 | 4.95 | 2.77 | 2.61 | 8.2 | 13 | | | | | | **8.2** | **13** | 18 | 0.013 | EJ02 | 2.20% | 4.5 | 9 | 0.0 |
| CA's FROM MERIDIAN RANCH FILING 11A FDR, TIME OF CONCENTRATION ADJUSTED TO MATCH FLOW RATE FROM SCS METHOD | | | | | | | | | 87.5 | 0.88 | 1.47 | 22.47 | 92.72 | **20** | **136** | | | | | | | |
| EJ02 | | | | | | | | | 87.5 | 0.88 | 1.47 | 25.24 | 95.33 | **22** | **140** | 54 | 0.013 | EJ01 | 0.49% | 67 | 9 | 0.1 |

# Storm Drain Hydraulics:

## STORM DRAINAGE SYSTEM DESIGN

### HYDRAULICS

PROJECT: **Rolling Hills Ranch PUD**

Date: 2/3/2020

| Label | Upstrm Node | Dnstrm Node | Intlet CA (acres) | Inlet Tc (min) | Inlet Flow (ft³/s) | System CA (acres) | System Flow Time (min) | System Intensity (in/hr) | Section Size (in) | Length (ft) | Slope (%) | Capacity (Full Flow) (ft³/s) | System Flow (ft³/s) | Velocity (Ave) (ft/s) | Elevation Ground (Upstrm) (ft) | Hydraulic Grade Line (Upstrm) (ft) | Invert (Upstrm) (ft) | Elevation Ground (Dnstrm) (ft) | Hydraulic Grade Line (Dnstrm) (ft) | Invert (Dnstrm) (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P99 | CB4 | OSJ1 | 1.58 | 18.1 | 8.7 | 1.58 | 18.1 | 5.44 | 24 | 228.62 | 1.01% | 23 | 8.7 | 6.7 | 7142.00 | 7137.8 | 7136.75 | 7139.93 | 7135.5 | 7134.45 |
| P100 | OSJ1 | OSJ2 | | | | 1.58 | 18.7 | 5.36 | 24 | 396.00 | 1.99% | 32 | 8.5 | 8.6 | 7139.93 | 7135.5 | 7134.45 | 7132.00 | 7127.6 | 7126.55 |
| P101 | OSJ2 | OS5 | | | | 1.58 | 19.4 | 5.26 | 24 | 183.00 | 4.67% | 49 | 8.4 | 11.6 | 7132.00 | 7127.6 | 7126.55 | 7123.00 | 7118.6 | 7118.00 |

# Appendix B - HEC-HMS Data

# Input Data

## Rolling Hills Ranch PUD

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

| BASIN | AREA (acre) | AREA ($mi^2$) | CURVE NO. | LAG TIME (min) |
|---|---|---|---|---|
| INTERIM | | | | |
| 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 | 39 | 0.0608 | 65.4 | 18.2 |
| 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 | 23.3 |
| FG10b | 27 | 0.0416 | 71.4 | 20.0 |
| FG11 | 40 | 0.0625 | 78.2 | 23.2 |
| FG12 | 21 | 0.0328 | 80.0 | 16.1 |
| FG13 | 34 | 0.0534 | 66.3 | 29.6 |
| FG14 | 64 | 0.1000 | 74.6 | 26.4 |
| FG15 | 7 | 0.0103 | 78.6 | 15.6 |
| FG16 | 51 | 0.0791 | 78.8 | 13.0 |
| FG17a | 44 | 0.0694 | 76.5 | 14.4 |
| FG17b | 14 | 0.0214 | 79.9 | 11.4 |
| FG17c | 20 | 0.0313 | 65.2 | 11.8 |
| FG18 | 41 | 0.0644 | 73.5 | 29.9 |
| FG19 | 34 | 0.0527 | 80.3 | 15.3 |
| FG19a | 5 | 0.0077 | 75.2 | 16.4 |
| FG20 | 7 | 0.0109 | 92.9 | 10.1 |
| FG22 | 42 | 0.0658 | 64.5 | 20.9 |
| FG23a | 11 | 0.0177 | 70.3 | 18.7 |
| FG23b | 23 | 0.0359 | 61.8 | 21.5 |
| FG23c | 5 | 0.0070 | 67.8 | 20.6 |
| FG24 | 160 | 0.2503 | 61.3 | 32.3 |
| FG25 | 70 | 0.1086 | 74.1 | 36.6 |
| FG28 | 43 | 0.0673 | 63.0 | 25.6 |
| FG29 | 64 | 0.0997 | 61.0 | 19.1 |
| FG30 | 25 | 0.0389 | 61.0 | 12.0 |
| FG31 | 59 | 0.0922 | 80.0 | 24.0 |
| FG32 | 26 | 0.0402 | 61.0 | 13.6 |
| FG33 | 19 | 0.0302 | 69.2 | 19.3 |
| FG34 | 54 | 0.0836 | 61.0 | 20.1 |
| FG35 | 38 | 0.0586 | 61.1 | 50.0 |
| FG36 | 18 | 0.0281 | 61.6 | 24.3 |
| FG37 | 77 | 0.1203 | 61.0 | 41.6 |

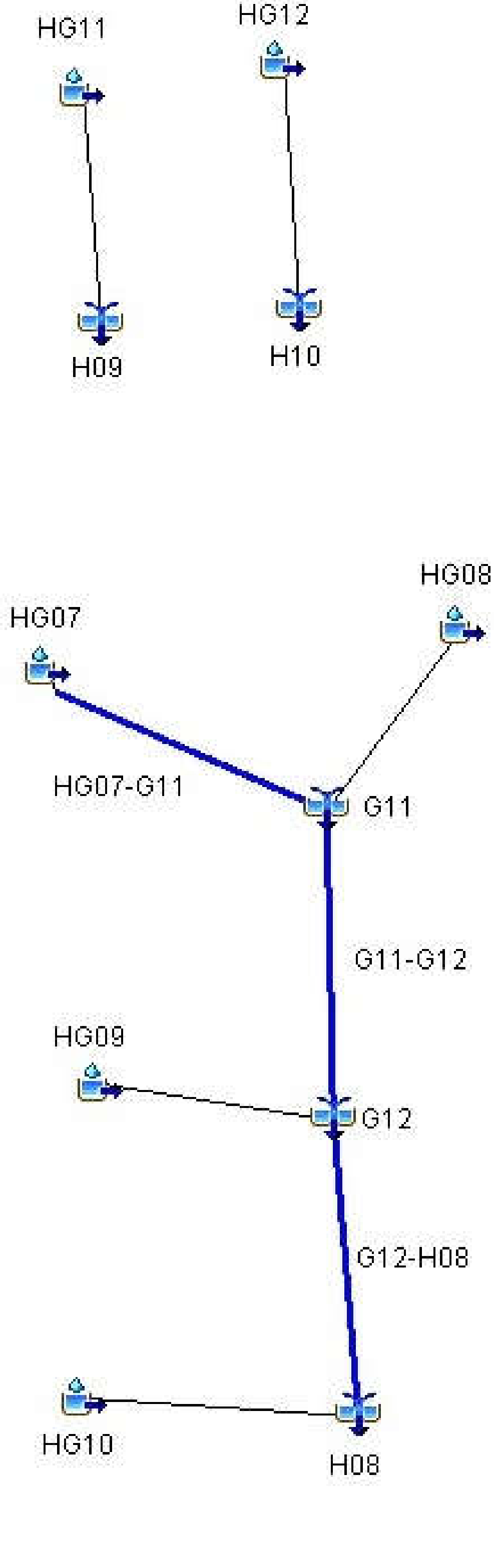
| BASIN | AREA (acre) | AREA ($mi^2$) | CURVE NO. | LAG TIME (min) |
|---|---|---|---|---|
| FUTURE | | | | |
| OS05 | 37 | 0.0578 | 61.0 | 15.2 |
| OS06 | 84 | 0.1313 | 61.0 | 18.7 |
| OS07a | 11 | 0.0170 | 63.1 | 13.9 |
| OS07b | 10 | 0.0156 | 63.1 | 10.9 |
| OS08 | 26 | 0.0406 | 65.7 | 15.9 |
| OS09 | 98 | 0.1527 | 65.0 | 29.5 |
| FG01 | 34 | 0.0538 | 66.4 | 33.8 |
| FG02 | 25 | 0.0391 | 64.6 | 16.1 |
| FG03 | 13 | 0.0203 | 68.0 | 11.6 |
| FG04 | 11 | 0.0172 | 68.0 | 7.6 |
| FG05 | 37 | 0.0580 | 70.1 | 28.7 |
| FG06 | 39 | 0.0608 | 65.4 | 18.4 |
| FG08A | 48 | 0.0750 | 76.8 | 13.3 |
| FG08B | 40 | 0.0630 | 76.7 | 16.6 |
| FG09 | 31 | 0.0484 | 71.7 | 20.8 |
| FG10a | 52 | 0.0806 | 73.2 | 23.3 |
| FG10b | 27 | 0.0416 | 71.4 | 20.0 |
| FG11 | 40 | 0.0625 | 78.2 | 23.2 |
| FG12 | 21 | 0.0328 | 80.0 | 16.1 |
| FG13 | 34 | 0.0534 | 66.3 | 29.6 |
| FG14 | 64 | 0.1000 | 74.6 | 26.4 |
| FG15 | 7 | 0.0103 | 78.6 | 15.6 |
| FG16 | 51 | 0.0791 | 78.8 | 13.0 |
| FG17a | 44 | 0.0694 | 76.5 | 14.4 |
| FG17b | 14 | 0.0214 | 79.9 | 11.4 |
| FG17c | 20 | 0.0313 | 65.2 | 11.8 |
| FG18 | 41 | 0.0644 | 73.5 | 29.9 |
| FG19 | 34 | 0.0527 | 80.3 | 15.3 |
| FG19a | 5 | 0.0077 | 75.2 | 16.4 |
| FG20 | 7 | 0.0109 | 92.9 | 10.1 |
| FG21a | 5 | 0.0072 | 63.9 | 10.1 |
| FG21b | 11 | 0.0170 | 78.5 | 15.3 |
| FG22 | 88 | 0.1380 | 67.3 | 24.8 |
| FG23a | 14 | 0.0216 | 68.6 | 18.0 |
| FG23b | 18 | 0.0286 | 64.7 | 16.5 |
| FG23c | 8 | 0.0122 | 67.3 | 14.0 |
| FG24 | 88 | 0.1373 | 68.1 | 24.9 |
| FG25 | 70 | 0.1086 | 74.1 | 36.6 |
| FG26 | 55 | 0.0863 | 70.7 | 23.1 |
| FG27 | 32 | 0.0500 | 74.7 | 23.9 |
| FG28 | 16 | 0.0245 | 66.6 | 23.0 |
| FG29 | 64 | 0.0997 | 61.0 | 19.1 |
| FG30 | 25 | 0.0389 | 80.0 | 10.9 |
| FG31 | 59 | 0.0922 | 80.0 | 24.0 |
| FG32 | 26 | 0.0402 | 80.0 | 12.1 |
| FG33 | 19 | 0.0302 | 73.5 | 19.3 |
| FG34 | 38 | 0.0600 | 62.0 | 23.5 |
| FG35 | 22 | 0.0344 | 63.4 | 26.4 |
| FG36 | 18 | 0.0281 | 61.0 | 25.0 |
| FG37 | 51 | 0.0797 | 61.0 | 24.7 |

INSERT PRECIPITATION CHART

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

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

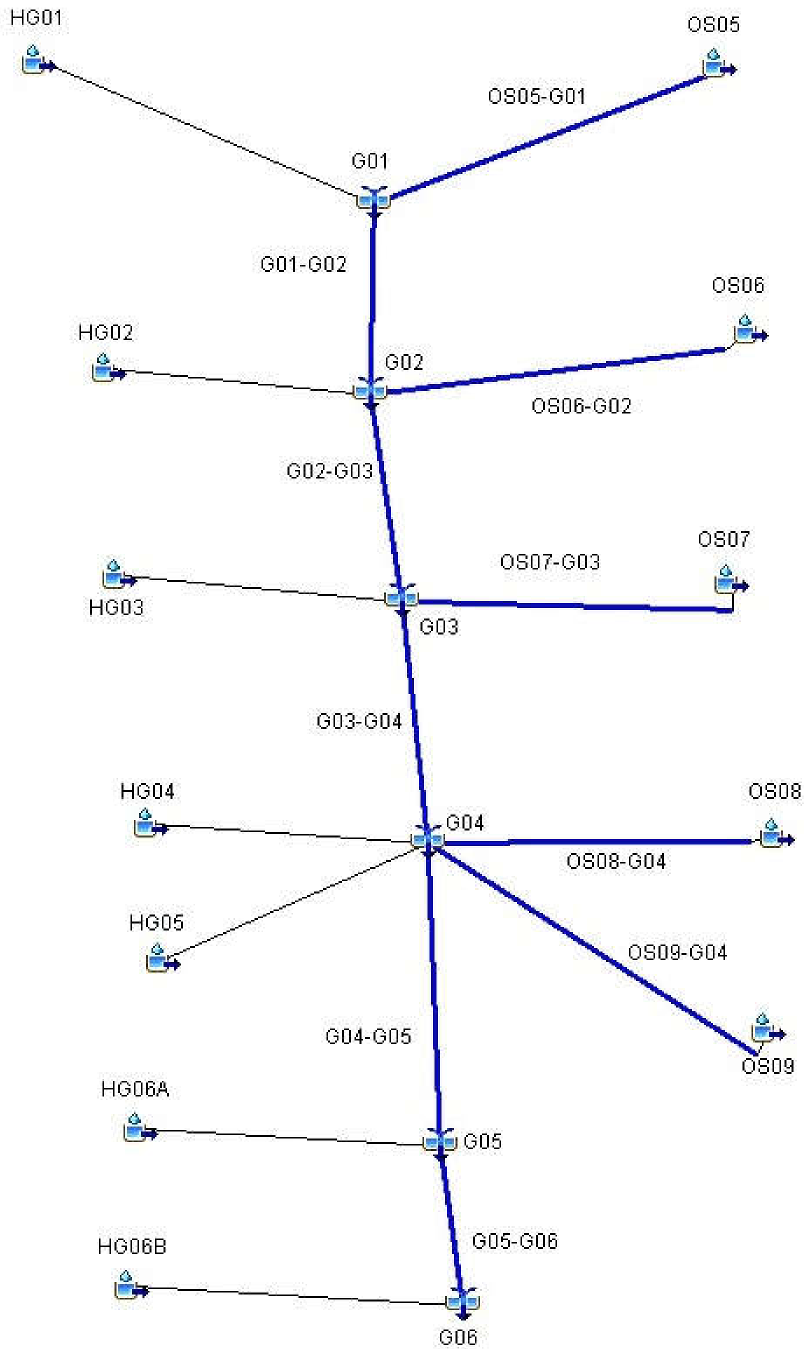
HAEGLER HISTORIC



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

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

GIECK. HISTORIC



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

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

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

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

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

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

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

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

| INTERIM MDDP (100-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | TIME OF PEAK | TOTAL VOLUME Q100 (AC. FT.) |
| 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 | 0.0658 | 46 | 01Jul2015, 12:18 | 5.5 |
| OS07a-POND F | 0.0170 | 13 | 01Jul2015, 12:18 | 1.3 |
| POND F | 0.4596 | 177 | 01Jul2015, 12:42 | 35.8 |
| POND F-G7 | 0.4596 | 177 | 01Jul2015, 12:42 | 35.6 |
| FG22 | 0.0658 | 51 | 01Jul2015, 12:18 | 6.0 |
| FG23a | 0.0177 | 18 | 01Jul2015, 12:12 | 1.9 |
| OS07b | 0.0156 | 15 | 01Jul2015, 12:06 | 1.2 |
| OS07b-G7 | 0.0156 | 13 | 01Jul2015, 12:24 | 1.2 |
| G7 | 0.5587 | 215 | 01Jul2015, 12:36 | 44.7 |
| G7-G10 | 0.5587 | 215 | 01Jul2015, 12:42 | 44.3 |
| FG24 | 0.2503 | 110 | 01Jul2015, 12:30 | 17.9 |
| OS09 | 0.1527 | 90 | 01Jul2015, 12:24 | 13.0 |
| OS09-G10 | 0.1527 | 88 | 01Jul2015, 12:30 | 12.9 |
| OS08 | 0.0397 | 35 | 01Jul2015, 12:12 | 3.5 |
| OS08-G8 | 0.0397 | 34 | 01Jul2015, 12:24 | 3.4 |
| G8 | 0.4427 | 227 | 01Jul2015, 12:30 | 34.1 |
| G8-G10 | 0.4427 | 225 | 01Jul2015, 12:30 | 34.0 |
| FG23b | 0.0359 | 21 | 01Jul2015, 12:18 | 2.6 |
| G10 | 1.0373 | 444 | 01Jul2015, 12:36 | 81.0 |
| G10-G11 | 1.0373 | 442 | 01Jul2015, 12:36 | 80.9 |
| FG23c | 0.0070 | 6 | 01Jul2015, 12:12 | 0.7 |
| G11 | 1.0443 | 445 | 01Jul2015, 12:36 | 81.6 |
| FG25 | 0.1086 | 85 | 01Jul2015, 12:30 | 13.3 |
| FG28 | 0.0673 | 38 | 01Jul2015, 12:18 | 5.2 |
| POND G IN | 1.2202 | 558 | 01Jul2015, 12:36 | 100.2 |
| POND G | 1.2202 | 399 | 01Jul2015, 13:00 | 91.4 |
| G12 | 1.2202 | 399 | 01Jul2015, 13:00 | 91.4 |
| G12-G06 | 1.2202 | 398 | 01Jul2015, 13:06 | 90.8 |
| 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 | 1.3601 | 418 | 01Jul2015, 13:06 | 100.7 |
| FG10A | 0.0806 | 81 | 01Jul2015, 12:18 | 9.6 |
| FG08A | 0.0750 | 116 | 01Jul2015, 12:06 | 10.2 |

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.) |
| 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 | 433 | 01Jul2015, 12:12 | 47.3 |
| FG13 | 0.0534 | 34 | 01Jul2015, 12:24 | 4.8 |
| FG12 | 0.0328 | 50 | 01Jul2015, 12:12 | 5.0 |
| POND D IN | 0.4573 | 509 | 01Jul2015, 12:12 | 57.0 |
| POND D | 0.4573 | 134 | 01Jul2015, 13:00 | 46.8 |
| POND D-G17 | 0.4573 | 134 | 01Jul2015, 13:00 | 46.8 |
| FG15 | 0.0103 | 15 | 01Jul2015, 12:06 | 1.5 |
| FG15-G17A | 0.0103 | 15 | 01Jul2015, 12:12 | 1.5 |
| G17A | 0.4676 | 137 | 01Jul2015, 13:00 | 48.2 |
| FG14 | 0.1000 | 98 | 01Jul2015, 12:18 | 12.5 |
| G17 | 0.5676 | 196 | 01Jul2015, 12:30 | 60.8 |
| G17-G18 | 0.5676 | 196 | 01Jul2015, 12:36 | 60.7 |
| FG16 | 0.0791 | 133 | 01Jul2015, 12:06 | 11.5 |
| G18 | 0.6467 | 240 | 01Jul2015, 12:24 | 72.2 |
| G18-POND E | 0.6467 | 240 | 01Jul2015, 12:24 | 72.2 |
| FG31 | 0.0922 | 116 | 01Jul2015, 12:18 | 13.9 |
| FG30 | 0.0389 | 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 | 552 | 01Jul2015, 12:12 | 119.8 |
| POND E | 1.0170 | 233 | 01Jul2015, 13:36 | 95.8 |
| H08 | 1.0170 | 200 | 01Jul2015, 13:36 | 83.8 |
| H09 | 0.0000 | 34 | 01Jul2015, 13:36 | 12.0 |
| FG34 | 0.0836 | 48 | 01Jul2015, 12:18 | 5.9 |
| G14 | 0.0836 | 48 | 01Jul2015, 12:18 | 5.9 |
| G14-G15 | 0.0836 | 48 | 01Jul2015, 12:18 | 5.9 |
| FG35 | 0.0586 | 19 | 01Jul2015, 12:48 | 4.1 |
| G15 | 0.1422 | 60 | 01Jul2015, 12:24 | 10.0 |
| G15-G08 | 0.1422 | 59 | 01Jul2015, 12:24 | 9.9 |
| FG37 | 0.1203 | 44 | 01Jul2015, 12:42 | 8.4 |
| FG36 | 0.0281 | 16 | 01Jul2015, 12:18 | 2.0 |
| FG36-G08 | 0.0281 | 15 | 01Jul2015, 12:24 | 2.0 |
| G08 | 0.2906 | 114 | 01Jul2015, 12:30 | 20.3 |
| | | | | |

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

| INTERIM MDDP (50-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK | TOTAL VOLUME Q50 (AC. FT.) |
| 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 | 0.0658 | 32 | 01Jul2015, 12:18 | 4.0 |
| OS07a-POND F | 0.0170 | 9 | 01Jul2015, 12:18 | 0.9 |
| POND F | 0.4596 | 121 | 01Jul2015, 12:42 | 25.7 |
| POND F-G7 | 0.4596 | 120 | 01Jul2015, 12:48 | 25.5 |
| FG22 | 0.0658 | 36 | 01Jul2015, 12:18 | 4.4 |
| FG23a | 0.0177 | 13 | 01Jul2015, 12:12 | 1.4 |
| OS07b | 0.0156 | 10.0 | 01Jul2015, 12:06 | 0.9 |
| OS07b-G7 | 0.0156 | 9 | 01Jul2015, 12:24 | 0.9 |
| G7 | 0.5587 | 145 | 01Jul2015, 12:42 | 32.2 |
| G7-G10 | 0.5587 | 144 | 01Jul2015, 12:48 | 31.9 |
| FG24 | 0.2503 | 73 | 01Jul2015, 12:30 | 12.6 |
| OS09 | 0.1527 | 62 | 01Jul2015, 12:24 | 9.4 |
| OS09-G10 | 0.1527 | 61 | 01Jul2015, 12:36 | 9.3 |
| OS08 | 0.0397 | 24 | 01Jul2015, 12:12 | 2.6 |
| OS08-G8 | 0.0397 | 24 | 01Jul2015, 12:24 | 2.5 |
| G8 | 0.4427 | 154 | 01Jul2015, 12:30 | 24.4 |
| G8-G10 | 0.4427 | 151 | 01Jul2015, 12:30 | 24.3 |
| FG23b | 0.0359 | 14 | 01Jul2015, 12:18 | 1.9 |
| G10 | 1.0373 | 287 | 01Jul2015, 12:42 | 58.1 |
| G10-G11 | 1.0373 | 285 | 01Jul2015, 12:42 | 58.0 |
| FG23c | 0.0070 | 4.2 | 01Jul2015, 12:18 | 0.5 |
| G11 | 1.0443 | 287 | 01Jul2015, 12:42 | 58.5 |
| FG25 | 0.1086 | 64 | 01Jul2015, 12:30 | 10.2 |
| FG28 | 0.0673 | 26 | 01Jul2015, 12:24 | 3.7 |
| POND G IN | 1.2202 | 363 | 01Jul2015, 12:42 | 72.5 |
| POND G | 1.2202 | 237 | 01Jul2015, 13:12 | 64.3 |
| G12 | 1.2202 | 237 | 01Jul2015, 13:12 | 64.3 |
| G12-G06 | 1.2202 | 236 | 01Jul2015, 13:18 | 63.8 |
| 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 | 1.3601 | 248 | 01Jul2015, 13:18 | 70.8 |
| FG10A | 0.0806 | 61 | 01Jul2015, 12:18 | 7.3 |
| FG08A | 0.0750 | 90 | 01Jul2015, 12:06 | 7.9 |

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.) |
| FG08A-G05 | 0.0750 | 86 | 01Jul2015, 12:12 | 7.9 |
| FG08B | 0.0630 | 67 | 01Jul2015, 12:12 | 6.6 |
| FG08B-G05 | 0.0630 | 65 | 01Jul2015, 12:12 | 6.6 |
| FG11 | 0.0625 | 59 | 01Jul2015, 12:18 | 7.0 |
| FG09 | 0.0484 | 36 | 01Jul2015, 12:12 | 4.1 |
| FG09-G05 | 0.0484 | 36 | 01Jul2015, 12:18 | 4.1 |
| FG10B | 0.0416 | 31 | 01Jul2015, 12:12 | 3.5 |
| G05 | 0.3711 | 330 | 01Jul2015, 12:12 | 36.4 |
| FG13 | 0.0534 | 24 | 01Jul2015, 12:24 | 3.5 |
| FG12 | 0.0328 | 40 | 01Jul2015, 12:12 | 3.9 |
| POND D IN | 0.4573 | 387 | 01Jul2015, 12:12 | 43.9 |
| POND D | 0.4573 | 91 | 01Jul2015, 13:06 | 34.7 |
| POND D-G17 | 0.4573 | 91 | 01Jul2015, 13:06 | 34.6 |
| FG15 | 0.0103 | 12 | 01Jul2015, 12:12 | 1.2 |
| FG15-G17A | 0.0103 | 12 | 01Jul2015, 12:12 | 1.2 |
| G17A | 0.4676 | 93 | 01Jul2015, 13:06 | 35.8 |
| FG14 | 0.1000 | 74 | 01Jul2015, 12:18 | 9.6 |
| G17 | 0.5676 | 132 | 01Jul2015, 12:36 | 45.4 |
| G17-G18 | 0.5676 | 131 | 01Jul2015, 12:36 | 45.4 |
| FG16 | 0.0791 | 104 | 01Jul2015, 12:06 | 9.0 |
| G18 | 0.6467 | 178 | 01Jul2015, 12:12 | 54.4 |
| G18-POND E | 0.6467 | 176 | 01Jul2015, 12:12 | 54.4 |
| FG31 | 0.0922 | 92 | 01Jul2015, 12:18 | 11.0 |
| FG30 | 0.0389 | 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 | 423 | 01Jul2015, 12:12 | 91.3 |
| POND E | 1.0170 | 144 | 01Jul2015, 14:00 | 68.1 |
| H08 | 1.0170 | 130 | 01Jul2015, 14:00 | 59.8 |
| H09 | 0.0000 | 14 | 01Jul2015, 14:00 | 8.3 |
| FG34 | 0.0836 | 32 | 01Jul2015, 12:18 | 4.2 |
| G14 | 0.0836 | 32 | 01Jul2015, 12:18 | 4.2 |
| G14-G15 | 0.0836 | 32 | 01Jul2015, 12:24 | 4.1 |
| FG35 | 0.0586 | 13 | 01Jul2015, 12:54 | 2.9 |
| G15 | 0.1422 | 39 | 01Jul2015, 12:24 | 7.0 |
| G15-G08 | 0.1422 | 39 | 01Jul2015, 12:30 | 6.9 |
| FG37 | 0.1203 | 29 | 01Jul2015, 12:42 | 5.9 |
| FG36 | 0.0281 | 10 | 01Jul2015, 12:18 | 1.4 |
| FG36-G08 | 0.0281 | 10 | 01Jul2015, 12:24 | 1.4 |
| G08 | 0.2906 | 75 | 01Jul2015, 12:30 | 14.3 |
| | | | | |

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

| INTERIM MDDP (25-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q25 (CFS) | TIME OF PEAK | TOTAL VOLUME Q25 (AC. FT.) |
| OS06 | 0.1313 | 30 | 01Jul2015, 12:18 | 4.3 |
| G1a | 0.1313 | 30 | 01Jul2015, 12:18 | 4.3 |
| G1a-G2 | 0.1313 | 30 | 01Jul2015, 12:18 | 4.2 |
| OS05 | 0.0578 | 15 | 01Jul2015, 12:12 | 1.9 |
| OS05-G1 | 0.0578 | 15 | 01Jul2015, 12:12 | 1.9 |
| FG01 | 0.0531 | 14 | 01Jul2015, 12:30 | 2.4 |
| FG01-G1 | 0.0531 | 14 | 01Jul2015, 12:30 | 2.4 |
| G1 | 0.1109 | 25 | 01Jul2015, 12:18 | 4.3 |
| G1-G2 | 0.1109 | 25 | 01Jul2015, 12:24 | 4.3 |
| FG02 | 0.0391 | 14 | 01Jul2015, 12:12 | 1.6 |
| G2 | 0.2813 | 67 | 01Jul2015, 12:18 | 10.2 |
| G2-G3 | 0.2813 | 66 | 01Jul2015, 12:24 | 10.1 |
| FG03 | 0.0203 | 12 | 01Jul2015, 12:06 | 1.0 |
| FG04 | 0.0172 | 11 | 01Jul2015, 12:00 | 0.9 |
| G3 | 0.3188 | 74 | 01Jul2015, 12:24 | 12.0 |
| G3-POND F | 0.3188 | 74 | 01Jul2015, 12:24 | 12.0 |
| FG06 | 0.0658 | 20 | 01Jul2015, 12:18 | 2.7 |
| OS07a-POND F | 0.0170 | 6 | 01Jul2015, 12:24 | 0.6 |
| POND F | 0.4596 | 60 | 01Jul2015, 12:54 | 17.2 |
| POND F-G7 | 0.4596 | 60 | 01Jul2015, 13:00 | 17.1 |
| FG22 | 0.0658 | 24 | 01Jul2015, 12:18 | 3.1 |
| FG23a | 0.0177 | 9 | 01Jul2015, 12:12 | 1.0 |
| OS07b | 0.0156 | 6.2 | 01Jul2015, 12:06 | 0.6 |
| OS07b-G7 | 0.0156 | 5 | 01Jul2015, 12:30 | 0.6 |
| G7 | 0.5587 | 72 | 01Jul2015, 13:00 | 21.8 |
| G7-G10 | 0.5587 | 72 | 01Jul2015, 13:06 | 21.5 |
| FG24 | 0.2503 | 43 | 01Jul2015, 12:30 | 8.3 |
| OS09 | 0.1527 | 39 | 01Jul2015, 12:30 | 6.5 |
| OS09-G10 | 0.1527 | 39 | 01Jul2015, 12:36 | 6.3 |
| OS08 | 0.0397 | 16 | 01Jul2015, 12:12 | 1.8 |
| OS08-G8 | 0.0397 | 15 | 01Jul2015, 12:24 | 1.7 |
| G8 | 0.4427 | 94 | 01Jul2015, 12:30 | 16.3 |
| G8-G10 | 0.4427 | 94 | 01Jul2015, 12:36 | 16.2 |
| FG23b | 0.0359 | 8 | 01Jul2015, 12:18 | 1.2 |
| G10 | 1.0373 | 146 | 01Jul2015, 12:48 | 39.0 |
| G10-G11 | 1.0373 | 145 | 01Jul2015, 12:48 | 39.0 |
| FG23c | 0.0070 | 2.8 | 01Jul2015, 12:18 | 0.4 |
| G11 | 1.0443 | 146 | 01Jul2015, 12:48 | 39.3 |
| FG25 | 0.1086 | 46 | 01Jul2015, 12:30 | 7.5 |
| FG28 | 0.0673 | 15.9 | 01Jul2015, 12:24 | 2.5 |
| POND G IN | 1.2202 | 202 | 01Jul2015, 12:36 | 49.3 |
| POND G | 1.2202 | 118 | 01Jul2015, 13:36 | 41.8 |
| G12 | 1.2202 | 118 | 01Jul2015, 13:36 | 41.8 |
| G12-G06 | 1.2202 | 117 | 01Jul2015, 13:42 | 41.5 |
| FG29 | 0.0997 | 23 | 01Jul2015, 12:18 | 3.3 |
| FG32 | 0.0402 | 11 | 01Jul2015, 12:12 | 1.3 |
| FG32-G06 | 0.0402 | 11 | 01Jul2015, 12:12 | 1.3 |
| G06 | 1.3601 | 124 | 01Jul2015, 13:36 | 46.0 |
| FG10A | 0.0806 | 43 | 01Jul2015, 12:18 | 5.4 |
| FG08A | 0.0750 | 66 | 01Jul2015, 12:06 | 5.9 |

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

| INTERIM MDDP (25-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q25 (CFS) | TIME OF PEAK | TOTAL VOLUME Q25 (AC. FT.) |
| FG08A-G05 | 0.0750 | 64 | 01Jul2015, 12:12 | 5.9 |
| FG08B | 0.0630 | 49 | 01Jul2015, 12:12 | 5.0 |
| FG08B-G05 | 0.0630 | 48 | 01Jul2015, 12:12 | 4.9 |
| FG11 | 0.0625 | 44 | 01Jul2015, 12:18 | 5.2 |
| FG09 | 0.0484 | 25 | 01Jul2015, 12:18 | 3.0 |
| FG09-G05 | 0.0484 | 25 | 01Jul2015, 12:18 | 3.0 |
| FG10B | 0.0416 | 22 | 01Jul2015, 12:12 | 2.5 |
| G05 | 0.3711 | 239 | 01Jul2015, 12:12 | 26.9 |
| FG13 | 0.0534 | 15 | 01Jul2015, 12:24 | 2.4 |
| FG12 | 0.0328 | 30 | 01Jul2015, 12:12 | 3.0 |
| POND D IN | 0.4573 | 280 | 01Jul2015, 12:12 | 32.4 |
| POND D | 0.4573 | 50 | 01Jul2015, 13:24 | 24.3 |
| POND D-G17 | 0.4573 | 50 | 01Jul2015, 13:24 | 24.3 |
| FG15 | 0.0103 | 9.0 | 01Jul2015, 12:12 | 0.9 |
| FG15-G17A | 0.0103 | 9.0 | 01Jul2015, 12:12 | 0.9 |
| G17A | 0.4676 | 51 | 01Jul2015, 13:24 | 25.2 |
| FG14 | 0.1000 | 53 | 01Jul2015, 12:18 | 7.1 |
| G17 | 0.5676 | 75 | 01Jul2015, 12:24 | 32.3 |
| G17-G18 | 0.5676 | 75 | 01Jul2015, 12:24 | 32.2 |
| FG16 | 0.0791 | 78 | 01Jul2015, 12:06 | 6.8 |
| G18 | 0.6467 | 128 | 01Jul2015, 12:12 | 39.1 |
| G18-POND E | 0.6467 | 126 | 01Jul2015, 12:12 | 39.0 |
| FG31 | 0.0922 | 69 | 01Jul2015, 12:18 | 8.4 |
| FG30 | 0.0389 | 12 | 01Jul2015, 12:06 | 1.3 |
| FG30-PONDHS | 0.0389 | 11 | 01Jul2015, 12:18 | 1.3 |
| POND HS | 0.1311 | 40 | 01Jul2015, 12:42 | 9.6 |
| FG17a | 0.0694 | 57 | 01Jul2015, 12:06 | 5.4 |
| FG17a-POND E | 0.0694 | 56 | 01Jul2015, 12:12 | 5.4 |
| FG18 | 0.0644 | 30 | 01Jul2015, 12:24 | 4.3 |
| FG18-POND E | 0.0644 | 30 | 01Jul2015, 12:24 | 4.3 |
| FG19 | 0.0527 | 50 | 01Jul2015, 12:06 | 4.9 |
| FG17c | 0.0313 | 14 | 01Jul2015, 12:06 | 1.4 |
| FG17b | 0.0214 | 24 | 01Jul2015, 12:06 | 1.9 |
| POND E IN | 1.0170 | 308 | 01Jul2015, 12:12 | 66.5 |
| POND E | 1.0170 | 74 | 01Jul2015, 14:42 | 44.4 |
| H08 | 1.0170 | 66 | 01Jul2015, 14:42 | 37.8 |
| H09 | 0.0000 | 7.9 | 01Jul2015, 14:42 | 6.6 |
| FG34 | 0.0836 | 19 | 01Jul2015, 12:18 | 2.7 |
| G14 | 0.0836 | 19 | 01Jul2015, 12:18 | 2.7 |
| G14-G15 | 0.0836 | 18 | 01Jul2015, 12:24 | 2.7 |
| FG35 | 0.0586 | 7 | 01Jul2015, 12:54 | 1.9 |
| G15 | 0.1422 | 23 | 01Jul2015, 12:30 | 4.6 |
| G15-G08 | 0.1422 | 23 | 01Jul2015, 12:30 | 4.5 |
| FG37 | 0.1203 | 17 | 01Jul2015, 12:42 | 3.9 |
| FG36 | 0.0281 | 6 | 01Jul2015, 12:24 | 1.0 |
| FG36-G08 | 0.0281 | 6 | 01Jul2015, 12:30 | 0.9 |
| G08 | 0.2906 | 44 | 01Jul2015, 12:36 | 9.3 |
| | | | | |

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 | 0.0658 | 9 | 01Jul2015, 12:18 | 1.5 |
| OS07a-POND F | 0.0170 | 2 | 01Jul2015, 12:30 | 0.3 |
| POND F | 0.4596 | 17 | 01Jul2015, 13:48 | 9.3 |
| POND F-G7 | 0.4596 | 17 | 01Jul2015, 13:54 | 9.2 |
| FG22 | 0.0658 | 12 | 01Jul2015, 12:18 | 1.7 |
| FG23a | 0.0177 | 5 | 01Jul2015, 12:12 | 0.6 |
| OS07b | 0.0156 | 3 | 01Jul2015, 12:06 | 0.3 |
| OS07b-G7 | 0.0156 | 2.3 | 01Jul2015, 12:36 | 0.3 |
| G7 | 0.5587 | 22 | 01Jul2015, 12:54 | 11.9 |
| G7-G10 | 0.5587 | 22 | 01Jul2015, 13:06 | 11.7 |
| FG24 | 0.2503 | 17.0 | 01Jul2015, 12:36 | 4.2 |
| OS09 | 0.1527 | 18 | 01Jul2015, 12:30 | 3.5 |
| OS09-G10 | 0.1527 | 18 | 01Jul2015, 12:42 | 3.5 |
| OS08 | 0.0397 | 8 | 01Jul2015, 12:12 | 1.0 |
| OS08-G8 | 0.0397 | 7 | 01Jul2015, 12:30 | 1.0 |
| G8 | 0.4427 | 41 | 01Jul2015, 12:36 | 8.6 |
| G8-G10 | 0.4427 | 40.8 | 01Jul2015, 12:42 | 8.6 |
| FG23b | 0.0359 | 3.3 | 01Jul2015, 12:24 | 0.6 |
| G10 | 1.0373 | 60 | 01Jul2015, 12:48 | 20.9 |
| G10-G11 | 1.0373 | 60 | 01Jul2015, 12:48 | 20.9 |
| FG23c | 0.0070 | 1.4 | 01Jul2015, 12:18 | 0.2 |
| G11 | 1.0443 | 61 | 01Jul2015, 12:48 | 21.1 |
| FG25 | 0.1086 | 27 | 01Jul2015, 12:36 | 4.7 |
| FG28 | 0.0673 | 6.7 | 01Jul2015, 12:24 | 1.3 |
| POND G IN | 1.2202 | 91 | 01Jul2015, 12:42 | 27.1 |
| POND G | 1.2202 | 35 | 01Jul2015, 14:48 | 20.9 |
| G12 | 1.2202 | 35 | 01Jul2015, 14:48 | 20.9 |
| G12-G06 | 1.2202 | 35 | 01Jul2015, 15:00 | 20.7 |
| FG29 | 0.0997 | 8.7 | 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 | 1.3601 | 37 | 01Jul2015, 14:54 | 23.0 |
| FG10A | 0.0806 | 25 | 01Jul2015, 12:18 | 3.3 |
| FG08A | 0.0750 | 41 | 01Jul2015, 12:06 | 3.8 |

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.) |
| FG08A-G05 | 0.0750 | 41 | 01Jul2015, 12:12 | 3.8 |
| FG08B | 0.0630 | 31 | 01Jul2015, 12:12 | 3.2 |
| FG08B-G05 | 0.0630 | 29 | 01Jul2015, 12:18 | 3.2 |
| FG11 | 0.0625 | 28 | 01Jul2015, 12:18 | 3.4 |
| FG09 | 0.0484 | 14 | 01Jul2015, 12:18 | 1.8 |
| FG09-G05 | 0.0484 | 14 | 01Jul2015, 12:18 | 1.8 |
| FG10B | 0.0416 | 12 | 01Jul2015, 12:18 | 1.5 |
| G05 | 0.3711 | 145 | 01Jul2015, 12:18 | 17.1 |
| FG13 | 0.0534 | 7.5 | 01Jul2015, 12:30 | 1.4 |
| FG12 | 0.0328 | 20 | 01Jul2015, 12:12 | 2.0 |
| POND D IN | 0.4573 | 168 | 01Jul2015, 12:18 | 20.4 |
| POND D | 0.4573 | 19 | 01Jul2015, 14:24 | 14.8 |
| POND D-G17 | 0.4573 | 19 | 01Jul2015, 14:24 | 14.8 |
| FG15 | 0.0103 | 5.8 | 01Jul2015, 12:12 | 0.6 |
| FG15-G17A | 0.0103 | 5.8 | 01Jul2015, 12:12 | 0.6 |
| G17A | 0.4676 | 19 | 01Jul2015, 14:12 | 15.3 |
| FG14 | 0.1000 | 32 | 01Jul2015, 12:24 | 4.5 |
| G17 | 0.5676 | 43 | 01Jul2015, 12:24 | 19.8 |
| G17-G18 | 0.5676 | 43 | 01Jul2015, 12:30 | 19.8 |
| FG16 | 0.0791 | 50 | 01Jul2015, 12:06 | 4.5 |
| G18 | 0.6467 | 79 | 01Jul2015, 12:12 | 24.3 |
| G18-POND E | 0.6467 | 78 | 01Jul2015, 12:12 | 24.3 |
| FG31 | 0.0922 | 45 | 01Jul2015, 12:18 | 5.6 |
| FG30 | 0.0389 | 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 | 6.5 | 01Jul2015, 12:06 | 0.8 |
| FG17b | 0.0214 | 16 | 01Jul2015, 12:06 | 1.3 |
| POND E IN | 1.0170 | 190 | 01Jul2015, 12:12 | 42.0 |
| POND E | 1.0170 | 28 | 01Jul2015, 18:00 | 22.9 |
| H08 | 1.0170 | 22 | 01Jul2015, 18:00 | 17.8 |
| H09 | 0.0000 | 5.7 | 01Jul2015, 18:00 | 5.1 |
| FG34 | 0.0836 | 7 | 01Jul2015, 12:18 | 1.4 |
| G14 | 0.0836 | 7 | 01Jul2015, 12:18 | 1.4 |
| G14-G15 | 0.0836 | 7 | 01Jul2015, 12:30 | 1.4 |
| FG35 | 0.0586 | 3 | 01Jul2015, 13:00 | 1.0 |
| G15 | 0.1422 | 9 | 01Jul2015, 12:36 | 2.3 |
| G15-G08 | 0.1422 | 9 | 01Jul2015, 12:36 | 2.3 |
| FG37 | 0.1203 | 7 | 01Jul2015, 12:48 | 2.0 |
| FG36 | 0.0281 | 2 | 01Jul2015, 12:24 | 0.5 |
| FG36-G08 | 0.0281 | 2 | 01Jul2015, 12:36 | 0.5 |
| G08 | 0.2906 | 18 | 01Jul2015, 12:42 | 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 | 0.8 | 01Jul2015, 12:12 | 0.2 |
| FG04 | 0.0172 | 3.1 | 01Jul2015, 12:06 | 0.3 |
| G3 | 0.3188 | 11 | 01Jul2015, 12:36 | 3.3 |
| G3-POND F | 0.3188 | 11 | 01Jul2015, 12:42 | 3.3 |
| FG06 | 0.0658 | 3.9 | 01Jul2015, 12:24 | 0.8 |
| OS07a-POND F | 0.0170 | 0.9 | 01Jul2015, 12:36 | 0.2 |
| POND F | 0.4596 | 8.0 | 01Jul2015, 14:12 | 5.0 |
| POND F-G7 | 0.4596 | 8.0 | 01Jul2015, 14:18 | 4.9 |
| FG22 | 0.0658 | 5.6 | 01Jul2015, 12:18 | 1.0 |
| FG23a | 0.0177 | 2.7 | 01Jul2015, 12:18 | 0.4 |
| OS07b | 0.0156 | 1.0 | 01Jul2015, 12:12 | 0.2 |
| OS07b-G7 | 0.0156 | 0.9 | 01Jul2015, 12:42 | 0.2 |
| G7 | 0.5587 | 10.0 | 01Jul2015, 14:00 | 6.5 |
| G7-G10 | 0.5587 | 10.0 | 01Jul2015, 14:12 | 6.4 |
| FG24 | 0.2503 | 6.2 | 01Jul2015, 12:42 | 2.2 |
| OS09 | 0.1527 | 8.2 | 01Jul2015, 12:36 | 2.0 |
| OS09-G10 | 0.1527 | 8.2 | 01Jul2015, 12:48 | 2.0 |
| OS08 | 0.0397 | 3.4 | 01Jul2015, 12:12 | 0.6 |
| OS08-G8 | 0.0397 | 3.3 | 01Jul2015, 12:36 | 0.6 |
| G8 | 0.4427 | 17.1 | 01Jul2015, 12:42 | 4.7 |
| G8-G10 | 0.4427 | 17.1 | 01Jul2015, 12:48 | 4.7 |
| FG23b | 0.0359 | 1.2 | 01Jul2015, 12:30 | 0.3 |
| G10 | 1.0373 | 25 | 01Jul2015, 12:48 | 11.4 |
| G10-G11 | 1.0373 | 25 | 01Jul2015, 12:54 | 11.4 |
| FG23c | 0.0070 | 0.7 | 01Jul2015, 12:18 | 0.1 |
| G11 | 1.0443 | 25 | 01Jul2015, 12:54 | 11.5 |
| FG25 | 0.1086 | 17 | 01Jul2015, 12:36 | 3.1 |
| FG28 | 0.0673 | 2.7 | 01Jul2015, 12:30 | 0.7 |
| POND G IN | 1.2202 | 42 | 01Jul2015, 12:48 | 15.3 |
| POND G | 1.2202 | 13 | 01Jul2015, 17:36 | 9.7 |
| G12 | 1.2202 | 13 | 01Jul2015, 17:36 | 9.7 |
| G12-G06 | 1.2202 | 13 | 01Jul2015, 17:42 | 9.5 |
| FG29 | 0.0997 | 2.8 | 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 | 1.3601 | 14 | 01Jul2015, 17:42 | 10.7 |
| FG10A | 0.0806 | 15 | 01Jul2015, 12:18 | 2.2 |
| FG08A | 0.0750 | 27 | 01Jul2015, 12:06 | 2.6 |

