REVISION TO:
MASTER DEVELOPMENT
DRAINAGE PLAN
MERIDIAN RANCH
EL PASO COUNTY, COLORADO

MERIDIAN RANCH

A GOLF & RECREATIONAL COMMUNITY

June 2017

Prepared For:

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

Prepared By:
Tech Contractors
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PCD Project No.

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

Stonebridge Filing 3 at Meridian Ranch
Final Drainage Plan

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EXECUTIVE SUMMARY

The purpose of the revision to the following Master Development Drainage Plan is to present updated conceptual drainage improvements for the Meridian Ranch Development based upon the proposed sketch plan amendment, ZCP and up to date data from within the 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 the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version). Concepts presented in this report will be refined and specific improvements addressed during the Final Plat process.

The revisions included within this report include the density increase as proposed with this sketch plan amendment. The previous revision to the MDDP (2015) included the removal of the regional park land mass from the Meridian Ranch developed property and the relocation of the detention ponds originally located along Eastonville Road to locations upstream and immediately adjacent to the parklands. The relocation of the detention ponds designated as Ponds G and I result in a change in the release rate at that location. The historic calculations remain the same from the 2015 MDDP revision. The developed calculations reflect the density increase sought in this revision.

The original boundary limits of Meridian Ranch encompassed 2620 acre proposed development and is located approximately 12 miles northeast of the City of Colorado Springs, 2.5 miles north of the town of Falcon and immediately north of the Woodmen Hills development.

The Sketch Plan amendment includes all the remaining 850 acres of undeveloped portion of Meridian Ranch. Of the undeveloped land it is proposed to have 415 acres of residential development; 3 acres of metropolitan district facilities; 255 acres of open space, drainage/detention facilities and park sites; 53 acres dedicated to school sites; and 124 acres of R.O.W.

The calculated developed flows in excess of the existing runoff discharge will be mitigated with the use of full spectrum detention facilities to be located within the project and along eastern boundary of the project. The Meridian Ranch Development will not adversely impact the downstream properties.

Revise. The calculations seem to be designed to release at historic rate.
Revise statement and note 90% of predevelopment per current Full Spectrum Detention criteria.

INTRODUCTION

Purpose

The purpose of the revision to the following Master Development Drainage Plan is to present updated conceptual drainage improvements for the Meridian Ranch Development based upon the proposed sketch plan and up to date construction within the development. The calculated developed flows in excess of eighty percent (80%) of the historic runoff discharge across eastern boundary of the project will be mitigated with the use of detention facilities to be located within the project and along eastern project boundary. Concepts presented in this report will be refined and specific improvements addressed during the Final Plat process.

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 development 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 the City of Colorado Springs Drainage Criteria Manual, Volume 1 (DCM-1) ((2014 version).

EXISTING CONDITIONS

General Location

Meridian Ranch encompasses 2620 acres of proposed residential development and is located approximately 12 miles northeast of the City of Colorado Springs, 2.5 miles north of the town of Falcon and immediately north of the Woodmen Hills development in El Paso County. Please see Figure 1: Vicinity Map.

Land Use

In the past farming and ranching dominated the area surrounding Meridian Ranch. However, urbanization has been occurring in the general vicinity for several years. Most notably, urbanization is occurring within the Meridian Ranch Development with the completion of several filings, Woodmen Hills to the south, to the west is the Paint Brush Hills subdivision, 4 Way Ranch to the east and Latigo Trails and Antlers Ridge to the north.

The Sketch Plan amendment includes all the remaining 850 acres of undeveloped portion of Meridian Ranch. Of the undeveloped land it is proposed to have 415 acres of residential development; 3 acres of metropolitan district facilities; 255 acres of open space, drainage/detention facilities and park sites; 53 acres dedicated to school sites; and 124 acres of R.O.W.

Figure 1: Vicinity Map

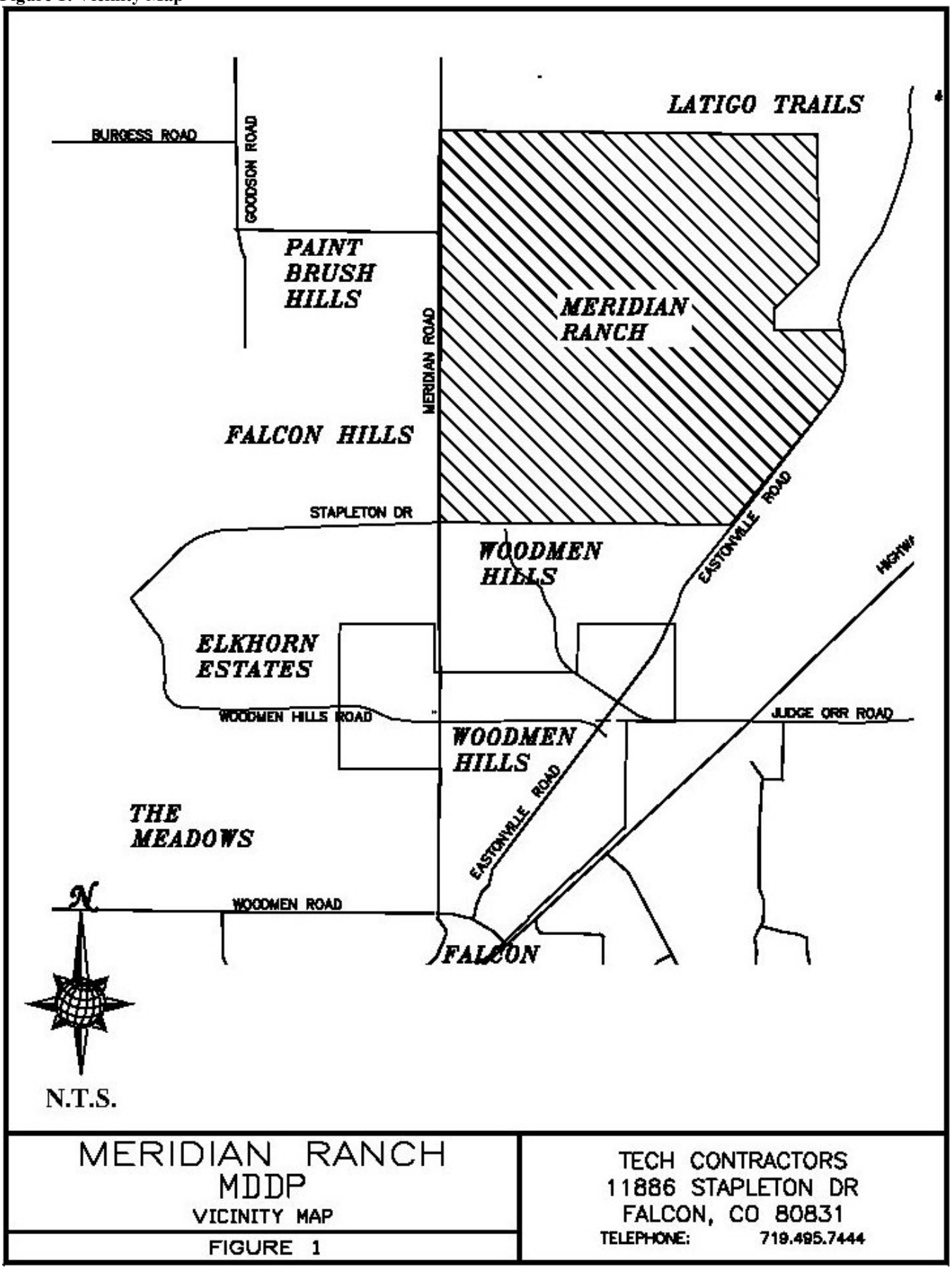


Table 1: Master Plan Land Use

Land Use	Original Acres	Amended	Notes
Single Family Residential	1115	415	4400 DU
Commercial/Business	15	0	
Dedicated School Sites	128	53	
Metro District Facilities	46	3	
Wastewater Facility	14	0	
Right of Way	387	124	
Park/Open Space/Det. Fac.	875	255	
Total	**2620**	**850**	

Topography and Floodplains

The topography of the site is typical of a high desert, short grass prairie with relatively flat slopes generally ranging from 2% to 4%. The area drains generally from northwest to southeast being tributary to the Bennett Ranch, Haegler Ranch and Gieck Ranch Drainage Basins, all of which are tributary to Black Squirrel Creek.

The Federal Emergency Management Agency (FEMA) has established floodplain along portions of the tributary streams located in the Gieck Ranch Basin. A LOMR was processed through FEMA in 2014, becoming effective on March 24, 2015 over the eastern portion of the site within the Gieck Ranch Drainage Basin. See

Figure 2: FEMA Floodplain Map

Geology

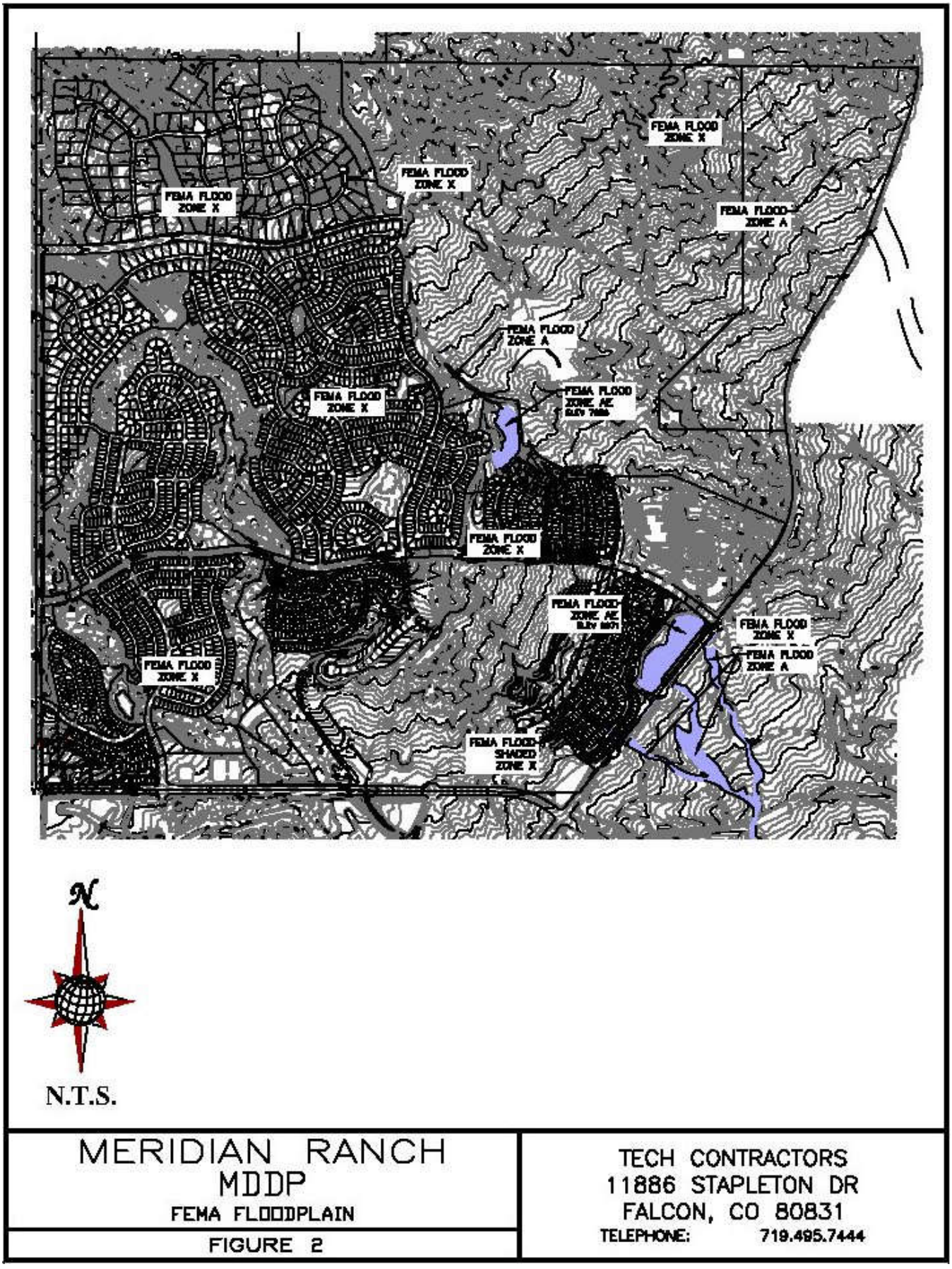
Soil Conservation Service soil survey records indicate that the service area is predominately covered by soils classified in the Stapleton series (83) with portions classified from the Pring series (71), both categorized in the Hydrological Group B, areas of Columbine soils (19) are also found on the site, categorized in the Hydrological Group A. For the purposes of this report all soils were assumed to be from the Hydrological Group B, producing a higher runoff value. 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.