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.) |
| 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 | 93 | 01Jul2015, 12:18 | 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 | 107 | 01Jul2015, 12:18 | 13.6 |
| POND D | 0.4573 | 12 | 01Jul2015, 14:36 | 9.2 |
| POND D-G17 | 0.4573 | 12 | 01Jul2015, 14:42 | 9.2 |
| FG15 | 0.0103 | 4 | 01Jul2015, 12:12 | 0.4 |
| FG15-G17A | 0.0103 | 4 | 01Jul2015, 12:12 | 0.4 |
| G17A | 0.4676 | 12 | 01Jul2015, 14:36 | 9.6 |
| FG14 | 0.1000 | 20 | 01Jul2015, 12:24 | 3.0 |
| G17 | 0.5676 | 25 | 01Jul2015, 12:24 | 12.5 |
| G17-G18 | 0.5676 | 25 | 01Jul2015, 12:24 | 12.5 |
| FG16 | 0.0791 | 34 | 01Jul2015, 12:06 | 3.1 |
| G18 | 0.6467 | 51 | 01Jul2015, 12:12 | 15.7 |
| G18-POND E | 0.6467 | 50 | 01Jul2015, 12:12 | 15.6 |
| FG31 | 0.0922 | 31 | 01Jul2015, 12:18 | 3.9 |
| FG30 | 0.0389 | 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 | 123 | 01Jul2015, 12:12 | 27.7 |
| POND E | 1.0170 | 15 | 01Jul2015, 20:18 | 12.1 |
| H08 | 1.0170 | 11 | 01Jul2015, 20:18 | 8.6 |
| H09 | 0.0000 | 4 | 01Jul2015, 20:18 | 3.5 |
| FG34 | 0.0836 | 2 | 01Jul2015, 12:24 | 0.7 |
| G14 | 0.0836 | 2 | 01Jul2015, 12:24 | 0.7 |
| G14-G15 | 0.0836 | 2 | 01Jul2015, 12:42 | 0.7 |
| FG35 | 0.0586 | 1 | 01Jul2015, 13:12 | 0.5 |
| G15 | 0.1422 | 3 | 01Jul2015, 12:48 | 1.2 |
| G15-G08 | 0.1422 | 3 | 01Jul2015, 12:54 | 1.2 |
| FG37 | 0.1203 | 3 | 01Jul2015, 13:00 | 1.0 |
| FG36 | 0.0281 | 1 | 01Jul2015, 12:30 | 0.3 |
| FG36-G08 | 0.0281 | 1 | 01Jul2015, 12:42 | 0.3 |
| G08 | 0.2906 | 6 | 01Jul2015, 12:54 | 2.4 |
| | | | | |

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

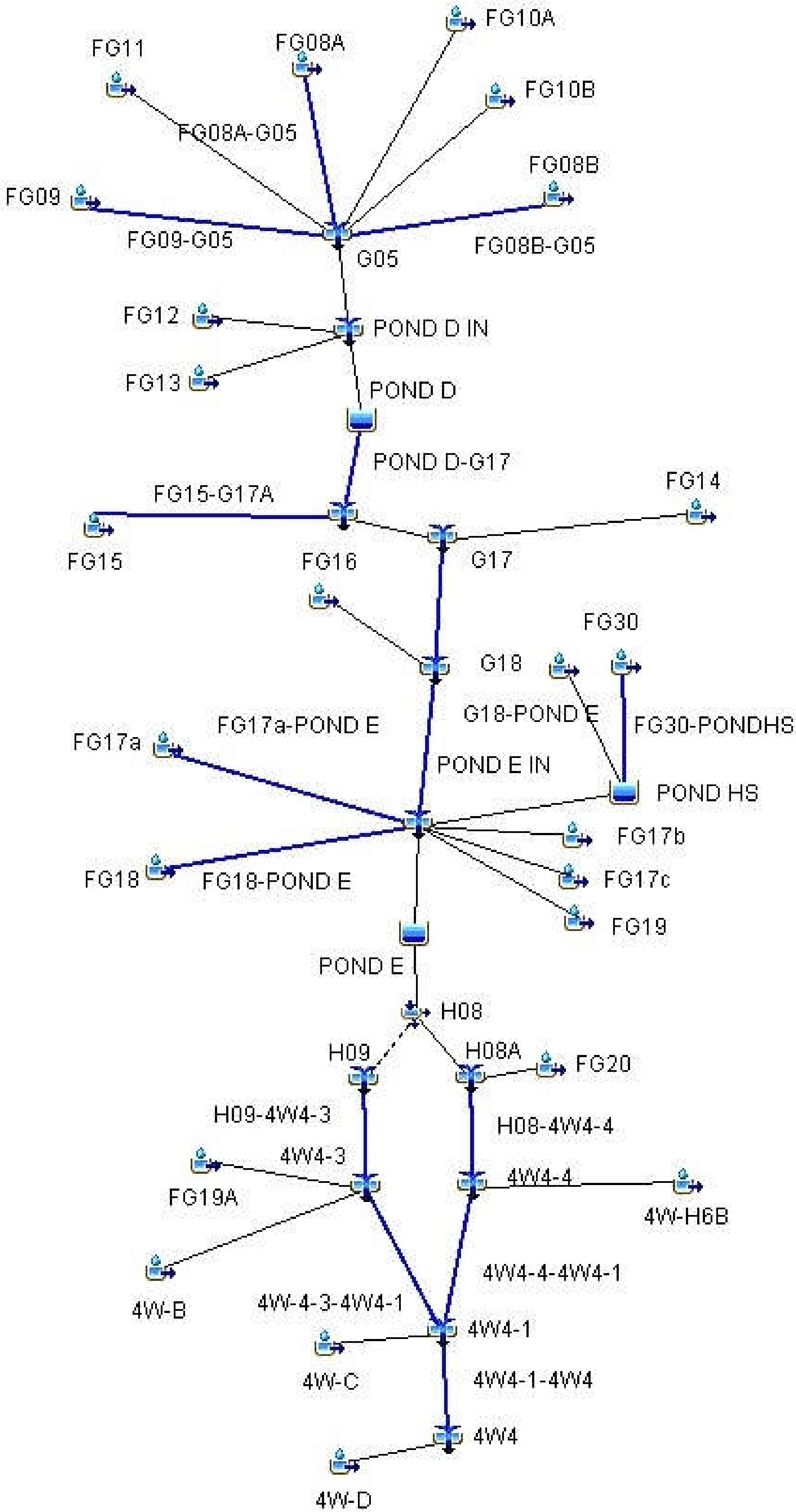
| INTERIM MDDP (2-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK | TOTAL VOLUME Q2 (AC. FT.) |
| OS06 | 0.1313 | 0.5 | 01Jul2015, 13:30 | 0.3 |
| G1a | 0.1313 | 0.5 | 01Jul2015, 13:30 | 0.3 |
| G1a-G2 | 0.1313 | 0.5 | 01Jul2015, 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 | 0.0658 | 0.8 | 01Jul2015, 12:42 | 0.3 |
| OS07a-POND F | 0.0170 | 0.1 | 01Jul2015, 13:30 | 0.1 |
| POND F | 0.4596 | 2.3 | 01Jul2015, 16:12 | 1.9 |
| POND F-G7 | 0.4596 | 2.3 | 01Jul2015, 16:24 | 1.9 |
| FG22 | 0.0658 | 1.4 | 01Jul2015, 12:30 | 0.4 |
| FG23a | 0.0177 | 1.0 | 01Jul2015, 12:18 | 0.2 |
| OS07b | 0.0156 | 0.1 | 01Jul2015, 12:48 | 0.1 |
| OS07b-G7 | 0.0156 | 0.1 | 01Jul2015, 13:42 | 0.1 |
| G7 | 0.5587 | 2.9 | 01Jul2015, 16:30 | 2.6 |
| G7-G10 | 0.5587 | 2.9 | 01Jul2015, 16:48 | 2.5 |
| FG24 | 0.2503 | 1.1 | 01Jul2015, 13:48 | 0.7 |
| OS09 | 0.1527 | 1.9 | 01Jul2015, 12:54 | 0.8 |
| OS09-G10 | 0.1527 | 1.9 | 01Jul2015, 13:18 | 0.8 |
| OS08 | 0.0397 | 0.7 | 01Jul2015, 12:24 | 0.2 |
| OS08-G8 | 0.0397 | 0.7 | 01Jul2015, 12:54 | 0.2 |
| G8 | 0.4427 | 3.4 | 01Jul2015, 13:24 | 1.7 |
| G8-G10 | 0.4427 | 3.4 | 01Jul2015, 13:30 | 1.7 |
| FG23b | 0.0359 | 0.2 | 01Jul2015, 13:18 | 0.1 |
| G10 | 1.0373 | 5.7 | 01Jul2015, 13:54 | 4.3 |
| G10-G11 | 1.0373 | 5.7 | 01Jul2015, 13:54 | 4.3 |
| FG23c | 0.0070 | 0.2 | 01Jul2015, 12:24 | 0.1 |
| G11 | 1.0443 | 5.8 | 01Jul2015, 13:42 | 4.3 |
| FG25 | 0.1086 | 7.5 | 01Jul2015, 12:36 | 1.7 |
| FG28 | 0.0673 | 0.5 | 01Jul2015, 13:12 | 0.3 |
| POND G IN | 1.2202 | 10.8 | 01Jul2015, 13:12 | 6.3 |
| POND G | 1.2202 | 4.2 | 01Jul2015, 22:30 | 4.0 |
| G12 | 1.2202 | 4.2 | 01Jul2015, 22:30 | 4.0 |
| G12-G06 | 1.2202 | 4.2 | 01Jul2015, 22:48 | 3.9 |
| FG29 | 0.0997 | 0.4 | 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 | 1.3601 | 5 | 01Jul2015, 23:42 | 4.3 |
| FG10A | 0.0806 | 6.5 | 01Jul2015, 12:24 | 1.1 |
| FG08A | 0.0750 | 13 | 01Jul2015, 12:12 | 1.5 |

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

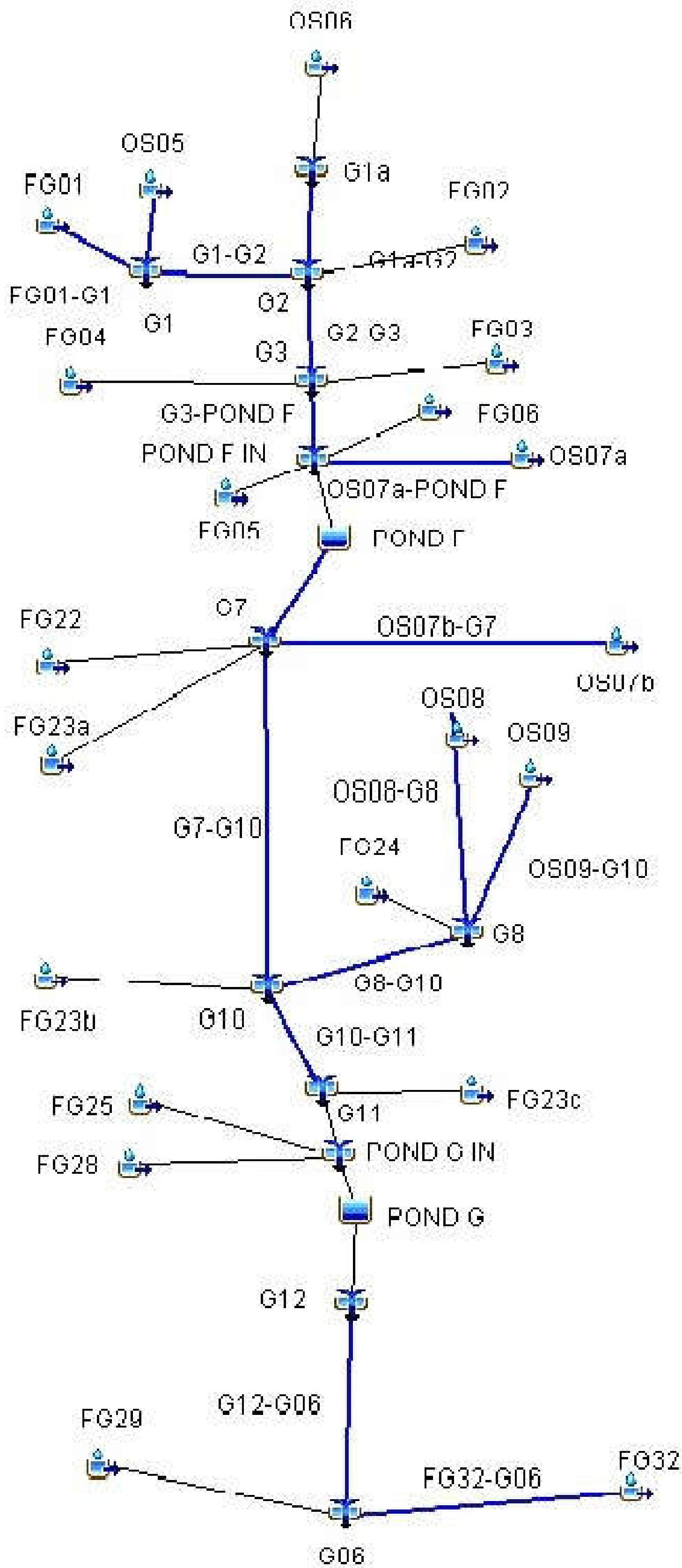
| INTERIM MDDP (2-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK | TOTAL VOLUME Q2 (AC. FT.) |
| FG08A-G05 | 0.0750 | 13 | 01Jul2015, 12:18 | 1.5 |
| FG08B | 0.0630 | 10 | 01Jul2015, 12:12 | 1.2 |
| FG08B-G05 | 0.0630 | 10 | 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 | 45 | 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 | 52 | 01Jul2015, 12:18 | 7.5 |
| POND D | 0.4573 | 4 | 01Jul2015, 18:00 | 4.0 |
| POND D-G17 | 0.4573 | 4 | 01Jul2015, 18:06 | 4.0 |
| FG15 | 0.0103 | 2 | 01Jul2015, 12:12 | 0.2 |
| FG15-G17A | 0.0103 | 2 | 01Jul2015, 12:12 | 0.2 |
| G17A | 0.4676 | 4 | 01Jul2015, 17:54 | 4.2 |
| FG14 | 0.1000 | 9 | 01Jul2015, 12:24 | 1.6 |
| G17 | 0.5676 | 12 | 01Jul2015, 12:24 | 5.8 |
| G17-G18 | 0.5676 | 12 | 01Jul2015, 12:30 | 5.8 |
| FG16 | 0.0791 | 18 | 01Jul2015, 12:06 | 1.9 |
| G18 | 0.6467 | 26 | 01Jul2015, 12:12 | 7.7 |
| G18-POND E | 0.6467 | 25 | 01Jul2015, 12:12 | 7.6 |
| 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 | 14.5 |
| POND E | 1.0170 | 6 | 02Jul2015, 00:00 | 5.7 |
| H08 | 1.0170 | 4 | 02Jul2015, 00:00 | 3.4 |
| H09 | 0.0000 | 2 | 02Jul2015, 00:00 | 2.3 |
| FG34 | 0.0836 | 0 | 01Jul2015, 13:36 | 0.2 |
| G14 | 0.0836 | 0 | 01Jul2015, 13:36 | 0.2 |
| G14-G15 | 0.0836 | 0 | 01Jul2015, 14:00 | 0.2 |
| FG35 | 0.0586 | 0 | 01Jul2015, 14:24 | 0.2 |
| G15 | 0.1422 | 1 | 01Jul2015, 14:06 | 0.4 |
| G15-G08 | 0.1422 | 1 | 01Jul2015, 14:18 | 0.4 |
| FG37 | 0.1203 | 0 | 01Jul2015, 14:12 | 0.3 |
| FG36 | 0.0281 | 0 | 01Jul2015, 13:30 | 0.1 |
| FG36-G08 | 0.0281 | 0 | 01Jul2015, 13:48 | 0.1 |
| G08 | 0.2906 | 1 | 01Jul2015, 14:12 | 0.7 |
| | | | | |

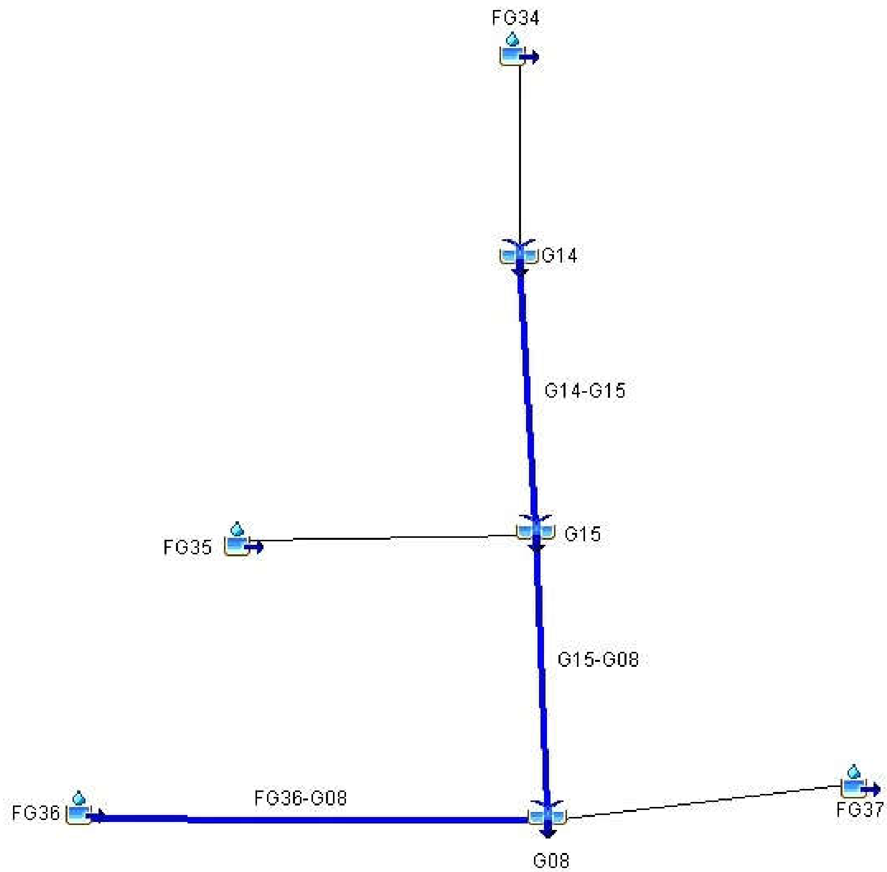
Highlighted green rows reference key design points (Typical all charts this section)

HAEGLER INTERIM CONDITIONS



GIECK INTERIM CONDITIONS




FG34
G14
G14-G15
FG35
G15
G15-G08
FG36
FG36-G08
FG37
G08

| 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 | 1.3 |
| G1a | 0.1313 | 80 | 01Jul2015, 12:12 | 1.3 |
| G1a-G2 | 0.1313 | 79 | 01Jul2015, 12:18 | 1.3 |
| OS05 | 0.0578 | 39 | 01Jul2015, 12:12 | 1.3 |
| OS05-G1 | 0.0578 | 39 | 01Jul2015, 12:12 | 1.3 |
| FG01 | 0.0538 | 31 | 01Jul2015, 12:30 | 1.7 |
| FG01-G1 | 0.0538 | 31 | 01Jul2015, 12:30 | 1.7 |
| G1 | 0.1116 | 61 | 01Jul2015, 12:18 | 1.5 |
| G1-G2 | 0.1116 | 61 | 01Jul2015, 12:18 | 1.5 |
| FG02 | 0.0391 | 32 | 01Jul2015, 12:12 | 1.6 |
| G2 | 0.2820 | 167 | 01Jul2015, 12:18 | 1.4 |
| G2-G3 | 0.2820 | 163 | 01Jul2015, 12:18 | 1.4 |
| FG03 | 0.0203 | 24 | 01Jul2015, 12:06 | 1.8 |
| FG04 | 0.0172 | 22 | 01Jul2015, 12:00 | 1.8 |
| G3 | 0.3195 | 185 | 01Jul2015, 12:18 | 1.5 |
| G3-POND F | 0.3195 | 183 | 01Jul2015, 12:18 | 1.5 |
| FG06 | 0.0675 | 56 | 01Jul2015, 12:12 | 1.7 |
| FG05 | 0.0580 | 45 | 01Jul2015, 12:24 | 2.0 |
| OS07a | 0.0170 | 14 | 01Jul2015, 12:06 | 1.5 |
| OS07a-POND F | 0.0170 | 13 | 01Jul2015, 12:18 | 1.4 |
| POND F IN | 0.4620 | 293 | 01Jul2015, 12:18 | 1.6 |
| POND F | 0.4620 | 179 | 01Jul2015, 12:42 | 1.5 |
| POND F-G7 | 0.4620 | 179 | 01Jul2015, 12:42 | 1.5 |
| FG21b | 0.0170 | 26 | 01Jul2015, 12:12 | 2.8 |
| FG21a | 0.0072 | 6 | 01Jul2015, 12:06 | 1.3 |
| FG21a-G7 | 0.0072 | 6 | 01Jul2015, 12:18 | 1.3 |
| G7 | 0.4862 | 188 | 01Jul2015, 12:42 | 1.5 |
| G7-G8 | 0.4862 | 188 | 01Jul2015, 12:42 | 1.5 |
| FG22 | 0.1380 | 102 | 01Jul2015, 12:18 | 1.8 |
| OS08 | 0.0406 | 35 | 01Jul2015, 12:12 | 1.7 |
| OS08-G8 | 0.0406 | 34 | 01Jul2015, 12:12 | 1.7 |
| FG23a | 0.0216 | 21 | 01Jul2015, 12:12 | 1.9 |
| OS07b | 0.0156 | 15 | 01Jul2015, 12:06 | 1.5 |
| OS07b-G7 | 0.0156 | 14 | 01Jul2015, 12:12 | 1.5 |
| G8 | 0.7020 | 297 | 01Jul2015, 12:30 | 1.6 |
| G8-G10 | 0.7020 | 294 | 01Jul2015, 12:30 | 1.6 |
| OS09 | 0.1527 | 90 | 01Jul2015, 12:24 | 1.6 |
| OS09-G10 | 0.1527 | 88 | 01Jul2015, 12:36 | 1.6 |
| FG24 | 0.1373 | 105 | 01Jul2015, 12:18 | 1.8 |
| G9 | 0.2900 | 180 | 01Jul2015, 12:24 | 1.7 |
| G9-G10 | 0.2900 | 178 | 01Jul2015, 12:30 | 1.7 |
| FG23b | 0.0286 | 23 | 01Jul2015, 12:12 | 1.6 |
| G10 | 1.0206 | 484 | 01Jul2015, 12:30 | 1.6 |
| G10-G11 | 1.0206 | 480 | 01Jul2015, 12:30 | 1.6 |
| FG23c | 0.0122 | 12 | 01Jul2015, 12:06 | 1.8 |
| G11 | 1.0328 | 485 | 01Jul2015, 12:30 | 1.6 |
| FG25 | 0.1086 | 85 | 01Jul2015, 12:30 | 2.3 |
| FG26 | 0.0863 | 78 | 01Jul2015, 12:18 | 2.0 |
| FG26-POND G | 0.0863 | 77 | 01Jul2015, 12:18 | 2.0 |
| FG27 | 0.0500 | 52 | 01Jul2015, 12:18 | 2.4 |
| FG28 | 0.0245 | 18 | 01Jul2015, 12:18 | 1.7 |

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.) |
| POND G IN | 1.3022 | 691 | 01Jul2015, 12:30 | 1.7 |
| POND G | 1.3022 | 479 | 01Jul2015, 12:54 | 1.6 |
| G12 | 1.3022 | 479 | 01Jul2015, 12:54 | 1.6 |
| G12-G06 | 1.3022 | 479 | 01Jul2015, 13:00 | 1.6 |
| FG29 | 0.0997 | 60 | 01Jul2015, 12:12 | 1.3 |
| FG32 | 0.0402 | 72 | 01Jul2015, 12:06 | 2.8 |
| FG32-G06 | 0.0402 | 69 | 01Jul2015, 12:06 | 2.8 |
| G06 | 1.4421 | 507 | 01Jul2015, 12:54 | 1.6 |
| FG08A | 0.0750 | 116 | 01Jul2015, 12:06 | 2.6 |
| FG08A-G05 | 0.0750 | 110 | 01Jul2015, 12:12 | 2.5 |
| FG08B | 0.0630 | 86 | 01Jul2015, 12:12 | 2.5 |
| FG08B-G05 | 0.0630 | 84 | 01Jul2015, 12:12 | 2.5 |
| FG09 | 0.0484 | 48 | 01Jul2015, 12:12 | 2.1 |
| FG09-G05 | 0.0484 | 48 | 01Jul2015, 12:18 | 2.1 |
| FG10B | 0.0416 | 42 | 01Jul2015, 12:12 | 2.1 |
| G05 | 0.2280 | 282 | 01Jul2015, 12:12 | 2.4 |
| FG10A | 0.0806 | 81 | 01Jul2015, 12:18 | 2.2 |
| FG11 | 0.0625 | 75 | 01Jul2015, 12:18 | 2.7 |
| FG13 | 0.0534 | 34 | 01Jul2015, 12:24 | 1.7 |
| FG12 | 0.0328 | 50 | 01Jul2015, 12:12 | 2.8 |
| POND D IN | 0.4573 | 509 | 01Jul2015, 12:12 | 2.3 |
| POND D | 0.4573 | 134 | 01Jul2015, 13:00 | 1.9 |
| POND D-G17 | 0.4573 | 134 | 01Jul2015, 13:00 | 1.9 |
| FG15 | 0.0103 | 15 | 01Jul2015, 12:06 | 2.7 |
| FG15-G17A | 0.0103 | 15 | 01Jul2015, 12:12 | 2.7 |
| G17A | 0.4676 | 137 | 01Jul2015, 13:00 | 1.9 |
| FG14 | 0.1000 | 98 | 01Jul2015, 12:18 | 2.4 |
| G17 | 0.5676 | 196 | 01Jul2015, 12:30 | 2.0 |
| G17-G18 | 0.5676 | 196 | 01Jul2015, 12:36 | 2.0 |
| FG16 | 0.0791 | 133 | 01Jul2015, 12:06 | 2.7 |
| G18 | 0.6467 | 240 | 01Jul2015, 12:24 | 2.1 |
| G18-POND E | 0.6467 | 240 | 01Jul2015, 12:24 | 2.1 |
| FG31 | 0.0922 | 116 | 01Jul2015, 12:18 | 2.8 |
| FG30 | 0.0389 | 73 | 01Jul2015, 12:06 | 2.8 |
| FG30-PONDHS | 0.0389 | 70 | 01Jul2015, 12:12 | 2.8 |
| POND HS | 0.1311 | 153 | 01Jul2015, 12:24 | 2.8 |
| FG17a | 0.0694 | 101 | 01Jul2015, 12:06 | 2.5 |
| FG17a-POND E | 0.0694 | 99 | 01Jul2015, 12:06 | 2.5 |
| FG18 | 0.0644 | 56 | 01Jul2015, 12:24 | 2.3 |
| FG18-POND E | 0.0644 | 56 | 01Jul2015, 12:24 | 2.3 |
| FG19 | 0.0527 | 84 | 01Jul2015, 12:06 | 2.9 |
| FG17c | 0.0313 | 31 | 01Jul2015, 12:06 | 1.6 |
| FG17b | 0.0214 | 39 | 01Jul2015, 12:06 | 2.8 |
| POND E IN | 1.0170 | 610 | 01Jul2015, 12:18 | 2.3 |
| POND E | 1.0170 | 242 | 01Jul2015, 13:30 | 1.8 |
| H08 | 1.0170 | 205 | 01Jul2015, 13:30 | 1.6 |
| H09 | 0.0000 | 37 | 01Jul2015, 13:30 | n/a |

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.) |
| FG34 | 0.0600 | 34 | 01Jul2015, 12:18 | 1.4 |
| G14 | 0.0600 | 34 | 01Jul2015, 12:18 | 1.4 |
| G14-G15 | 0.0600 | 34 | 01Jul2015, 12:24 | 1.4 |
| FG35 | 0.0344 | 20 | 01Jul2015, 12:24 | 1.5 |
| G15 | 0.0944 | 53 | 01Jul2015, 12:24 | 1.4 |
| G15-G08 | 0.0944 | 52 | 01Jul2015, 12:24 | 1.4 |
| FG37 | 0.0797 | 41 | 01Jul2015, 12:18 | 1.3 |
| FG36 | 0.0281 | 14 | 01Jul2015, 12:18 | 1.3 |
| FG36-G08 | 0.0281 | 14 | 01Jul2015, 12:24 | 1.3 |
| G08 | 0.2022 | 106 | 01Jul2015, 12:24 | 1.4 |
| | | | | |

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

| FUTURE MDDP (50-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK | TOTAL VOLUME Q50 (AC. FT.) |
| OS06 | 0.1313 | 52 | 01Jul2015, 12:12 | 6.5 |
| G1a | 0.1313 | 52 | 01Jul2015, 12:12 | 6.5 |
| G1a-G2 | 0.1313 | 52 | 01Jul2015, 12:18 | 6.5 |
| OS05 | 0.0578 | 26 | 01Jul2015, 12:12 | 2.9 |
| OS05-G1 | 0.0578 | 25 | 01Jul2015, 12:12 | 2.9 |
| FG01 | 0.0538 | 22 | 01Jul2015, 12:30 | 3.6 |
| FG01-G1 | 0.0538 | 22 | 01Jul2015, 12:30 | 3.6 |
| G1 | 0.1116 | 41 | 01Jul2015, 12:18 | 6.4 |
| G1-G2 | 0.1116 | 41 | 01Jul2015, 12:18 | 6.4 |
| FG02 | 0.0391 | 22 | 01Jul2015, 12:12 | 2.4 |
| G2 | 0.2820 | 112 | 01Jul2015, 12:18 | 15.3 |
| G2-G3 | 0.2820 | 109 | 01Jul2015, 12:24 | 15.2 |
| FG03 | 0.0203 | 17 | 01Jul2015, 12:06 | 1.5 |
| FG04 | 0.0172 | 16 | 01Jul2015, 12:00 | 1.3 |
| G3 | 0.3195 | 123 | 01Jul2015, 12:18 | 17.9 |
| G3-POND F | 0.3195 | 121 | 01Jul2015, 12:18 | 17.9 |
| FG06 | 0.0675 | 40 | 01Jul2015, 12:12 | 4.4 |
| 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 | 0.4620 | 200 | 01Jul2015, 12:18 | 27.9 |
| POND F | 0.4620 | 125 | 01Jul2015, 12:42 | 26.2 |
| POND F-G7 | 0.4620 | 124 | 01Jul2015, 12:48 | 26.0 |
| FG21b | 0.0170 | 20 | 01Jul2015, 12:12 | 2.0 |
| FG21a | 0.0072 | 4 | 01Jul2015, 12:06 | 0.4 |
| FG21a-G7 | 0.0072 | 3 | 01Jul2015, 12:18 | 0.4 |
| G7 | 0.4862 | 130 | 01Jul2015, 12:42 | 28.4 |
| G7-G8 | 0.4862 | 130 | 01Jul2015, 12:48 | 28.4 |
| FG22 | 0.1380 | 73 | 01Jul2015, 12:18 | 9.6 |
| OS08 | 0.0406 | 25 | 01Jul2015, 12:12 | 2.6 |
| OS08-G8 | 0.0406 | 24 | 01Jul2015, 12:12 | 2.6 |
| FG23a | 0.0216 | 15 | 01Jul2015, 12:12 | 1.6 |
| OS07b | 0.0156 | 10 | 01Jul2015, 12:06 | 0.9 |
| OS07b-G7 | 0.0156 | 10 | 01Jul2015, 12:12 | 0.9 |
| G8 | 0.7020 | 192 | 01Jul2015, 12:36 | 43.1 |
| G8-G10 | 0.7020 | 191 | 01Jul2015, 12:42 | 42.9 |
| OS09 | 0.1527 | 62 | 01Jul2015, 12:24 | 9.4 |
| OS09-G10 | 0.1527 | 62 | 01Jul2015, 12:36 | 9.3 |
| FG24 | 0.1373 | 76 | 01Jul2015, 12:18 | 9.9 |
| G9 | 0.2900 | 125 | 01Jul2015, 12:30 | 19.2 |
| G9-G10 | 0.2900 | 125.0 | 01Jul2015, 12:30 | 19.2 |
| FG23b | 0.0286 | 16 | 01Jul2015, 12:12 | 1.8 |
| G10 | 1.0206 | 313 | 01Jul2015, 12:36 | 63.8 |
| G10-G11 | 1.0206 | 311 | 01Jul2015, 12:36 | 63.6 |
| FG23c | 0.0122 | 9 | 01Jul2015, 12:06 | 0.9 |
| G11 | 1.0328 | 314 | 01Jul2015, 12:36 | 64.5 |
| FG25 | 0.1086 | 64 | 01Jul2015, 12:30 | 10.2 |
| FG26 | 0.0863 | 58 | 01Jul2015, 12:18 | 7.1 |
| FG26-POND G | 0.0863 | 57 | 01Jul2015, 12:18 | 7.0 |
| FG27 | 0.0500 | 40 | 01Jul2015, 12:18 | 4.8 |
| FG28 | 0.0245 | 13 | 01Jul2015, 12:18 | 1.7 |

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

| FUTURE MDDP (50-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q50 (CFS) | TIME OF PEAK | TOTAL VOLUME Q50 (AC. FT.) |
| POND G IN | 1.3022 | 459 | 01Jul2015, 12:30 | 88.2 |
| POND G | 1.3022 | 338 | 01Jul2015, 13:00 | 79.8 |
| G12 | 1.3022 | 338 | 01Jul2015, 13:00 | 79.8 |
| G12-G06 | 1.3022 | 337 | 01Jul2015, 13:00 | 79.2 |
| 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 | 1.4421 | 357 | 01Jul2015, 13:00 | 89.0 |
| 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 | 61 | 01Jul2015, 12:18 | 7.3 |
| 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 | 387 | 01Jul2015, 12:12 | 43.9 |
| POND D | 0.4573 | 91 | 01Jul2015, 13:06 | 34.7 |
| POND D-G17 | 0.4573 | 91 | 01Jul2015, 13:06 | 34.6 |
| FG15 | 0.0103 | 12 | 01Jul2015, 12:12 | 1.2 |
| FG15-G17A | 0.0103 | 12 | 01Jul2015, 12:12 | 1.2 |
| G17A | 0.4676 | 93 | 01Jul2015, 13:06 | 35.8 |
| FG14 | 0.1000 | 74 | 01Jul2015, 12:18 | 9.6 |
| G17 | 0.5676 | 132 | 01Jul2015, 12:36 | 45.4 |
| G17-G18 | 0.5676 | 131 | 01Jul2015, 12:36 | 45.4 |
| FG16 | 0.0791 | 104 | 01Jul2015, 12:06 | 9.0 |
| G18 | 0.6467 | 178 | 01Jul2015, 12:12 | 54.4 |
| G18-POND E | 0.6467 | 176 | 01Jul2015, 12:12 | 54.4 |
| FG31 | 0.0922 | 92 | 01Jul2015, 12:18 | 11.0 |
| FG30 | 0.0389 | 57 | 01Jul2015, 12:06 | 4.7 |
| FG30-PONDHS | 0.0389 | 56 | 01Jul2015, 12:12 | 4.6 |
| POND HS | 0.1311 | 106 | 01Jul2015, 12:30 | 15.5 |
| FG17a | 0.0694 | 78 | 01Jul2015, 12:06 | 7.3 |
| FG17a-POND E | 0.0694 | 76 | 01Jul2015, 12:06 | 7.3 |
| FG18 | 0.0644 | 42 | 01Jul2015, 12:24 | 5.9 |
| FG18-POND E | 0.0644 | 42 | 01Jul2015, 12:24 | 5.9 |
| FG19 | 0.0527 | 66 | 01Jul2015, 12:06 | 6.4 |
| FG17c | 0.0313 | 22 | 01Jul2015, 12:06 | 2.0 |
| FG17b | 0.0214 | 31 | 01Jul2015, 12:06 | 2.6 |
| POND E IN | 1.0170 | 432 | 01Jul2015, 12:12 | 94.0 |
| POND E | 1.0170 | 153 | 01Jul2015, 13:54 | 70.7 |
| H08 | 1.0170 | 137 | 01Jul2015, 13:54 | 62.1 |
| H09 | 0.0000 | 16 | 01Jul2015, 13:54 | 8.5 |

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.) |
| FG34 | 0.0600 | 23 | 01Jul2015, 12:18 | 3.2 |
| G14 | 0.0600 | 23 | 01Jul2015, 12:18 | 3.2 |
| G14-G15 | 0.0600 | 22 | 01Jul2015, 12:24 | 3.1 |
| FG35 | 0.0344 | 13.4 | 01Jul2015, 12:24 | 2.0 |
| G15 | 0.0944 | 35.6 | 01Jul2015, 12:24 | 5.1 |
| G15-G08 | 0.0944 | 35 | 01Jul2015, 12:30 | 5.0 |
| FG37 | 0.0797 | 27 | 01Jul2015, 12:24 | 4.0 |
| FG36 | 0.0281 | 9 | 01Jul2015, 12:24 | 1.4 |
| FG36-G08 | 0.0281 | 9 | 01Jul2015, 12:30 | 1.4 |
| G08 | 0.2022 | 69 | 01Jul2015, 12:24 | 10.4 |
| | | | | |