Columbine series

The Columbine series consists of deep, well drained to excessively drained soils that formed in very gravelly ar-kosic alluvium. These soils are on terraces, flood plains, and alluvial fans and in drainageways. They have slopes of 0 to 3 percent. Average annual precipitation is about 15 inches, and average annual air temperature is about 47 degrees F.

Columbine soils are similar to Chaseville soils and are near Ellicott and Pring soils. Chaseville soils have hue of 5YR to 10YR. Ellicott soils have a light colored surface layer. Pring soils are less than 35 percent gravel and have a mean annual soil temperature of less than 47 degrees F.

Figure 2: FEMA Floodplain Map



Typical pedon of Columbine gravelly sandy loam, 0 to 3 percent slopes, approximately 1/2 mile northeast of the Black Squirrel bridge on U. S. Highway 24, near center of sec. 13, T. 12 S., R. 64 W.:

A11-0 to 6 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; 20 percent fine angular gravel; neutral; gradual smooth boundary.

A12-6 to 14 inches; brown (10YR 5/3) very gravelly loamy sand, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard; very friable; 40 percent fine angular gravel; neutral; gradual wavy boundary.

C-14 to 60 inches; light yellowish brown (2.5Y 6/4) very gravelly loamy sand, light olive brown (2.5Y 5/4) moist; massive; hard, very friable; 60 percent fine angular gravel; neutral.

The solum ranges from 10 to 20 inches in thickness, The control section is 35 to 75 percent coarse fragments. It ranges from slightly acid to mildly alkaline. The Al horizon is grayish bl"OWl1, brown, or dark grayish brown. The C horizon is light yellowish brown to yellowish brown.

Pring series

The Pring series consists of deep, well drained soils that formed in arkosic sandy sediment, These soils are on valley side slopes and uplands, They have slopes of 3 to 30 percent, Average annual precipitation is about 17 inches, and average annual air temperature is about 43 degrees F.

Pring soils are similar to Kutler and Stapleton soils and are near Elbeth, Peyton, and Tomah soils, Kutler soils have a paralithic contact at a depth of 20 to 40 inches, Stapleton soils have warmer soil temperatures, Elbeth soils have A2 and B2t horizons, Peyton soils have a B2t horizon, Tomah oils have an A2 horizon and a B2t horizon in which clay is accumulating in lamellae and thin bands.

Typical pedon of Pring coarse sandy loam, 8 to 15 percent slopes, about 950 feet south and 300 feet east of the northwest comer of the NW 1/4SE1/4 of sec, 17, T, 11 S.,R. 63 W.:

A1-0 to 4 inches; dad< grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable; slightly acid; c1ear smooth boundary.

AC-4 to 14 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, very friable; neutral; clear smooth boundary.

C-14 to 60 inches; pale brown (10YR (6/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; very hard, very friable; 15 percent fine and medium gravel; neutral.

The solum ranges from 10 to 20 inches in thickness. It is 0 to 15 percent coarse fragments. It is slightly acid or neutral. The A1 horizon is dark grayish brown to very dark grayish brown. The C horizon is pale brown or brown.

Stapleton series

The Stapleton series consists of deep, well drained soils that formed in sandy alluvium derived from arkosic bedrock. These soils are on uplands. They have slopes of 3 to 20 percent. Average annual precipitation is about 15 inches, and average annual air temperature is about 47 degrees F.

Stapleton soils are similar to Columbine and Pring soils. They are near Bresser and Truckton soils. Columbine soils have more than 35 percent coarse fragments. Pring soils have mean annual soil temperatures of less than 47 degrees F. Bresser soils have a B2t horizon of sandy clay loam. Truckton soils have a B2t horizon of sandy loam.

Typical pedon of Stapleton sandy loam, 3 to 8 percent slopes, about 800 feet north and 300 feet east of the southwest corner of sec. 16, T. 12 S., R. 64 W.:

> Al-O to 11 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; 5 percent gravel; neutral; clear smooth boundary.
>
> B2-11 to 17 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular structure; slightly hard, very friable, slightly sticky; 15 percent fine gravel; neutral; gradual smooth boundary.
>
> C1-17 to 26 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; very hard, very friable; 15 percent fine gravel; neutral; gradual smooth boundary.
>
> C2-26 to 60 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 5/3) moist; massive; 30 percent gravel; neutral.

The solum ranges from 12 to 20 inches in thickness. It is 0 to 35 percent coarse fragments. It is slightly acid or neutral. The A1 horizon is grayish brown or dark grayish brown sandy loam or gravelly sandy loam. The B horizon is brown or grayish brown gravelly sandy loam or coarse sandy loam. The C horizon is pale brown or light brownish gray.

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

Climate

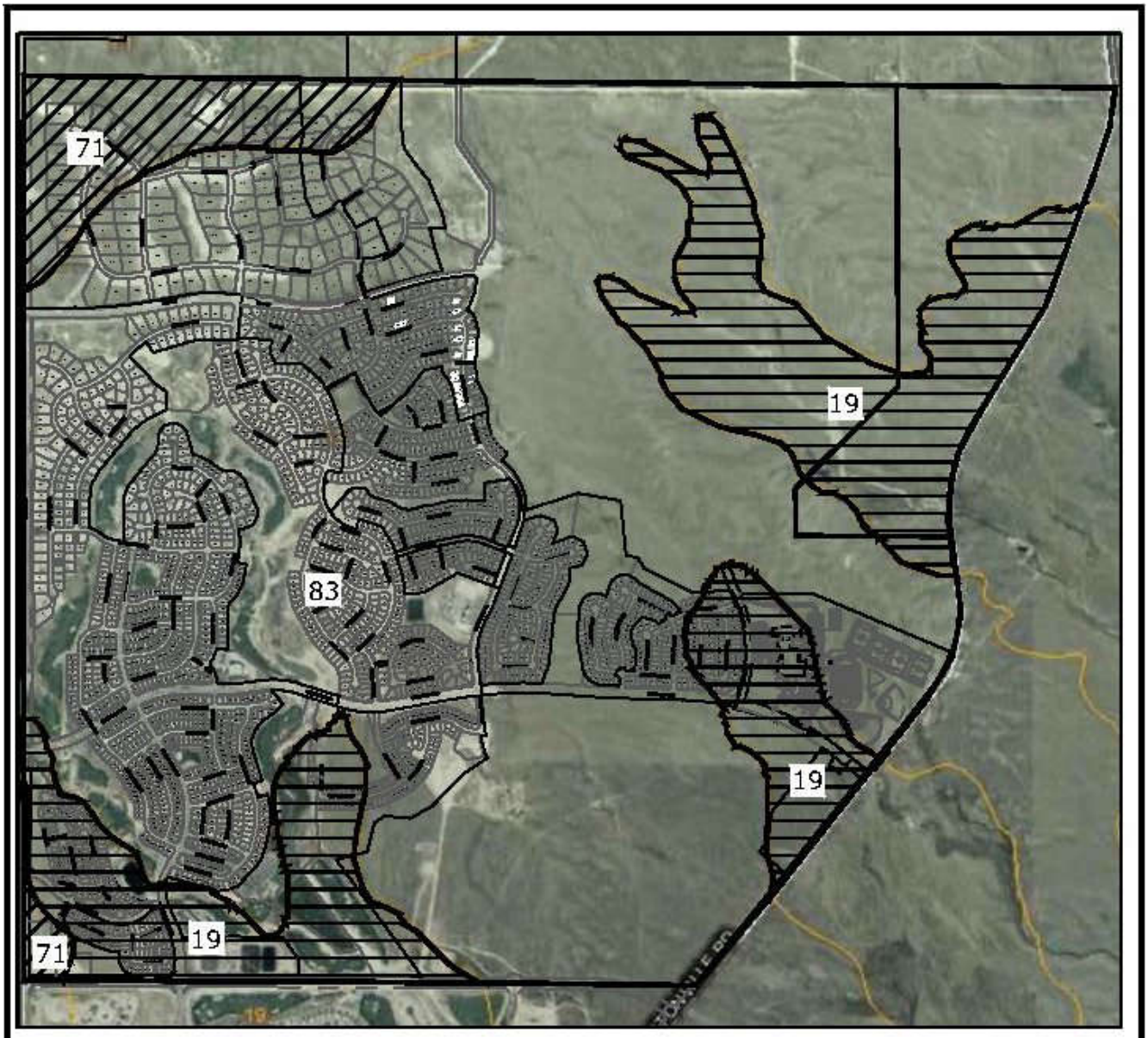
Mild summers and winters, light precipitation, high evaporation and moderately high wind velocities characterize the climate of the study area.

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 a maximum temperature higher than 98 F and a minimum temperature lower than -16 F. Precipitation averages 15.73 inches annually, with 80% of this occurring during the months of April through September. The average annual Class A pan evaporation is 45 inches.

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 placing improvements in a manner that provides an opportunity to lay the banks of excavations back at a slope greater than 1:1 during construction, the problems associated with sloughing soils can be minimized.

Figure 3: Soils Map



DRAINAGE BASINS AND SUB-BASINS

El Paso County has identified four major drainage basins within Meridian Ranch. Please see Figure 4: Existing Condition Major Drainage Basin Map.

Falcon Basin

El Paso County processed a Drainage Basin Planning Study (DBPS) for the Falcon Basin (CHWS1400).

The southwestern corner of Meridian Ranch (44 ac.) was located within the Falcon Drainage Basin, accepting drainage from the eastern portion of Meridian Road and draining south by southeast onto the Woodmen Hill Development.

As a result of the development of this property; runoff from this portion of the Falcon Basin has been redirected easterly along Stapleton Drive to the main channel of the Bennett Ranch Basin and thus removed from the Falcon Drainage Basin. Therefore, this basin was studied for the historic condition only.

Bennett Ranch Basin

The western third of Meridian Ranch is within the Bennett Ranch Basin and accepts flow from Falcon Hills and Paint Brush Hills to the west and from unplatted areas north of Paint Brush Hills and Antlers Ridge north of Meridian Ranch. Runoff from this basin flows southerly to the Stapleton Drive where it enters the Woodmen Hills Development at Design Point B26. This basin consists of two channels, the main branch flows southeasterly from Meridian Road north of Londonderry Drive toward the confluence point with the second branch at Design Point B19. The second branch runs from the northwestern portion of the site near Meridian Road and Rex Road southerly toward DP B19 where it joins the main branch north of Stapleton Drive. The Bennett Ranch Basin flow exits Meridian Ranch at DP26 crossing under Stapleton Drive.

A Drainage Basin Planning Study for the Bennett Ranch Basin (CHWS1200) has been completed and adopted per El Paso County regulations.

Haegler Ranch Basin

The Haegler Ranch Drainage Basin has been studied and during the process it was determined that the existing boundary line between the Gieck Ranch Basin and the Haegler Ranch Basin should be shifted south. With the approval of the Haegler Ranch Basin Study, the basin boundary was moved (Figure 4: Existing Condition Major Drainage Basin Map).

The Haegler Ranch Basin is located within the extreme southeast corner of Meridian Ranch. The Haegler Ranch Basin begins within Meridian Ranch and flows in a southeasterly direction toward the intersection of Stapleton Drive and Eastonville Road.

A Drainage Basin Planning Study for the Haegler Ranch Basin (CHMS0200) has been completed and adopted per El Paso County regulations.

Gieck Ranch Basin

Approximately 1,300 acres of Meridian Ranch is located within the Gieck Ranch Basin. Surface runoff enters the site unplatted land, Antlers Ridge and Latigo Trails located to the north and continues in a southeasterly direction toward the El Paso County Regional Park along easterly

boundary of the site and Eastonville Road. There are several points along the eastern boundary of the project and Eastonville Road that discharge the runoff off the site.

Information obtained from the Latigo Trails MDDP completed in October 2001 identifies several acres that discharge un-detained developed flow onto Meridian Ranch property; these areas are modeled as developed 2.5 acre density in both the Existing and Developed models. Those areas that drain un-detained directly onto Meridian Ranch were modeled using a Curve Number (CN) of 66.