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

| FUTURE MDDP (25-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q25 (CFS) | TIME OF PEAK | TOTAL VOLUME Q25 (AC. FT.) |
| OS06 | 0.1313 | 30 | 01Jul2015, 12:18 | 4.3 |
| G1a | 0.1313 | 30 | 01Jul2015, 12:18 | 4.3 |
| G1a-G2 | 0.1313 | 30 | 01Jul2015, 12:18 | 4.2 |
| OS05 | 0.0578 | 15 | 01Jul2015, 12:12 | 1.9 |
| OS05-G1 | 0.0578 | 15 | 01Jul2015, 12:12 | 1.9 |
| FG01 | 0.0538 | 14 | 01Jul2015, 12:30 | 2.5 |
| FG01-G1 | 0.0538 | 14 | 01Jul2015, 12:30 | 2.5 |
| G1 | 0.1116 | 25 | 01Jul2015, 12:18 | 4.4 |
| G1-G2 | 0.1116 | 25 | 01Jul2015, 12:24 | 4.3 |
| FG02 | 0.0391 | 14 | 01Jul2015, 12:12 | 1.6 |
| G2 | 0.2820 | 67 | 01Jul2015, 12:18 | 10.2 |
| G2-G3 | 0.2820 | 66 | 01Jul2015, 12:24 | 10.1 |
| FG03 | 0.0203 | 12 | 01Jul2015, 12:06 | 1.0 |
| FG04 | 0.0172 | 11 | 01Jul2015, 12:00 | 0.9 |
| G3 | 0.3195 | 74 | 01Jul2015, 12:24 | 12.0 |
| G3-POND F | 0.3195 | 74 | 01Jul2015, 12:24 | 12.0 |
| FG06 | 0.0675 | 26 | 01Jul2015, 12:12 | 3.1 |
| FG05 | 0.0580 | 23 | 01Jul2015, 12:24 | 3.3 |
| OS07a | 0.0170 | 6 | 01Jul2015, 12:12 | 0.6 |
| OS07a-POND F | 0.0170 | 6 | 01Jul2015, 12:24 | 0.6 |
| POND F IN | 0.4620 | 123 | 01Jul2015, 12:24 | 19.0 |
| POND F | 0.4620 | 64 | 01Jul2015, 12:54 | 17.6 |
| POND F-G7 | 0.4620 | 63 | 01Jul2015, 13:00 | 17.5 |
| FG21b | 0.0170 | 16 | 01Jul2015, 12:12 | 1.5 |
| FG21a | 0.0072 | 2 | 01Jul2015, 12:06 | 0.2 |
| FG21a-G7 | 0.0072 | 2 | 01Jul2015, 12:24 | 0.2 |
| G7 | 0.4862 | 67 | 01Jul2015, 13:00 | 19.3 |
| G7-G8 | 0.4862 | 67 | 01Jul2015, 13:00 | 19.2 |
| FG22 | 0.1380 | 47 | 01Jul2015, 12:18 | 6.7 |
| OS08 | 0.0406 | 16 | 01Jul2015, 12:12 | 1.8 |
| OS08-G8 | 0.0406 | 15 | 01Jul2015, 12:18 | 1.8 |
| FG23a | 0.0216 | 10 | 01Jul2015, 12:12 | 1.1 |
| OS07b | 0.0156 | 6 | 01Jul2015, 12:06 | 0.6 |
| OS07b-G7 | 0.0156 | 6 | 01Jul2015, 12:12 | 0.6 |
| G8 | 0.7020 | 97 | 01Jul2015, 12:54 | 29.5 |
| G8-G10 | 0.7020 | 96 | 01Jul2015, 12:54 | 29.3 |
| OS09 | 0.1527 | 39 | 01Jul2015, 12:30 | 6.5 |
| OS09-G10 | 0.1527 | 39 | 01Jul2015, 12:36 | 6.3 |
| FG24 | 0.1373 | 50 | 01Jul2015, 12:18 | 7.0 |
| G9 | 0.2900 | 81 | 01Jul2015, 12:30 | 13.3 |
| G9-G10 | 0.2900 | 79.0 | 01Jul2015, 12:30 | 13.3 |
| FG23b | 0.0286 | 10 | 01Jul2015, 12:12 | 1.2 |
| G10 | 1.0206 | 176 | 01Jul2015, 12:30 | 43.8 |
| G10-G11 | 1.0206 | 174 | 01Jul2015, 12:30 | 43.6 |
| FG23c | 0.0122 | 6 | 01Jul2015, 12:12 | 0.6 |
| G11 | 1.0328 | 177 | 01Jul2015, 12:30 | 44.2 |
| FG25 | 0.1086 | 45.9 | 01Jul2015, 12:30 | 7.5 |
| FG26 | 0.0863 | 40 | 01Jul2015, 12:18 | 5.1 |
| FG26-POND G | 0.0863 | 39 | 01Jul2015, 12:18 | 5.1 |
| FG27 | 0.0500 | 29 | 01Jul2015, 12:18 | 3.6 |
| FG28 | 0.0245 | 8 | 01Jul2015, 12:18 | 1.1 |

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

| FUTURE MDDP (25-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q25 (CFS) | TIME OF PEAK | TOTAL VOLUME Q25 (AC. FT.) |
| POND G IN | 1.3022 | 288 | 01Jul2015, 12:30 | 61.5 |
| POND G | 1.3022 | 173 | 01Jul2015, 13:12 | 53.7 |
| G12 | 1.3022 | 173 | 01Jul2015, 13:12 | 53.7 |
| G12-G06 | 1.3022 | 173 | 01Jul2015, 13:18 | 53.2 |
| FG29 | 0.0997 | 23 | 01Jul2015, 12:18 | 3.3 |
| FG32 | 0.0402 | 44 | 01Jul2015, 12:06 | 3.7 |
| FG32-G06 | 0.0402 | 41 | 01Jul2015, 12:06 | 3.7 |
| G06 | 1.4421 | 184 | 01Jul2015, 13:18 | 60.1 |
| FG08A | 0.0750 | 66 | 01Jul2015, 12:06 | 5.9 |
| FG08A-G05 | 0.0750 | 64 | 01Jul2015, 12:12 | 5.9 |
| FG08B | 0.0630 | 49 | 01Jul2015, 12:12 | 5.0 |
| FG08B-G05 | 0.0630 | 48 | 01Jul2015, 12:12 | 4.9 |
| FG09 | 0.0484 | 25 | 01Jul2015, 12:18 | 3.0 |
| FG09-G05 | 0.0484 | 25 | 01Jul2015, 12:18 | 3.0 |
| FG10B | 0.0416 | 22 | 01Jul2015, 12:12 | 2.5 |
| G05 | 0.2280 | 156 | 01Jul2015, 12:12 | 16.3 |
| FG10A | 0.0806 | 43 | 01Jul2015, 12:18 | 5.4 |
| FG11 | 0.0625 | 44 | 01Jul2015, 12:18 | 5.2 |
| FG13 | 0.0534 | 15 | 01Jul2015, 12:24 | 2.4 |
| FG12 | 0.0328 | 30.2 | 01Jul2015, 12:12 | 3.0 |
| POND D IN | 0.4573 | 279.7 | 01Jul2015, 12:12 | 32.4 |
| POND D | 0.4573 | 50 | 01Jul2015, 13:24 | 24.3 |
| POND D-G17 | 0.4573 | 50 | 01Jul2015, 13:24 | 24.3 |
| FG15 | 0.0103 | 9 | 01Jul2015, 12:12 | 0.9 |
| FG15-G17A | 0.0103 | 9 | 01Jul2015, 12:12 | 0.9 |
| G17A | 0.4676 | 51 | 01Jul2015, 13:24 | 25.2 |
| FG14 | 0.1000 | 53 | 01Jul2015, 12:18 | 7.1 |
| G17 | 0.5676 | 75 | 01Jul2015, 12:24 | 32.3 |
| G17-G18 | 0.5676 | 75 | 01Jul2015, 12:24 | 32.2 |
| FG16 | 0.0791 | 78 | 01Jul2015, 12:06 | 6.8 |
| G18 | 0.6467 | 128 | 01Jul2015, 12:12 | 39.1 |
| G18-POND E | 0.6467 | 126 | 01Jul2015, 12:12 | 39.0 |
| FG31 | 0.0922 | 69 | 01Jul2015, 12:18 | 8.4 |
| FG30 | 0.0389 | 44 | 01Jul2015, 12:06 | 3.6 |
| FG30-PONDHS | 0.0389 | 42 | 01Jul2015, 12:12 | 3.5 |
| POND HS | 0.1311 | 53 | 01Jul2015, 12:42 | 11.9 |
| FG17a | 0.0694 | 57 | 01Jul2015, 12:06 | 5.4 |
| FG17a-POND E | 0.0694 | 56 | 01Jul2015, 12:12 | 5.4 |
| FG18 | 0.0644 | 30 | 01Jul2015, 12:24 | 4.3 |
| FG18-POND E | 0.0644 | 30 | 01Jul2015, 12:24 | 4.3 |
| FG19 | 0.0527 | 50 | 01Jul2015, 12:06 | 4.9 |
| FG17c | 0.0313 | 14 | 01Jul2015, 12:06 | 1.4 |
| FG17b | 0.0214 | 24 | 01Jul2015, 12:06 | 1.9 |
| POND E IN | 1.0170 | 318 | 01Jul2015, 12:12 | 68.8 |
| POND E | 1.0170 | 80 | 01Jul2015, 14:36 | 46.5 |
| H08 | 1.0170 | 72 | 01Jul2015, 14:36 | 39.8 |
| H09 | 0.0000 | 8 | 01Jul2015, 14:36 | 6.7 |

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

| FUTURE MDDP (25-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q25 (CFS) | TIME OF PEAK | TOTAL VOLUME Q25 (AC. FT.) |
| FG34 | 0.0600 | 13 | 01Jul2015, 12:24 | 2.1 |
| G14 | 0.0600 | 13 | 01Jul2015, 12:24 | 2.1 |
| G14-G15 | 0.0600 | 13 | 01Jul2015, 12:30 | 2.1 |
| FG35 | 0.0344 | 8.3 | 01Jul2015, 12:24 | 1.3 |
| G15 | 0.0944 | 21.3 | 01Jul2015, 12:30 | 3.4 |
| G15-G08 | 0.0944 | 21 | 01Jul2015, 12:30 | 3.3 |
| FG37 | 0.0797 | 16 | 01Jul2015, 12:24 | 2.6 |
| FG36 | 0.0281 | 6 | 01Jul2015, 12:24 | 0.9 |
| FG36-G08 | 0.0281 | 5 | 01Jul2015, 12:30 | 0.9 |
| G08 | 0.2022 | 41 | 01Jul2015, 12:30 | 6.8 |
| | | | | |

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

| FUTURE MDDP (10-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK | TOTAL VOLUME Q10 (AC. FT.) |
| OS06 | 0.1313 | 12 | 01Jul2015, 12:18 | 2.2 |
| G1a | 0.1313 | 12 | 01Jul2015, 12:18 | 2.2 |
| G1a-G2 | 0.1313 | 11 | 01Jul2015, 12:24 | 2.1 |
| OS05 | 0.0578 | 5.6 | 01Jul2015, 12:12 | 1.0 |
| OS05-G1 | 0.0578 | 5.5 | 01Jul2015, 12:18 | 1.0 |
| FG01 | 0.0538 | 7.0 | 01Jul2015, 12:36 | 1.4 |
| FG01-G1 | 0.0538 | 7.0 | 01Jul2015, 12:36 | 1.4 |
| G1 | 0.1116 | 11 | 01Jul2015, 12:24 | 2.3 |
| G1-G2 | 0.1116 | 11 | 01Jul2015, 12:30 | 2.3 |
| FG02 | 0.0391 | 6.4 | 01Jul2015, 12:12 | 0.9 |
| G2 | 0.2820 | 27 | 01Jul2015, 12:24 | 5.4 |
| G2-G3 | 0.2820 | 27 | 01Jul2015, 12:30 | 5.3 |
| FG03 | 0.0203 | 5.9 | 01Jul2015, 12:06 | 0.6 |
| FG04 | 0.0172 | 5.8 | 01Jul2015, 12:06 | 0.5 |
| G3 | 0.3195 | 31 | 01Jul2015, 12:30 | 6.4 |
| G3-POND F | 0.3195 | 31 | 01Jul2015, 12:30 | 6.4 |
| FG06 | 0.0675 | 12 | 01Jul2015, 12:18 | 1.7 |
| FG05 | 0.0580 | 12.2 | 01Jul2015, 12:24 | 2.0 |
| OS07a | 0.0170 | 2 | 01Jul2015, 12:12 | 0.3 |
| OS07a-POND F | 0.0170 | 2 | 01Jul2015, 12:30 | 0.3 |
| POND F IN | 0.4620 | 53.7 | 01Jul2015, 12:30 | 10.4 |
| POND F | 0.4620 | 17.0 | 01Jul2015, 13:48 | 9.6 |
| POND F-G7 | 0.4620 | 17.0 | 01Jul2015, 13:54 | 9.5 |
| FG21b | 0.0170 | 10.2 | 01Jul2015, 12:12 | 1.0 |
| FG21a | 0.0072 | 1 | 01Jul2015, 12:06 | 0.1 |
| FG21a-G7 | 0.0072 | 1 | 01Jul2015, 12:30 | 0.1 |
| G7 | 0.4862 | 18 | 01Jul2015, 13:36 | 10.6 |
| G7-G8 | 0.4862 | 18.3 | 01Jul2015, 13:42 | 10.6 |
| FG22 | 0.1380 | 24.0 | 01Jul2015, 12:24 | 3.8 |
| OS08 | 0.0406 | 7.7 | 01Jul2015, 12:12 | 1.0 |
| OS08-G8 | 0.0406 | 8 | 01Jul2015, 12:18 | 1.0 |
| FG23a | 0.0216 | 5 | 01Jul2015, 12:12 | 0.7 |
| OS07b | 0.0156 | 3 | 01Jul2015, 12:06 | 0.3 |
| OS07b-G7 | 0.0156 | 2 | 01Jul2015, 12:18 | 0.3 |
| G8 | 0.7020 | 48 | 01Jul2015, 12:18 | 16.4 |
| G8-G10 | 0.7020 | 47 | 01Jul2015, 12:24 | 16.3 |
| OS09 | 0.1527 | 18 | 01Jul2015, 12:30 | 3.5 |
| OS09-G10 | 0.1527 | 18.1 | 01Jul2015, 12:42 | 3.5 |
| FG24 | 0.1373 | 26 | 01Jul2015, 12:24 | 4.0 |
| G9 | 0.2900 | 38 | 01Jul2015, 12:36 | 7.5 |
| G9-G10 | 0.2900 | 36.8 | 01Jul2015, 12:36 | 7.5 |
| FG23b | 0.0286 | 5 | 01Jul2015, 12:12 | 0.7 |
| G10 | 1.0206 | 80 | 01Jul2015, 12:30 | 24.4 |
| G10-G11 | 1.0206 | 80 | 01Jul2015, 12:36 | 24.4 |
| FG23c | 0.0122 | 3 | 01Jul2015, 12:12 | 0.3 |
| G11 | 1.0328 | 81 | 01Jul2015, 12:36 | 24.7 |
| FG25 | 0.1086 | 27.1 | 01Jul2015, 12:36 | 4.7 |
| FG26 | 0.0863 | 22 | 01Jul2015, 12:18 | 3.0 |
| FG26-POND G | 0.0863 | 22 | 01Jul2015, 12:24 | 3.0 |
| FG27 | 0.0500 | 17 | 01Jul2015, 12:18 | 2.3 |
| FG28 | 0.0245 | 4 | 01Jul2015, 12:18 | 0.7 |

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

| FUTURE MDDP (10-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q10 (CFS) | TIME OF PEAK | TOTAL VOLUME Q10 (AC. FT.) |
| POND G IN | 1.3022 | 145.9 | 01Jul2015, 12:30 | 35.3 |
| POND G | 1.3022 | 57 | 01Jul2015, 13:54 | 28.8 |
| G12 | 1.3022 | 57 | 01Jul2015, 13:54 | 28.8 |
| G12-G06 | 1.3022 | 57 | 01Jul2015, 14:00 | 28.6 |
| 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 | 1.4421 | 61 | 01Jul2015, 13:54 | 32.7 |
| 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 | 12.2 | 01Jul2015, 12:18 | 1.5 |
| G05 | 0.2280 | 94 | 01Jul2015, 12:12 | 10.3 |
| FG10A | 0.0806 | 25 | 01Jul2015, 12:18 | 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 | 168.0 | 01Jul2015, 12:18 | 20.4 |
| POND D | 0.4573 | 19 | 01Jul2015, 14:24 | 14.8 |
| POND D-G17 | 0.4573 | 19 | 01Jul2015, 14:24 | 14.8 |
| FG15 | 0.0103 | 6 | 01Jul2015, 12:12 | 0.6 |
| FG15-G17A | 0.0103 | 6 | 01Jul2015, 12:12 | 0.6 |
| G17A | 0.4676 | 19 | 01Jul2015, 14:12 | 15.3 |
| FG14 | 0.1000 | 32 | 01Jul2015, 12:24 | 4.5 |
| G17 | 0.5676 | 43 | 01Jul2015, 12:24 | 19.8 |
| G17-G18 | 0.5676 | 43 | 01Jul2015, 12:30 | 19.8 |
| FG16 | 0.0791 | 50 | 01Jul2015, 12:06 | 4.5 |
| G18 | 0.6467 | 79 | 01Jul2015, 12:12 | 24.3 |
| G18-POND E | 0.6467 | 78 | 01Jul2015, 12:12 | 24.3 |
| FG31 | 0.0922 | 45 | 01Jul2015, 12:18 | 5.6 |
| FG30 | 0.0389 | 29 | 01Jul2015, 12:06 | 2.4 |
| FG30-PONDHS | 0.0389 | 27 | 01Jul2015, 12:12 | 2.3 |
| POND HS | 0.1311 | 36 | 01Jul2015, 12:42 | 7.9 |
| FG17a | 0.0694 | 35 | 01Jul2015, 12:06 | 3.5 |
| FG17a-POND E | 0.0694 | 35.1 | 01Jul2015, 12:12 | 3.5 |
| FG18 | 0.0644 | 18 | 01Jul2015, 12:24 | 2.7 |
| FG18-POND E | 0.0644 | 17 | 01Jul2015, 12:30 | 2.7 |
| FG19 | 0.0527 | 33 | 01Jul2015, 12:12 | 3.3 |
| 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 | 43.7 |
| POND E | 1.0170 | 30 | 01Jul2015, 17:36 | 24.4 |
| H08 | 1.0170 | 24.1 | 01Jul2015, 17:36 | 19.1 |
| H09 | 0.0000 | 6 | 01Jul2015, 17:36 | 5.3 |

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.) |
| FG34 | 0.0600 | 5.5 | 01Jul2015, 12:24 | 1.1 |
| G14 | 0.0600 | 5.5 | 01Jul2015, 12:24 | 1.1 |
| G14-G15 | 0.0600 | 5.4 | 01Jul2015, 12:36 | 1.1 |
| FG35 | 0.0344 | 3.5 | 01Jul2015, 12:30 | 0.7 |
| G15 | 0.0944 | 8.7 | 01Jul2015, 12:36 | 1.8 |
| G15-G08 | 0.0944 | 9 | 01Jul2015, 12:36 | 1.7 |
| FG37 | 0.0797 | 6 | 01Jul2015, 12:24 | 1.3 |
| FG36 | 0.0281 | 2 | 01Jul2015, 12:30 | 0.5 |
| FG36-G08 | 0.0281 | 2 | 01Jul2015, 12:36 | 0.5 |
| G08 | 0.2022 | 16 | 01Jul2015, 12:36 | 3.5 |
| | | | | |

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

| FUTURE MDDP (5-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q5 (CFS) | TIME OF PEAK | TOTAL VOLUME Q5 (AC. FT.) |
| OS06 | 0.1313 | 3.8 | 01Jul2015, 12:24 | 1.1 |
| G1a | 0.1313 | 3.8 | 01Jul2015, 12:24 | 1.1 |
| G1a-G2 | 0.1313 | 3.6 | 01Jul2015, 12:36 | 1.1 |
| OS05 | 0.0578 | 1.8 | 01Jul2015, 12:18 | 0.5 |
| OS05-G1 | 0.0578 | 1.7 | 01Jul2015, 12:24 | 0.5 |
| FG01 | 0.0538 | 3.4 | 01Jul2015, 12:36 | 0.8 |
| FG01-G1 | 0.0538 | 3.4 | 01Jul2015, 12:36 | 0.8 |
| G1 | 0.1116 | 4.9 | 01Jul2015, 12:36 | 1.3 |
| G1-G2 | 0.1116 | 4.8 | 01Jul2015, 12:36 | 1.3 |
| FG02 | 0.0391 | 2.7 | 01Jul2015, 12:18 | 0.5 |
| G2 | 0.2820 | 10 | 01Jul2015, 12:30 | 2.9 |
| G2-G3 | 0.2820 | 10 | 01Jul2015, 12:42 | 2.9 |
| FG03 | 0.0203 | 0.8 | 01Jul2015, 12:12 | 0.2 |
| FG04 | 0.0172 | 3.1 | 01Jul2015, 12:06 | 0.3 |
| G3 | 0.3195 | 11 | 01Jul2015, 12:36 | 3.3 |
| G3-POND F | 0.3195 | 11 | 01Jul2015, 12:42 | 3.3 |
| FG06 | 0.0675 | 5.8 | 01Jul2015, 12:18 | 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 | 0.4620 | 22.3 | 01Jul2015, 12:36 | 5.7 |
| POND F | 0.4620 | 8.5 | 01Jul2015, 14:06 | 5.2 |
| POND F-G7 | 0.4620 | 8.5 | 01Jul2015, 14:12 | 5.1 |
| FG21b | 0.0170 | 7.0 | 01Jul2015, 12:12 | 0.7 |
| FG21a | 0.0072 | 0.3 | 01Jul2015, 12:12 | 0.1 |
| FG21a-G7 | 0.0072 | 0.3 | 01Jul2015, 12:42 | 0.1 |
| G7 | 0.4862 | 9 | 01Jul2015, 14:06 | 5.9 |
| G7-G8 | 0.4862 | 9.2 | 01Jul2015, 14:12 | 5.9 |
| FG22 | 0.1380 | 12.0 | 01Jul2015, 12:24 | 2.3 |
| OS08 | 0.0406 | 3.4 | 01Jul2015, 12:12 | 0.6 |
| OS08-G8 | 0.0406 | 3 | 01Jul2015, 12:18 | 0.6 |
| FG23a | 0.0216 | 3 | 01Jul2015, 12:18 | 0.4 |
| OS07b | 0.0156 | 1.0 | 01Jul2015, 12:12 | 0.2 |
| OS07b-G7 | 0.0156 | 0.9 | 01Jul2015, 12:18 | 0.2 |
| G8 | 0.7020 | 25 | 01Jul2015, 12:18 | 9.3 |
| G8-G10 | 0.7020 | 24 | 01Jul2015, 12:24 | 9.3 |
| OS09 | 0.1527 | 8 | 01Jul2015, 12:36 | 2.0 |
| OS09-G10 | 0.1527 | 8.2 | 01Jul2015, 12:48 | 2.0 |
| FG24 | 0.1373 | 13 | 01Jul2015, 12:24 | 2.5 |
| G9 | 0.2900 | 17 | 01Jul2015, 12:48 | 4.4 |
| G9-G10 | 0.2900 | 16.9 | 01Jul2015, 12:48 | 4.4 |
| FG23b | 0.0286 | 2 | 01Jul2015, 12:18 | 0.4 |
| G10 | 1.0206 | 39 | 01Jul2015, 12:24 | 14.0 |
| G10-G11 | 1.0206 | 38.9 | 01Jul2015, 12:30 | 13.9 |
| FG23c | 0.0122 | 1.5 | 01Jul2015, 12:12 | 0.2 |
| G11 | 1.0328 | 39.7 | 01Jul2015, 12:30 | 14.1 |
| FG25 | 0.1086 | 16.7 | 01Jul2015, 12:36 | 3.1 |
| FG26 | 0.0863 | 12 | 01Jul2015, 12:24 | 1.9 |
| FG26-POND G | 0.0863 | 12 | 01Jul2015, 12:24 | 1.9 |
| FG27 | 0.0500 | 11 | 01Jul2015, 12:18 | 1.5 |
| FG28 | 0.0245 | 2 | 01Jul2015, 12:24 | 0.4 |

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.) |
| POND G IN | 1.3022 | 78.7 | 01Jul2015, 12:30 | 21.0 |
| POND G | 1.3022 | 22 | 01Jul2015, 15:12 | 15.2 |
| G12 | 1.3022 | 22 | 01Jul2015, 15:12 | 15.2 |
| G12-G06 | 1.3022 | 22 | 01Jul2015, 15:18 | 15.0 |
| 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 | 1.4421 | 24 | 01Jul2015, 15:18 | 17.5 |
| 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 | 15 | 01Jul2015, 12:18 | 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 | 107.0 | 01Jul2015, 12:18 | 13.6 |
| POND D | 0.4573 | 12 | 01Jul2015, 14:36 | 9.2 |
| POND D-G17 | 0.4573 | 12 | 01Jul2015, 14:42 | 9.2 |
| FG15 | 0.0103 | 4 | 01Jul2015, 12:12 | 0.4 |
| FG15-G17A | 0.0103 | 4 | 01Jul2015, 12:12 | 0.4 |
| G17A | 0.4676 | 12 | 01Jul2015, 14:36 | 9.6 |
| FG14 | 0.1000 | 20 | 01Jul2015, 12:24 | 3.0 |
| G17 | 0.5676 | 25 | 01Jul2015, 12:24 | 12.5 |
| G17-G18 | 0.5676 | 25 | 01Jul2015, 12:24 | 12.5 |
| FG16 | 0.0791 | 34 | 01Jul2015, 12:06 | 3.1 |
| G18 | 0.6467 | 51 | 01Jul2015, 12:12 | 15.7 |
| G18-POND E | 0.6467 | 50 | 01Jul2015, 12:12 | 15.6 |
| FG31 | 0.0922 | 31 | 01Jul2015, 12:18 | 3.9 |
| FG30 | 0.0389 | 20 | 01Jul2015, 12:06 | 1.7 |
| FG30-PONDHS | 0.0389 | 18 | 01Jul2015, 12:12 | 1.6 |
| POND HS | 0.1311 | 26 | 01Jul2015, 12:36 | 5.6 |
| FG17a | 0.0694 | 23 | 01Jul2015, 12:12 | 2.4 |
| FG17a-POND E | 0.0694 | 22.9 | 01Jul2015, 12:12 | 2.4 |
| FG18 | 0.0644 | 11 | 01Jul2015, 12:30 | 1.8 |
| FG18-POND E | 0.0644 | 11 | 01Jul2015, 12:30 | 1.8 |
| FG19 | 0.0527 | 23 | 01Jul2015, 12:12 | 2.3 |
| FG17c | 0.0313 | 3 | 01Jul2015, 12:12 | 0.4 |
| FG17b | 0.0214 | 11 | 01Jul2015, 12:06 | 0.9 |
| POND E IN | 1.0170 | 126 | 01Jul2015, 12:12 | 29.0 |
| POND E | 1.0170 | 16 | 01Jul2015, 20:00 | 13.1 |
| H08 | 1.0170 | 11.8 | 01Jul2015, 20:00 | 9.4 |
| H09 | 0.0000 | 4.1 | 01Jul2015, 20:00 | 3.7 |

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.) |
| FG34 | 0.0600 | 2.0 | 01Jul2015, 12:30 | 0.6 |
| G14 | 0.0600 | 2.0 | 01Jul2015, 12:30 | 0.6 |
| G14-G15 | 0.0600 | 2.0 | 01Jul2015, 12:42 | 0.6 |
| FG35 | 0.0344 | 1.5 | 01Jul2015, 12:30 | 0.4 |
| G15 | 0.0944 | 3.3 | 01Jul2015, 12:42 | 0.9 |
| G15-G08 | 0.0944 | 3.3 | 01Jul2015, 12:48 | 0.9 |
| FG37 | 0.0797 | 2.0 | 01Jul2015, 12:36 | 0.7 |
| FG36 | 0.0281 | 0.7 | 01Jul2015, 12:36 | 0.2 |
| FG36-G08 | 0.0281 | 0.7 | 01Jul2015, 12:48 | 0.2 |
| G08 | 0.2022 | 5.8 | 01Jul2015, 12:48 | 1.8 |
| | | | | |

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

| FUTURE MDDP (2-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK | TOTAL VOLUME Q2 (AC. FT.) |
| OS06 | 0.1313 | 0.5 | 01Jul2015, 13:30 | 0.3 |
| G1a | 0.1313 | 0.5 | 01Jul2015, 13:30 | 0.3 |
| G1a-G2 | 0.1313 | 0.5 | 01Jul2015, 13:48 | 0.3 |
| OS05 | 0.0578 | 0.2 | 01Jul2015, 13:24 | 0.2 |
| OS05-G1 | 0.0578 | 0.2 | 01Jul2015, 13:30 | 0.2 |
| FG01 | 0.0538 | 0.9 | 01Jul2015, 12:48 | 0.4 |
| FG01-G1 | 0.0538 | 0.9 | 01Jul2015, 12:48 | 0.4 |
| G1 | 0.1116 | 1.1 | 01Jul2015, 12:54 | 0.5 |
| G1-G2 | 0.1116 | 1.1 | 01Jul2015, 13:00 | 0.5 |
| FG02 | 0.0391 | 0.5 | 01Jul2015, 12:30 | 0.2 |
| G2 | 0.2820 | 1.9 | 01Jul2015, 13:18 | 1.0 |
| G2-G3 | 0.2820 | 1.9 | 01Jul2015, 13:30 | 1.0 |
| FG03 | 0.0203 | 0.8 | 01Jul2015, 12:12 | 0.2 |
| FG04 | 0.0172 | 0.9 | 01Jul2015, 12:06 | 0.1 |
| G3 | 0.3195 | 2.4 | 01Jul2015, 13:24 | 1.3 |
| G3-POND F | 0.3195 | 2.4 | 01Jul2015, 13:30 | 1.3 |
| FG06 | 0.0675 | 1.3 | 01Jul2015, 12:24 | 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, 13:30 | 0.1 |
| POND F IN | 0.4620 | 5.0 | 01Jul2015, 12:48 | 2.4 |
| POND F | 0.4620 | 2.4 | 01Jul2015, 15:48 | 2.0 |
| POND F-G7 | 0.4620 | 2.4 | 01Jul2015, 16:00 | 2.0 |
| FG21b | 0.0170 | 4.0 | 01Jul2015, 12:12 | 0.4 |
| FG21a | 0.0072 | 0.0 | 01Jul2015, 13:06 | 0.0 |
| FG21a-G7 | 0.0072 | 0.0 | 01Jul2015, 14:06 | 0.0 |
| G7 | 0.4862 | 4.0 | 01Jul2015, 12:12 | 2.5 |
| G7-G8 | 0.4862 | 3.9 | 01Jul2015, 12:12 | 2.5 |
| FG22 | 0.1380 | 3.3 | 01Jul2015, 12:30 | 1.0 |
| OS08 | 0.0406 | 0.7 | 01Jul2015, 12:24 | 0.2 |
| OS08-G8 | 0.0406 | 0.7 | 01Jul2015, 12:30 | 0.2 |
| FG23a | 0.0216 | 0.8 | 01Jul2015, 12:18 | 0.2 |
| OS07b | 0.0156 | 0.1 | 01Jul2015, 12:48 | 0.1 |
| OS07b-G7 | 0.0156 | 0.1 | 01Jul2015, 13:00 | 0.1 |
| G8 | 0.7020 | 7.9 | 01Jul2015, 12:24 | 3.9 |
| G8-G10 | 0.7020 | 7.9 | 01Jul2015, 12:30 | 3.9 |
| OS09 | 0.1527 | 1.9 | 01Jul2015, 12:54 | 0.8 |
| OS09-G10 | 0.1527 | 1.9 | 01Jul2015, 13:18 | 0.8 |
| FG24 | 0.1373 | 4 | 01Jul2015, 12:30 | 1.1 |
| G9 | 0.2900 | 4 | 01Jul2015, 13:12 | 1.9 |
| G9-G10 | 0.2900 | 4.4 | 01Jul2015, 13:12 | 1.9 |
| FG23b | 0.0286 | 0 | 01Jul2015, 12:30 | 0.2 |
| G10 | 1.0206 | 12.1 | 01Jul2015, 12:30 | 5.9 |
| G10-G11 | 1.0206 | 12.1 | 01Jul2015, 12:36 | 5.9 |
| FG23c | 0.0122 | 0.4 | 01Jul2015, 12:18 | 0.1 |
| G11 | 1.0328 | 12.3 | 01Jul2015, 12:36 | 6.0 |
| FG25 | 0.1086 | 7.5 | 01Jul2015, 12:36 | 1.7 |
| FG26 | 0.0863 | 5 | 01Jul2015, 12:24 | 1.0 |
| FG26-POND G | 0.0863 | 4.5 | 01Jul2015, 12:30 | 0.9 |
| FG27 | 0.0500 | 5.0 | 01Jul2015, 12:24 | 0.8 |
| FG28 | 0.0245 | 0.5 | 01Jul2015, 12:30 | 0.2 |

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

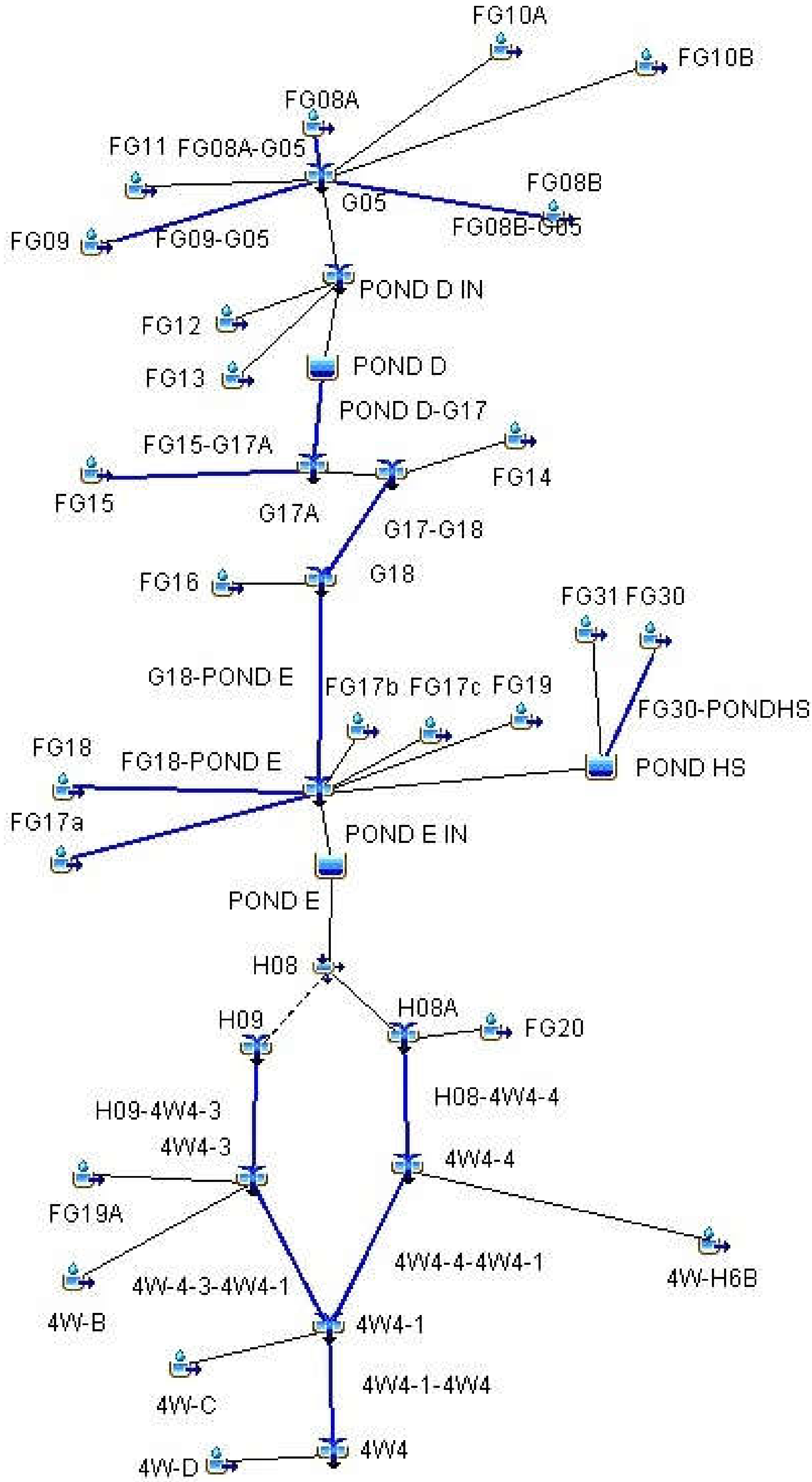
| FUTURE MDDP (2-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK | TOTAL VOLUME Q2 (AC. FT.) |
| POND G IN | 1.3022 | 28.5 | 01Jul2015, 12:30 | 9.5 |
| POND G | 1.3022 | 5 | 02Jul2015, 00:00 | 5.2 |
| G12 | 1.3022 | 5 | 02Jul2015, 00:00 | 5.2 |
| G12-G06 | 1.3022 | 5 | 02Jul2015, 00:00 | 5.1 |
| 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 | 1.4421 | 11 | 01Jul2015, 12:12 | 6.4 |
| 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 | 7 | 01Jul2015, 12:24 | 1.1 |
| 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 | 52.1 | 01Jul2015, 12:18 | 7.5 |
| POND D | 0.4573 | 4.3 | 01Jul2015, 18:00 | 4.0 |
| POND D-G17 | 0.4573 | 4.3 | 01Jul2015, 18:06 | 4.0 |
| FG15 | 0.0103 | 2 | 01Jul2015, 12:12 | 0.2 |
| FG15-G17A | 0.0103 | 2 | 01Jul2015, 12:12 | 0.2 |
| G17A | 0.4676 | 4 | 01Jul2015, 17:54 | 4.2 |
| FG14 | 0.1000 | 9 | 01Jul2015, 12:24 | 1.6 |
| G17 | 0.5676 | 12 | 01Jul2015, 12:24 | 5.8 |
| G17-G18 | 0.5676 | 12 | 01Jul2015, 12:30 | 5.8 |
| FG16 | 0.0791 | 18 | 01Jul2015, 12:06 | 1.9 |
| G18 | 0.6467 | 26 | 01Jul2015, 12:12 | 7.7 |
| G18-POND E | 0.6467 | 25 | 01Jul2015, 12:12 | 7.6 |
| FG31 | 0.0922 | 17 | 01Jul2015, 12:18 | 2.4 |
| FG30 | 0.0389 | 11 | 01Jul2015, 12:06 | 1.0 |
| FG30-PONDHS | 0.0389 | 10.9 | 01Jul2015, 12:18 | 1.0 |
| POND HS | 0.1311 | 14.8 | 01Jul2015, 12:42 | 3.3 |
| FG17a | 0.0694 | 12 | 01Jul2015, 12:12 | 1.3 |
| FG17a-POND E | 0.0694 | 11.6 | 01Jul2015, 12:12 | 1.3 |
| FG18 | 0.0644 | 4.7 | 01Jul2015, 12:30 | 0.9 |
| FG18-POND E | 0.0644 | 5 | 01Jul2015, 12:30 | 0.9 |
| FG19 | 0.0527 | 13.1 | 01Jul2015, 12:12 | 1.4 |
| 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 | 64.0 | 01Jul2015, 12:12 | 15.4 |
| POND E | 1.0170 | 6.6 | 02Jul2015, 00:00 | 5.9 |
| H08 | 1.0170 | 4.1 | 02Jul2015, 00:00 | 3.6 |
| H09 | 0.0000 | 2.4 | 02Jul2015, 00:00 | 2.3 |

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

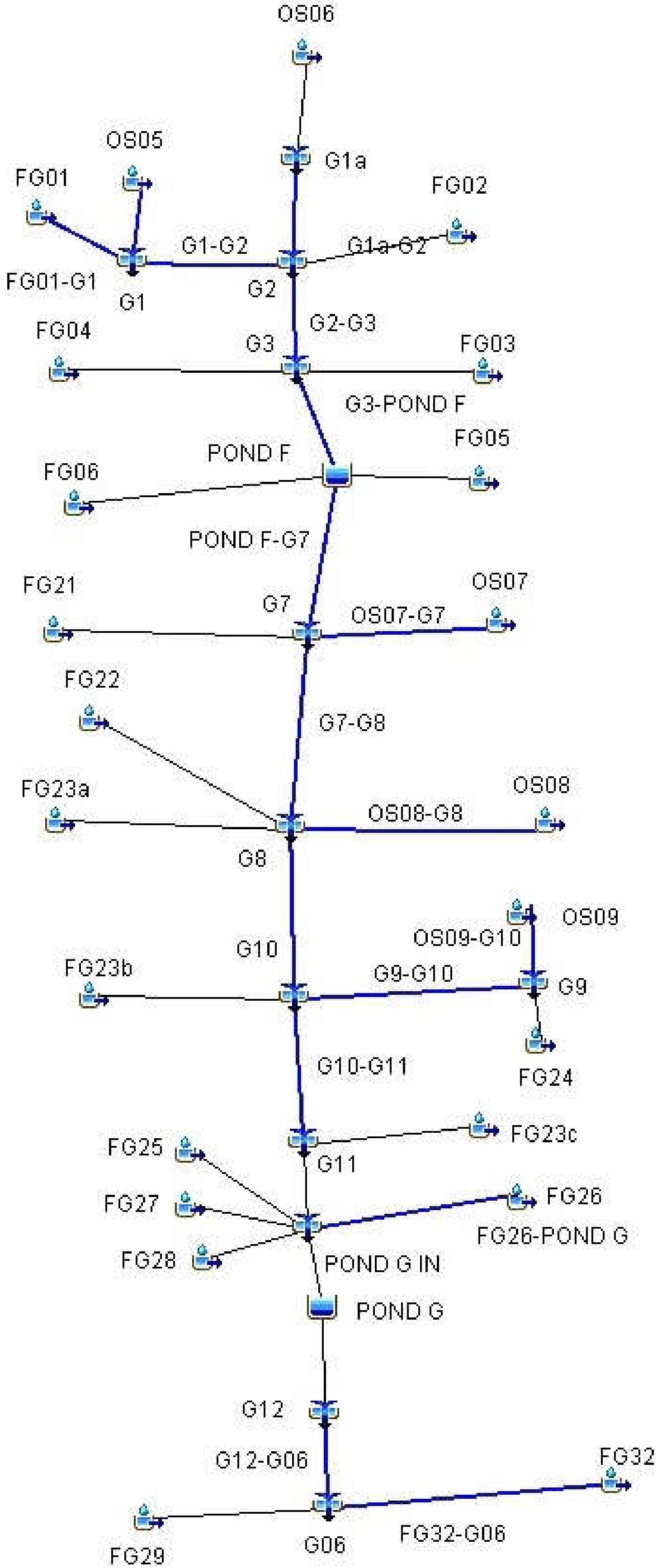
| FUTURE MDDP (2-YEAR) | | | | |
|---|---|---|---|---|
| HYDROLOGIC ELEMENT | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q2 (CFS) | TIME OF PEAK | TOTAL VOLUME Q2 (AC. FT.) |
| FG34 | 0.0600 | 0.3 | 01Jul2015, 13:18 | 0.2 |
| G14 | 0.0600 | 0.3 | 01Jul2015, 13:18 | 0.2 |
| G14-G15 | 0.0600 | 0.3 | 01Jul2015, 13:48 | 0.2 |
| FG35 | 0.0344 | 0.3 | 01Jul2015, 13:06 | 0.1 |
| G15 | 0.0944 | 0.6 | 01Jul2015, 13:36 | 0.3 |
| G15-G08 | 0.0944 | 0.6 | 01Jul2015, 13:48 | 0.3 |
| FG37 | 0.0797 | 0.3 | 01Jul2015, 13:42 | 0.2 |
| FG36 | 0.0281 | 0.1 | 01Jul2015, 13:42 | 0.1 |
| FG36-G08 | 0.0281 | 0.1 | 01Jul2015, 14:00 | 0.1 |
| G08 | 0.2022 | 1.0 | 01Jul2015, 13:48 | 0.6 |
| | | | | |

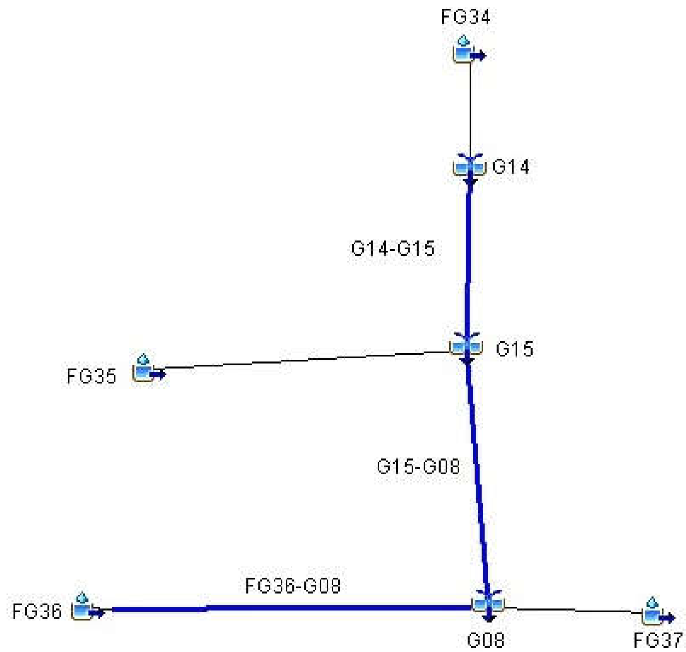
Highlighted green rows reference key design points (Typical all charts this section)