Additionally, the Latigo MDDP used higher CN values for the existing condition, therefore the existing detention facilities located on the Latigo property release at a higher rate than the original Meridian Ranch MDDP had modeled. The calculations within these areas of Latigo were re-modeled with the 2015 Revised MDDP; this report makes no changes to the Latigo calculations from the 2015 Revised MDDP. Latigo run off that is released through a detention pond onto Meridian Ranch has been modeled using the higher Latigo undeveloped pasture CN value of 65 in both models.

The Gieck Ranch Drainage Basin has been approved by the County, during the process it was determined that the existing boundary line between the Gieck Ranch Basin and the Haegler Ranch Basin should be shifted south. (Figure 4: Existing Condition Major Drainage Basin Map).

DRAINAGE DESIGN CRITERIA

SCS Hydrograph Procedure

The Soil Conservation Service (SCS) Hydrograph (HEC-HMS) procedure was used to determine final design parameters for the major drainage facilities within the project. Onsite basin areas were calculated using aerial topography of the site and approved final design data. Times of concentration were estimated using the SCS procedures described in the DCM. Based upon the hydrologic soil type, the natural conditions found in the basins and the runoff curve numbers (CN) chart from Table 6-9 for Pre-development Thunderstorm Conditions (ARCI) and Table 6-10 for Frontal Storms &Thunderstorms for Developed Conditions (ARCII), the following CN values were used for the given conditions.

Table 2: 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
Golf Course	62
Latigo (undetained)	66
Latigo (detained)	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.

Channel Improvements

It has always been the intent that the existing channels shall be preserved as natural as possible outside the limits of the proposed detention facilities and the proposed golf course. The channels will be analyzed using the methods outlined in the DCM to determine if protection will be necessary due to the increased flows as a result of development. Riprap grade control structures will be used where needed to maintain proper velocities in grass-lined channels. It is recommended that storm sewer discharge points be limited to within the pond areas whenever possible to help preserve the natural channel and to avoid erosion of a low flow channel.

Detention Storage Criteria

Preliminary detention storage requirements were estimated graphically using the SCS method for single stage structure routing. The relationship between allowable outflow (Qout) and inflow (Qin) to the pond is directly correlated to the volume of direct runoff (Vr) and volume of storage (Vstor) to obtain a graphic solution. These estimates were then refined using the HEC-HMS model.

Preliminary storage volumes and outflow quantities have been provided for each of the detention facilities to be 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. The future detention ponds are to be designed as identified in those portions of the City of Colorado Springs Drainage Criteria Manual (DCMV1), Volume 1dated May 2014 as adopted by El Paso County by Resolution 15-042 on January 28, 2015. Section 3.2.1 of Chapter 13 of the DCMV1 states detention ponds are to be designed to meet the Full Spectrum Design (FSD) concept introduced by the Urban Drainage and Flood Control District. The concept of FSD is for the detention pond to discharge the developed flow at a rate less than or equal to the historic rate for each design storm as identified in Chapter 6 (Hydrology) of the DCMV1. There are six existing detention facilities located within Meridian Ranch, the storage volumes and discharge rates for these ponds were calculated using as-built information. No modifications are proposed for any existing detention pond that has been designed and constructed prior to the effective date of Resolution 15-042.

Water Quality Capture Volume (WQCV) is to be included with the detention volume calculated to provide for water quality, allowing sediment to settle out and accumulate over time to improve the quality of the discharged flow from the project site. To maintain full volume for detention during the life of the facility regular maintenance must be performed to remove sediment. The WQCV is to be based on the equations found in Volume 2, City of Colorado Springs/El Paso County Drainage Criteria Manual. Detention of the WQCV is used to meet El Paso County criteria for a storm water quality discharge. The release rates from the WQCV are generally small, which help 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 sedimentation. This greatly improves the quality of runoff leaving the facilities and reduces the potential for erosion. The positive impact on water quality is expected to be significant, particularly during construction. WQCV is required for all detention facilities within the Meridian Ranch development.

DRAINAGE CALCULATIONS

General Concept

Drainage patterns on the project site generally flow in south or southeasterly direction. The project site has been analyzed with the SCS method for both the historic and the developed conditions for the design storms outlined in the adopted sections of the City of Colorado Springs Hydrology Chapter of the Drainage Criteria Manual, Volume 1. Detention ponds will be placed or have been placed within the development or at the downstream boundary of the project such that the release rate for each design storm will be at or below the historic flow rates as determined by the historic model. The exception is the Bennett Basin where regional detention and water quality has been provided for Meridian Ranch at the Bennett Ranch Regional Detention Pond located within Woodmen Hills adjacent and north of Eastonville Road.

Existing Drainage Characteristics

Table 3: Historic Condition Peak Flows summarizes existing condition peak flows for the subbasins.

Falcon Basin

The Falcon Basin covered approximately 44 acres of the southwest corner of the development. The area was bounded by Meridian Road to the west, Bennett Ranch Basin along the northeast boundary and the extension of Stapleton Drive to the south. In the past the land was used as pasture and covered with native grasses, the land gently slopes to the south. Surface runoff from this area (Q_{100} = 37 cfs) exited the site to the south and was intercepted by a natural channel and then conveyed south through Bennett Basin.

Bennett Ranch Basin

Runoff from the Paint Brush Hills development and open range/pasture land comprising a total of approximately 1,000 acres discharged onto Meridian Road via triple 48" RCPs at Design Point B14, where it enters the site approximately 0.5 mi. north of Stapleton Drive. A composite curve number of 62.9 was used for the offsite area tributary to the site, combining the pasture land with that of Paint Brush Hills development, consisting of 2.5 to 5.0 acre single family residential lots, and Falcon Hills Subdivision made up of 0.5-acre lots. Falcon Hills installed detention facilities in order to reduce the developed peak runoff rate. The offsite tributary area generates a peak flow rate of approximately 55 cfs for the 5-year storm event and 757 cfs for the 100-year event across Meridian Road as is enters the site. The runoff then continues south toward DP B19 where it joins easterly branch.
The runoff from Branch 2 originates offsite from areas north of Meridian Ranch. These offsite tributary areas were open range/pasture lands totaling more than 355 acres. Surface flow entered the site at three separate locations. The combined flow from the two channels at DP19 (Q_5= 105 cfs, Q_{100}= 1563 cfs) continues south to DP 26 where it exits the site under Stapleton Drive. Meridian Ranch discharges 113 cfs under existing conditions during the 5-year storm event and 1737 cfs during the 100-year storm event to the south. The surface flow continues southerly toward Eastonville Road (DP32, Q_5= 115 cfs, Q_{100}= 1782 cfs) and Judge Orr Road (DP37, Q_5= 131 cfs, Q_{100}= 2117 cfs.

Haegler Ranch Basin

The Haegler Ranch Basin comprises approximately 63 acres of area in the southeast corner of Meridian Ranch. The Haegler Ranch Basin begins within Meridian Ranch and flows in a southeasterly direction toward the intersection of Stapleton Drive and Eastonville Road.

Gieck Ranch Basin

Most of the eastern half of Meridian Ranch lies within the Gieck Ranch Basin. Surface runoff enters the site via overland flow from Antlers Ridge and Latigo Trails subdivisions and unplatted land

Table 3 - Historic Condition Peak Flow Rates

HISTORIC 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)
OS02	0.2219	148	102	65	30	13	3
B01	0.2219	148	102	65	30	13	3
B01-B07	0.2219	148	102	65	30	13	3
OS03	0.1984	130	88	55	23	9	2
B02-B03	0.1984	129	88	55	23	9	2
HB01	0.0234	19	13	8	3	1	0
B03	0.2218	140	95	59	25	10	2
B03-B07	0.2218	140	94	59	25	10	2
OS04	0.1359	83	54	32	12	4	1
B04-B05	0.1359	82	54	32	12	4	1
HB03	0.1266	103	68	41	15	5	1
B05	0.2625	144	91	52	20	7	1
B05-B07	0.2625	144	91	52	20	7	1
HB02	0.1063	77	51	30	11	4	0
HB04	0.0609	47	31	19	7	2	0
B07	0.8734	519	344	207	86	33	6
B07-B12	0.8734	518	343	207	86	33	6
HB05	0.1375	102	67	40	15	5	1
HB06	0.1641	111	73	43	16	5	1
B12	1.175	679	440	259	103	40	7
B12-PB	1.175	677	440	259	103	39	7
HB07	0.0313	29	19	12	4	1	0
POND B	1.2063	688	446	262	105	40	7
PB-19	1.2063	687	444	261	104	40	7
OS01	1.5594	757	510	316	136	55	11
OS01-B19	1.5594	756	509	315	136	55	11
HB08	0.1344	81	53	32	12	4	1
HB09	0.3047	138	90	54	21	7	1
B19	3.2048	1563	1041	635	266	105	20
B19-B26	3.2048	1563	1039	634	266	105	20
HB10	0.3047	172	113	67	26	9	1
HB12	0.0797	54	36	21	8	3	0
HB12-B26	0.0797	54	35	21	8	3	0
B26	3.5892	1737	1147	693	288	113	21
26-32	3.5892	1734	1146	693	287	113	21
B-11	0.1125	60	40	23	9	3	0
32	3.7017	1782	1177	709	293	115	22
32-37	3.7017	1782	1175	708	293	115	22
B-14	0.4039	178	117	70	27	10	2
B-13	0.2813	127	83	50	19	7	1
36	0.6852	306	200	119	47	17	3
36-37	0.6852	305	200	119	47	17	3
B-15	0.075	39	26	15	6	2	0
37	4.4619	2117	1391	834	338	131	25
OS06	0.1313	87	57	34	13	4	1
OS06-G02	0.1313	86	57	34	13	4	1
OS05	0.0578	48	32	19	7	2	0
OS05-G01	0.0578	47	31	19	7	2	0
HG01	0.0547	35	23	14	5	2	0
G01	0.1125	82	54	32	12	4	0
G01-G02	0.1125	81	53	32	12	4	0
HG02	0.0906	49	32	19	7	2	0
G02	0.3344	216	142	85	32	10	1
G02-G03	0.3344	215	141	84	32	10	1
HG03	0.1828	82	54	32	13	5	1
OS07	0.0328	28	19	12	5	2	0
OS07-G03	0.0328	27	19	12	5	2	0

HISTORIC 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)
G03	0.55	323	213	127	49	16	2
G03-G04	0.55	322	212	127	49	16	2
OS09	0.1547	96	67	43	20	9	2
OS09-G04	0.1547	96	67	43	20	9	2
HG04	0.0891	42	28	17	6	2	0
HG05	0.1125	52	34	20	8	3	0
OS08	0.0406	39	27	18	9	4	1
OS08-G04	0.0406	38	27	18	8	4	1
G04	0.9469	551	367	223	89	32	5
G04-G05	0.9469	548	366	222	88	31	5
HG06A	0.1375	51	34	20	8	3	1
G05	1.0844	596	399	242	96	34	6
G05-G06	1.0844	596	397	241	96	34	6
HG06B	0.1031	35	23	14	6	2	0
G06	1.1875	628	418	254	101	36	6
HG07	0.0984	50	32	19	7	3	0
HG07-G11	0.0984	50	32	19	7	3	0
HG08	0.1328	77	51	30	11	4	1
G11	0.2312	122	79	47	18	6	1
G11-G12	0.2312	121	79	47	18	6	1
HG09	0.1781	76	50	30	12	4	1
G12	0.4093	196	128	76	29	10	2
G12-H08	0.4093	196	128	76	29	10	2
HG10	0.1375	40	26	16	7	3	1
H08	0.5468	227	149	89	35	13	2
HG14	0.2297	83	55	33	13	5	1
HG13	0.0844	59	40	25	11	4	1
G07	0.0844	59	40	25	11	4	1
G07-G08	0.0844	59	40	25	11	4	1
G08	0.3141	122	81	49	20	8	1
HG15	0.2563	71	47	28	12	5	1
H13	0.2563	71	47	28	12	5	1
HG11	0.2047	80	53	31	13	5	1
H09	0.2047	80	53	31	13	5	1
HH01	0.0984	70	46	27	10	3	0
H12	0.0984	70	46	27	10	3	0
HG12	0.1297	60	39	23	9	3	1
H10	0.1297	60	39	23	9	3	1

located to the north. Runoff is generally southeasterly, there are several culvert crossings under Eastonville Road to discharge runoff from the site.