HAEGLER FUTURE CONDITIONS



GIECK FUTURE CONDITIONS




FG34
G14
G14-G15
G15
FG35
G15-G08
FG36-G08
FG36
G08
FG37

# Appendix C - Detention Pond Information

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

| | |
|---|---|
| embankment length = | 710 |
| embankment elev = | 7060 |
| spillway length = | 100 |
| spillway elevation = | 7058 |
| 100 year storage elev.= | 7057.1 |
| 100 year storage vol.= | 25.5 |
| 100 year discharge= | 134 |
| 5 year storage elev.= | 7053.9 |
| 5 year storage vol.= | 7.4 |
| 5 year discharge= | 12 |
| WQCV storage vol.= | 1.0 |
| WQCV depth = | 2.42 |
| 1/2 WQCV storage vol.= | 0.50 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Gieck Basin - El Paso County, Colorado

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

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

| STAGE | | STORAGE | | | | TOTAL DISCHARGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF BANK | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL FLOW |
| | | sqft | acre | acft | cum acft | | | 1 | 2 | 3 | 4 | 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^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

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

Data for spillway and embankment:

| | |
|---|---|
| embankment length = | 1860 |
| embankment elev = | 6976 |
| spillway length = | 200 |
| spillway elevation = | 6974 |
| 100 year storage elev.= | 6973.6 |
| 100 year storage vol.= | 42.4 |
| 100 year discharge= | 205 |
| 5 year storage elev.= | 6971.4 |
| 5 year storage vol.= | 18.0 |
| 5 year discharge= | 12 |
| WQCV storage elev.= | 6968.9 |
| WQCV storage vol.= | 1.5 |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.= | 0.8 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

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

Outlet Culvert Dimensions

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

| STAGE | | STORAGE | | | | DISCHARGE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL 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-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.= | 6973.6 |
| 100 year storage vol.= | 42.4 |
| 100 year discharge= | 37 |
| 5 year storage elev.= | 6971.4 |
| 5 year storage vol.= | 18.0 |
| 5 year discharge= | 4.1 |
| WQCV storage elev.= | 6968.9 |
| WQCV storage vol.= | 1.5 |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.= | 0.75 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

| STAGE | | STORAGE | | | | DISCHARGE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL 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 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.= | 8.8 |
| 100 year discharge= | 177 |
| 5 year storage elev.= | 7131.2 |
| 5 year storage vol.= | 1.8 |
| 5 year discharge= | 8.0 |
| WQCV storage elev.= | 7129.1 |
| WQCV storage vol.= | 0.3 |
| 1/2 WQCV storage elev.= | 7128.6 |
| 1/2 WQCV storage vol.= | 0.15 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

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. | | | |

| | |
|---|---|
| 50 year storage elev.= | 7134.9 |
| 50 year discharge= | 121 |
| 25 year storage elev.= | 7134.1 |
| 25 year discharge= | 60 |
| 10 year storage elev.= | 7132.7 |
| 10 year discharge= | 17 |
| 2 year storage elev.= | 7130.1 |
| 2 year discharge= | 2.3 |

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

## Meridian Ranch Proposed Detention Pond G-FINAL 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.= | 7030.0 |
| 100 year storage vol.= | 24.1 |
| 100 year discharge= | 399 |
| 5 year storage elev.= | 7027.4 |
| 5 year storage vol.= | 8.1 |
| 5 year discharge= | 13 |
| WQCV storage elev.= | 7025.8 |
| WQCV storage vol.= | 0.9 |
| 1/2 WQCV storage elev.= | 7024.9 |
| 1/2 WQCV storage vol.= | 0.45 |

Data for outlet pipe and grate:

| Type | | H or V | Dimensions Width (ft.) | X Height (ft.) | Dia.(in) | | (sqft) | | |
|---|---|---|---|---|---|---|---|---|---|
| **Rectangular** | Orifice 1: | V | 0.0414 | 1.40 | | Area = | 0.058 | Elev to cl = | 7024.00 |
| **Rectangular** | Orifice 2: | V | 8.5 | 1.1 | | Area = | 9.350 | Elev to cl = | 7027.55 |
| **Circular** | Orifice 3: | H | | | 12 | Area = | 0.785 | Elev to cl = | 7025.40 |
| **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 discharge= | 237 |
| 25 year storage elev.= | 7028.8 |
| 25 year discharge= | 117 |
| 10 year storage elev.= | 7028.0 |
| 10 year discharge= | 35 |
| 2 year storage elev.= | 7026.4 |
| 2 year discharge= | 4.2 |

| STAGE | | STORAGE | | | | DISCHARGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF BANK | SPILLWAY | ORIFICE (max outflow) | | | | | GRATE (max outflow) | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL FLOW |
| | | 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 | - | - | 0.1 | - | - | - | - | - | 51 | | 0.1 | 0.07 |
| 7025 | 1.7 | 39917 | 0.92 | 0.5 | 0.50 | - | - | 0.3 | - | - | - | - | - | 111 | | 0.3 | 0.28 |
| 7026 | 2.7 | 126469 | 2.90 | 1.9 | 2.41 | - | - | 0.4 | - | 2.9 | - | - | - | 184 | | 3.3 | 3.3 |
| 7026.5 | 3.2 | 166675 | 3.83 | 3.6 | 4.06 | - | - | 0.4 | - | 4.0 | - | - | - | 224 | | 4.4 | 4.4 |
| 7027 | 3.7 | 206880 | 4.75 | 2.1 | 6.20 | - | - | 0.5 | - | 4.8 | - | - | - | 268 | | 5.3 | 5.3 |
| 7027.5 | 4.2 | 232032 | 5.33 | 4.6 | 8.64 | - | - | 0.5 | 9.0 | 5.5 | - | 9.0 | - | 304 | | 15 | 15 |
| 7028 | 4.7 | 257183 | 5.90 | 5.3 | 11.53 | - | - | 0.6 | 25.5 | 6.1 | 4.2 | 25.5 | - | 337 | | 36 | 36 |
| 7028.5 | 5.2 | 264196 | 6.07 | 5.7 | 14.33 | - | - | 0.6 | 43.9 | 6.7 | 9.7 | 43.9 | 27 | 373 | | 88 | 88 |
| 7029 | 5.7 | 271209 | 6.23 | 6.1 | 17.59 | - | - | 0.6 | 54.2 | 7.2 | 12.7 | 54.2 | 92 | 406 | | 167 | 167 |
| 7029.5 | 6.2 | 276106 | 6.34 | 11.7 | 20.30 | - | - | 0.7 | 70.5 | 7.7 | 17.1 | 70.5 | 179 | 436 | | 275 | 275 |
| 7030 | 6.7 | 281003 | 6.45 | 9.4 | 23.72 | - | - | 0.7 | 77.3 | 8.1 | 19.0 | 77.3 | 283 | 464 | | 388 | 388 |
| 7030.5 | 7.2 | 286003 | 6.57 | 6.5 | 26.75 | - | - | 0.7 | 77.3 | 8.5 | 19.0 | 77.3 | 402 | 491 | | 491 | 491 |
| 7031 | 7.7 | 291002 | 6.68 | 6.6 | 30.28 | - | - | 0.7 | 83.6 | 8.9 | 20.7 | 83.6 | 533 | 516 | | 516 | 516 |
| 7031.5 | 8.2 | 296443 | 6.81 | 6.7 | 33.44 | - | - | 0.8 | 89.5 | 9.3 | 22.2 | 89.5 | 677 | 540 | | 540 | 540 |
| 7032 | 8.7 | 301883 | 6.93 | 3.4 | 36.87 | 137.9 | 137.9 | 0.8 | 95.0 | 9.7 | 23.7 | 95.0 | 832 | 563 | | 563 | 701 |
| 7032.5 | 9.2 | 309236 | 7.10 | 7.0 | 40.39 | 390.0 | 390.0 | 0.8 | 100.2 | 10.1 | 25.1 | 100.2 | 997 | 586 | | 586 | 976 |
| 7033 | 9.7 | 316589 | 7.27 | 3.6 | 44.0 | 716.5 | 716.5 | 0.8 | 105.1 | 10.4 | 26.4 | 105.1 | 1,171 | 607 | | 607 | 1,323 |

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Geick Basin - El Paso County, Colorado

Data for spillway and embankment:

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

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

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

Notes:
1) Top-of-bank and spillway flows are weir equations from section 11.3.1 in the DCM. Q=CLH^1.5 (C=3.0)
2) Orifice flows are also from section 11.3.1. Q=CA(2gH)^.5 (C=.6)
3) Grate flows are determined from equations 7-2 and 7-3. Weir Flow Q=(3PH^1.5)/F, Orifice Flow Q=4.815*AH^0.5)

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

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

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

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

| STAGE | | STORAGE | | | | TOTAL DISCHARGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF BANK | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL FLOW |
| | | sqft | acre | acft | cum acft | | | 1 | 2 | 3 | 4 | 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^0.5)
4) Pipe flows use the lesser of: 1) Inlet control equations 27 & 28, page 146 of HDS No. 5 - or - 2) Allowable Pipe Flow equation on page 11-9 of the DCM. Use Table 9, page 147-148, HDS No. 5 for formulas 26 & 27.

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

### Gieck Basin - El Paso County, Colorado

Data for spillway and embankment:

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

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

| STAGE | | STORAGE | | | | DISCHARGE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL 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.= | 42.4 |
| 100 year discharge= | 37 |
| 5 year storage elev.= | 6971.4 |
| 5 year storage vol.= | 18.0 |
| 5 year discharge= | 4.1 |
| WQCV storage elev.= | 6968.9 |
| WQCV storage vol.= | 1.5 |
| 1/2 WQCV storage elev.= | 6968.3 |
| 1/2 WQCV storage vol.= | 0.8 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

| STAGE | | STORAGE | | | | DISCHARGE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV | HEIGHT | AREA | | VOLUME | | TOP OF | SPILLWAY | ORIFICE (max outflow) | | | | GRATE (max outflow) | PIPE | | REALIZED CULVERT OUTFLOW | TOTAL 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.= | 8.8 |
| 100 year discharge= | 177 |
| 5 year storage elev.= | 7131.2 |
| 5 year storage vol.= | 1.9 |
| 5 year discharge= | 8.1 |
| WQCV storage elev.= | 7129.1 |
| WQCV storage vol.= | 0.3 |
| 1/2 WQCV storage elev.= | 7128.6 |
| 1/2 WQCV storage vol.= | 0.15 |

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

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. | | | |

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

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

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

# STAGE/STORAGE/DISCHARGE CURVES FOR DETENTION POND ANALYSIS

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

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

Data for spillway and embankment:

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

Data for outlet pipe and grate:

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

Stand Pipe Dimensions

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

Outlet Culvert Dimensions

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

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

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

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

# FUTURE POND G

WQCV Control Riser Calculations

| | | |
|---|---|---|
| TRIBUTARY AREA | | 577 acres |
| DRAIN TIME | | 40 hr |
| | *a* | 1 |
| IMPERVIOUSNESS RATIO | *i* | 0.18 |
| DEPTH OF OUTLET | | 1.9 |
| WQCV | | 0.11 inches |
| WQCV DESIGN VOL | | **0.9** ac-ft |
| | $K_{40}$ | 0.36 |
| AREA PER RISER[1] | a | 7.67 $in^2$ |
| No. of Columns | | 1 |
| No. of Holes | | 3 per column |
| Area per Hole | | 2.56 $in^2$ |
| Hole size | | 1 3/4 in |
| Steel Plate Thickness | | 1/4 in |

[1] AREA PER ROW PER RISER

| | |
|---|---|
| Actual area per row per hole: | 2.41 $in^2$ |
| Actual area per riser: | 7.2 $in^2$ |
| Actual area per riser: | 0.050 $ft^2$ |

**TABLE SB-2**

| Hole Dia (in) | | Area per Row ($in^2$) | | | | | |
|---|---|---|---|---|---|---|---|
| Holes per Row | | 1 | 2 | 3 | 4 | 5 | 6 |
| Min steel thickness | | 1/4 | 5/16 | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/4 | 0.2500 | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.29 |
| 5/16 | 0.3125 | 0.08 | 0.15 | 0.23 | 0.31 | 0.38 | 0.46 |
| 3/8 | 0.3750 | 0.11 | 0.22 | 0.33 | 0.44 | 0.55 | 0.66 |
| 7/16 | 0.4375 | 0.15 | 0.30 | 0.45 | 0.60 | 0.75 | 0.90 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 1 | 1.0000 | 0.79 | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/8 | 1.1250 | 0.99 | 1.99 | 2.98 | 3.98 | 4.97 | 5.96 |
| 1 1/4 | 1.2500 | 1.23 | 2.45 | 3.68 | 4.91 | 6.14 | 7.36 |
| 1 3/8 | 1.3750 | 1.48 | 2.97 | 4.45 | 5.94 | 7.42 | 8.91 |
| 1 1/2 | 1.5000 | 1.77 | 3.53 | 5.30 | 7.07 | 8.84 | 10.60 |
| 1 5/8 | 1.6250 | 2.07 | 4.15 | 6.22 | 8.30 | 10.37 | 12.44 |
| 1 3/4 | 1.7500 | 2.41 | 4.81 | 7.22 | 9.62 | 12.03 | 14.43 |
| 1 7/8 | 1.8750 | 2.76 | 5.52 | 8.28 | 11.04 | 13.81 | 16.57 |
| 2 | 2.0000 | 3.14 | 6.28 | 9.42 | 12.57 | 15.71 | 18.85 |

n = Number of columns of perforations

**ROLLING HILLS RANCH PUD INTERIM CONDITION**

**Simulation Run: RHPUD-100 YR Reservoir: POND D**

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

| | | | |
|---|---|---|---|
| Peak Inflow: | 107 (CFS) | Date/Time of Peak Inflow: | 01Jul2015, 12:18 |
| Peak Outflow: | 12 (CFS) | Date/Time of Peak Outflow: | 01Jul2015, 14:36 |
| Total Inflow : | 13.6 (AC-FT) | Peak Storage: | 7.4 (AC-FT) |
| Total Outflow: | 9.2 (AC-FT) | Peak Elevation: | 7053.9 (FT) |

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

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

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

| | | | |
|---|---|---|---|
| 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: | 242(CFS) | Date/Time of Peak Inflow: | 01Jul2015, 12:18 |
| Peak Outflow: | 155 (CFS) | Date/Time of Peak Outflow: | 01Jul2015, 12:42 |
| Total Inflow : | 33.5 (AC-FT) | Peak Storage: | 7.6 (AC-FT) |
| Total Outflow: | 31.6 (AC-FT) | Peak Elevation: | 7135.6 (FT) |

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

| | | | |
|---|---|---|---|
| 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: | 18 (CFS) | Date/Time of Peak Inflow: | 01Jul2015, 12:36 |
| Peak Outflow: | 6.5 (CFS) | Date/Time of Peak Outflow: | 01Jul2015, 14:24 |
| Total Inflow : | 4.8 (AC-FT) | Peak Storage: | 1.5 (AC-FT) |
| Total Outflow: | 4.3 (AC-FT) | Peak Elevation: | 7131.0 (FT) |

**Simulation Run: RHPUD-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: | 504 (CFS) | Date/Time of Peak Inflow: | 01Jul2015, 12:36 |
| Peak Outflow: | 369 (CFS) | Date/Time of Peak Outflow: | 01Jul2015, 13:06 |
| Total Inflow : | 95.6 (AC-FT) | Peak Storage: | 23.1 (AC-FT) |
| Total Outflow: | 86.8 (AC-FT) | Peak Elevation: | 7029.9 (FT) |

**Simulation Run: RHPUD-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: | 38 (CFS) | Date/Time of Peak Inflow: | 01Jul2015, 12:48 |
| Peak Outflow: | 12 (CFS) | Date/Time of Peak Outflow: | 01Jul2015, 18:18 |
| Total Inflow : | 14.2 (AC-FT) | Peak Storage: | 7.8 (AC-FT) |
| Total Outflow: | 8.6 (AC-FT) | Peak Elevation: | 7025.8 (FT) |

**ROLLING HILLS RANCH PUD FUTURE CONDITION**

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

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

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

Volume Units: AC-FT

Computed Results:

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

# Appendix D – Outlet Protection Design

Again, enter Figure HS-19a using the smaller $d/D$ (or $d/H$) ratio to find the $A/A_{full}$ ratio. Then,

$$A = \left(A/A_{full}\right)A_{full} \qquad \text{(HS-16c)}$$

Finally,

$$V = Q/A \qquad \text{(HS-16d)}$$

In which for Equations 16a through 16d above:

$A_{full}$ = cross-sectional area of the pipe (ft$^2$)

$A$ = area of the design flow in the end of the pipe (ft$^2$)

$n$ = Manning's $n$ for the pipe full depth

$Q_{full}$ = pipe full discharge at its slope (cfs)

$R$ = hydraulic radius of the pipe flowing full, ft [$R_{full} = D/4$ for circular pipes, $R_{full} = A_{full}/(2H + 2w)$ for rectangular pipes, where $D$ = diameter of a circular conduit, $H$ = height of a rectangular conduit, and $w$ = width of a rectangular conduit (ft)]

$S_o$ = longitudinal slope of the pipe (ft/ft)

$V$ = design flow velocity at the pipe outlet (ft/sec)

$V_{full}$ = flow velocity of the pipe flowing full (ft/sec)

#### 3.4.3.2 Riprap Size

For the design velocity, use Figure HS-20c to find the size and type of the riprap to use in the scour protection basin downstream of the pipe outlet (i.e., B18, H, M or L). First, calculate the riprap sizing design parameter, $P_d$ , namely,

$$P_d = \left(V^2 + gd\right)^{1/2} \qquad \text{(HS-16e)}$$

in which:

$V$ = design flow velocity at pipe outlet (ft/sec)

$g$ = acceleration due to gravity = 32.2 ft/sec$^2$

$d$ = design depth of flow at pipe outlet (ft) necessary when the receiving or downstream channel may have little or no flow or tailwater at time when the pipe or culvert is in operation. Design criteria are provided in Figures HS-19a through HS-20c.

### 3.4.2 Objective

By providing a low tailwater basin at the end of a storm sewer conduit or culvert, the kinetic energy of the discharge is dissipated under controlled conditions without causing scour at the channel bottom. Photograph HS-12 shows a fairly large low tailwater basin.

### 3.4.3 Low Tailwater Basin Design

Low tailwater is defined as being equal to or less than ⅓ of the height of the storm sewer, that is:

$$y_t \leq \frac{D}{3} \quad \text{or} \quad y_t \leq \frac{H}{3}$$

in which:

$y_t$ = tailwater depth at design

$D$ = diameter of circular pipe (ft)

$H$ = height of rectangular pipe (ft)

#### 3.4.3.1 Finding Flow Depth and Velocity of Storm Sewer Outlet Pipe

The first step in the design of a scour protection basin at the outlet of a storm sewer is to find the depth and velocity of flow at the outlet. Pipe-full flow can be found using Manning's equation.

$$Q_{full} = \frac{1.49}{n} A_{full} \left(R_{full}\right)^{2/3} S_o^{1/2} \qquad \text{(HS-16a)}$$

Then and the pipe-full velocity can be found using the continuity equation.

$$V_{full} = Q_{full} / A_{full} \qquad \text{(HS-16a)}$$

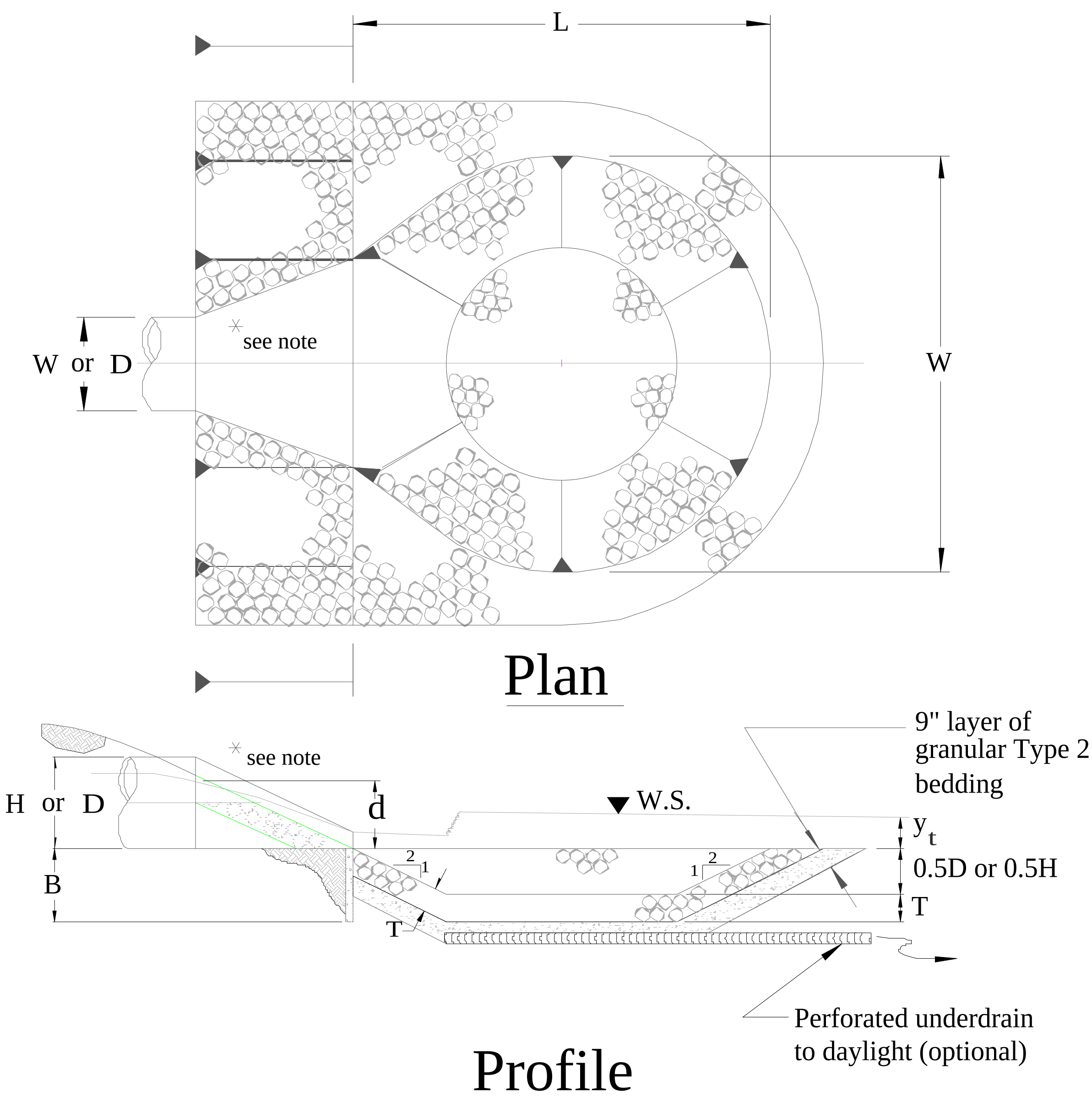
The normal depth of flow, $d$, and the velocity in a conduit can be found with the aid of Figure HS-20a and Figure HS-20b. Using the known design discharge, $Q$, and the calculated pipe-full discharge, $Q_{full}$, enter Figure HS-20a with the value of $Q/Q_{full}$ and find $d/D$ for a circular pipe of $d/H$ for a rectangular pipe.

Compare the value of $d/D$ (or $d/H$) with the one obtained from Figure HS-20b using the Froude parameter.

$$Q/D^{2.5} \quad \text{or} \quad Q/\left(wH^{1/5}\right) \qquad \text{(HS-16a)}$$

Choose the smaller of the two ($d/D$ or $d/H$) ratios to calculate the flow depth at the end of the pipe.

$$d = D\left(d/D\right) \quad \text{or} \quad d = H\left(d/H\right) \qquad \text{(HS-16b)}$$




*Note: For rectangular conduits use a standard design for a headwall with wingwalls, paved bottom between the wingwalls, with an end cutoff wall extending to a minimum depth equal to B

**Figure HS-19—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**
**Low Tailwater Basin at Pipe Outlets**
(Stevens and Urbonas 1996)

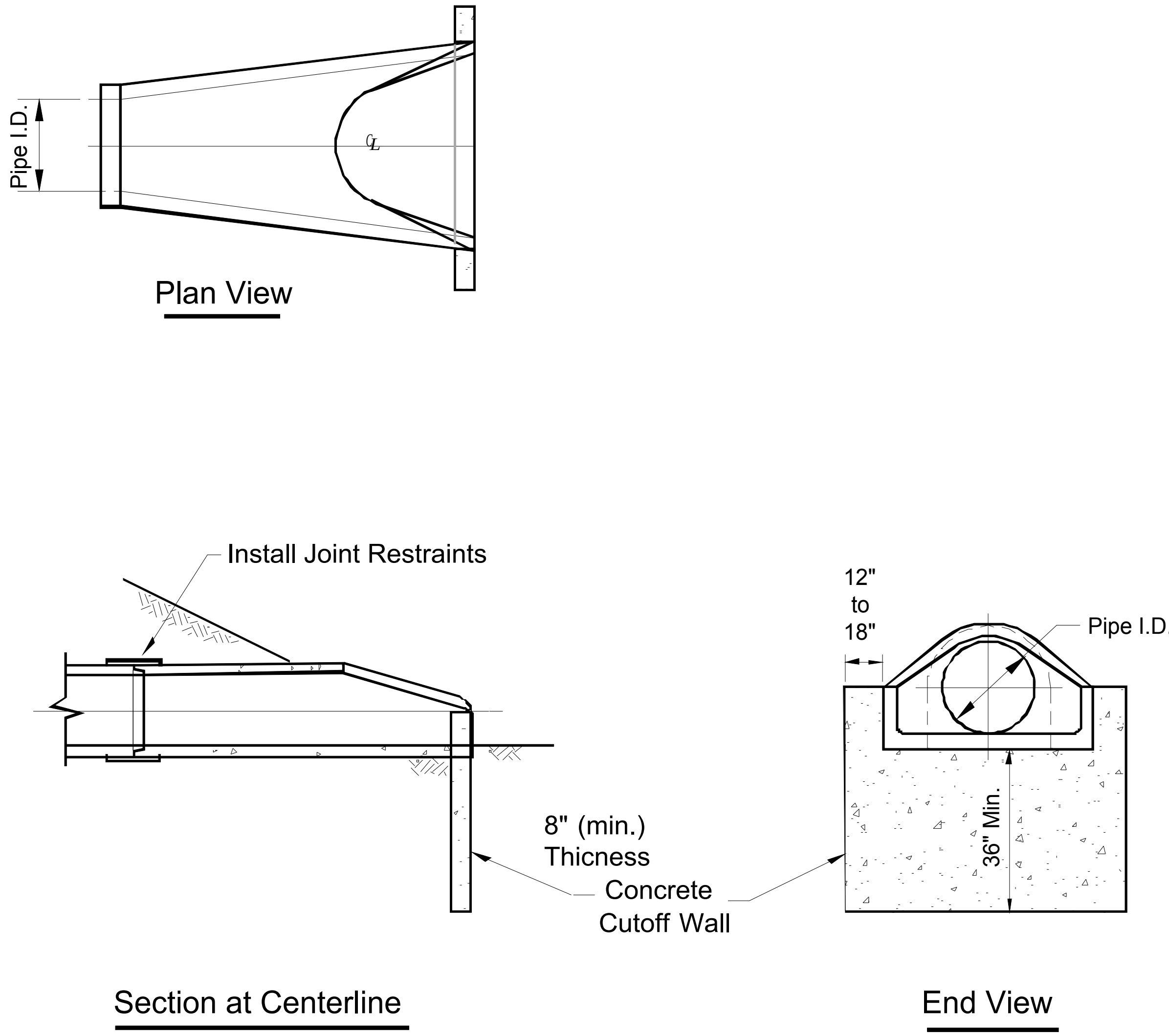



**Figure HS-19a—Concrete Flared End Section with Cutoff Wall for all Pipe Outlets**

*Photograph HS-12—Upstream and downstream views of a low tailwater basin in Douglas County protecting downstream wetland area. Burying and revegetation of the rock would blend the structure better with the adjacent terrain.*

When the riprap sizing design parameter indicates conditions that place the design above the Type H riprap line in Figure HS-20, use B18, or larger, grouted boulders. An alternative to a grouted boulder or loose riprap basin is to use the standard USBR Impact Basin VI or one of its modified versions, described earlier in this Chapter of the *Manual*.

After the riprap size has been selected, the minimum thickness of the riprap layer, $T$, in feet, in the basin is set at:

$$T = 1.75 D_{50} \qquad \text{(HS-17)}$$

in which:

$D_{50}$ = the median size of the riprap (see Table HS-9.)

**Table HS-9—Median (i.e., $D_{50}$) Size of District's Riprap/Boulder**

| Riprap Type | $D_{50}$—Median Rock Size (inches) |
|---|---|
| L | 9 |
| M | 12 |
| H | 18 |
| B18 | 18 (minimum dimension of grouted boulders) |

### 3.4.3.3 Basin Length

The minimum length of the basin, $L$, in Figure HS-19, is defined as being the greater of the following:

for circular pipe:

$$L = 4D \quad \text{or} \quad L = (D)^{1/2}\left(\frac{V}{2}\right) \qquad \text{(HS-18)}$$

for rectangular pipe: $L = 4H$ or $L = (H)^{1/2}\left(\frac{V}{2}\right)$ (HS-19)

in which:

$L$ = basin length

$H$ = height of rectangular conduit

$V$ = design flow velocity at outlet

$D$ = diameter of circular conduit

#### 3.4.3.4 Basin Width

The minimum width, $W$, of the basin downstream of the pipe's flared end section is set as follows:

for circular pipes: $W = 4D$ (HS-20)

for rectangular pipe: $W = w + 4H$ (HS-21)

in which,

$W$ = basin width (Figure HS-19)

$D$ = diameter of circular conduit

$w$ = width of rectangular conduit

#### 3.4.3.5 Other Design Requirements

All slopes in the pre-shaped riprapped basin are 2H to 1V.

Provide pipe joint fasteners and a structural concrete cutoff wall at the end of the flared end section for a circular pipe or a headwall with wingwalls and a paved bottom between the walls, both with a cutoff wall that extends down to a depth of:

$B = \frac{D}{2} + T$ or $B = \frac{H}{2} + T$ (HS-22)

in which,

$B$ = cutoff wall depth

$D$ = diameter of circular conduit

$T$ = Equation HS-17

The riprap must be extended up the outlet embankment's slope to the mid-pipe level.

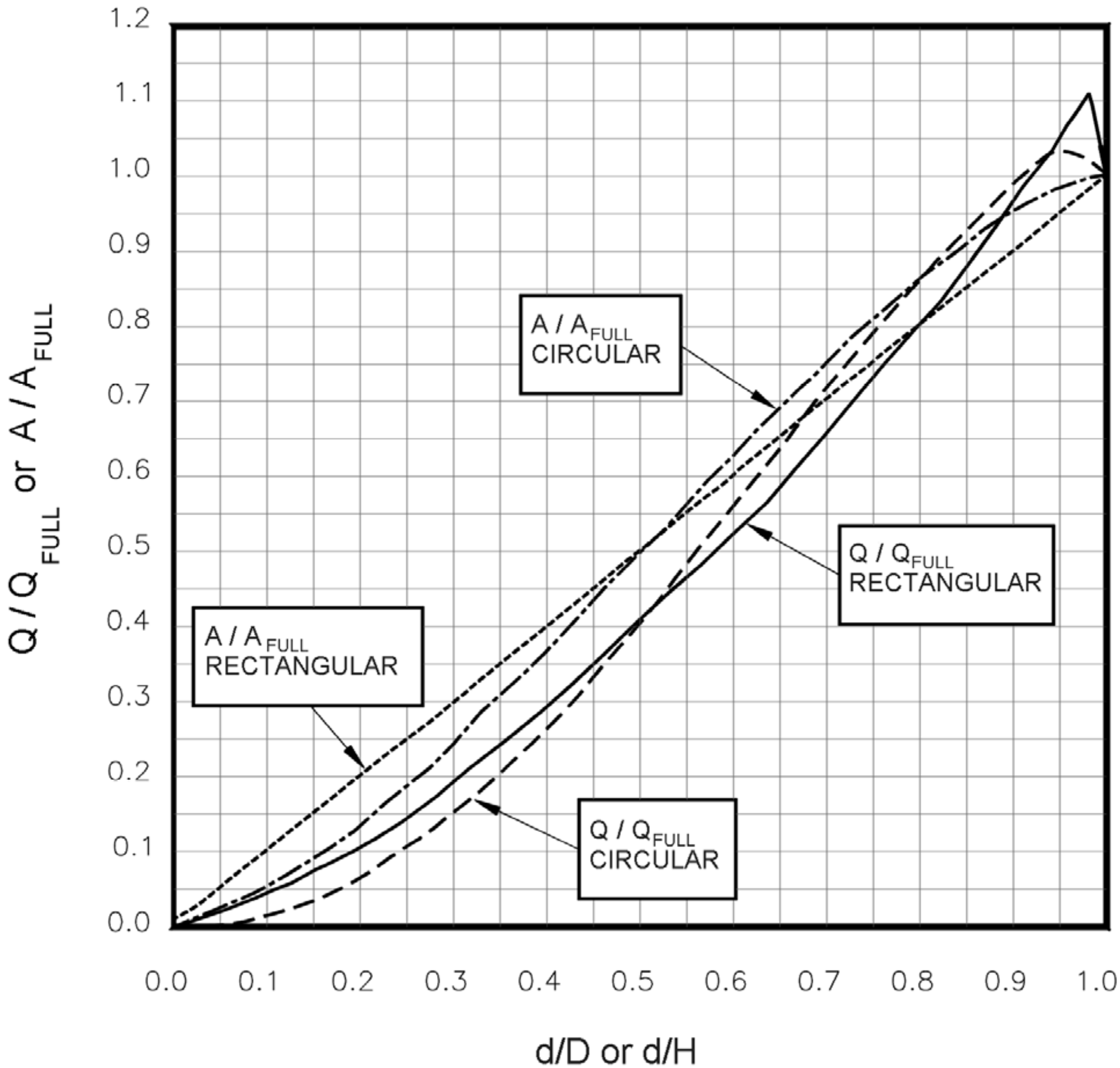



**Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**
**Discharge and Flow Area Relationships for Circular and Rectangular Pipes**
(Ratios for Flow Based on Manning's *n* Varying With Depth)
(Stevens and Urbonas 1996)

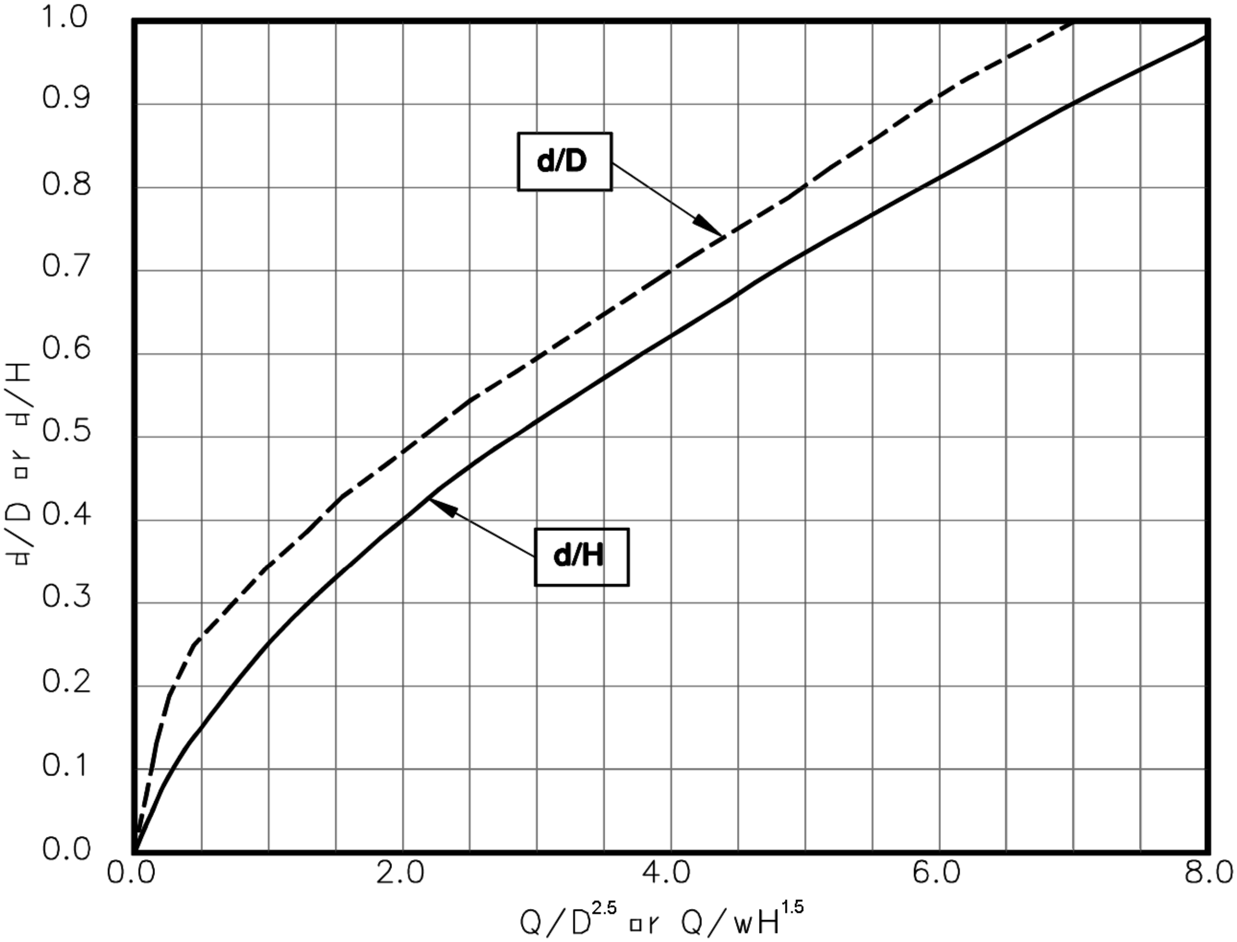



**Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Brink Depth for Horizontal Pipe Outlets**

(Stevens and Urbonas 1996)

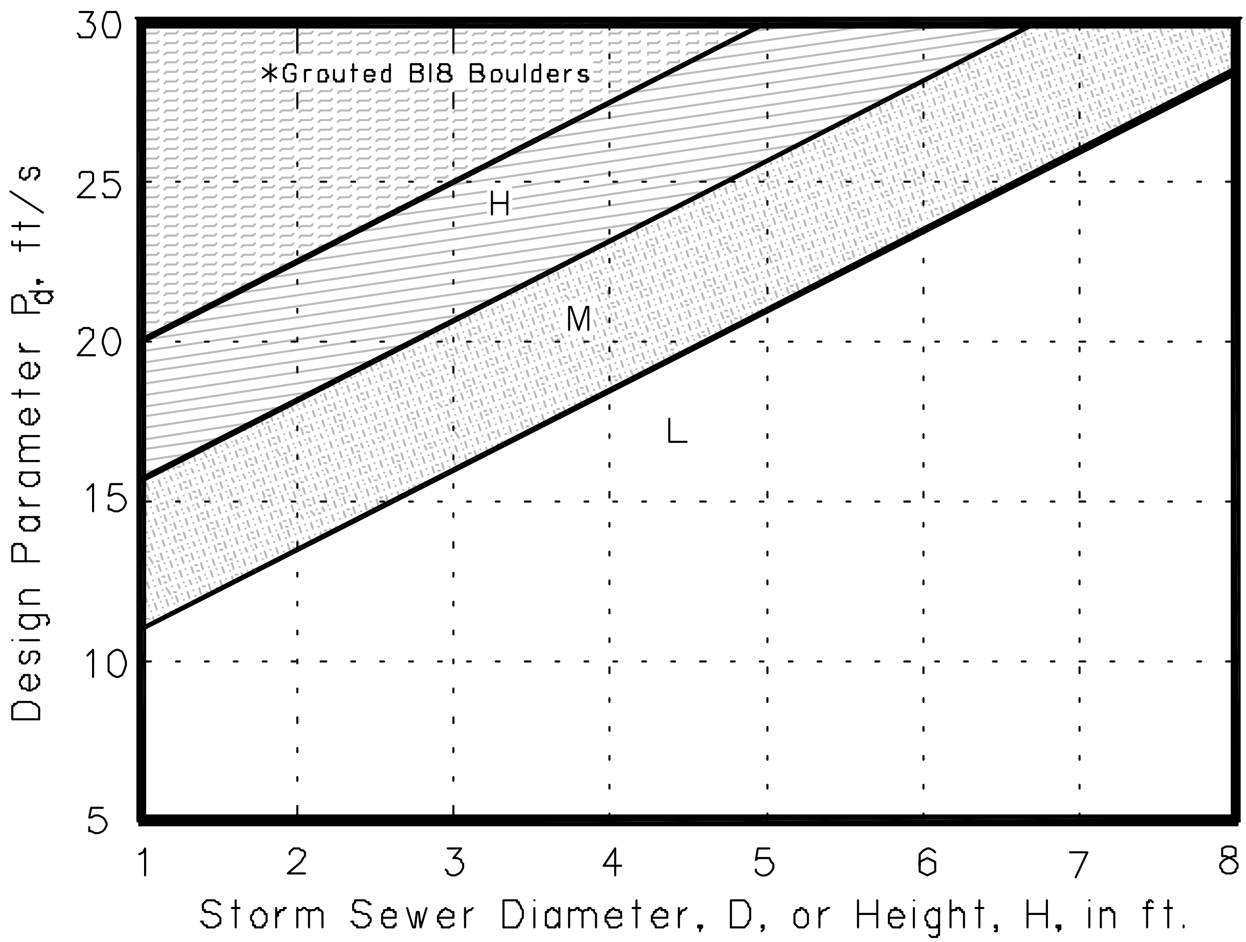



**Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet**

(Stevens and Urbonas 1996)

# RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

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

| OUTLET # | OS-2 |
|---|---|

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

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

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

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

Outlet Velocity (V = q/a) 14.3 FPS

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

RIP-RAP SIZE: M from HS-20c

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

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

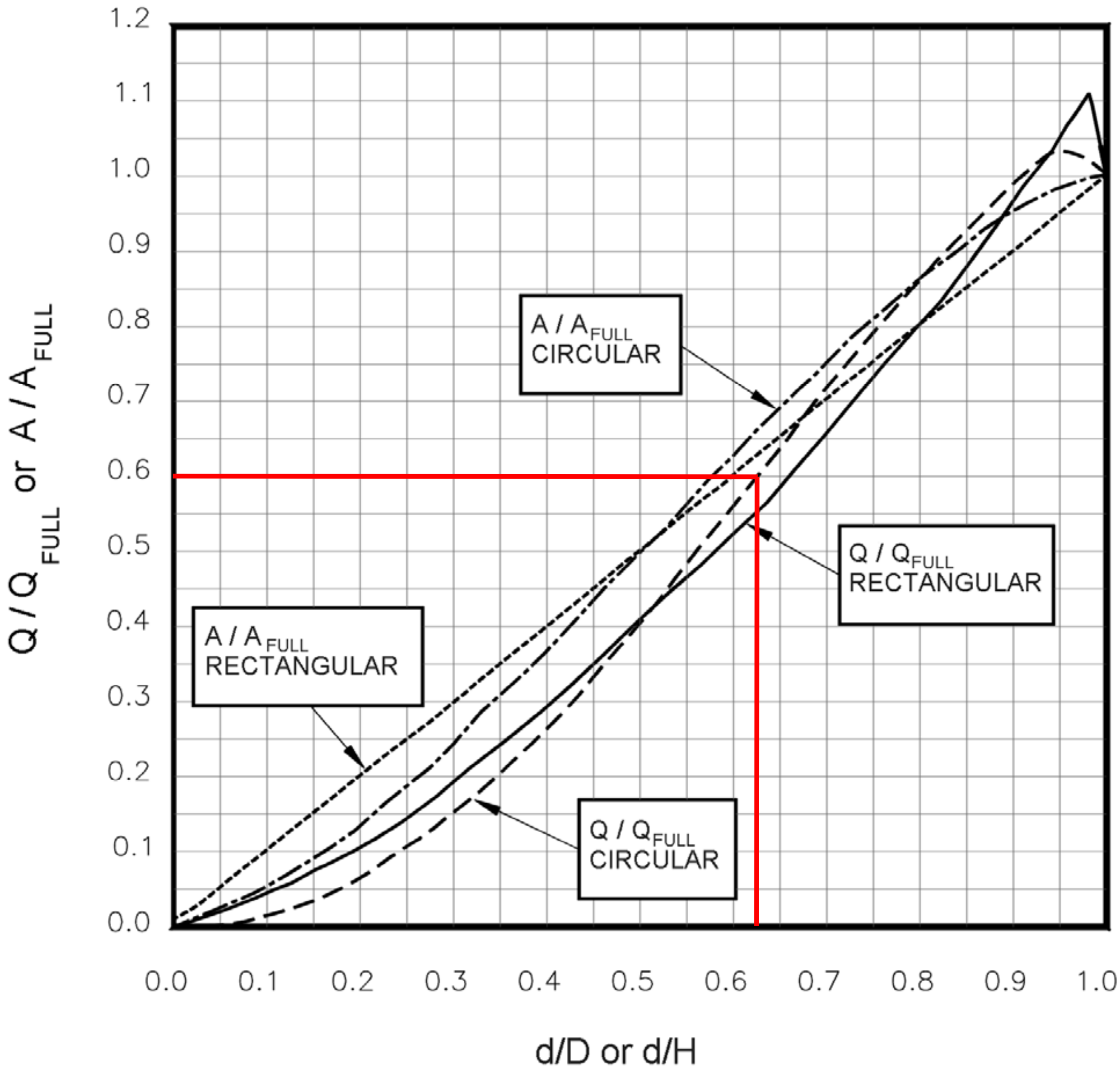



**Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—Discharge and Flow Area Relationships for Circular and Rectangular Pipes**
(Ratios for Flow Based on Manning's *n* Varying With Depth)
(Stevens and Urbonas 1996)

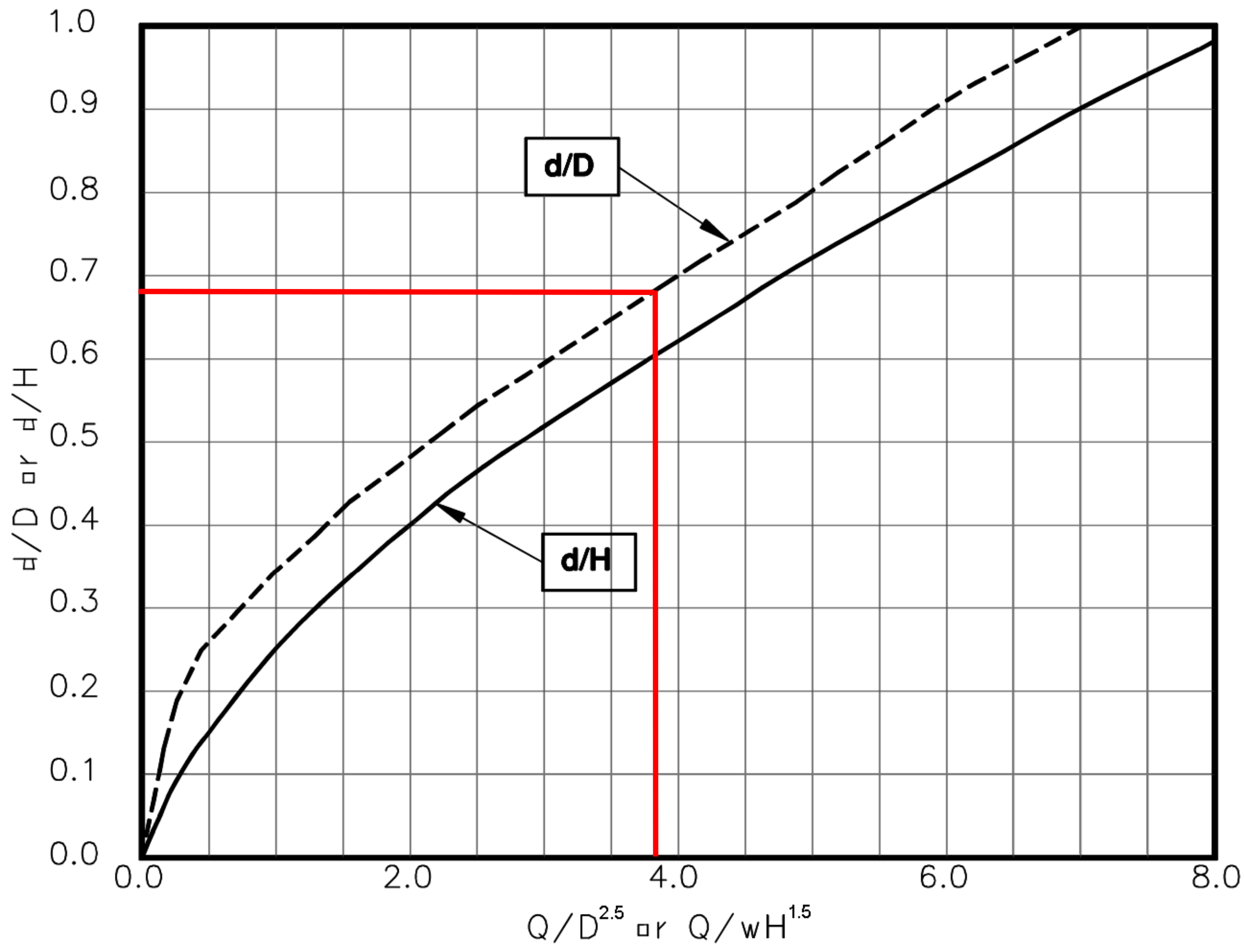



**Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**
**Brink Depth for Horizontal Pipe Outlets**
(Stevens and Urbonas 1996)

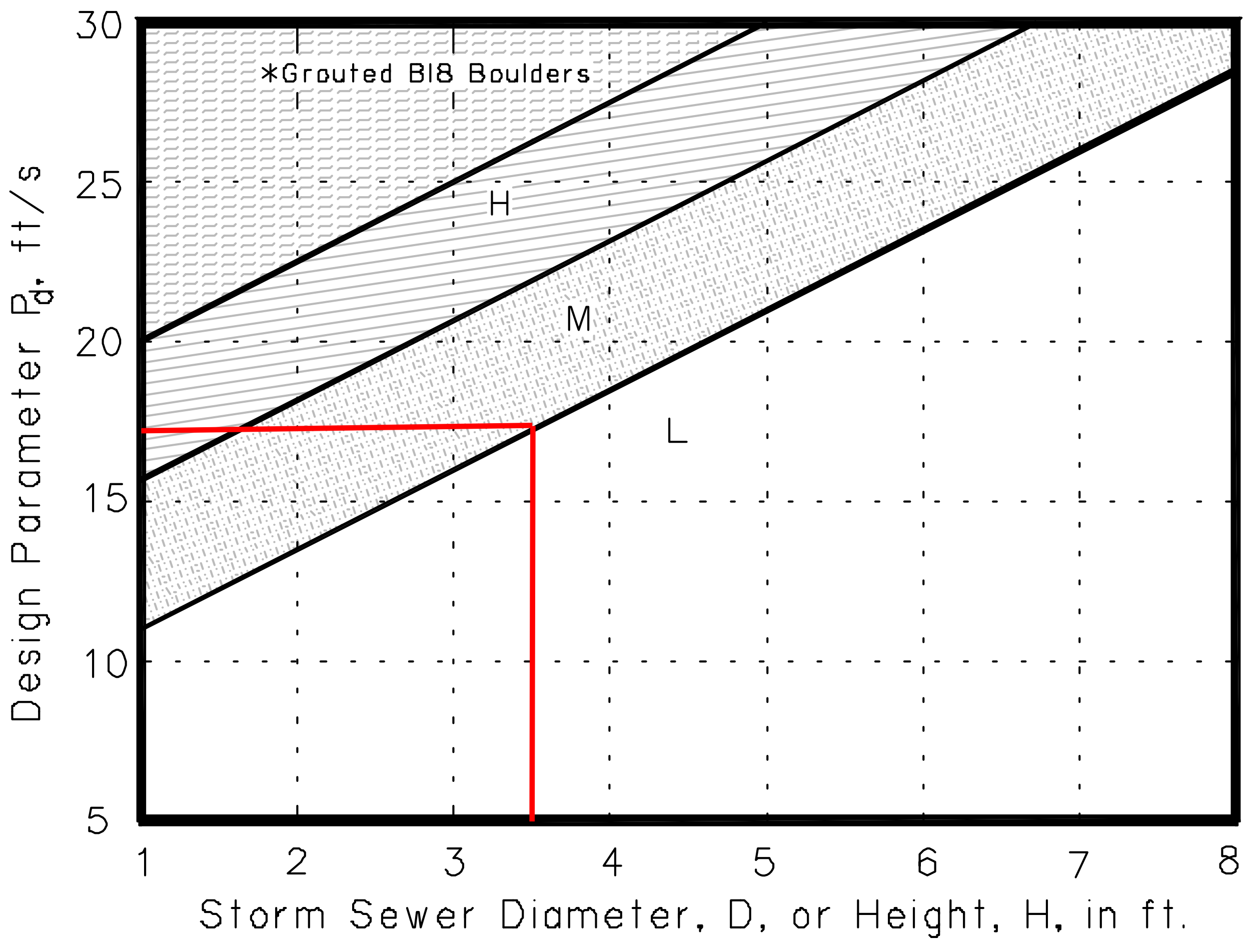



**Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet**

(Stevens and Urbonas 1996)

# RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

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

OUTLET # OS-5

| | | | | | | |
|---|---|---|---|---|---|---|
| Outlet Size (D) : | 24 | in. | | Discharge (q): | 8.3 | CFS |
| Capacity (Q): (full flow) | 49 | CFS | | Flow depth (d): (calculated) | 8.4 | in. |

| | | | | | |
|---|---|---|---|---|---|
| $Q_{full}$ = | 49 | CFS | $q/Q_{full}$ = | 0.17 | |
| $A_{full}$ = | 3.1 | SF | | | |
| $V_{full}$ = | 15.6 | FPS | $Q/D^{2.5}$ = | 1.5 | |

| | | |
|---|---|---|
| d/D | 0.35 | from HS-20a using $q/Q_{full}$ |
| d/D | 0.42 | from HS-20b using $Q/D^{2.5}$ |

| | | | | | |
|---|---|---|---|---|---|
| A' ($A/A_{full}$) | 0.35 | from HS-20a using smaller d/D from above | Flow Area (a=A' x $A_{full}$) | 1.1 | SF |

Outlet Velocity (V = q/a) 7.5 FPS

$P_d = (V^2 + gd)^{1/2}$ = 9

RIP-RAP SIZE: M from HS-20c

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

| | | | | | |
|---|---|---|---|---|---|
| Basin Length (L) | 8.0 | FT. | Cutoff Wall Depth (B=D/2+T) | 2.75 | FT |
| Basin Width (W) | 8.0 | FT. | | | |

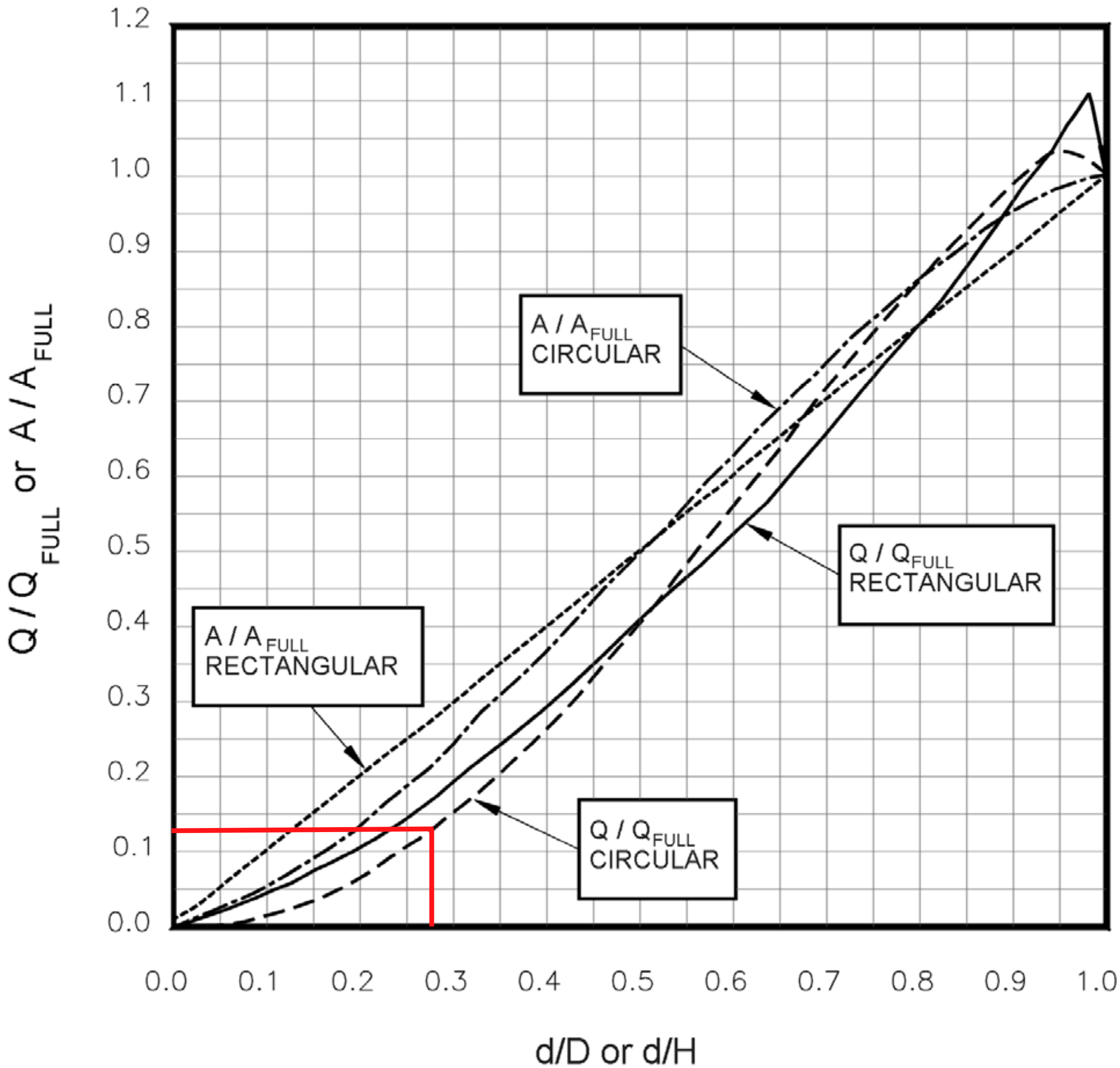



**Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—Discharge and Flow Area Relationships for Circular and Rectangular Pipes**
(Ratios for Flow Based on Manning's *n* Varying With Depth)
(Stevens and Urbonas 1996)

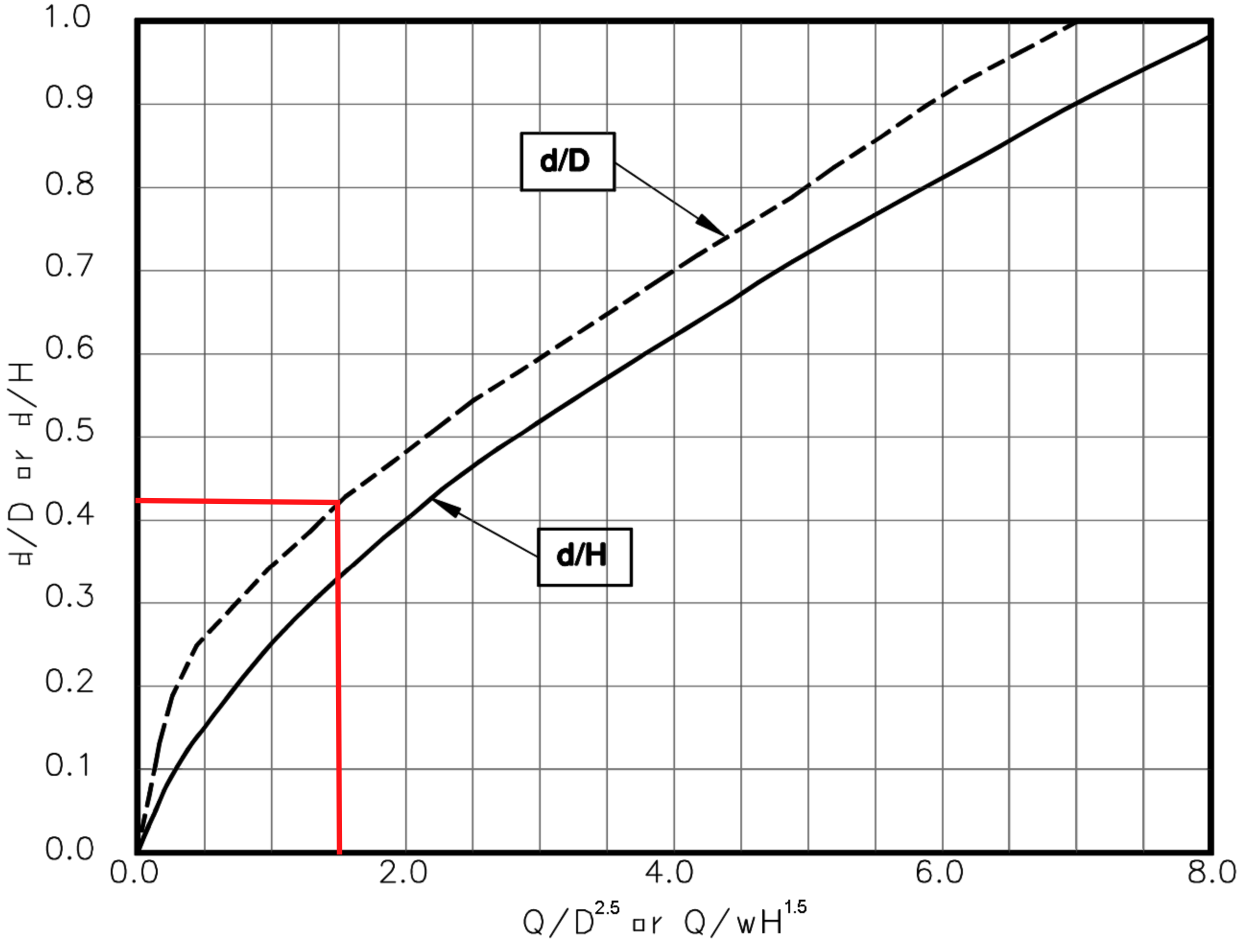



**Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Brink Depth for Horizontal Pipe Outlets**

(Stevens and Urbonas 1996)

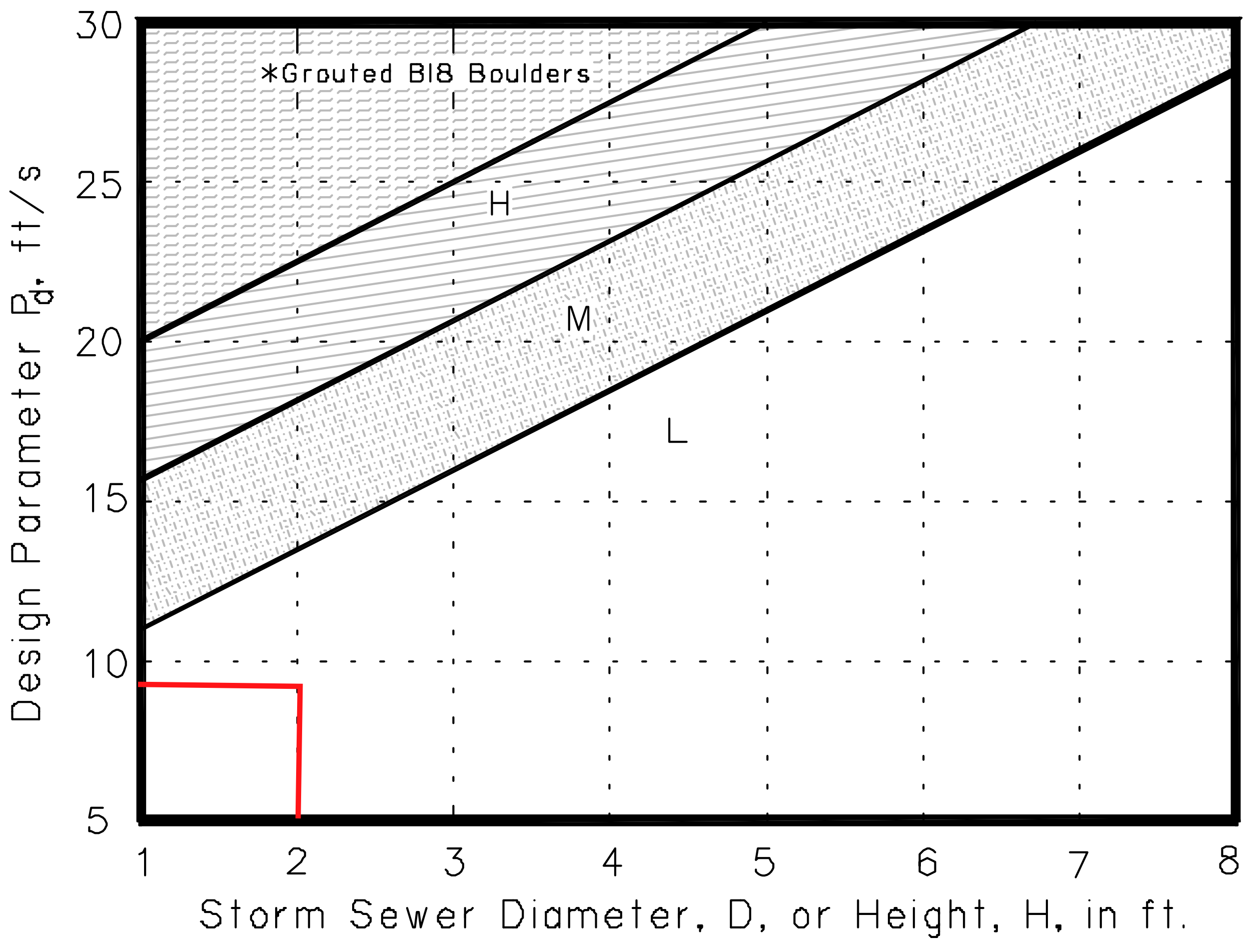



**Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet**

(Stevens and Urbonas 1996)

# RIP RAP PLUNGE POOL

Urban Drainage & Flood Control District Pipe Outlet Design

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

OUTLET # POND G

| | | | | | |
|---|---|---|---|---|---|
| Outlet Size (H) : | 48 | in. | Discharge (q): | 478 | CFS |
| Capacity (Q): (full flow) | 479 | CFS | Flow depth (d): (calculated) | 39.1 | in. |
| Retangular Width | 10 | | | | |

| | | | |
|---|---|---|---|
| $Q_{full}$ = | 479 CFS | $q/Q_{full}$ = | 1.00 |
| $A_{full}$ = | 40.0 SF | | |
| $V_{full}$ = | 12.0 FPS | $Q/wH^{1.5}$ = | 6.0 |

| | | |
|---|---|---|
| d/H | 1.00 | from HS-20a using $Q/Q_{full}$ |
| d/H | 0.82 | from HS-20b using $Q/wH^{1.5}$ |

| | | | | | |
|---|---|---|---|---|---|
| A' ($A/A_{full}$) | 0.82 | from HS-20a using smaller d/D from above | Flow Area ($a=A' \times A_{full}$) | 32.6 | SF |

Outlet Velocity (V = q/a) 14.7 FPS

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

RIP-RAP SIZE: M from HS-20c

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

| | | | | |
|---|---|---|---|---|
| Basin Length (L) | 16.0 FT. | Cutoff Wall Depth (B=H/2+T) | 3.75 | FT |
| Basin Width (W) | 26.0 FT. | | | |

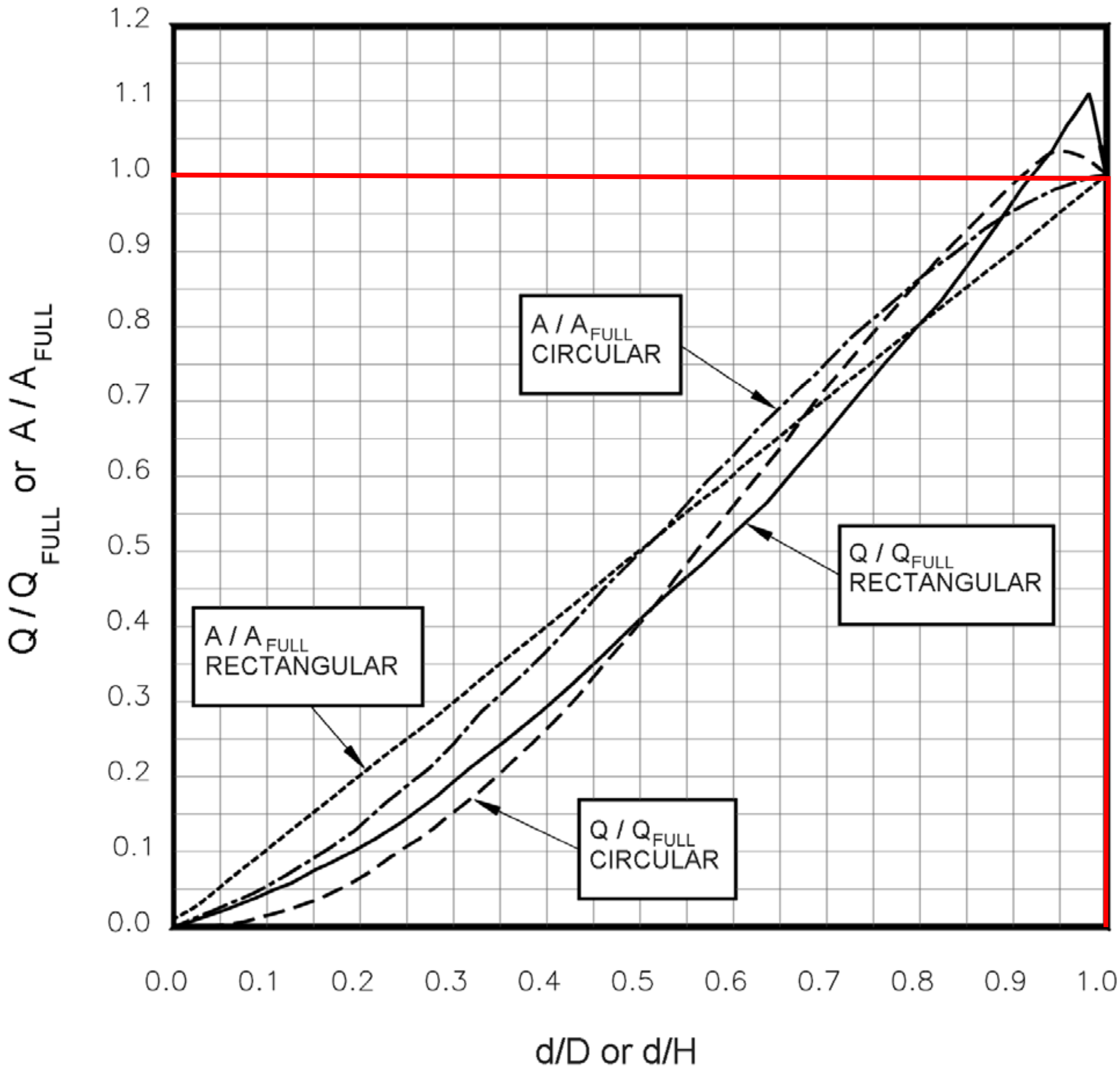



**Figure HS-20a—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—Discharge and Flow Area Relationships for Circular and Rectangular Pipes**
(Ratios for Flow Based on Manning's *n* Varying With Depth)
(Stevens and Urbonas 1996)

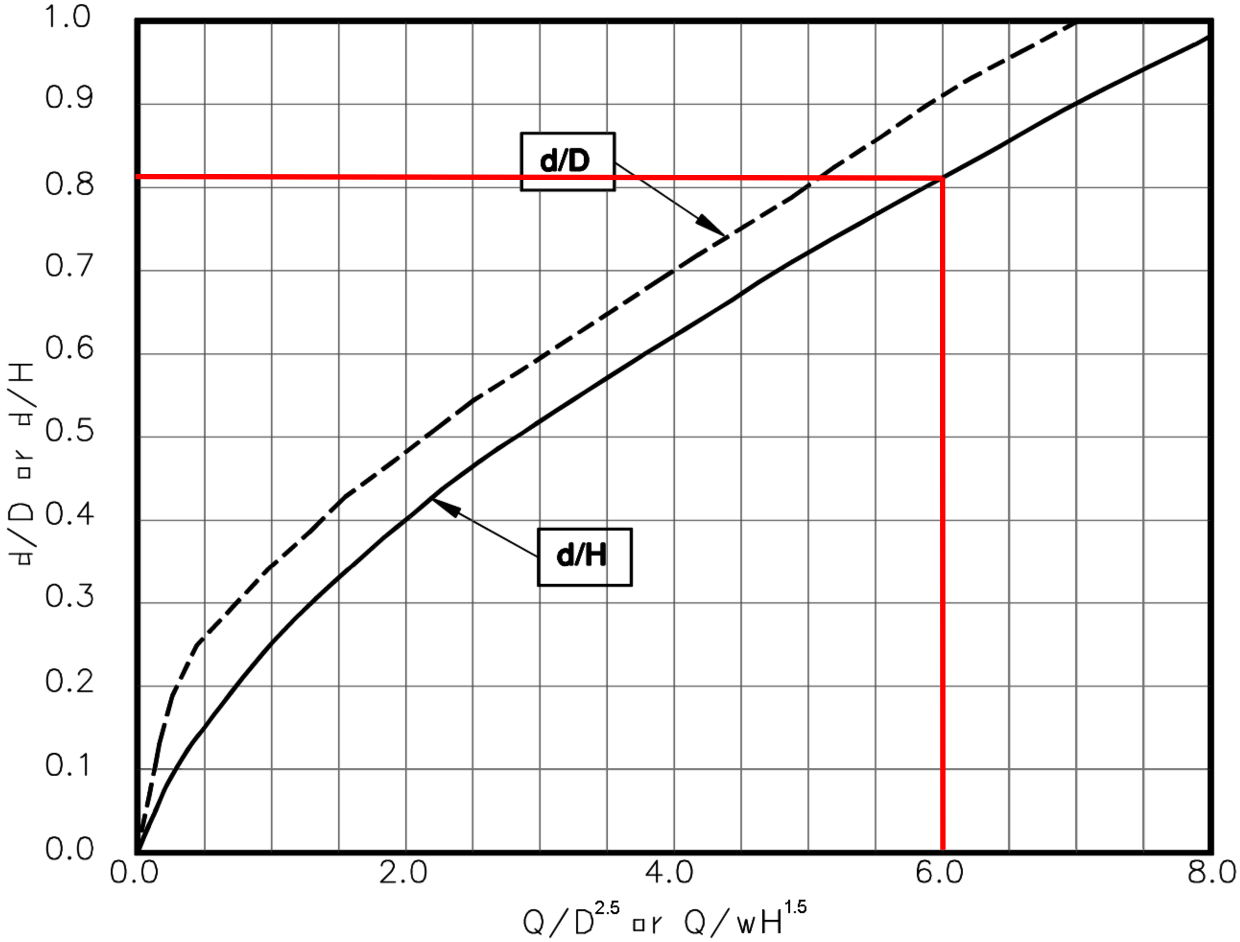



**Figure HS-20b—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Brink Depth for Horizontal Pipe Outlets**

(Stevens and Urbonas 1996)

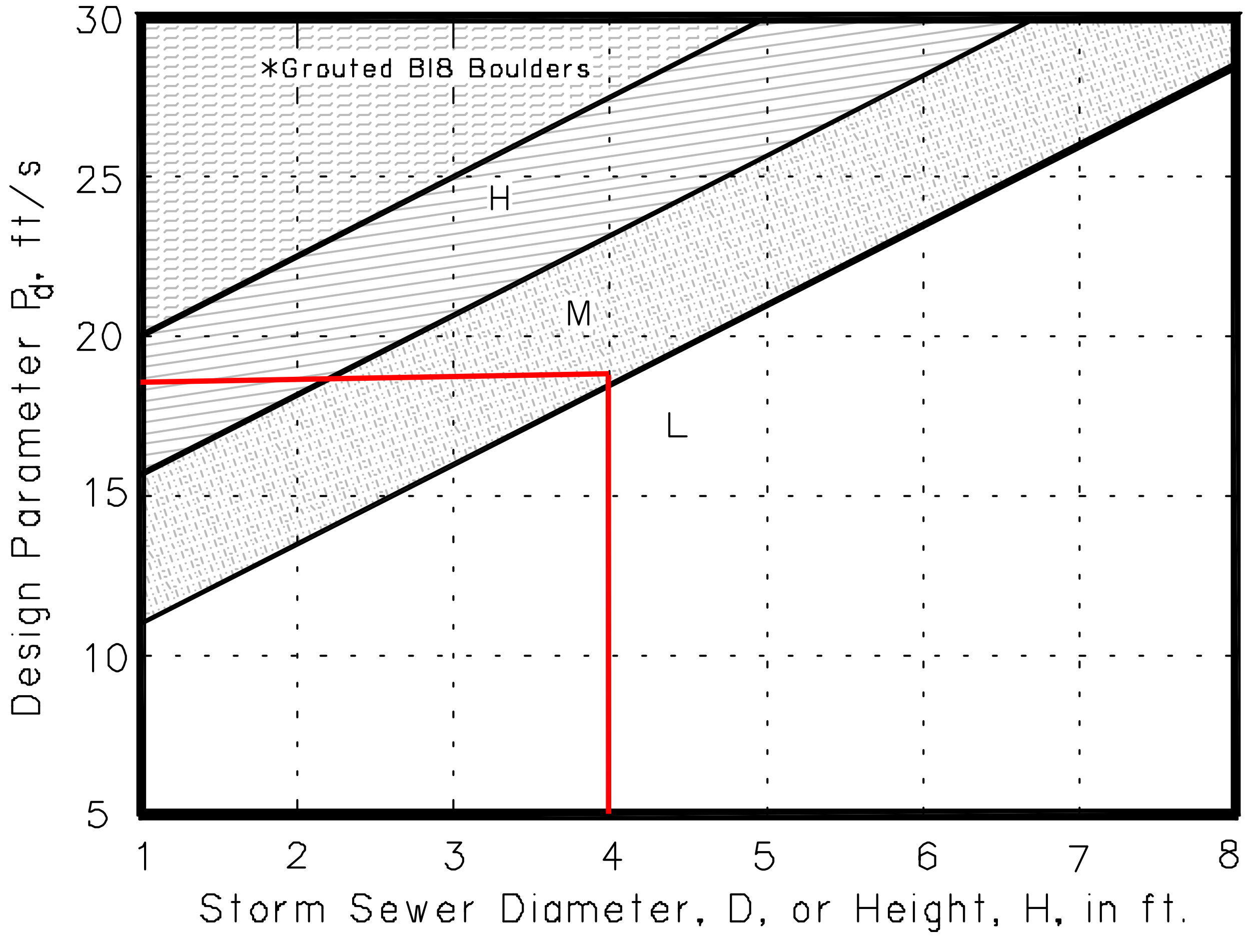



**Figure HS-20c—Low Tailwater Riprap Basins for Storm Sewer Pipe Outlets—**

**Riprap Selection Chart for Low Tailwater Basin at Pipe Outlet**

(Stevens and Urbonas 1996)

# Appendix E – Temporary Sedimentation Ponds

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

### TEMP POND 1

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 29.5 ac. | 1.2 ac-ft | 6.7 ft. |

Area required per Row
1.0 in$^2$

WS Elev: 7075.2

| No. of columns | Hole size |
|---|---|
| 4 | 9/16 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| | | | AREA | | VOLUME | |
| STAGE | ELEV | HEIGHT | sqft | acre | acft | cum acft |
| 1 | 7068.5 | 0 | 30 | 0.001 | 0.000 | 0.00 |
| 2 | 7069 | 0.5 | 1364 | 0.03 | 0.01 | 0.01 |
| 3 | 7070 | 1.5 | 4094 | 0.09 | 0.06 | 0.07 |
| 4 | 7071 | 2.5 | 6862 | 0.16 | 0.13 | 0.20 |
| 5 | 7072 | 3.5 | 8467 | 0.19 | 0.18 | 0.37 |
| 6 | 7073 | 4.5 | 10128 | 0.23 | 0.21 | 0.59 |
| 7 | 7074 | 5.5 | 11846 | 0.27 | 0.25 | 0.84 |
| 8 | 7075 | 6.5 | 13620 | 0.31 | 0.29 | 1.13 |
| 9 | 7076 | 7.5 | 15452 | 0.35 | 1.10 | 1.47 |

TABLE SB-2

| Minimum steel thickness | | 1 | 2 | 3 | **4** | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | | 1/4 | 5/16 | 3/8 | **3/8** | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| **9/16** | 0.5625 | 0.25 | 0.50 | 0.75 | **0.99** | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| 1 | 1.0000 | 0.79 | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/16 | 1.0625 | 0.89 | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

### TEMP POND 2

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 24.9 ac. | 1.0 ac-ft | 5.1 ft. |

Area required per Row
0.9 in$^2$

WS Elev: 7036.6

No. of columns: 1

Hole size: 1 1/16 in

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| | | | AREA | | VOLUME | |
| STAGE | ELEV | HEIGHT | sqft | acre | acft | cum acft |
| | | | | | | |
| 1 | 7031.5 | 0 | 10 | 0.000 | 0.000 | 0.00 |
| 2 | 7032 | 0.5 | 2660 | 0.06 | 0.02 | 0.02 |
| 3 | 7033 | 1.5 | 7570 | 0.17 | 0.12 | 0.13 |
| 4 | 7034 | 2.5 | 9179 | 0.21 | 0.19 | 0.33 |
| 5 | 7035 | 3.5 | 10861 | 0.25 | 0.23 | 0.56 |
| 6 | 7036 | 4.5 | 12614 | 0.29 | 0.27 | 0.82 |
| 7 | 7037 | 5.5 | 14438 | 0.33 | 0.31 | 1.13 |

**TABLE SB-2**

| Minimum steel thickness | | **1** | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | | **1/4** | 5/16 | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| 1 | 1.0000 | 0.79 | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| **1 1/16** | 1.0625 | **0.89** | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

### TEMP POND 3

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 7.6 ac. | 0.3 ac-ft | 1.9 ft. |

Area required per Row
0.8 $in^2$

WS Elev: 7063.4

| No. of columns | Hole size |
|---|---|
| 1 | 1 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| | | | AREA | | VOLUME | |
| STAGE | ELEV | HEIGHT | sqft | acre | acft | cum acft |
| 1 | 7061.5 | 0 | 10 | 0.000 | 0.000 | 0.00 |
| 2 | 7062 | 0.5 | 3807 | 0.09 | 0.02 | 0.02 |
| 3 | 7063 | 1.5 | 9900 | 0.23 | 0.16 | 0.18 |
| 4 | 7064 | 2.5 | 16892 | 0.39 | 0.31 | 0.49 |
| 5 | 7065 | 3.5 | 21531 | 0.49 | 0.44 | 0.93 |
| 6 | 7066 | 4.5 | 27137 | 0.62 | 0.56 | 1.49 |

## TABLE SB-2

| Minimum steel thickness | | **1** | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | | **1/4** | 5/16 | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| **1** | 1.0000 | **0.79** | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/16 | 1.0625 | 0.89 | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

### TEMP POND 4

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 5.8 ac. | 0.2 ac-ft | 1.7 ft. |

Area required per Row
0.8 $in^2$

WS Elev: 7057.2

| No. of columns | Hole size |
|---|---|
| 1 | 1 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| STAGE | ELEV | HEIGHT | AREA | | VOLUME | |
| | | | sqft | acre | acft | cum acft |
| 1 | 7055.5 | 0 | 10 | 0.000 | 0.000 | 0.00 |
| 2 | 7056 | 0.5 | 3763 | 0.09 | 0.02 | 0.02 |
| 3 | 7057 | 1.5 | 8129 | 0.19 | 0.14 | 0.16 |
| 4 | 7058 | 2.5 | 9414 | 0.22 | 0.20 | 0.36 |

| TABLE SB-2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Minimum steel thickness | | **1** | 2 | 3 | 4 | 5 | 6 |
| | | **1/4** | 5/16 | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| **1** | 1.0000 | **0.79** | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/16 | 1.0625 | 0.89 | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

**TEMP POND 5**

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 4.5 ac. | 0.2 ac-ft | 2.2 ft. |

Area required per Row
0.5 $in^2$

WS Elev: 7026.7

| No. of columns | Hole size |
|---|---|
| 2 | 9/16 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| | | | AREA | | VOLUME | |
| STAGE | ELEV | HEIGHT | sqft | acre | acft | cum acft |
| | | | | | | |
| 1 | 7024.5 | 0 | 10 | 0.000 | 0.000 | 0.00 |
| 2 | 7025 | 0.5 | 785 | 0.02 | 0.00 | 0.00 |
| 3 | 7026 | 1.5 | 3560 | 0.08 | 0.05 | 0.05 |
| 4 | 7027 | 2.5 | 4630 | 0.11 | 0.09 | 0.15 |
| 5 | 7028 | 3.5 | 5785 | 0.13 | 0.21 | 0.27 |

| TABLE SB-2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Minimum steel thickness | | 1 | **2** | 3 | 4 | 5 | 6 |
| | | 1/4 | **5/16** | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| **9/16** | 0.5625 | 0.25 | **0.50** | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| 7/8 | 0.8750 | 0.60 | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| 1 | 1.0000 | 0.79 | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/16 | 1.0625 | 0.89 | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## SEDIMENTATION SIZING

## PERMANENT POND 6

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 12.5 ac. | 0.5 ac-ft | 3.7 ft. |

Area required per Row

0.6 $in^2$

WS Elev: 7094.6

| No. of columns | Hole size |
|---|---|
| 1 | 7/8 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| STAGE | ELEV | HEIGHT | AREA | | VOLUME | |
| | | | sqft | acre | acft | cum acft |
| 1 | 7090.9 | 0 | 0 | 0.000 | 0.000 | 0.00 |
| 2 | 7091 | 0.1 | 44 | 0.00 | 0.00 | 0.00 |
| 3 | 7092 | 1.1 | 5600 | 0.13 | 0.06 | 0.06 |
| 4 | 7093 | 2.1 | 6835 | 0.16 | 0.14 | 0.21 |
| 5 | 7094 | 3.1 | 8170 | 0.19 | 0.17 | 0.38 |
| 6 | 7095 | 4.1 | 9606 | 0.22 | 0.20 | 0.58 |

**TABLE SB-2**

| Minimum steel thickness | | **1** | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | | **1/4** | 5/16 | 3/8 | 3/8 | 3/8 | 1/2 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| 13/16 | 0.8125 | 0.52 | 1.04 | 1.56 | 2.07 | 2.59 | 3.11 |
| **7/8** | 0.8750 | **0.60** | 1.20 | 1.80 | 2.41 | 3.01 | 3.61 |
| 15/16 | 0.9375 | 0.69 | 1.38 | 2.07 | 2.76 | 3.45 | 4.14 |
| 1 | 1.0000 | 0.79 | 1.57 | 2.36 | 3.14 | 3.93 | 4.71 |
| 1 1/16 | 1.0625 | 0.89 | 1.77 | 2.66 | 3.55 | 4.43 | 5.32 |

* 4 Columns of 13/16 holes existing.