There are three main drainage courses through the Gieck Basin, the first drainage course begins at offsite Basin OS-6, and traverses the Gieck Ranch Basin to Eastonville Road. Approximately 240 Acres north of the main drainage way also discharge from the site via two other minor crossings of Eastonville Road. The drainage ways in these areas are not as well defined as the main drainage way, and in some cases are virtually nonexistent.

The second main drainage way through the Gieck Ranch Basin accepts runoff off-site from roughly 270 acres of land along the northern property boundary from Antlers Ridge, unplatted land and Latigo Trails. The drainage course collects surface runoff from approximately 490 acres within Meridian Ranch. The channel flow traverses southeasterly toward Eastonville Road where a total flow of Q_5= 36 cfs, Q_{100}= 6248cfs exits the site at DP G06.

The final main channel, begins within Meridian Ranch and conveys it southeasterly through the site to Eastonville Road where a total flow of Q_5= 13 cfs, Q_{100}= 227 cfs exits the site at DP-H08 .

Proposed Design Drainage Characteristics

Figure 5: Developed Condition Subbasins illustrates the subbasin boundaries used for the hydrologic analysis for each of the major basins. Note that the existing condition subbasin boundaries, design points, and numbers do not necessarily correspond to those used for developed conditions. Table 4: Developed Condition Peak Flow summarizes developed condition peak flows for the subbasins.

Falcon Basin

When the site was developed, the area that was formerly within the Falcon Basin was redirected easterly toward DP B26, just north of Stapleton Drive and east of the wastewater treatment plant. Please refer to the discussion of the Bennett Ranch Basin below.

Bennett Ranch Basin

As discussed earlier in this report, the southwest corner of Meridian Ranch, which was originally part of the Falcon Basin, has been diverted to the Bennett Ranch Basin due to development via storm drain where it joins the remainder of the surface flow from the Bennett Basin at DP26

Runoff from the Bennett Ranch Basin is directed to DP B26 where the surface flow discharges under Stapleton Drive. The overall drainage pattern in the rest of Bennett Ranch Basin remains essentially unchanged, utilizing storm drains as necessary to convey runoff to the main channels. The major drainage ways in the Bennett Ranch Basin are used as part of the golf course. The channel remained in its natural state with the exception of the golf cart crossings, drop/grade control structures and two detention ponds.

Three detention ponds are located within the Bennett Ranch Basin in Meridian Ranch: near Design Points B6, B12 and B16. A summary of peak runoff rates is found in Table 4: Developed Condition Peak Flow

The surface flow continues south of Stapleton Drive where it enters the Bennett Ranch Regional Detention Pond. The regional pond is designed to anticipate the future developed runoff from Meridian Ranch and provide water quality for the area tributary to the pond.

Gieck Ranch Basin

Originally, there were several unstudied FEMA floodplains within the Gieck Basin. The channels are very poorly defined, and have been redefined by CLOMR/LOMR process. Storm drains are are used to convey runoff through the basin due to the development.

The Gieck Ranch Basin accepts surface runoff from the Latigo Trails Subdivision located to the north of Meridian Ranch. Runoff is generally southeasterly; there are several culvert crossings under Eastonville Road to discharge runoff from the site. The Offsite and onsite flows for developed subbasins are summarized in Table 4: Developed Condition Peak Flow.

Runoff begins offsite and flows southeasterly toward Eastonville Road. The runoff will be collected in a combination of storm sewers and open channels and conveyed southeasterly toward the proposed detention Pond G where the pond will discharge to the El Paso County Falcon Regional Park. The detention facility will release near DP G12 at a rate equal to or below the existing flow rate for the full spectrum of design storms into the existing drainage course within the Regional Park and drain southeasterly to Eastonville Road near DP G06.

Table 4 - Developed Condition Peak Flow Rates

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)
OS01	1.5594	757	510	316	136	55	11
DB16	0.0578	92	72	54	35	23	13
B10	1.6172	793	537	335	147	62	13
B10-B11	1.6172	793	537	335	147	62	13
DB17	0.0048	15	13	11	9	7	6
B11	1.6220	795	538	336	148	63	15
B11-POND C	1.6220	794	538	336	148	62	15
DB21	0.0519	54	38	25	12	5	1
DB18	0.0346	64	50	39	26	18	10
DB19	0.0281	36	27	20	11	7	3
DB20	0.0147	24	19	15	9	6	3
POND C	1.7513	749	507	310	128	50	11
POND C-B16	1.7513	749	507	309	128	50	11
DB25	0.0211	45	35	27	18	12	7
B16	1.7724	754	511	313	130	51	11
B16-B17	1.7724	754	510	312	130	51	11
DB26	0.0682	136	110	88	62	46	29
B17	1.8406	778	529	326	138	56	34
B17-B18	1.8406	778	529	326	138	56	34
OS03	0.1984	130	88	55	23	9	2
DB01	0.0719	90	66	46	25	14	5
B01	0.2703	199	138	89	42	19	5
B01-B02	0.2703	199	138	89	42	19	5
OS02	0.2219	148	102	65	30	13	3
DB02	0.0516	71	52	36	20	10	3
B02	0.5438	380	263	169	79	36	9
B02-POND A	0.5438	379	263	169	79	36	9
OS04	0.1359	83	54	32	12	4	1
DB03	0.0703	70	49	32	16	7	2
B03	0.2062	145	98	61	26	10	2
B03-B04	0.2062	145	98	60	25	10	2
DB04	0.0422	44	31	21	10	5	1
DB05	0.0384	37	27	18	9	5	1
B04	0.2868	218	149	94	42	18	4
B04-B05	0.2868	218	149	94	42	18	4
DB06	0.0219	44	35	28	19	14	9
B05	0.3087	253	176	115	55	25	10
B05-POND A	0.3087	252	176	114	55	25	10
DB07	0.0254	35	26	18	10	6	2
DB08	0.0297	32	22	15	7	3	0
POND A	0.9076	557	401	244	98	34	6
POND A-B06	0.9076	557	400	244	98	34	6
DB09	0.0189	34	26	19	12	8	4
B06	0.9265	565	407	248	100	35	6
B06-B07	0.9265	564	406	247	99	35	6
DB11	0.0969	114	85	60	35	20	8
DB10	0.0364	56	43	32	19	12	6
B07	1.0598	652	469	286	116	42	15
B07-B09	1.0598	651	468	285	116	42	14
DB12	0.0453	81	63	48	31	21	11
B09	1.1051	677	486	296	121	45	19
B09-POND B	1.1051	676	485	296	121	45	19
DB15	0.1234	105	75	50	25	12	3
DB13	0.0703	89	67	49	29	18	8
DB14	0.0556	93	72	54	35	23	12
POND B	1.3544	688	539	337	140	69	30