# ROLLING HILLS RANCH GRADING

## TEMPORARY SEDIMENTATION SIZING

## LAMBERT POND

| Tributary Area: | Required Volume | Depth at Outlet |
|---|---|---|
| 53.5 ac. | 2.2 ac-ft | 8.7 ft. |

Area required per Row
1.7 $in^2$

WS Elev: 7019.3

| No. of columns | Hole size |
|---|---|
| 3 | 13/16 in |

| STAGE | | | STORAGE | | | |
|---|---|---|---|---|---|---|
| | | | AREA | | VOLUME | |
| STAGE | ELEV | HEIGHT | sqft | acre | acft | cum acft |
| 1 | 7010.6 | 0 | 10 | 0.000 | 0.000 | 0.00 |
| 2 | 7011 | 0.4 | 810 | 0.02 | 0.00 | 0.00 |
| 3 | 7012 | 1.4 | 3352 | 0.08 | 0.05 | 0.05 |
| 4 | 7013 | 2.4 | 6498 | 0.15 | 0.11 | 0.16 |
| 5 | 7014 | 3.4 | 9562 | 0.22 | 0.18 | 0.35 |
| 6 | 7015 | 4.4 | 11631 | 0.27 | 0.57 | 0.57 |
| 7 | 7016 | 5.4 | 13756 | 0.32 | 0.79 | 0.84 |
| 8 | 7017 | 6.4 | 15939 | 0.37 | 1.03 | 1.19 |
| 9 | 7018 | 7.4 | 18178 | 0.42 | 1.27 | 1.62 |
| 10 | 7019 | 8.4 | 20473 | 0.47 | 0.44 | 2.07 |
| 11 | 7020 | 9.4 | 22825 | 0.52 | 0.50 | 2.56 |

## TABLE SB-2

| Minimum steel thickness | | 1 | 2 | **3** | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| | | 1/4 | 5/16 | **3/8** | 3/8 | 3/8 | 1/2 |
| 1/4 | 0.2500 | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.29 |
| 5/16 | 0.3125 | 0.08 | 0.15 | 0.23 | 0.31 | 0.38 | 0.46 |
| **3/8** | 0.3750 | 0.11 | 0.22 | 0.33 | **0.44** | 0.55 | 0.66 |
| 7/16 | 0.4375 | 0.15 | 0.30 | 0.45 | 0.60 | 0.75 | 0.90 |
| 1/2 | 0.5000 | 0.20 | 0.39 | 0.59 | 0.79 | 0.98 | 1.18 |
| 9/16 | 0.5625 | 0.25 | 0.50 | 0.75 | 0.99 | 1.24 | 1.49 |
| 5/8 | 0.6250 | 0.31 | 0.61 | 0.92 | 1.23 | 1.53 | 1.84 |
| 11/16 | 0.6875 | 0.37 | 0.74 | 1.11 | 1.48 | 1.86 | 2.23 |
| 3/4 | 0.7500 | 0.44 | 0.88 | 1.33 | 1.77 | 2.21 | 2.65 |
| **13/16** | 0.8125 | 0.52 | 1.04 | **1.56** | 2.07 | 2.59 | 3.11 |

# Appendix F – Regional Stormwater Quality Analysis

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

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

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

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

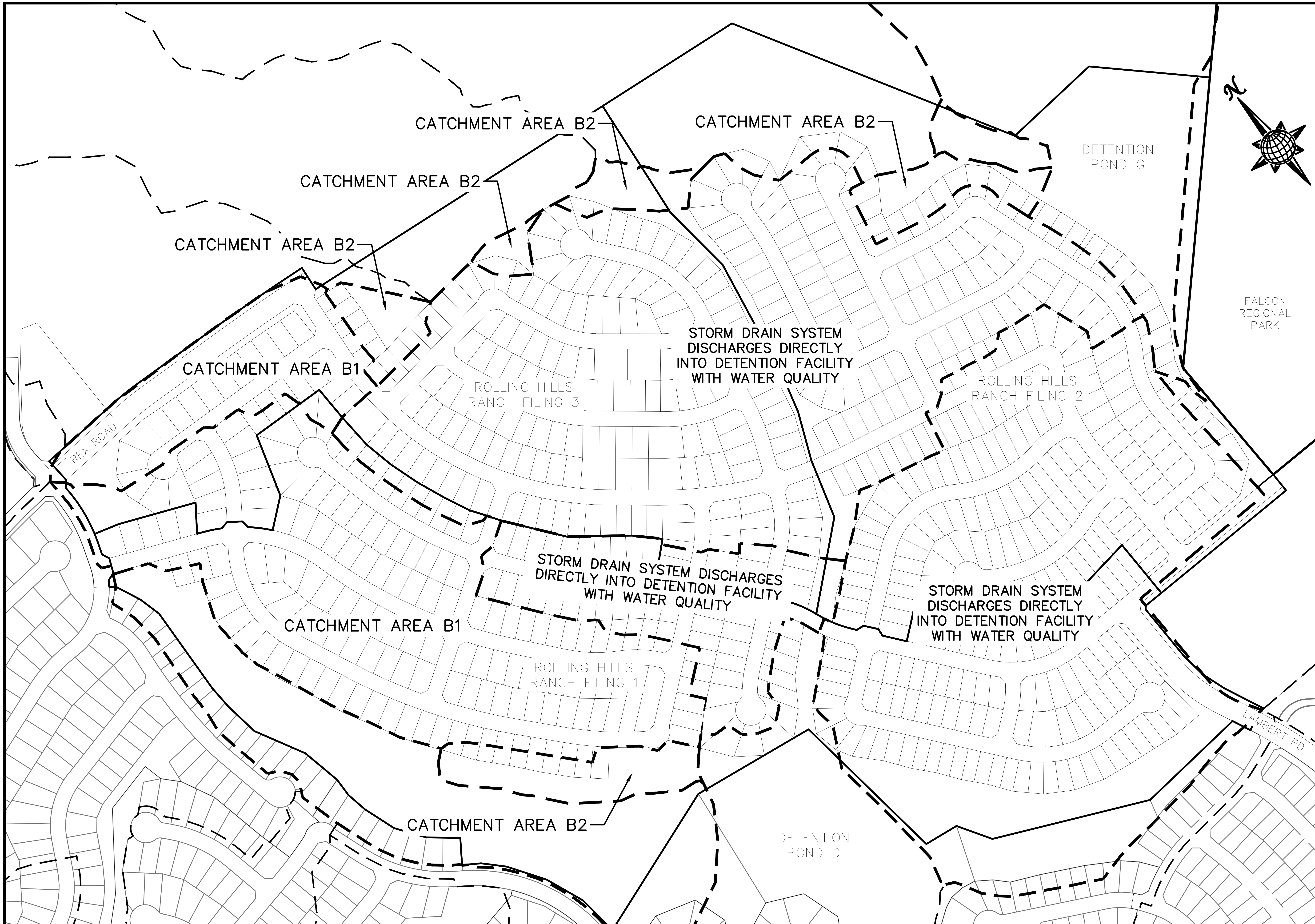
a. The regional WQCV facility must be implemented, functional, and maintained following good engineering, hydrologic and pollution control practices.
b. The regional WQCV facility must be designed and maintained for 100% WQCV for its entire drainage area.
c. The regional WQCV facility must have capacity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

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

iii. Documentation of operation and maintenance procedures to ensure the long-term observation, maintenance, and operation of the control measures. The documentation shall include frequencies for routine inspections and maintenance activities.
iv. Documentation regarding easements or other legal means for access of the control measure sites for operation, maintenance, and inspection of control measures.
v. Confirmation that control measures meet the requirements of section I.7.C.
vi. Confirmation that site plans meet the requirements of County's Site plan review and approval requirements.

g. The regional WQCV facility must be subject to the County's authority consistent with requirements and actions for a Control Measure in accordance with a base design standard.
h. Regional Facilities must be designed and implemented with flood control or water quality as the primary use. Recreational ponds and reservoirs may not be considered Regional Facilities. Water bodies listed by name in surface water quality classifications and standards regulations (5CCR1002-32 through 5CCR1002-38) may not be considered regional facilities.

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

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**REGIONAL WATER QUALITY**

OVERALL MAP

ROLLING HILLS RANCH PUD

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

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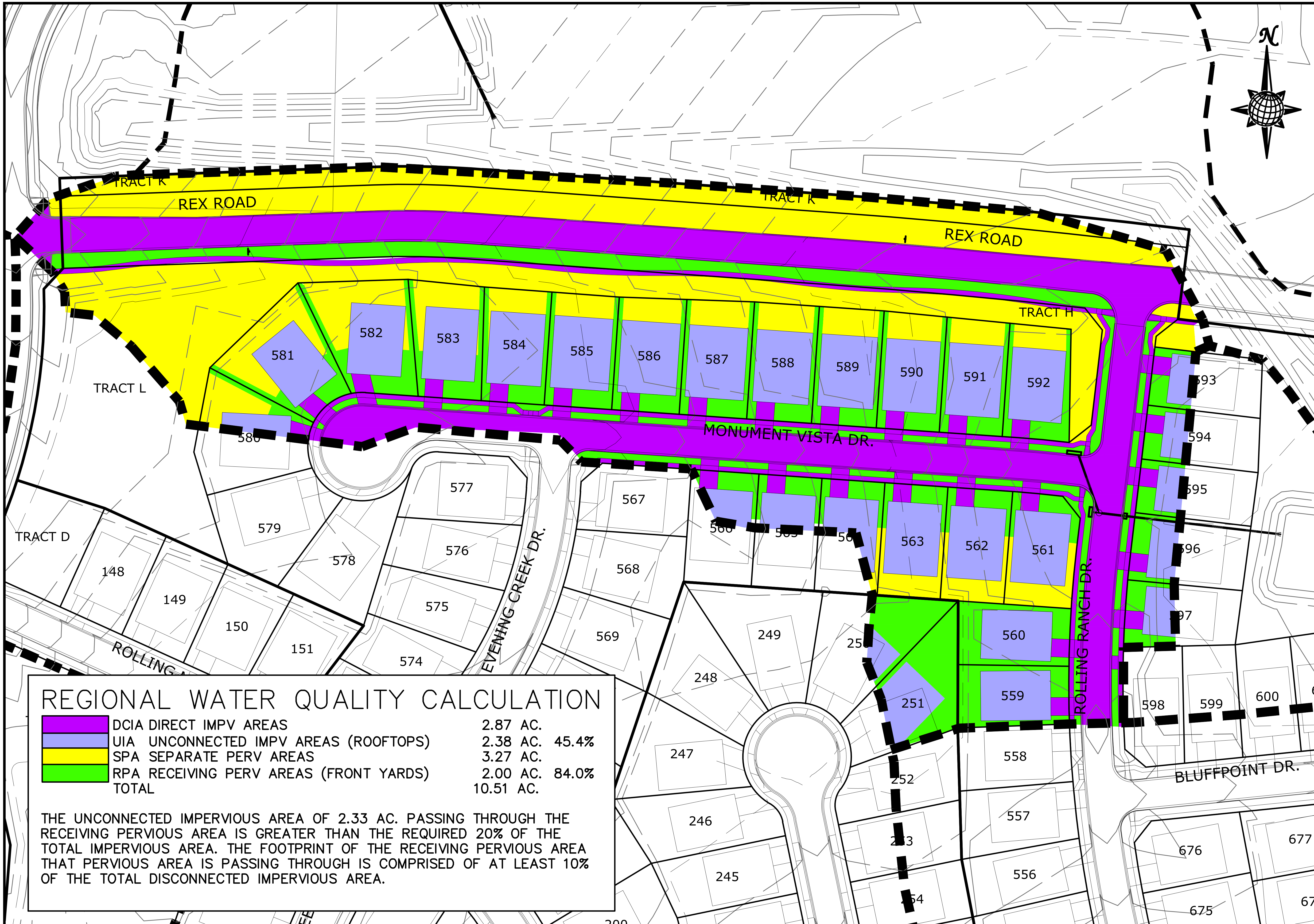


## REGIONAL WATER QUALITY CALCULATION

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

THE UNCONNECTED IMPERVIOUS AREA OF 2.33 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.


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# REGIONAL WATER QUALITY

CATCHMENT AREA A1

ROLLING HILLS RANCH PUD

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

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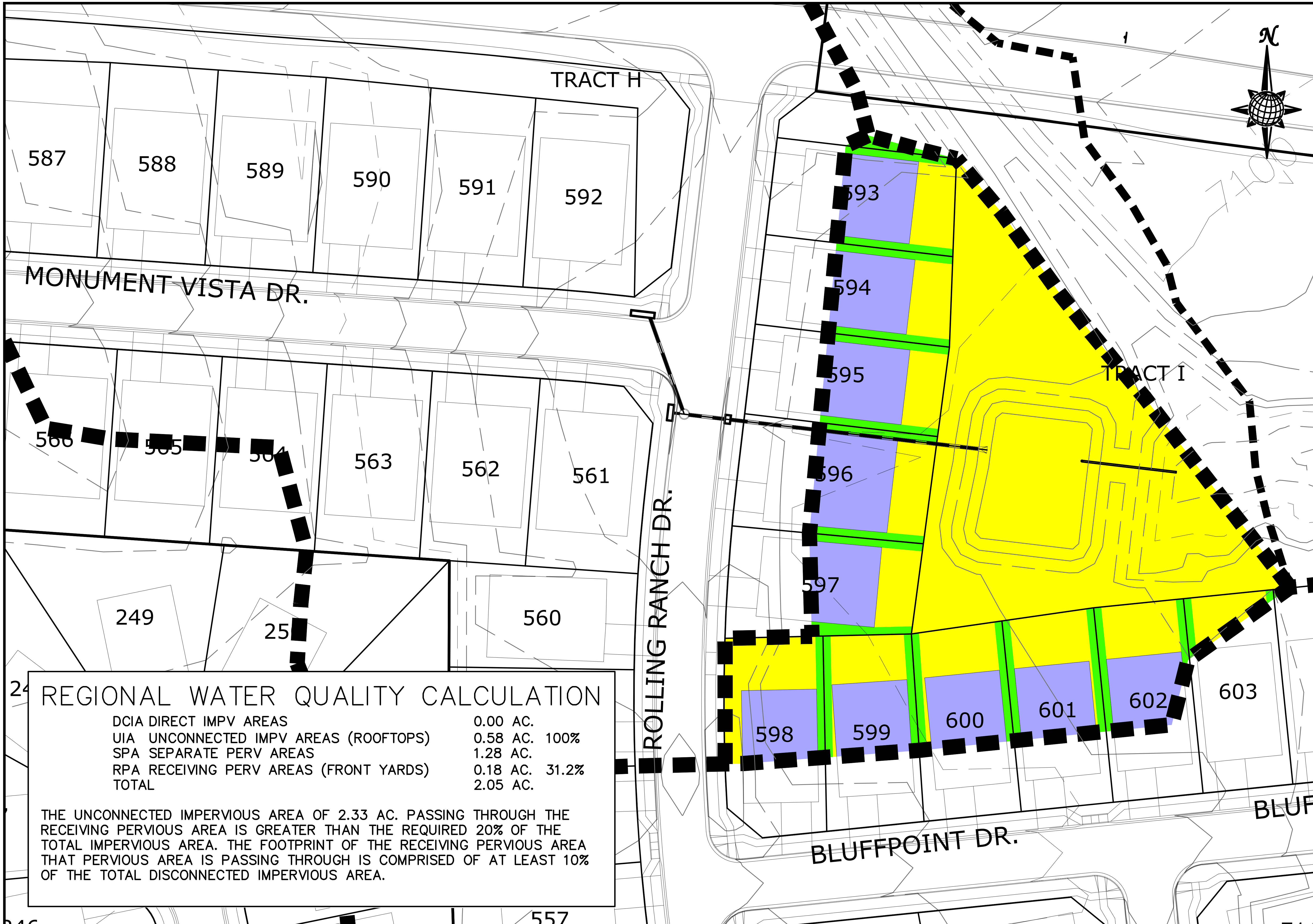


# REGIONAL WATER QUALITY CALCULATION

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

THE UNCONNECTED IMPERVIOUS AREA OF 2.33 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.

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**REGIONAL WATER QUALITY**
CATCHMENT AREA A2
ROLLING HILLS RANCH PUD

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Scale: N.T.S.
Sheet Number: 3

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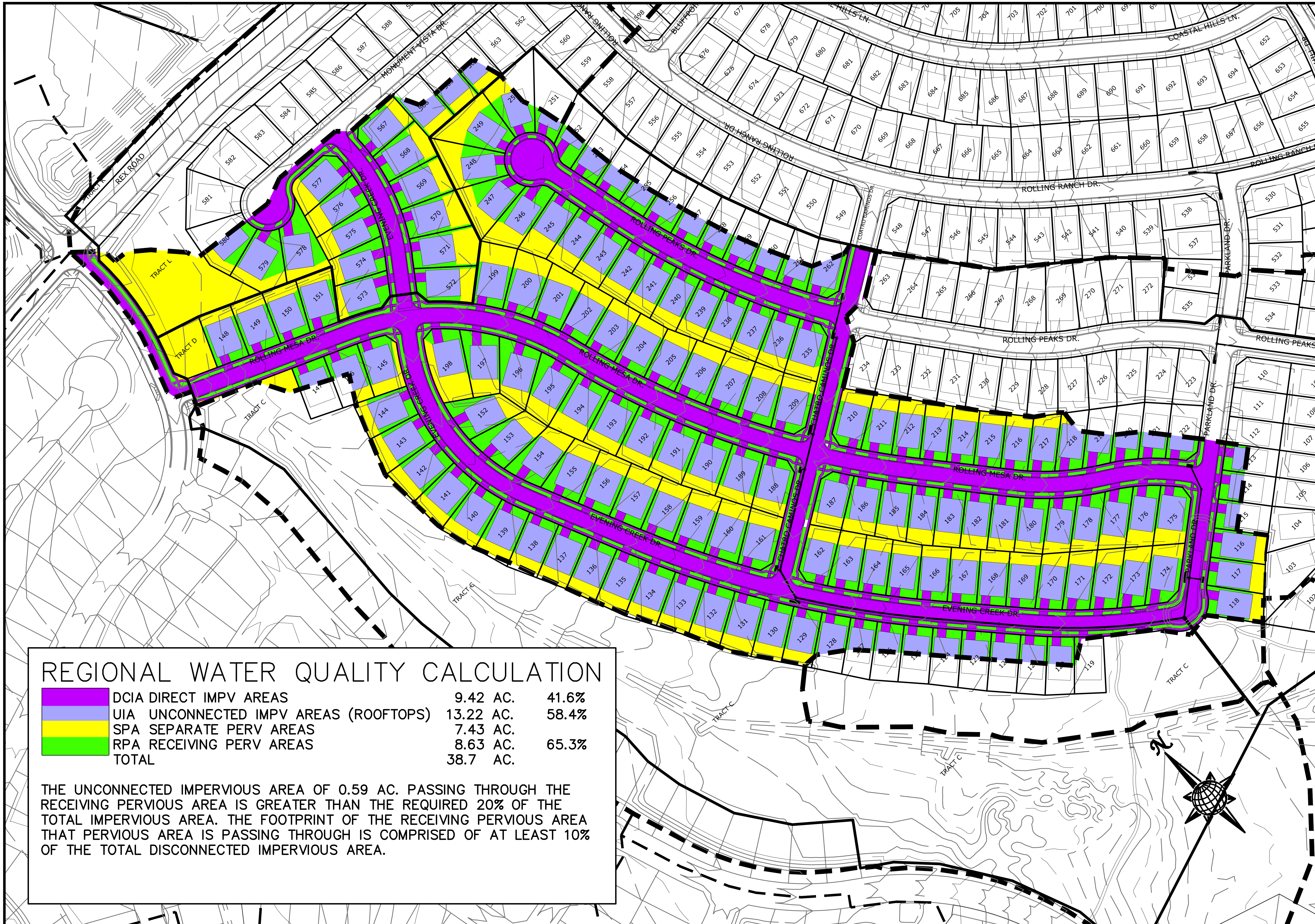


# REGIONAL WATER QUALITY CALCULATION

| | | | |
|---|---|---|---|
| DCIA | DIRECT IMPV AREAS | 9.42 AC. | 41.6% |
| UIA | UNCONNECTED IMPV AREAS (ROOFTOPS) | 13.22 AC. | 58.4% |
| SPA | SEPARATE PERV AREAS | 7.43 AC. | |
| RPA | RECEIVING PERV AREAS | 8.63 AC. | 65.3% |
| | TOTAL | 38.7 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.


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## REGIONAL WATER QUALITY

CATCHMENT AREA B1

ROLLING HILLS RANCH PUD

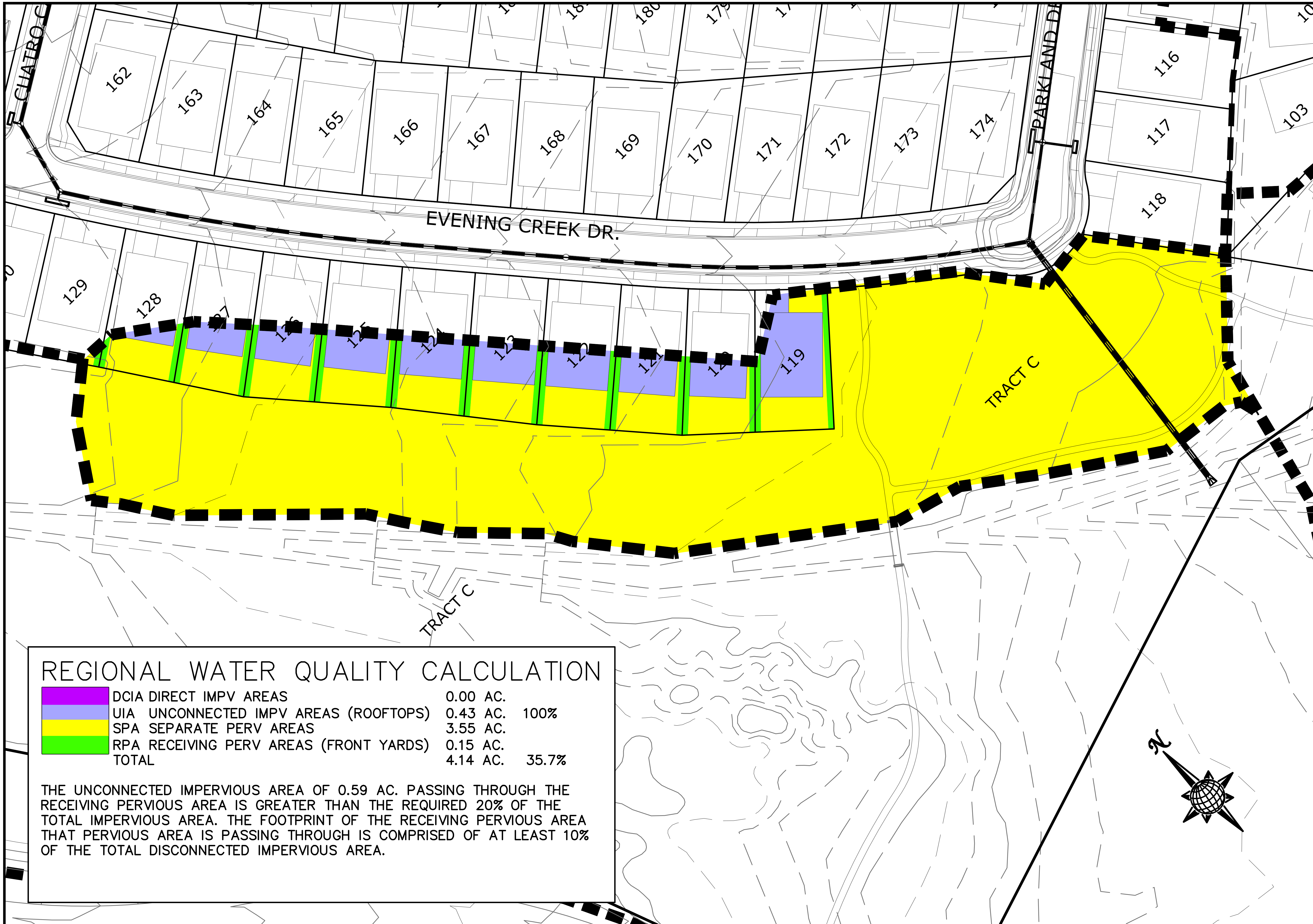
Drawn by TAK

Checked by -

Date FEB 2020

Scale N.T.S.

Sheet Number 4




## REGIONAL WATER QUALITY CALCULATION

| | | | |
|---|---|---|---|
| DCIA | DIRECT IMPV AREAS | 0.00 AC. | |
| UIA | UNCONNECTED IMPV AREAS (ROOFTOPS) | 0.43 AC. | 100% |
| SPA | SEPARATE PERV AREAS | 3.55 AC. | |
| RPA | RECEIVING PERV AREAS (FRONT YARDS) | 0.15 AC. | |
| | TOTAL | 4.14 AC. | 35.7% |

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.

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**REGIONAL WATER QUALITY**
CATCHMENT AREA B2
ROLLING HILLS RANCH PUD

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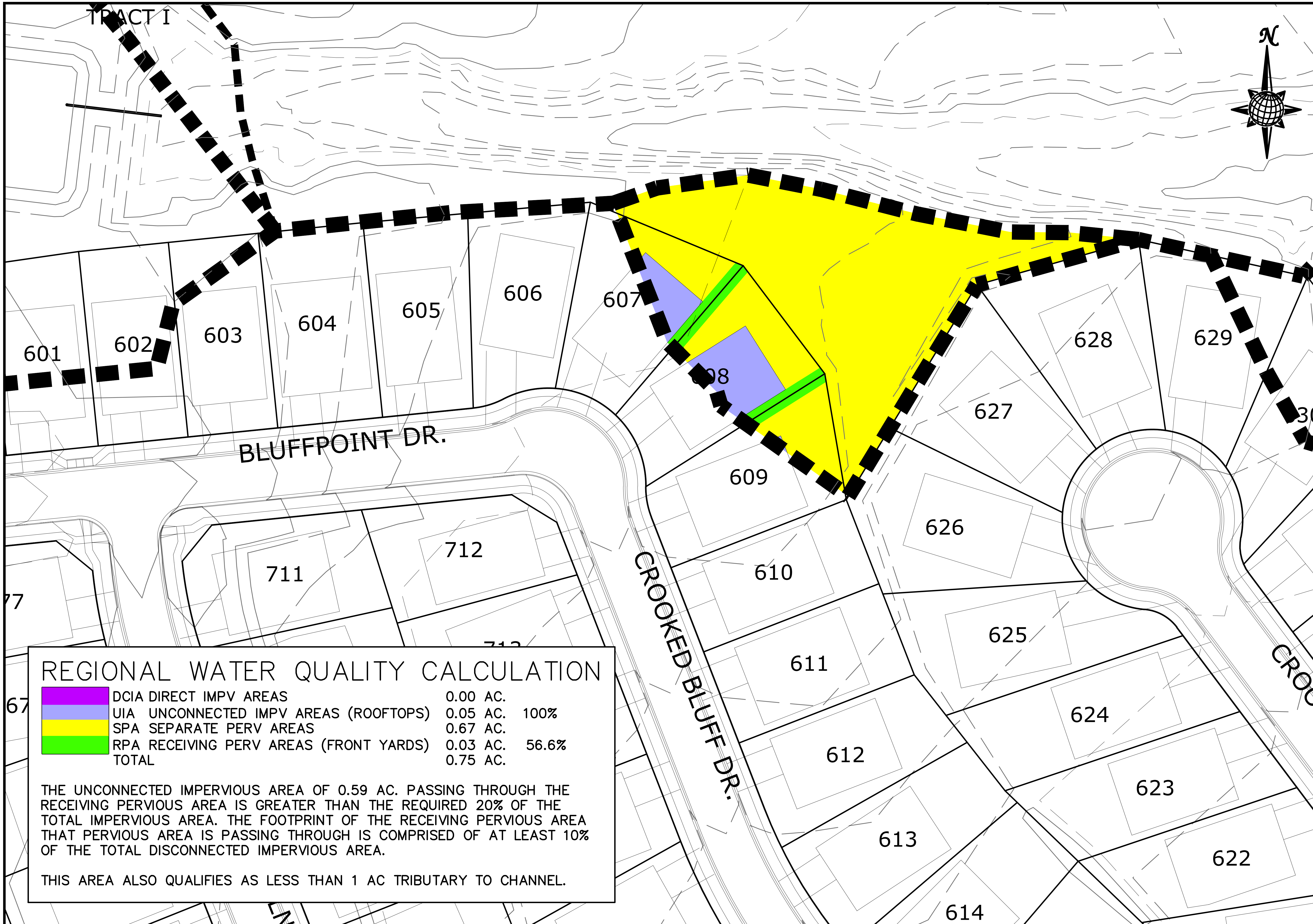
Sheet Number 5




## REGIONAL WATER QUALITY CALCULATION

| | | | |
|---|---|---|---|
| DCIA | DIRECT IMPV AREAS | 0.00 AC. | |
| UIA | UNCONNECTED IMPV AREAS (ROOFTOPS) | 0.05 AC. | 100% |
| SPA | SEPARATE PERV AREAS | 0.67 AC. | |
| RPA | RECEIVING PERV AREAS (FRONT YARDS) | 0.03 AC. | 56.6% |
| | TOTAL | 0.75 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.

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

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**REGIONAL WATER QUALITY**
CATCHMENT AREA D1
ROLLING HILLS RANCH PUD

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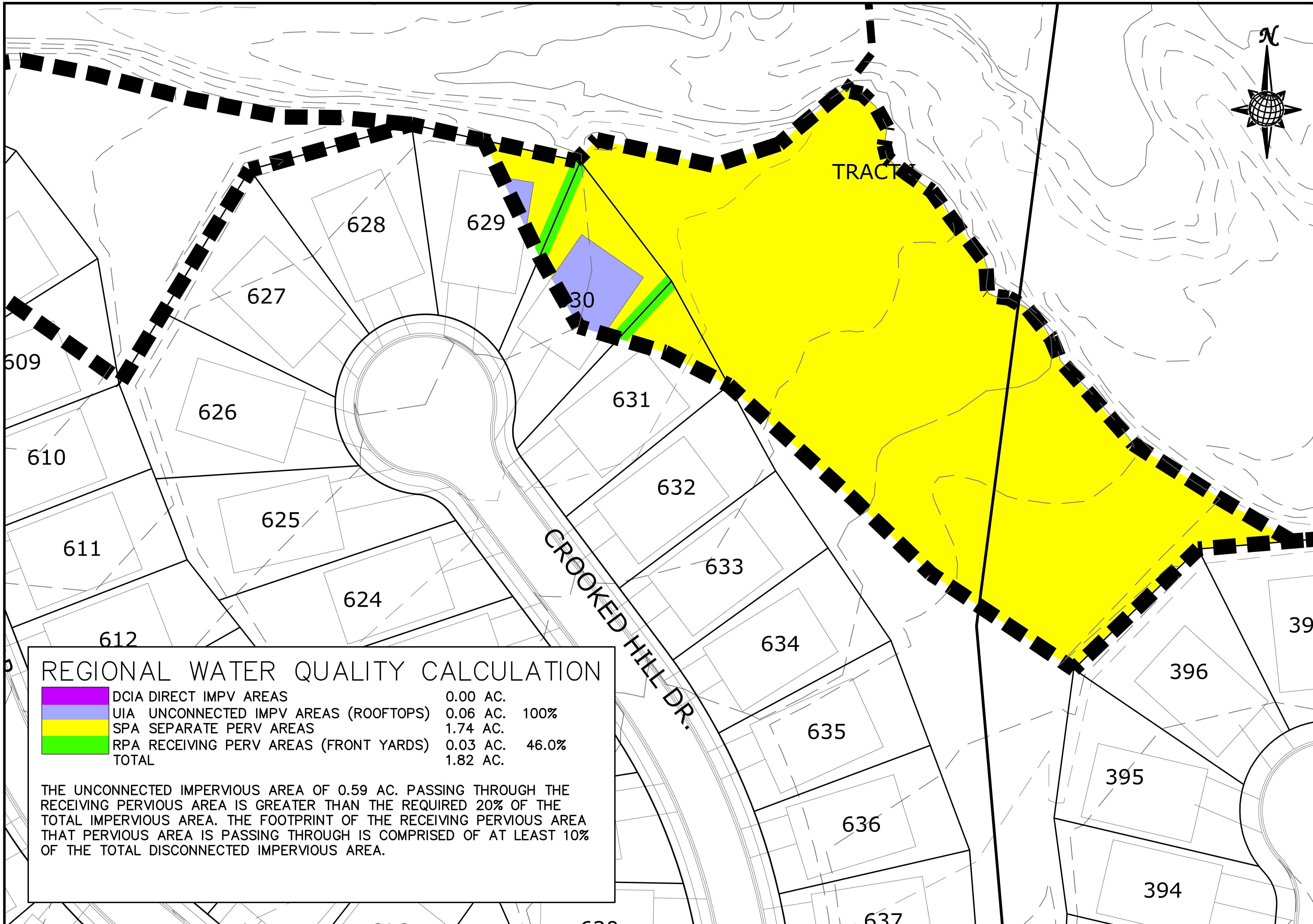
Date: FEB 2020
Scale: N.T.S.
Sheet Number: 6




## REGIONAL WATER QUALITY CALCULATION

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

THE UNCONNECTED IMPERVIOUS AREA OF 0.59 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.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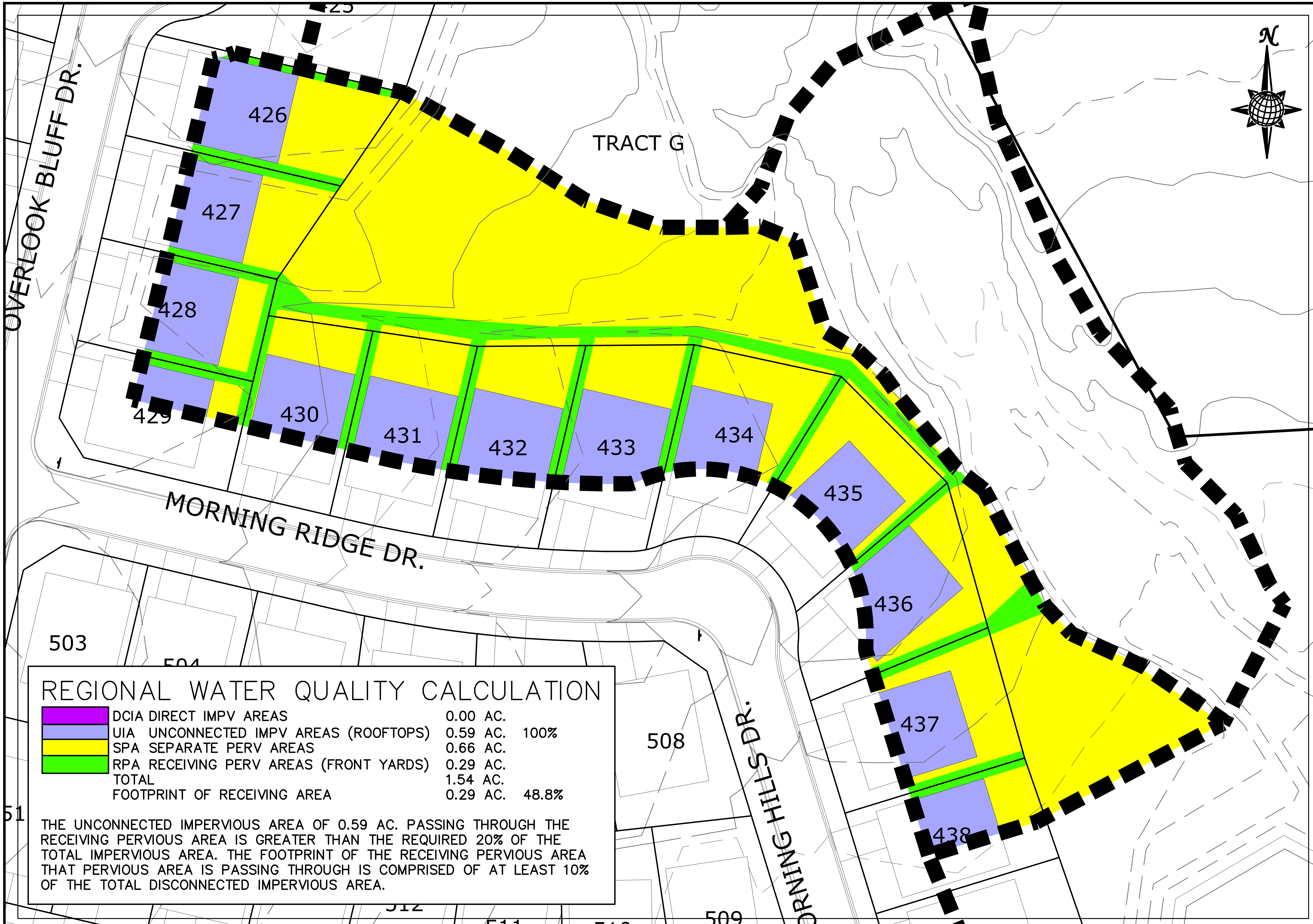
**REGIONAL WATER QUALITY**
CATCHMENT AREA D2
ROLLING HILLS RANCH PUD

| | |
|---|---|
| Drawn by | TAK |
| Checked by | - |
| Date | FEB 2020 |
| Scale | N.T.S. |
| Sheet Number | 7 |




## REGIONAL WATER QUALITY CALCULATION

| | | | |
|---|---|---|---|
| DCIA | DIRECT IMPV AREAS | 0.00 AC. | |
| UIA | UNCONNECTED IMPV AREAS (ROOFTOPS) | 0.59 AC. | 100% |
| SPA | SEPARATE PERV AREAS | 0.66 AC. | |
| RPA | RECEIVING PERV AREAS (FRONT YARDS) | 0.29 AC. | |
| | TOTAL | 1.54 AC. | |
| | FOOTPRINT OF RECEIVING AREA | 0.29 AC. | 48.8% |

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.


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


**REGIONAL WATER QUALITY**
CATCHMENT AREA D3
ROLLING HILLS RANCH PUD

Drawn by: TAK
Checked by: -
Date: FEB 2020
Scale: N.T.S.
Sheet Number: 8

# Appendix G – Soil Resource Report

United States Department of Agriculture

NRCS

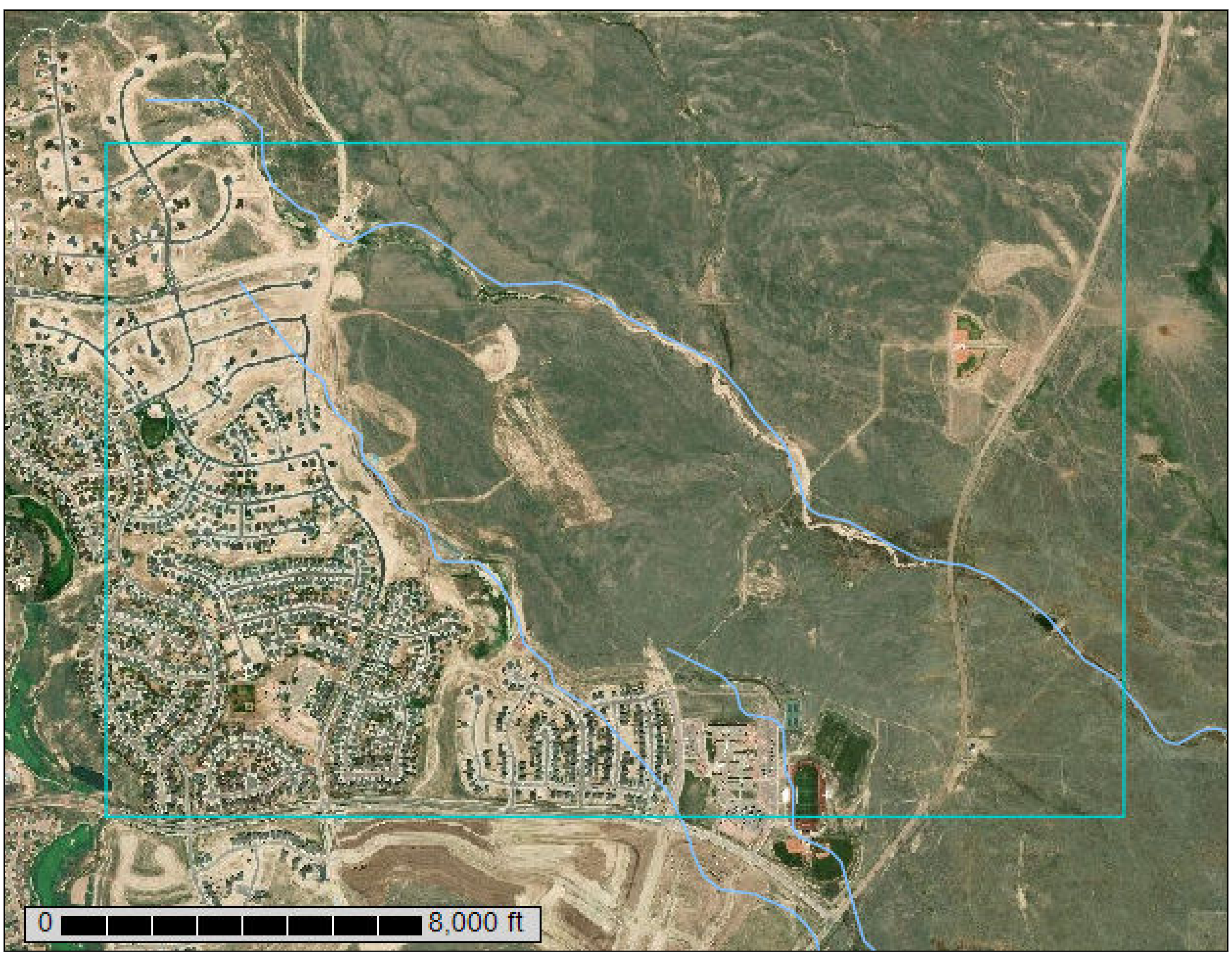
Natural Resources Conservation Service

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

# Custom Soil Resource Report for

# El Paso County Area, Colorado

## ROLLING HILLS RANCH PUD




February 21, 2019

# Preface

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

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

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

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

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

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

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# How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

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

## Soil Map


Map Scale: 1:15,400 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

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

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

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

**Water Features**
- Streams and Canals

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

**Background**
- Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

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

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

# Map Unit Legend

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

# Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

# El Paso County Area, Colorado

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

### Map Unit Setting

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

### Map Unit Composition

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

### Description of Columbine

#### Setting

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

#### Typical profile

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

#### Properties and qualities

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

#### Interpretive groups

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

### Minor Components

#### Fluvaquentic haplaquolls

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

#### Pleasant

*Percent of map unit:*

*Landform:* Depressions
*Hydric soil rating:* Yes

**Other soils**

*Percent of map unit:*
*Hydric soil rating:* No

## 83—Stapleton sandy loam, 3 to 8 percent slopes

### Map Unit Setting

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

### Map Unit Composition

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

### Description of Stapleton

#### Setting

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

#### Typical profile

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

#### Properties and qualities

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

#### Interpretive groups

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

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

### Minor Components

#### Pleasant

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

#### Fluvaquentic haplaquolls

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

#### Other soils

*Percent of map unit:*
*Hydric soil rating:* No

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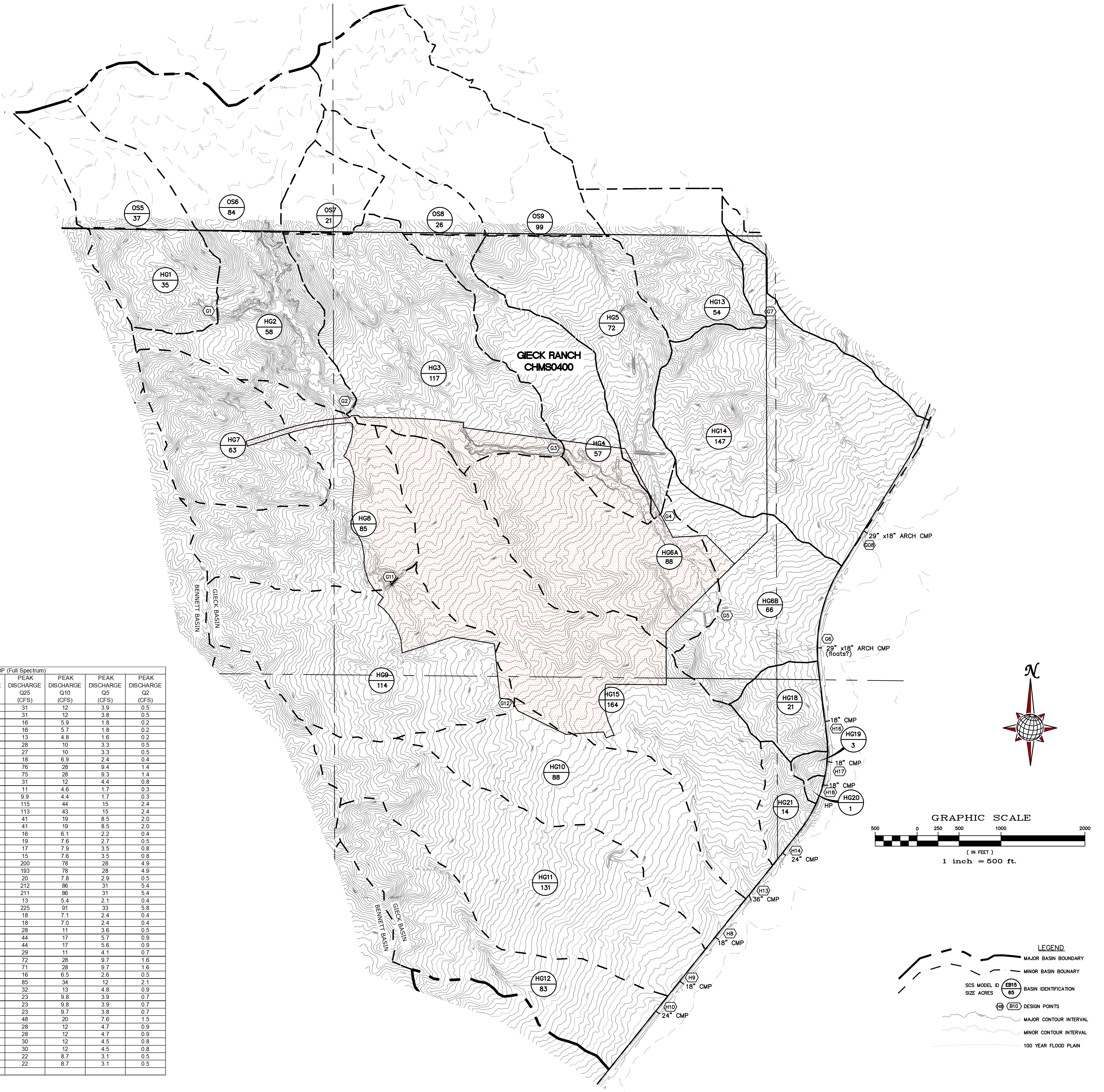
# Appendix H – Drainage Maps

# ROLLING HILLS RANCH
# MERIDIAN RANCH




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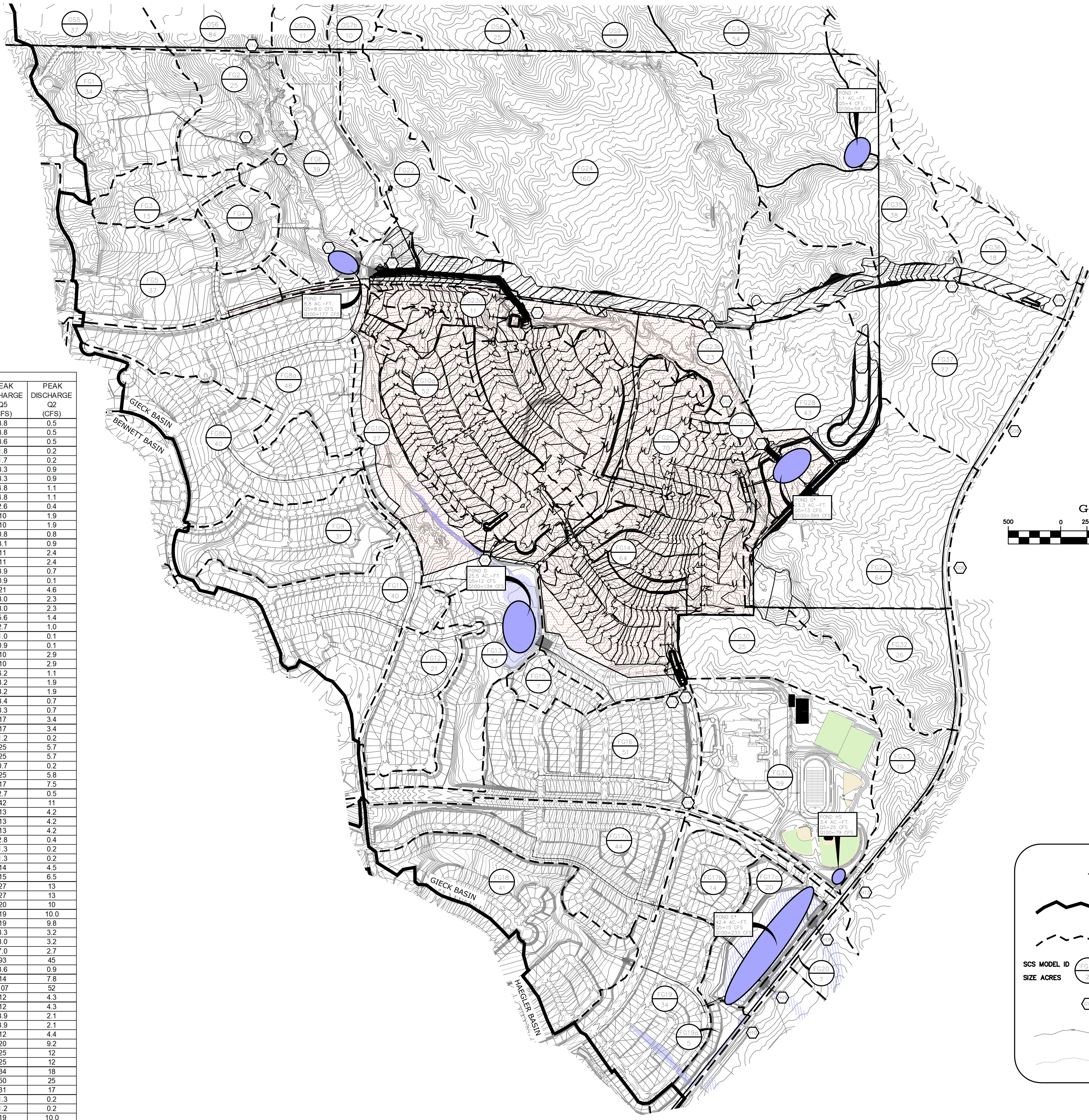
## *HISTORIC CONDITIONS - SCS MAP*

FEB 2020

**FIGURE 4**

# ROLLING HILL RANCH PUD
# MERIDIAN RANCH




N

GRAPHIC SCALE

500 0 250 500 1000 2000

( IN FEET )

1 inch = 500 ft.

LEGEND

MAJOR BASIN BOUNDARY

MINOR BASIN BOUNDARY

SCS MODEL ID / SIZE ACRES — BASIN IDENTIFICATION

DESIGN POINT

MAJOR CONTOUR INTERVAL

MINOR CONTOUR INTERVAL

| INTERIM MDDP (Full Spectrum) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | DRAINAGE AREA (SQ. MI.) | PEAK DISCHARGE Q100 (CFS) | PEAK DISCHARGE Q50 (CFS) | PEAK DISCHARGE Q25 (CFS) | PEAK DISCHARGE Q10 (CFS) | PEAK DISCHARGE Q5 (CFS) | PEAK DISCHARGE Q2 (CFS) |
| OS06 | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a | 0.1313 | 80 | 52 | 30 | 12 | 3.8 | 0.5 |
| G1a-G2 | 0.1313 | 79 | 52 | 30 | 11 | 3.6 | 0.5 |
| OS05 | 0.0578 | 39 | 26 | 15 | 5.6 | 1.8 | 0.2 |
| OS05-G1 | 0.0578 | 39 | 25 | 15 | 5.5 | 1.7 | 0.2 |
| FG01 | 0.0531 | 31 | 22 | 14 | 6.9 | 3.3 | 0.9 |
| FG01-G1 | 0.0531 | 31 | 22 | 14 | 6.9 | 3.3 | 0.9 |
| G1 | 0.1109 | 61 | 41 | 25 | 11 | 4.8 | 1.1 |
| G1-G2 | 0.1109 | 60 | 41 | 25 | 11 | 4.8 | 1.1 |
| FG02 | 0.0391 | 32 | 22 | 14 | 6.2 | 2.6 | 0.4 |
| G2 | 0.2813 | 166 | 112 | 67 | 27 | 10 | 1.9 |
| G2-G3 | 0.2813 | 163 | 108 | 66 | 27 | 10 | 1.9 |
| FG03 | 0.0203 | 24 | 17 | 12 | 5.9 | 0.8 | 0.8 |
| FG04 | 0.0172 | 22 | 16 | 11 | 5.8 | 3.1 | 0.9 |
| G3 | 0.3188 | 184 | 123 | 74 | 31 | 11 | 2.4 |
| G3-POND F | 0.3188 | 183 | 121 | 74 | 31 | 11 | 2.4 |
| FG06 | 0.0658 | 46 | 32 | 20 | 9.1 | 3.9 | 0.7 |
| OS07a-POND F | 0.0170 | 13 | 9.0 | 5.7 | 2.4 | 0.9 | 0.1 |
| POND F IN | 0.4596 | 285 | 193 | 120 | 53 | 21 | 4.6 |
| POND F | 0.4596 | 177 | 121 | 60 | 17 | 8.0 | 2.3 |
| POND F-G7 | 0.4596 | 177 | 120 | 60 | 17 | 8.0 | 2.3 |
| FG22 | 0.0658 | 51 | 36 | 24 | 12 | 5.6 | 1.4 |
| FG23a | 0.0177 | 18 | 13 | 9.0 | 4.9 | 2.7 | 1.0 |
| OS07b | 0.0156 | 15 | 10 | 6.2 | 2.6 | 1.0 | 0.1 |
| OS07b-G7 | 0.0156 | 13 | 9.2 | 5.4 | 2.3 | 0.9 | 0.1 |
| G7 | 0.5587 | 215 | 145 | 72 | 22 | 10 | 2.9 |
| G7-G10 | 0.5587 | 215 | 144 | 72 | 22 | 10 | 2.9 |
| FG24 | 0.2503 | 110 | 73 | 43 | 17 | 6.2 | 1.1 |
| OS09 | 0.1527 | 90 | 62 | 39 | 18 | 8.2 | 1.9 |
| OS09-G10 | 0.1527 | 88 | 61 | 39 | 18 | 8.2 | 1.9 |
| OS08 | 0.0397 | 35 | 24 | 16 | 7.5 | 3.4 | 0.7 |
| OS08-G8 | 0.0397 | 34 | 24 | 15 | 7.2 | 3.3 | 0.7 |
| G8 | 0.4427 | 227 | 154 | 94 | 41 | 17 | 3.4 |
| G8-G10 | 0.4427 | 225 | 151 | 94 | 41 | 17 | 3.4 |
| FG23b | 0.0359 | 21 | 14 | 8.4 | 3.3 | 1.2 | 0.2 |
| G10 | 1.0373 | 444 | 287 | 146 | 60 | 25 | 5.7 |
| G10-G11 | 1.0373 | 442 | 285 | 145 | 60 | 25 | 5.7 |
| FG23c | 0.0070 | 5.8 | 4.2 | 2.8 | 1.4 | 0.7 | 0.2 |
| G11 | 1.0443 | 445 | 287 | 146 | 61 | 25 | 5.8 |
| FG25 | 0.1086 | 85 | 64 | 46 | 27 | 17 | 7.5 |
| FG28 | 0.0673 | 38 | 26 | 16 | 6.7 | 2.7 | 0.5 |
| POND G IN | 1.2202 | 558 | 363 | 202 | 91 | 42 | 11 |
| POND G | 1.2202 | 399 | 237 | 117 | 35 | 13 | 4.2 |
| G12 | 1.2202 | 399 | 237 | 117 | 35 | 13 | 4.2 |
| G12-G06 | 1.2202 | 398 | 236 | 117 | 35 | 13 | 4.2 |
| FG29 | 0.0997 | 60 | 39 | 23 | 8.7 | 2.8 | 0.4 |
| FG32 | 0.0402 | 29 | 19 | 11 | 4.2 | 1.3 | 0.2 |
| FG32-G06 | 0.0402 | 28 | 19 | 11 | 4.1 | 1.3 | 0.2 |
| G06 | 1.3601 | 418 | 248 | 124 | 37 | 14 | 4.5 |
| FG10A | 0.0806 | 81 | 61 | 43 | 25 | 15 | 6.5 |
| FG08A | 0.0750 | 116 | 90 | 66 | 41 | 27 | 13 |
| FG08A-G05 | 0.0750 | 110 | 86 | 64 | 41 | 27 | 13 |
| FG08B | 0.0630 | 86 | 67 | 49 | 31 | 20 | 10 |
| FG08B-G05 | 0.0630 | 84 | 65 | 48 | 29 | 19 | 10.0 |
| FG11 | 0.0625 | 75 | 59 | 44 | 28 | 19 | 9.8 |
| FG09 | 0.0484 | 48 | 36 | 25 | 14 | 8.3 | 3.2 |
| FG09-G05 | 0.0484 | 48 | 36 | 25 | 14 | 8.0 | 3.2 |
| FG10B | 0.0416 | 42 | 31 | 22 | 12 | 7.0 | 2.7 |
| G05 | 0.3711 | 433 | 330 | 239 | 145 | 93 | 45 |
| FG13 | 0.0534 | 34 | 24 | 15 | 7.5 | 3.6 | 0.9 |
| FG12 | 0.0328 | 50 | 40 | 30 | 20 | 14 | 7.8 |
| POND D IN | 0.4573 | 509 | 387 | 280 | 168 | 107 | 52 |
| POND D | 0.4573 | 134 | 91 | 50 | 19 | 12 | 4.3 |
| POND D-G17 | 0.4573 | 134 | 91 | 50 | 19 | 12 | 4.3 |
| FG15 | 0.0103 | 15 | 12 | 9.0 | 5.8 | 3.9 | 2.1 |
| FG15-G17A | 0.0103 | 15 | 12 | 8.9 | 5.8 | 3.9 | 2.1 |
| G17A | 0.4676 | 137 | 93 | 51 | 19 | 12 | 4.4 |
| FG14 | 0.1000 | 98 | 74 | 53 | 32 | 20 | 9.2 |
| G17 | 0.5676 | 196 | 132 | 75 | 43 | 25 | 12 |
| G17-G18 | 0.5676 | 196 | 131 | 75 | 43 | 25 | 12 |
| FG16 | 0.0791 | 133 | 104 | 78 | 50 | 34 | 18 |
| G18-POND E | 0.6467 | 240 | 176 | 126 | 78 | 50 | 25 |
| FG31 | 0.0922 | 116 | 92 | 69 | 45 | 31 | 17 |
| FG30 | 0.0389 | 30 | 20 | 12 | 4.3 | 1.3 | 0.2 |
| FG30-PONDHS | 0.0389 | 28 | 19 | 11 | 4.2 | 1.2 | 0.2 |
| POND HS | 0.1311 | 112 | 63 | 40 | 28 | 19 | 10.0 |
| FG17a | 0.0694 | 101 | 78 | 57 | 35 | 23 | 12 |
| FG17a-POND E | 0.0694 | 99 | 76 | 56 | 35 | 23 | 12 |
| FG18 | 0.0644 | 56 | 42 | 30 | 18 | 11 | 4.7 |
| FG18-POND E | 0.0644 | 56 | 42 | 30 | 17 | 11 | 4.6 |
| FG19 | 0.0527 | 84 | 66 | 50 | 33 | 23 | 13 |
| FG17c | 0.0313 | 31 | 22 | 14 | 6.5 | 2.8 | 0.5 |
| FG17b | 0.0214 | 39 | 31 | 24 | 16 | 11 | 6.1 |
| POND E IN | 1.0170 | 552 | 423 | 308 | 190 | 123 | 63 |
| POND E | 1.0170 | 233 | 144 | 74 | 28 | 15 | 6.1 |
| H08 | 1.0170 | 200 | 130 | 66 | 22 | 11 | 3.7 |
| H09 | 0.0000 | 34 | 14 | 7.9 | 5.7 | 3.9 | 2.4 |
| FG34 | 0.0836 | 48 | 32 | 19 | 7.0 | 2.3 | 0.3 |
| G14 | 0.0836 | 48 | 32 | 19 | 7.0 | 2.3 | 0.3 |
| G14-G15 | 0.0836 | 48 | 32 | 18 | 7.0 | 2.3 | 0.3 |
| FG35 | 0.0586 | 19 | 13 | 7.4 | 3.0 | 1.2 | 0.2 |
| G15 | 0.1422 | 60 | 39 | 23 | 8.9 | 3.1 | 0.5 |
| G15-G08 | 0.1422 | 59 | 39 | 23 | 8.8 | 3.1 | 0.5 |
| FG37 | 0.1203 | 44 | 29 | 17 | 6.8 | 2.5 | 0.4 |
| FG36 | 0.0281 | 16 | 10 | 6 | 2.4 | 0.9 | 0.1 |
| FG36-G08 | 0.0281 | 15 | 10 | 6 | 2.4 | 0.8 | 0.1 |
| G08 | 0.2906 | 114 | 75 | 44 | 17.6 | 6.4 | 1.1 |

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

## INTERIM CONDITIONS - SCS MAP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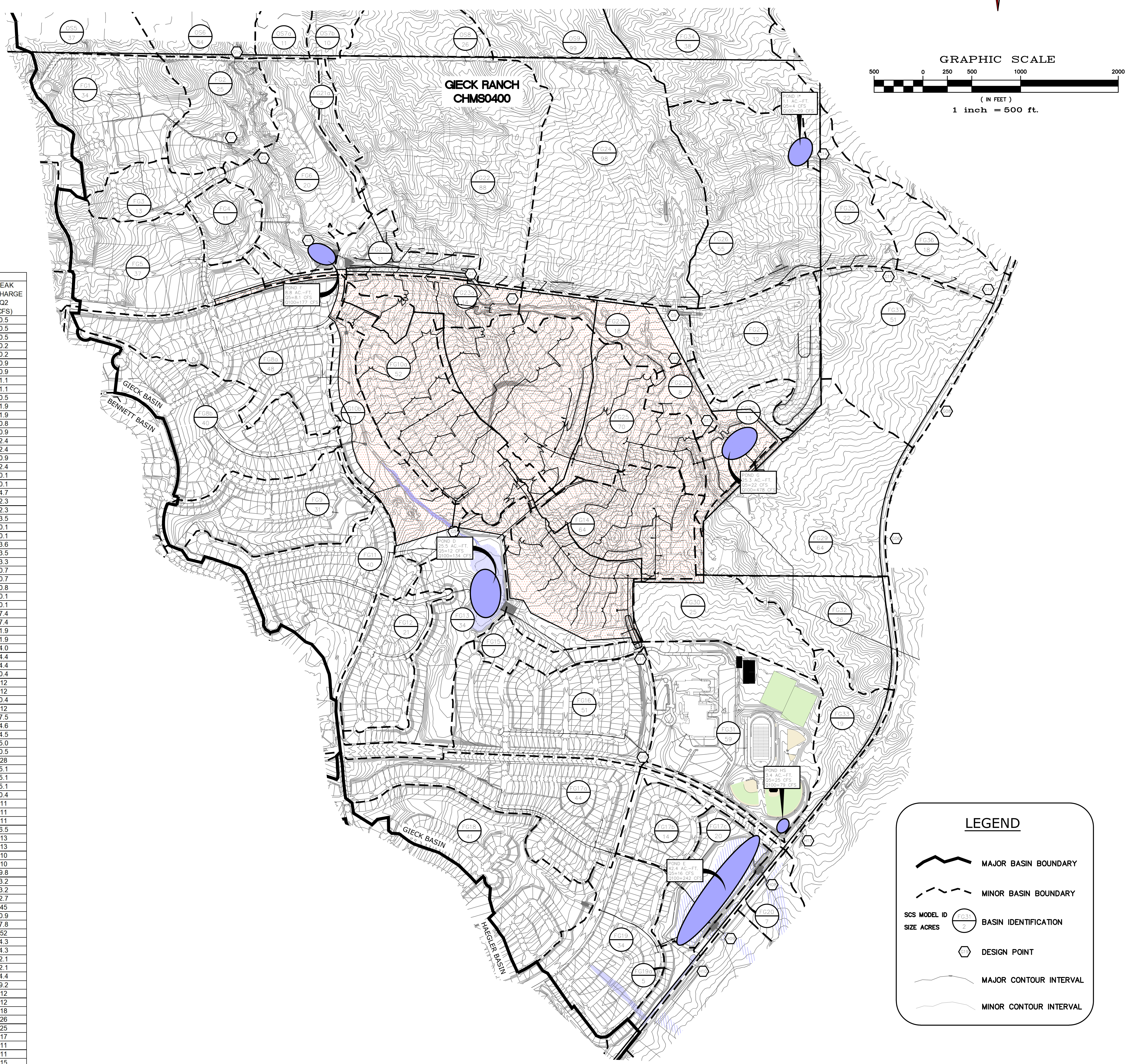
FEB 2020

FIGURE 5

# ROLLING HILL RANCH PUD
# MERIDIAN RANCH




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

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

# DEVELOPED CONDITIONS - SCS MAP

TECH CONTRACTORS
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FALCON, CO 80831
TELEPHONE: 719.495.7444

FEB 2020

FIGURE 5

NOTE:

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

BENCH MARK:

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

ELEVATION = 6874.00

GRAPHIC SCALE

100 0 50 100 200 400

( IN FEET )

1 inch = 100 ft.

N

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

61 — DESIGN POINT DESIGNATION

MAJOR BASIN BOUNDARY

SUB-BASIN BOUNDARY

6130 — EXISTING CONTOUR

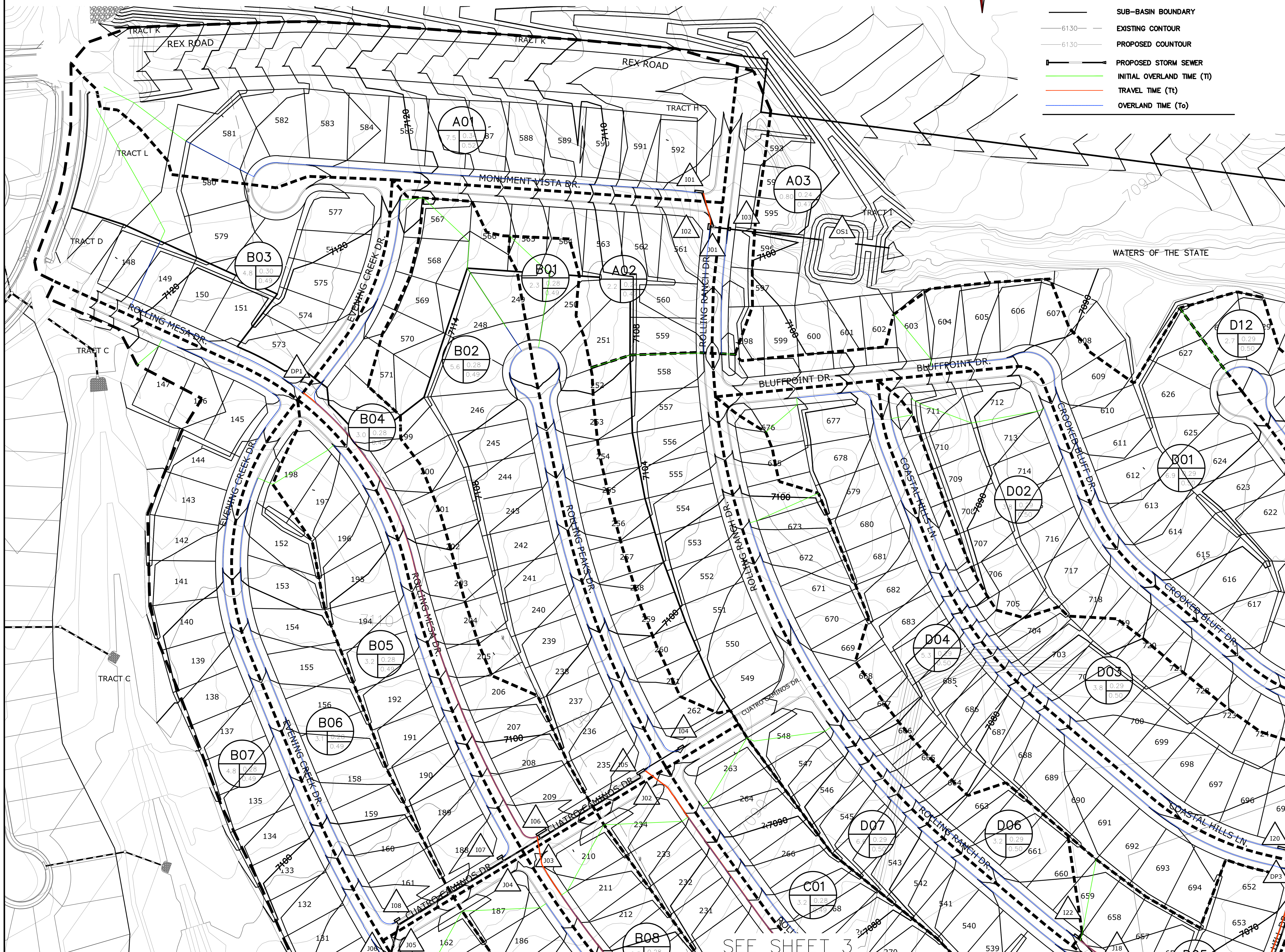
6130 — PROPOSED COUNTOUR

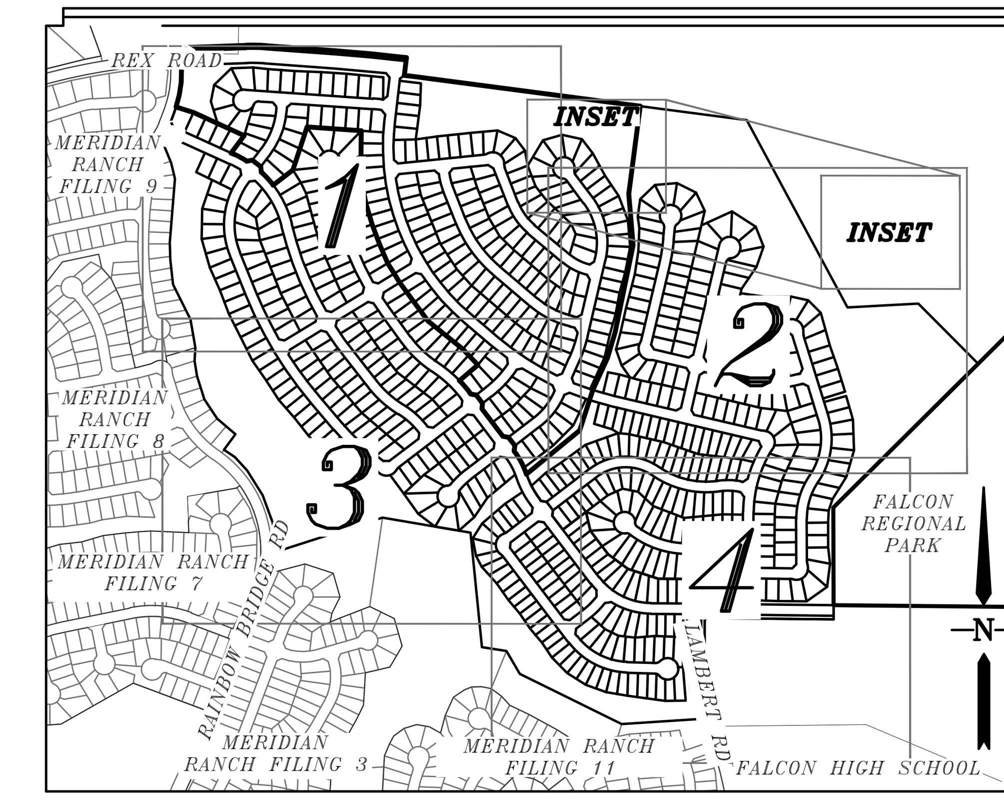
PROPOSED STORM SEWER

INITIAL OVERLAND TIME (Ti)

TRAVEL TIME (Tt)

OVERLAND TIME (To)




INDEX MAP

N.T.S.

| DP | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | INLET | Q(5) (CFS) | Q(100) (CFS) | PIPE |
|---|---|---|---|---|---|---|---|---|
| OS5 | OS1 | 4.40 | 1.3 | 9 | PR Type C | 1.2 | 8.4 | 24 " RCP |
| | | | | | | | | |
| I01 | A01 | 7.52 | 8.6 | 22 | PR 15 ' FORCED SUMP | 8.6 | 14 | 18 " RCP |
| I02 | A02 | 2.20 | 2.0 | 14 | PR 10 ' SUMP | 2.0 | 14 | 18 " RCP |
| J01 | | | | | | 10.5 | 28 | 24 " RCP |
| I03 | A03 | 0.79 | 1.0 | 3.1 | PR 5 ' SUMP | 11.3 | 30 | 24 " RCP |
| | | | | | | | | |
| I04 | B01 | 2.29 | 2.2 | 6.4 | PR 10 ' FORCED SUMP | 2.2 | 6.4 | 18 " RCP |
| I05 | B02 | 5.63 | 5.2 | 15 | PR 15 ' FORCED SUMP | 7.3 | 20 | 24 " RCP |
| J02 | | | | | | 7.3 | 20 | 24 " RCP |
| DP1 | B03 | 4.81 | 5.2 | 14 | | | | |
| I06 | B04 | 3.03 | 7.1 | 20 | PR 20 ' FORCED SUMP | 7.1 | 17 | 18 " RCP |
| J03 | | | | | | 13.9 | 36 | 30 " RCP |
| I07 | B05 | 3.22 | 3.1 | 9.1 | PR 10 ' FORCED SUMP | 3.1 | 9.1 | 18 " RCP |
| J04 | | | | | | 16.6 | 44 | 36 " RCP |
| I08 | B06 | 3.13 | 3.3 | 9.9 | PR 10 ' FORCED SUMP | 3.3 | 9.9 | 18 " RCP |
| J05 | | | | | | 19.0 | 51 | 36 " RCP |
| I09 | B07 | 4.76 | 4.3 | 13 | PR 20 ' FLOW-BY | 3.7 | 9.2 | 18 " RCP |
| J06 | | | | | | 22.4 | 59 | 36 " RCP |
| J07 | | | | | | 22.0 | 58 | 36 " RCP |
| I10 | B08 | 2.54 | 2.5 | 8.3 | PR 10 ' FORCED SUMP | 2.5 | 8.3 | 18 " RCP |
| J08 | | | | | | 2.5 | 8.2 | 18 " RCP |
| I11 | B09 | 2.74 | 2.6 | 7.7 | PR 10 ' SUMP | 2.6 | 7.7 | 18 " RCP |
| I12 | B10 & B11 | 6.38 | 8.5 | 27 | PR 20 ' SUMP | 5.4 | 18 | 18 " RCP |
| J09 | | | | | | 10.1 | 32 | 24 " RCP |
| J10 | | | | | | 30.6 | 87 | 42 " RCP |
| | | | | | | | | |
| I13 | C01 | 3.15 | 3.1 | 9.0 | PR 10 ' FORCED SUMP | 3.1 | 9.0 | 24 " RCP |
| I14 | C02 | 3.54 | 3.4 | 10 | PR 15 ' FORCED SUMP | 3.4 | 10 | 24 " RCP |
| J11 | | | | | | 6.0 | 18 | 24 " RCP |
| | | | | | | | | |
| I15 | C03 | 1.33 | 1.4 | 4.0 | PR 5 ' FORCED SUMP | 1.4 | 4.0 | 18 " RCP |
| I16 | C04 | 3.10 | 3.2 | 9.4 | PR 5 ' FORCED SUMP | 3.2 | 6.3 | 18 " RCP |
| J12 | | | | | | 9.5 | 26 | 30 " RCP |
| I17 | C05 | 0.58 | 0.6 | 1.8 | PR 5 ' SUMP | 0.6 | 1.8 | 18 " RCP |
| I18 | C06 | 1.03 | 1.0 | 6.0 | PR 5 ' SUMP | 1.0 | 6.0 | 18 " RCP |
| J13 | | | | | | 10.8 | 32 | 36 " RCP |
| CB1 | C07 | 0.88 | 0.9 | 2.5 | PR Type C | 0.9 | 2.5 | 18 " RCP |
| J14 | | | | | | 11.4 | 34 | 36 " RCP |
| | | | | | | | | |
| 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 | 7.3 | 21 | PR 20 ' FORCED SUMP | 7.3 | 17 | 18 " RCP |
| J16 | | | | | | 13.8 | 30 | 30 " RCP |
| DP3 | D04 | 5.30 | 5.0 | 17 | | | | |
| I21 | D05 | 2.00 | 6.9 | 24 | PR 15 ' FORCED SUMP | 6.9 | 14 | 24 " RCP |
| J17 | | | | | | 19.6 | 41 | 30 " RCP |
| I22 | D06 | 3.20 | 3.2 | 9 | PR 15 ' FLOW-BY | 2.6 | 6.2 | 18 " RCP |
| I23 | D07 | 6.59 | 6.9 | 20 | PR 10 ' FORCED SUMP | 6.9 | 9.9 | 18 " RCP |
| J18 | | | | | | 9.1 | 16 | 24 " RCP |
| I24 | D08 | 1.64 | 1.8 | 13 | PR 10 ' FORCED SUMP | 1.8 | 9.9 | 24 " RCP |
| J19 | | | | | | 29.2 | 64 | 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 | 5.4 | PR 10 ' SUMP | 2.0 | 8.4 | 18 " RCP |
| ES1 | D11 | 4.16 | 2.4 | 6.9 | " FES | 2.4 | 6.9 | 18 " RCP |
| I26 | D12 | 2.67 | 2.4 | 16 | PR 20 ' SUMP | 4.3 | 19 | 24 " RCP |
| J20 | | | | | | 29.2 | 71 | 42 " RCP |
| I27 | D13 | 1.79 | 2.2 | 5.8 | PR 15 ' FLOW-BY | 1.7 | 3.9 | 18 " RCP |
| J21 | | | | | | 29.2 | 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 | | | | | | 34.9 | 84 | 48 " RCP |
| I30 | D16 | 4.02 | 4.2 | 17 | PR 10 ' FORCED SUMP | 4.2 | 9.9 | 18 " RCP |
| J24 | | | | | | 37.4 | 90 | 48 " RCP |
| J25 | | | | | | 37.4 | 90 | 48 " RCP |
| | | | | | | | | |
| I31 | D17 | 5.13 | 5.3 | 27 | PR 15 ' SUMP | 5.3 | 24 | 30 " RCP |
| J26 | | | | | | 41.0 | 107 | 48 " RCP |
| I32 | D18 | 3.13 | 3.0 | 10 | PR 15 ' SUMP | 43.0 | 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 | | | | | | 13.7 | 35 | 30 " RCP |
| I35 | E03 | 5.82 | 6.5 | 17 | PR 15 ' FORCED SUMP | 6.5 | 14 | 18 " RCP |
| J29 | | | | | | 19.7 | 47 | 36 " RCP |
| I36 | E04 | 3.14 | 3.9 | 13 | PR 15 ' FORCED SUMP | 3.9 | 13 | 18 " RCP |
| I37 | E05 | 2.55 | 2.7 | 8.7 | PR 15 ' FLOW-BY | 2.3 | 6.0 | 18 " RCP |
| J30 | | | | | | 23.9 | 61 | 36 " RCP |
| J31 | | | | | | 23.8 | 61 | 36 " RCP |
| I38 | E06 | 1.27 | 1.6 | 4.2 | PR 5 ' FORCED SUMP | 1.6 | 4.2 | 18 " RCP |
| J32 | | | | | | 1.5 | 4.1 | 18 " RCP |
| I39 | E07 | 2.05 | 2.5 | 6.7 | PR 15 ' FLOW-BY | 2.0 | 4.5 | 18 " RCP |
| J33 | | | | | | 3.5 | 8.5 | 18 " RCP |
| I40 | E08 | 4.17 | 4.8 | 13 | PR 10 ' FORCED SUMP | 4.8 | 9.9 | 18 " RCP |
| J34 | | | | | | 8.0 | 18 | 24 " RCP |
| J35 | | | | | | 8.0 | 18 | 24 " RCP |
| I41 | E09 | 5.44 | 6.2 | 18 | PR 15 ' FORCED SUMP | 6.2 | 14 | 24 " RCP |
| J36 | | | | | | 35.2 | 86 | 42 " RCP |
| I42 | E10 | 6.98 | 7.0 | 19 | PR 20 ' SUMP | 7.0 | 19 | 24 " RCP |
| J37 | | | | | | 41.1 | 102 | 48 " RCP |
| CB3 | E11 | 13.04 | 6.3 | 18 | PR Type C | 6.3 | 18 | 18 " RCP |
| I43 | E12 | 1.60 | 3.6 | 9.2 | PR 20 ' FLOW-BY | 3.2 | 7.1 | 18 " RCP |
| J38 | | | | | | 52.5 | 132 | 54 " RCP |
| EI1 | E13 | 6.02 | 8.2 | 19 | EX 15 ' FORCED SUMP | 8.2 | 13 | 18 " RCP |
| | | | | | | | | |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MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANGE

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

Drawn by: TAL
Checked by: -
Date: FEB 2020
Scale: 1" = 100'

NOTE:

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

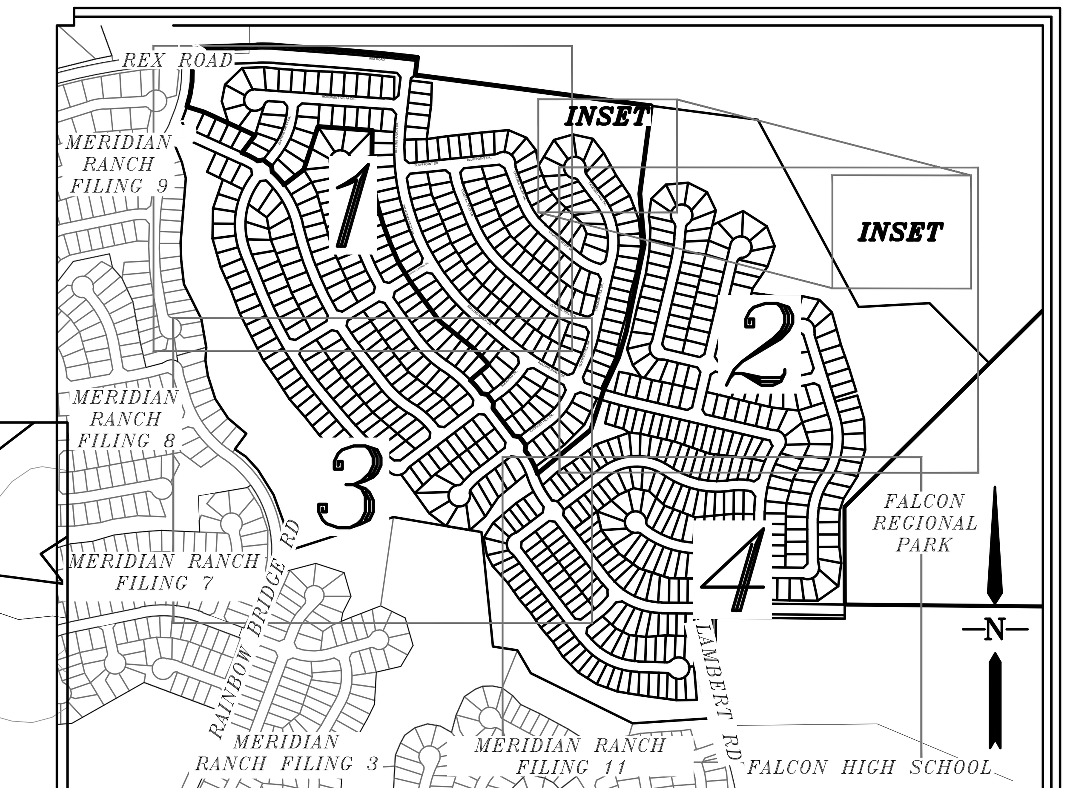
BENCH MARK:

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

ELEVATION = 6874.00

GRAPHIC SCALE

( IN FEET )
1 inch = 100 ft.


INDEX MAP
N.T.S.

| DP | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | INLET | Q(5) (CFS) | Q(100) (CFS) | PIPE |
|---|---|---|---|---|---|---|---|---|
| OS5 | OS1 | 4.40 | 1.3 | 9 | PR Type C | 1.2 | 8.4 | 24 " RCP |
| | | | | | | | | |
| I01 | A01 | 7.52 | 8.6 | 22 | PR 15 ' FORCED SUMP | 8.6 | 14 | 18 " RCP |
| I02 | A02 | 2.20 | 2.0 | 14 | PR 10 ' SUMP | 2.0 | 14 | 18 " RCP |
| J01 | | | | | | 10.5 | 28 | 24 " RCP |
| I03 | A03 | 0.79 | 1.0 | 3.1 | PR 5 ' SUMP | 11.3 | 30 | 24 " RCP |
| | | | | | | | | |
| I04 | B01 | 2.29 | 2.2 | 6.4 | PR 10 ' FORCED SUMP | 2.2 | 6.4 | 18 " RCP |
| I05 | B02 | 5.63 | 5.2 | 15 | PR 15 ' FORCED SUMP | 7.3 | 20 | 24 " RCP |
| J02 | | | | | | 7.3 | 20 | 24 " RCP |
| DP1 | B03 | 4.81 | 5.2 | 14 | | | | |
| I06 | B04 | 3.03 | 7.1 | 20 | PR 20 ' FORCED SUMP | 7.1 | 17 | 18 " RCP |
| J03 | | | | | | 13.9 | 36 | 30 " RCP |
| I07 | B05 | 3.22 | 3.1 | 9.1 | PR 10 ' FORCED SUMP | 3.1 | 9.1 | 18 " RCP |
| J04 | | | | | | 16.6 | 44 | 36 " RCP |
| I08 | B06 | 3.13 | 3.3 | 9.9 | PR 10 ' FORCED SUMP | 3.3 | 9.9 | 18 " RCP |
| J05 | | | | | | 19.0 | 51 | 36 " RCP |
| I09 | B07 | 4.76 | 4.3 | 13 | PR 20 ' FLOW-BY | 3.7 | 9.2 | 18 " RCP |
| J06 | | | | | | 22.4 | 59 | 36 " RCP |
| J07 | | | | | | 22.0 | 58 | 36 " RCP |
| I10 | B08 | 2.54 | 2.5 | 8.3 | PR 10 ' FORCED SUMP | 2.5 | 8.3 | 18 " RCP |
| J08 | | | | | | 2.5 | 8.2 | 18 " RCP |
| I11 | B09 | 2.74 | 2.6 | 7.7 | PR 10 ' SUMP | 2.6 | 7.7 | 18 " RCP |
| I12 | B10 & B11 | 6.38 | 8.5 | 27 | PR 20 ' SUMP | 5.4 | 18 | 18 " RCP |
| J09 | | | | | | 10.1 | 32 | 24 " RCP |
| J10 | | | | | | 30.6 | 87 | 42 " RCP |
| | | | | | | | | |
| I13 | C01 | 3.15 | 3.1 | 9.0 | PR 10 ' FORCED SUMP | 3.1 | 9.0 | 24 " RCP |
| I14 | C02 | 3.54 | 3.4 | 10 | PR 15 ' FORCED SUMP | 3.4 | 10 | 24 " RCP |
| J11 | | | | | | 6.0 | 18 | 24 " RCP |
| | | | | | | | | |
| I15 | C03 | 1.33 | 1.4 | 4.0 | PR 5 ' FORCED SUMP | 1.4 | 4.0 | 18 " RCP |
| I16 | C04 | 3.10 | 3.2 | 9.4 | PR 5 ' FORCED SUMP | 3.2 | 6.3 | 18 " RCP |
| J12 | | | | | | 9.5 | 26 | 30 " RCP |
| I17 | C05 | 0.58 | 0.6 | 1.8 | PR 5 ' SUMP | 0.6 | 1.8 | 18 " RCP |
| I18 | C06 | 1.03 | 1.0 | 6.0 | PR 5 ' SUMP | 1.0 | 6.0 | 18 " RCP |
| J13 | | | | | | 10.8 | 32 | 36 " RCP |
| CB1 | C07 | 0.88 | 0.9 | 2.5 | PR Type C | 0.9 | 2.5 | 18 " RCP |
| J14 | | | | | | 11.4 | 34 | 36 " RCP |
| | | | | | | | | |
| 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 | 7.3 | 21 | PR 20 ' FORCED SUMP | 7.3 | 17 | 18 " RCP |
| J16 | | | | | | 13.8 | 30 | 30 " RCP |
| DP3 | D04 | 5.30 | 5.0 | 17 | | | | |
| I21 | D05 | 2.00 | 6.9 | 24 | PR 15 ' FORCED SUMP | 6.9 | 14 | 24 " RCP |
| J17 | | | | | | 19.6 | 41 | 30 " RCP |
| I22 | D06 | 3.20 | 3.2 | 9 | PR 15 ' FLOW-BY | 2.6 | 6.2 | 18 " RCP |
| I23 | D07 | 6.59 | 6.9 | 20 | PR 10 ' FORCED SUMP | 6.9 | 9.9 | 18 " RCP |
| J18 | | | | | | 9.1 | 16 | 24 " RCP |
| I24 | D08 | 1.64 | 1.8 | 13 | PR 10 ' FORCED SUMP | 1.8 | 9.9 | 24 " RCP |
| J19 | | | | | | 29.2 | 64 | 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 | 5.4 | PR 10 ' SUMP | 2.0 | 8.4 | 18 " RCP |
| ES1 | D11 | 4.16 | 2.4 | 6.9 | " FES | 2.4 | 6.9 | 18 " RCP |
| I26 | D12 | 2.67 | 2.4 | 16 | PR 20 ' SUMP | 4.3 | 19 | 24 " RCP |
| J20 | | | | | | 29.2 | 71 | 42 " RCP |
| I27 | D13 | 1.79 | 2.2 | 5.8 | PR 15 ' FLOW-BY | 1.7 | 3.9 | 18 " RCP |
| J21 | | | | | | 29.2 | 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 | | | | | | 34.9 | 84 | 48 " RCP |
| I30 | D16 | 4.02 | 4.2 | 17 | PR 10 ' FORCED SUMP | 4.2 | 9.9 | 18 " RCP |
| J24 | | | | | | 37.4 | 90 | 48 " RCP |
| J25 | | | | | | 37.4 | 90 | 48 " RCP |
| | | | | | | | | |
| I31 | D17 | 5.13 | 5.3 | 27 | PR 15 ' SUMP | 5.3 | 24 | 30 " RCP |
| J26 | | | | | | 41.0 | 107 | 48 " RCP |
| I32 | D18 | 3.13 | 3.0 | 10 | PR 15 ' SUMP | 43.0 | 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 | | | | | | 13.7 | 35 | 30 " RCP |
| I35 | E03 | 5.82 | 6.5 | 17 | PR 15 ' FORCED SUMP | 6.5 | 14 | 18 " RCP |
| J29 | | | | | | 19.7 | 47 | 36 " RCP |
| I36 | E04 | 3.14 | 3.9 | 13 | PR 15 ' FORCED SUMP | 3.9 | 13 | 18 " RCP |
| I37 | E05 | 2.55 | 2.7 | 8.7 | PR 15 ' FLOW-BY | 2.3 | 6.0 | 18 " RCP |
| J30 | | | | | | 23.9 | 61 | 36 " RCP |
| J31 | | | | | | 23.8 | 61 | 36 " RCP |
| I38 | E06 | 1.27 | 1.6 | 4.2 | PR 5 ' FORCED SUMP | 1.6 | 4.2 | 18 " RCP |
| J32 | | | | | | 1.5 | 4.1 | 18 " RCP |
| I39 | E07 | 2.05 | 2.5 | 6.7 | PR 15 ' FLOW-BY | 2.0 | 4.5 | 18 " RCP |
| J33 | | | | | | 3.5 | 8.5 | 18 " RCP |
| I40 | E08 | 4.17 | 4.8 | 13 | PR 10 ' FORCED SUMP | 4.8 | 9.9 | 18 " RCP |
| J34 | | | | | | 8.0 | 18 | 24 " RCP |
| J35 | | | | | | 8.0 | 18 | 24 " RCP |
| I41 | E09 | 5.44 | 6.2 | 18 | PR 15 ' FORCED SUMP | 6.2 | 14 | 24 " RCP |
| J36 | | | | | | 35.2 | 86 | 42 " RCP |
| I42 | E10 | 6.98 | 7.0 | 19 | PR 20 ' SUMP | 7.0 | 19 | 24 " RCP |
| J37 | | | | | | 41.1 | 102 | 48 " RCP |
| CB3 | E11 | 13.04 | 6.3 | 18 | PR Type C | 6.3 | 18 | 18 " RCP |
| I43 | E12 | 1.60 | 3.6 | 9.2 | PR 20 ' FLOW-BY | 3.2 | 7.1 | 18 " RCP |
| J38 | | | | | | 52.5 | 132 | 54 " RCP |
| EI1 | E13 | 6.02 | 8.2 | 19 | EX 15 ' FORCED SUMP | 8.2 | 13 | 18 " RCP |

| No. | Revisions | Date | Init. | Appr. | Date |
|---|---|---|---|---|---|
| - | - | | | | |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MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANGE

Drawn by TAL
Checked by -
Date FEB 2020

Scale 1" = 100'

NOTE:

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BENCH MARK:

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

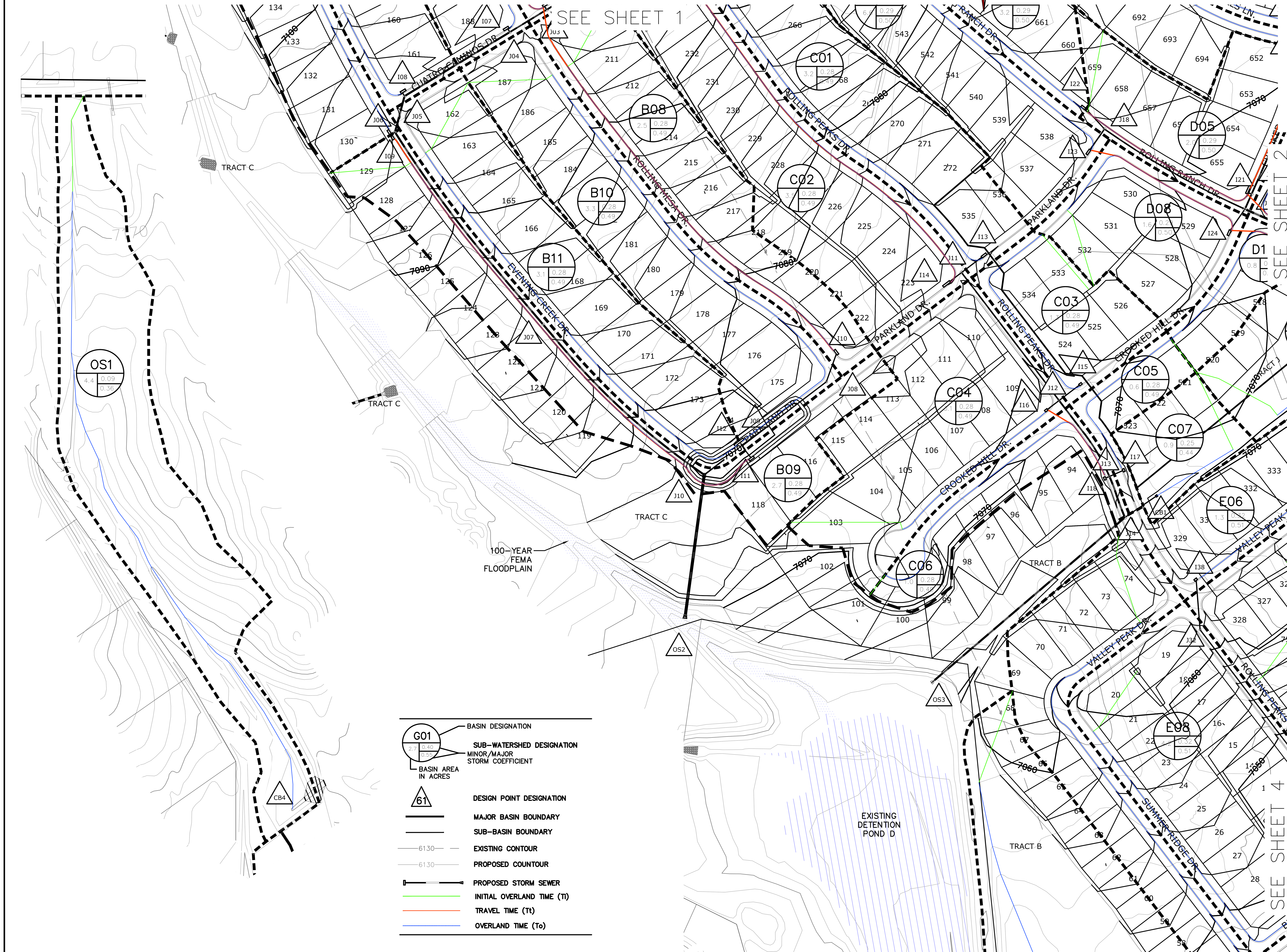
ELEVATION = 6874.00

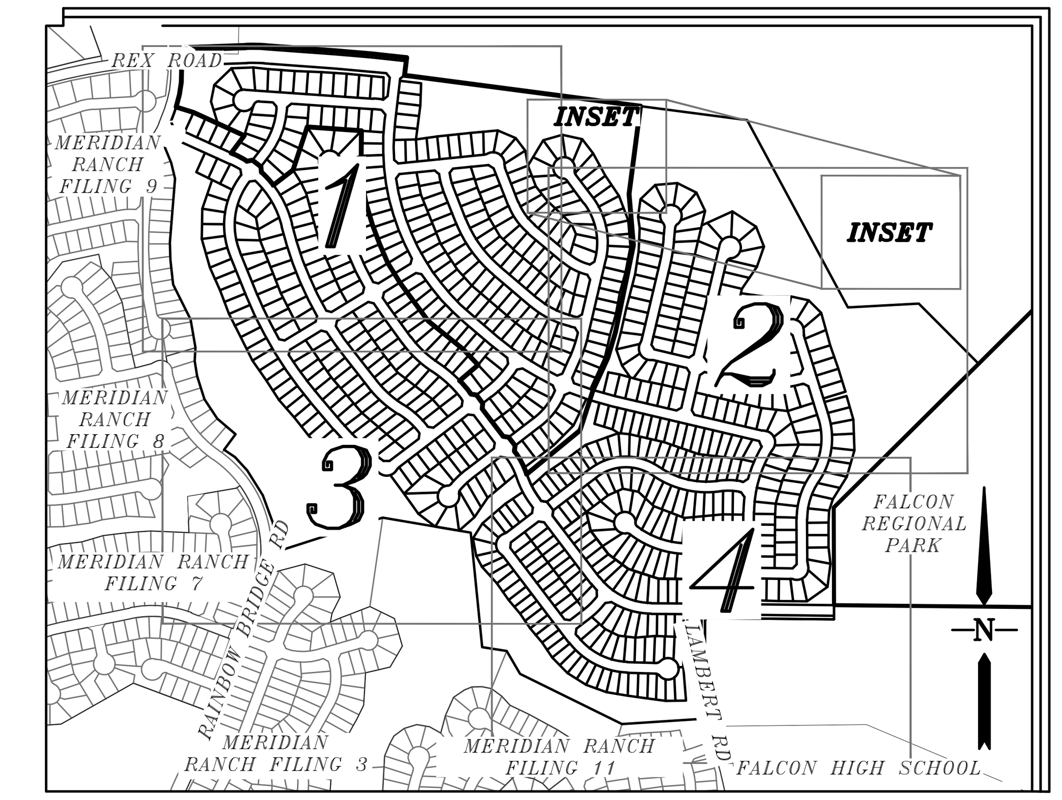
GRAPHIC SCALE

100 0 50 100 200 400

( IN FEET )

1 inch = 100 ft.




INDEX MAP

N.T.S.

| DP | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | INLET | Q(5) (CFS) | Q(100) (CFS) | PIPE |
|---|---|---|---|---|---|---|---|---|
| OS5 | OS1 | 4.40 | 1.3 | 9 | PR Type C | 1.2 | 8.4 | 24 " RCP |
| | | | | | | | | |
| I01 | A01 | 7.52 | 8.6 | 22 | PR 15 ' FORCED SUMP | 8.6 | 14 | 18 " RCP |
| I02 | A02 | 2.20 | 2.0 | 14 | PR 10 ' SUMP | 2.0 | 14 | 18 " RCP |
| J01 | | | | | | 10.5 | 28 | 24 " RCP |
| I03 | A03 | 0.79 | 1.0 | 3.1 | PR 5 ' SUMP | 11.3 | 30 | 24 " RCP |
| | | | | | | | | |
| I04 | B01 | 2.29 | 2.2 | 6.4 | PR 10 ' FORCED SUMP | 2.2 | 6.4 | 18 " RCP |
| I05 | B02 | 5.63 | 5.2 | 15 | PR 15 ' FORCED SUMP | 7.3 | 20 | 24 " RCP |
| J02 | | | | | | 7.3 | 20 | 24 " RCP |
| DP1 | B03 | 4.81 | 5.2 | 14 | | | | |
| I06 | B04 | 3.03 | 7.1 | 20 | PR 20 ' FORCED SUMP | 7.1 | 17 | 18 " RCP |
| J03 | | | | | | 13.9 | 36 | 30 " RCP |
| I07 | B05 | 3.22 | 3.1 | 9.1 | PR 10 ' FORCED SUMP | 3.1 | 9.1 | 18 " RCP |
| J04 | | | | | | 16.6 | 44 | 36 " RCP |
| I08 | B06 | 3.13 | 3.3 | 9.9 | PR 10 ' FORCED SUMP | 3.3 | 9.9 | 18 " RCP |
| J05 | | | | | | 19.0 | 51 | 36 " RCP |
| I09 | B07 | 4.76 | 4.3 | 13 | PR 20 ' FLOW-BY | 3.7 | 9.2 | 18 " RCP |
| J06 | | | | | | 22.4 | 59 | 36 " RCP |
| J07 | | | | | | 22.0 | 58 | 36 " RCP |
| I10 | B08 | 2.54 | 2.5 | 8.3 | PR 10 ' FORCED SUMP | 2.5 | 8.3 | 18 " RCP |
| J08 | | | | | | 2.5 | 8.2 | 18 " RCP |
| I11 | B09 | 2.74 | 2.6 | 7.7 | PR 10 ' SUMP | 2.6 | 7.7 | 18 " RCP |
| I12 | B10 & B11 | 6.38 | 8.5 | 27 | PR 20 ' SUMP | 5.4 | 18 | 18 " RCP |
| J09 | | | | | | 10.1 | 32 | 24 " RCP |
| J10 | | | | | | 30.6 | 87 | 42 " RCP |
| | | | | | | | | |
| I13 | C01 | 3.15 | 3.1 | 9.0 | PR 10 ' FORCED SUMP | 3.1 | 9.0 | 24 " RCP |
| I14 | C02 | 3.54 | 3.4 | 10 | PR 15 ' FORCED SUMP | 3.4 | 10 | 24 " RCP |
| J11 | | | | | | 6.0 | 18 | 24 " RCP |
| | | | | | | | | |
| I15 | C03 | 1.33 | 1.4 | 4.0 | PR 5 ' FORCED SUMP | 1.4 | 4.0 | 18 " RCP |
| I16 | C04 | 3.10 | 3.2 | 9.4 | PR 5 ' FORCED SUMP | 3.2 | 6.3 | 18 " RCP |
| J12 | | | | | | 9.5 | 26 | 30 " RCP |
| I17 | C05 | 0.58 | 0.6 | 1.8 | PR 5 ' SUMP | 0.6 | 1.8 | 18 " RCP |
| I18 | C06 | 1.03 | 1.0 | 6.0 | PR 5 ' SUMP | 1.0 | 6.0 | 18 " RCP |
| J13 | | | | | | 10.8 | 32 | 36 " RCP |
| CB1 | C07 | 0.88 | 0.9 | 2.5 | PR Type C | 0.9 | 2.5 | 18 " RCP |
| J14 | | | | | | 11.4 | 34 | 36 " RCP |
| | | | | | | | | |
| 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 | 7.3 | 21 | PR 20 ' FORCED SUMP | 7.3 | 17 | 18 " RCP |
| J16 | | | | | | 13.8 | 30 | 30 " RCP |
| DP3 | D04 | 5.30 | 5.0 | 17 | | | | |
| I21 | D05 | 2.00 | 6.9 | 24 | PR 15 ' FORCED SUMP | 6.9 | 14 | 24 " RCP |
| J17 | | | | | | 19.6 | 41 | 30 " RCP |
| I22 | D06 | 3.20 | 3.2 | 9 | PR 15 ' FLOW-BY | 2.6 | 6.2 | 18 " RCP |
| I23 | D07 | 6.59 | 6.9 | 20 | PR 10 ' FORCED SUMP | 6.9 | 9.9 | 18 " RCP |
| J18 | | | | | | 9.1 | 16 | 24 " RCP |
| I24 | D08 | 1.64 | 1.8 | 13 | PR 10 ' FORCED SUMP | 1.8 | 9.9 | 24 " RCP |
| J19 | | | | | | 29.2 | 64 | 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 | 5.4 | PR 10 ' SUMP | 2.0 | 8.4 | 18 " RCP |
| ES1 | D11 | 4.16 | 2.4 | 6.9 | " FES | 2.4 | 6.9 | 18 " RCP |
| I26 | D12 | 2.67 | 2.4 | 16 | PR 20 ' SUMP | 4.3 | 19 | 24 " RCP |
| J20 | | | | | | 29.2 | 71 | 42 " RCP |
| I27 | D13 | 1.79 | 2.2 | 5.8 | PR 15 ' FLOW-BY | 1.7 | 3.9 | 18 " RCP |
| J21 | | | | | | 29.2 | 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 | | | | | | 34.9 | 84 | 48 " RCP |
| I30 | D16 | 4.02 | 4.2 | 17 | PR 10 ' FORCED SUMP | 4.2 | 9.9 | 18 " RCP |
| J24 | | | | | | 37.4 | 90 | 48 " RCP |
| J25 | | | | | | 37.4 | 90 | 48 " RCP |
| | | | | | | | | |
| I31 | D17 | 5.13 | 5.3 | 27 | PR 15 ' SUMP | 5.3 | 24 | 30 " RCP |
| J26 | | | | | | 41.0 | 107 | 48 " RCP |
| I32 | D18 | 3.13 | 3.0 | 10 | PR 15 ' SUMP | 43.0 | 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 | | | | | | 13.7 | 35 | 30 " RCP |
| I35 | E03 | 5.82 | 6.5 | 17 | PR 15 ' FORCED SUMP | 6.5 | 14 | 18 " RCP |
| J29 | | | | | | 19.7 | 47 | 36 " RCP |
| I36 | E04 | 3.14 | 3.9 | 13 | PR 15 ' FORCED SUMP | 3.9 | 13 | 18 " RCP |
| I37 | E05 | 2.55 | 2.7 | 8.7 | PR 15 ' FLOW-BY | 2.3 | 6.0 | 18 " RCP |
| J30 | | | | | | 23.9 | 61 | 36 " RCP |
| J31 | | | | | | 23.8 | 61 | 36 " RCP |
| I38 | E06 | 1.27 | 1.6 | 4.2 | PR 5 ' FORCED SUMP | 1.6 | 4.2 | 18 " RCP |
| J32 | | | | | | 1.5 | 4.1 | 18 " RCP |
| I39 | E07 | 2.05 | 2.5 | 6.7 | PR 15 ' FLOW-BY | 2.0 | 4.5 | 18 " RCP |
| J33 | | | | | | 3.5 | 8.5 | 18 " RCP |
| I40 | E08 | 4.17 | 4.8 | 13 | PR 10 ' FORCED SUMP | 4.8 | 9.9 | 18 " RCP |
| J34 | | | | | | 8.0 | 18 | 24 " RCP |
| J35 | | | | | | 8.0 | 18 | 24 " RCP |
| I41 | E09 | 5.44 | 6.2 | 18 | PR 15 ' FORCED SUMP | 6.2 | 14 | 24 " RCP |
| J36 | | | | | | 35.2 | 86 | 42 " RCP |
| I42 | E10 | 6.98 | 7.0 | 19 | PR 20 ' SUMP | 7.0 | 19 | 24 " RCP |
| J37 | | | | | | 41.1 | 102 | 48 " RCP |
| CB3 | E11 | 13.04 | 6.3 | 18 | PR Type C | 6.3 | 18 | 18 " RCP |
| I43 | E12 | 1.60 | 3.6 | 9.2 | PR 20 ' FLOW-BY | 3.2 | 7.1 | 18 " RCP |
| J38 | | | | | | 52.5 | 132 | 54 " RCP |
| EI1 | E13 | 6.02 | 8.2 | 19 | EX 15 ' FORCED SUMP | 8.2 | 13 | 18 " RCP |
| | | | | | | | | |

| No. | Revisions | Date | Init. | Appr. | Date |
|---|---|---|---|---|---|
| - | - | - | - | - | - |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MERIDIAN RANCH

RATIONAL DRAINAGE MAP
PRELIMINARY DRAINAGE REPORT
ROLLING HILLS RANGE

Drawn by TAL
Checked by -
Date FEB 2020

Scale 1" = 100'

NOTE:

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

BENCH MARK:

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

ELEVATION = 6874.00

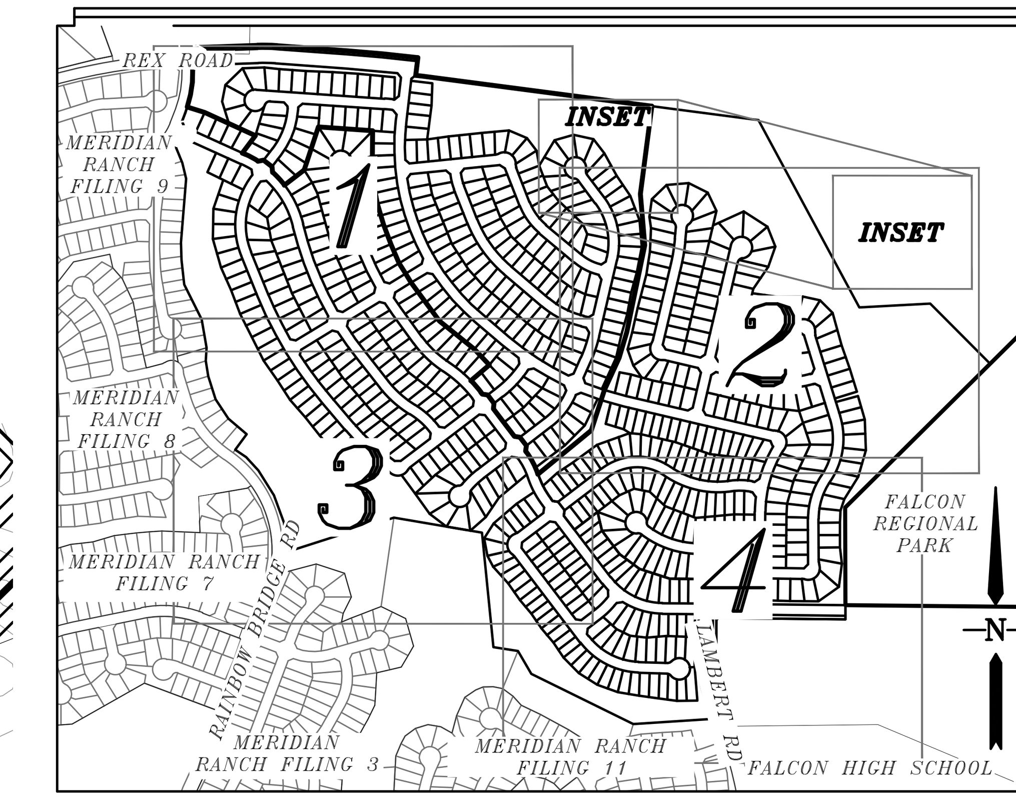
GRAPHIC SCALE

100 0 50 100 200 400

( IN FEET )

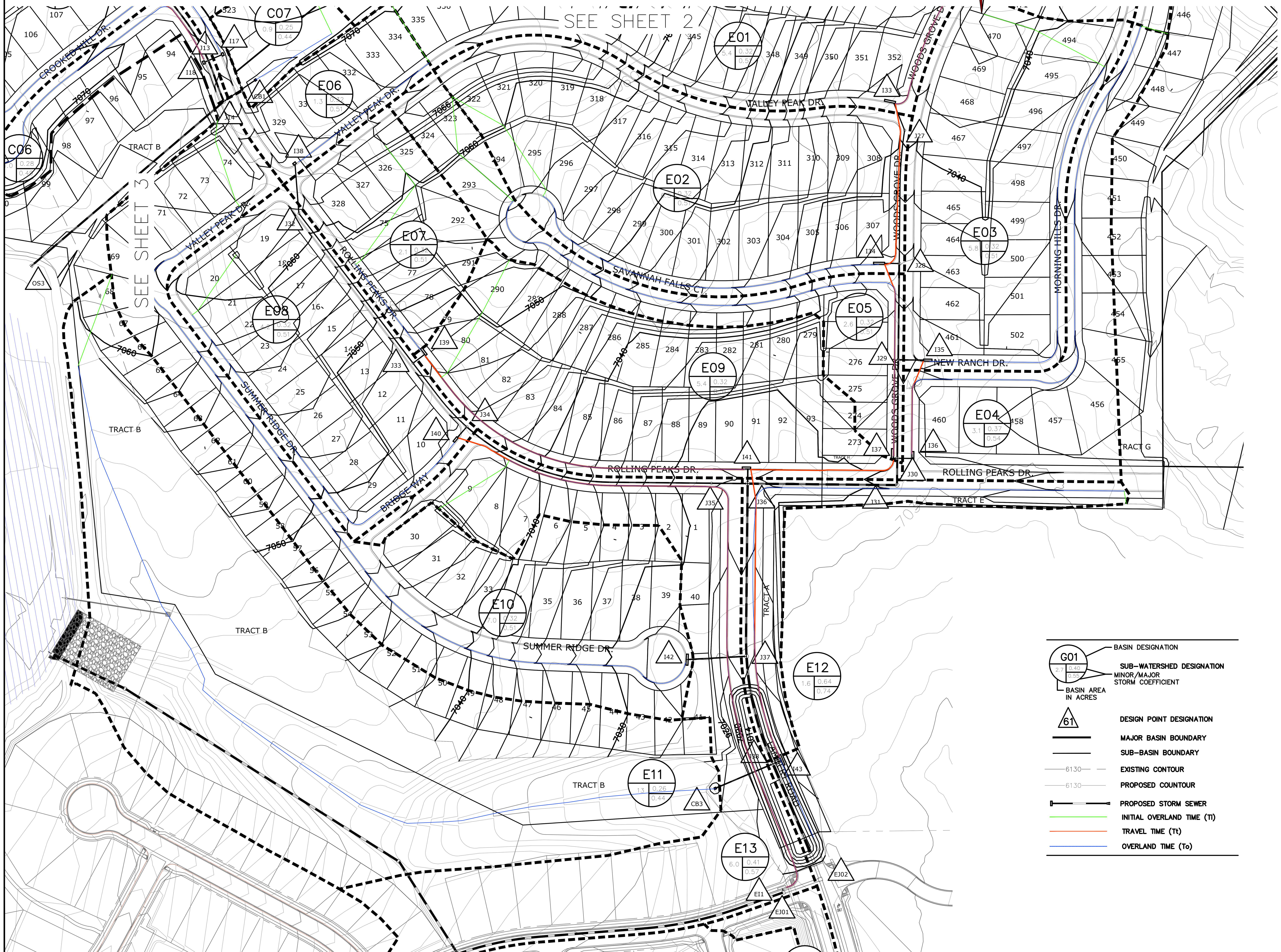
1 inch = 100 ft.

N




INDEX MAP

N.T.S.




| | |
|---|---|
| G01 | BASIN DESIGNATION |
| | SUB-WATERSHED DESIGNATION |
| | MINOR/MAJOR STORM COEFFICIENT |
| | BASIN AREA IN ACRES |
| 61 | DESIGN POINT DESIGNATION |
| | MAJOR BASIN BOUNDARY |
| | SUB-BASIN BOUNDARY |
| 6130 | EXISTING CONTOUR |
| 6130 | PROPOSED COUNTOUR |
| | PROPOSED STORM SEWER |
| | INITIAL OVERLAND TIME (Ti) |
| | TRAVEL TIME (Tt) |
| | OVERLAND TIME (To) |

| DP | BASIN | AREA (AC) | Q(5) (CFS) | Q(100) (CFS) | | INLET | Q(5) (CFS) | Q(100) (CFS) | PIPE |
|---|---|---|---|---|---|---|---|---|---|
| OS5 | OS1 | 4.40 | 1.3 | 9 | | PR Type C | 1.2 | 8.4 | 24 " RCP |
| | | | | | | | | | |
| I01 | A01 | 7.52 | 8.6 | 22 | | PR 15 ' FORCED SUMP | 8.6 | 14 | 18 " RCP |
| I02 | A02 | 2.20 | 2.0 | 14 | | PR 10 ' SUMP | 2.0 | 14 | 18 " RCP |
| J01 | | | | | | | 10.5 | 28 | 24 " RCP |
| I03 | A03 | 0.79 | 1.0 | 3.1 | | PR 5 ' SUMP | 11.3 | 30 | 24 " RCP |
| | | | | | | | | | |
| I04 | B01 | 2.29 | 2.2 | 6.4 | | PR 10 ' FORCED SUMP | 2.2 | 6.4 | 18 " RCP |
| I05 | B02 | 5.63 | 5.2 | 15 | | PR 15 ' FORCED SUMP | 7.3 | 20 | 24 " RCP |
| J02 | | | | | | | 7.3 | 20 | 24 " RCP |
| DP1 | B03 | 4.81 | 5.2 | 14 | | | | | |
| I06 | B04 | 3.03 | 7.1 | 20 | | PR 20 ' FORCED SUMP | 7.1 | 17 | 18 " RCP |
| J03 | | | | | | | 13.9 | 36 | 30 " RCP |
| I07 | B05 | 3.22 | 3.1 | 9.1 | | PR 10 ' FORCED SUMP | 3.1 | 9.1 | 18 " RCP |
| J04 | | | | | | | 16.6 | 44 | 36 " RCP |
| I08 | B06 | 3.13 | 3.3 | 9.9 | | PR 10 ' FORCED SUMP | 3.3 | 9.9 | 18 " RCP |
| J05 | | | | | | | 19.0 | 51 | 36 " RCP |
| I09 | B07 | 4.76 | 4.3 | 13 | | PR 20 ' FLOW-BY | 3.7 | 9.2 | 18 " RCP |
| J06 | | | | | | | 22.4 | 59 | 36 " RCP |
| J07 | | | | | | | 22.0 | 58 | 36 " RCP |
| I10 | B08 | 2.54 | 2.5 | 8.3 | | PR 10 ' FORCED SUMP | 2.5 | 8.3 | 18 " RCP |
| J08 | | | | | | | 2.5 | 8.2 | 18 " RCP |
| I11 | B09 | 2.74 | 2.6 | 7.7 | | PR 10 ' SUMP | 2.6 | 7.7 | 18 " RCP |
| I12 | B10 & B11 | 6.38 | 8.5 | 27 | | PR 20 ' SUMP | 5.4 | 18 | 18 " RCP |
| J09 | | | | | | | 10.1 | 32 | 24 " RCP |
| J10 | | | | | | | 30.6 | 87 | 42 " RCP |
| | | | | | | | | | |
| I13 | C01 | 3.15 | 3.1 | 9.0 | | PR 10 ' FORCED SUMP | 3.1 | 9.0 | 24 " RCP |
| I14 | C02 | 3.54 | 3.4 | 10 | | PR 15 ' FORCED SUMP | 3.4 | 10 | 24 " RCP |
| J11 | | | | | | | 6.0 | 18 | 24 " RCP |
| | | | | | | | | | |
| I15 | C03 | 1.33 | 1.4 | 4.0 | | PR 5 ' FORCED SUMP | 1.4 | 4.0 | 18 " RCP |
| I16 | C04 | 3.10 | 3.2 | 9.4 | | PR 5 ' FORCED SUMP | 3.2 | 6.3 | 18 " RCP |
| J12 | | | | | | | 9.5 | 26 | 30 " RCP |
| I17 | C05 | 0.58 | 0.6 | 1.8 | | PR 5 ' SUMP | 0.6 | 1.8 | 18 " RCP |
| I18 | C06 | 1.03 | 1.0 | 6.0 | | PR 5 ' SUMP | 1.0 | 6.0 | 18 " RCP |
| J13 | | | | | | | 10.8 | 32 | 36 " RCP |
| CB1 | C07 | 0.88 | 0.9 | 2.5 | | PR Type C | 0.9 | 2.5 | 18 " RCP |
| J14 | | | | | | | 11.4 | 34 | 36 " RCP |
| | | | | | | | | | |
| 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 | 7.3 | 21 | | PR 20 ' FORCED SUMP | 7.3 | 17 | 18 " RCP |
| J16 | | | | | | | 13.8 | 30 | 30 " RCP |
| DP3 | D04 | 5.30 | 5.0 | 17 | | | | | |
| I21 | D05 | 2.00 | 6.9 | 24 | | PR 15 ' FORCED SUMP | 6.9 | 14 | 24 " RCP |
| J17 | | | | | | | 19.6 | 41 | 30 " RCP |
| I22 | D06 | 3.20 | 3.2 | 9 | | PR 15 ' FLOW-BY | 2.6 | 6.2 | 18 " RCP |
| I23 | D07 | 6.59 | 6.9 | 20 | | PR 10 ' FORCED SUMP | 6.9 | 9.9 | 18 " RCP |
| J18 | | | | | | | 9.1 | 16 | 24 " RCP |
| I24 | D08 | 1.64 | 1.8 | 13 | | PR 10 ' FORCED SUMP | 1.8 | 9.9 | 24 " RCP |
| J19 | | | | | | | 29.2 | 64 | 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 | 5.4 | | PR 10 ' SUMP | 2.0 | 8.4 | 18 " RCP |
| ES1 | D11 | 4.16 | 2.4 | 6.9 | | " FES | 2.4 | 6.9 | 18 " RCP |
| I26 | D12 | 2.67 | 2.4 | 16 | | PR 20 ' SUMP | 4.3 | 19 | 24 " RCP |
| J20 | | | | | | | 29.2 | 71 | 42 " RCP |
| I27 | D13 | 1.79 | 2.2 | 5.8 | | PR 15 ' FLOW-BY | 1.7 | 3.9 | 18 " RCP |
| J21 | | | | | | | 29.2 | 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 | | | | | | | 34.9 | 84 | 48 " RCP |
| I30 | D16 | 4.02 | 4.2 | 17 | | PR 10 ' FORCED SUMP | 4.2 | 9.9 | 18 " RCP |
| J24 | | | | | | | 37.4 | 90 | 48 " RCP |
| J25 | | | | | | | 37.4 | 90 | 48 " RCP |
| | | | | | | | | | |
| I31 | D17 | 5.13 | 5.3 | 27 | | PR 15 ' SUMP | 5.3 | 24 | 30 " RCP |
| J26 | | | | | | | 41.0 | 107 | 48 " RCP |
| I32 | D18 | 3.13 | 3.0 | 10 | | PR 15 ' SUMP | 43.0 | 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 | | | | | | | 13.7 | 35 | 30 " RCP |
| I35 | E03 | 5.82 | 6.5 | 17 | | PR 15 ' FORCED SUMP | 6.5 | 14 | 18 " RCP |
| J29 | | | | | | | 19.7 | 47 | 36 " RCP |
| I36 | E04 | 3.14 | 3.9 | 13 | | PR 15 ' FORCED SUMP | 3.9 | 13 | 18 " RCP |
| I37 | E05 | 2.55 | 2.7 | 8.7 | | PR 15 ' FLOW-BY | 2.3 | 6.0 | 18 " RCP |
| J30 | | | | | | | 23.9 | 61 | 36 " RCP |
| J31 | | | | | | | 23.8 | 61 | 36 " RCP |
| I38 | E06 | 1.27 | 1.6 | 4.2 | | PR 5 ' FORCED SUMP | 1.6 | 4.2 | 18 " RCP |
| J32 | | | | | | | 1.5 | 4.1 | 18 " RCP |
| I39 | E07 | 2.05 | 2.5 | 6.7 | | PR 15 ' FLOW-BY | 2.0 | 4.5 | 18 " RCP |
| J33 | | | | | | | 3.5 | 8.5 | 18 " RCP |
| I40 | E08 | 4.17 | 4.8 | 13 | | PR 10 ' FORCED SUMP | 4.8 | 9.9 | 18 " RCP |
| J34 | | | | | | | 8.0 | 18 | 24 " RCP |
| J35 | | | | | | | 8.0 | 18 | 24 " RCP |
| I41 | E09 | 5.44 | 6.2 | 18 | | PR 15 ' FORCED SUMP | 6.2 | 14 | 24 " RCP |
| J36 | | | | | | | 35.2 | 86 | 42 " RCP |
| I42 | E10 | 6.98 | 7.0 | 19 | | PR 20 ' SUMP | 7.0 | 19 | 24 " RCP |
| J37 | | | | | | | 41.1 | 102 | 48 " RCP |
| CB3 | E11 | 13.04 | 6.3 | 18 | | PR Type C | 6.3 | 18 | 18 " RCP |
| I43 | E12 | 1.60 | 3.6 | 9.2 | | PR 20 ' FLOW-BY | 3.2 | 7.1 | 18 " RCP |
| J38 | | | | | | | 52.5 | 132 | 54 " RCP |
| EI1 | E13 | 6.02 | 8.2 | 19 | | EX 15 ' FORCED SUMP | 8.2 | 13 | 18 " RCP |
| | | | | | | | | | |

| No. | Revisions | Date | Init. | Appr. | Date |
|---|---|---|---|---|---|
| | | | | | |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MERIDIAN RANCH

# RATIONAL DRAINAGE MAP
## PRELIMINARY DRAINAGE REPORT
## ROLLING HILLS RANGE

Drawn by TAL
Checked by -
Date FEB 2020
Scale 1" = 100'
4 of 4