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 B-B12	1.3544	688	539	336	140	69	30
DB22	0.0516	91	72	55	36	25	14
DB23	0.0172	45	38	31	23	18	13
B12	1.4232	714	562	352	148	83	38
B12-B14	1.4232	714	562	352	148	83	38
DB24	0.0531	94	73	56	36	24	13
B14	1.4763	743	577	363	162	92	46
B14-B15	1.4763	742	576	362	162	92	46
DB28	0.0516	79	61	46	30	20	11
B15	1.5279	783	595	375	179	107	56
B15-B18	1.5279	781	595	374	179	107	56
DB27	0.1578	140	101	70	37	20	7
DB29	0.0959	89	65	46	25	14	5
B26	3.6222	1621	1178	735	316	186	95
B26-27	3.6222	1621	1177	735	316	185	94
FB-01	0.0630	81	63	47	29	19	10
FB01-27a	0.0630	81	63	47	29	19	10
FB-02	0.0375	75	60	47	32	23	14
B19	0.1005	146	114	87	57	38	21
B19-27	0.1005	146	114	87	56	38	21
27	3.7227	1663	1209	756	337	213	108
27-32	3.7227	1662	1208	755	336	212	107
WH-24	0.1325	217	170	129	84	56	31
WH-26	0.0839	49	33	20	8	3	0
WH-27	0.0217	23	16	10	4	1	0
30	0.2381	271	205	150	91	59	31
30-31	0.2381	270	205	149	91	59	31
WH-28	0.0398	60	47	36	23	15	8
31	0.2779	330	252	185	114	74	39
31-32	0.2779	329	251	185	113	73	39
WH-29	0.0511	80	62	47	30	20	11
WH-31	0.0406	75	59	46	30	21	12
WH-30	0.0159	26	19	13	7	4	1
32	4.1082	1815	1302	817	457	287	139
WH32	0.0458	54	38	24	10	4	0
BEN POND	4.1540	1409	1000	607	259	105	46
WH-33	0.0064	12	9	7	5	3	2
33	4.1604	1411	1001	607	259	105	46
33-37	4.1604	1410	1001	607	259	105	46
WH35	0.1550	171	124	84	44	22	6
WH34	0.0450	68	52	38	23	15	7
B34-36	0.0450	68	52	38	23	15	7
36	0.2000	239	176	122	67	37	13
36-37	0.2000	238	174	121	66	37	13
WH36	0.0750	63	43	27	11	4	1
37	4.4354	1449	1031	627	269	109	50
FG01	0.1127	58	40	25	11	5	1
OS05	0.0578	43	29	17	6	2	0
G1	0.1705	83	55	34	14	6	1
G1-G2	0.1705	83	55	34	14	6	1
OS06	0.1313	87	57	34	13	4	1
G1a	0.1313	87	57	34	13	4	1
G1a-G2	0.1313	87	57	34	13	4	1
FG02	0.0391	35	24	16	7	3	1
G2	0.3409	200	132	80	32	12	2
G2-G3	0.3409	199	132	80	32	12	2
FG03	0.0203	26	19	13	7	1	1

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)
FG04	0.0172	23	16	11	6	3	1
G3	0.3784	222	147	89	36	13	3
G3-POND F	0.3784	221	147	89	36	13	3
FG05	0.0922	65	46	30	15	7	2
FG06	0.0188	21	15	10	5	3	1
POND F	0.4894	181	126	65	17	8	2
POND F-G7	0.4894	181	126	65	17	8	2
FG21	0.0656	55	39	26	13	6	2
OS07	0.0328	28	19	12	5	2	0
OS07-G7	0.0328	27	19	12	5	2	0
G7	0.5878	223	151	77	22	10	3
G7-G8	0.5878	223	151	77	22	10	3
FG22	0.0641	46	33	22	11	5	1
G8	0.6519	261	172	87	29	12	3
G8-G8A	0.6519	261	172	87	29	12	3
FG23	0.0813	59	42	27	13	6	2
OS08	0.0406	39	27	18	9	4	1
OS11-G8A	0.0406	39	27	18	9	4	1
G8A	0.7738	331	209	105	46	21	6
G8A-G9	0.7738	331	209	105	46	21	6
FG25	0.0219	19	14	10	6	3	1
G9	0.7957	349	219	115	51	24	7
G9-G11	0.7957	348	219	115	51	24	7
OS09	0.1547	96	67	43	20	9	2
OS09-G10	0.1547	96	67	43	20	9	2
FG24	0.1047	77	54	34	16	7	1
G10	0.2594	166	115	74	34	15	3
G10-G11	0.2594	166	115	73	34	15	3
FG26	0.0813	81	61	43	25	15	6
FG27B	0.0508	61	48	35	22	14	7
FG27A	0.0259	16	11	7	3	2	0
FG27A-G11	0.0259	16	11	7	3	2	0
G11	1.2131	632	400	258	125	62	18
FG28	0.0203	18	13	8	4	2	0
POND G	1.2334	549	348	187	66	31	9
G12	1.2334	549	348	187	66	31	9
G12-G06	1.2334	548	348	187	66	31	9
FG29	0.1031	60	40	24	9	3	0
FG32	0.0402	74	58	45	29	20	11
FG32-G06	0.0402	73	58	44	29	20	11
G06	1.3767	591	374	203	73	35	12
FG10	0.0963	71	53	37	21	12	5
FG08A	0.0750	125	97	73	46	30	15
FG08A-G05	0.0750	125	97	72	45	30	15
FG08B	0.0630	94	72	54	34	22	11
FG08B-G05	0.0630	93	72	54	34	22	11
FG11	0.0625	81	63	47	30	20	11
FG09	0.0484	52	39	27	16	9	4
FG09-G05	0.0484	52	39	27	16	9	4
G05	0.3452	385	295	217	133	84	42
FG13	0.0656	44	31	20	10	5	1
FG12	0.0328	55	44	33	22	15	8
POND D	0.4436	126	85	47	18	11	4
POND D-G17	0.4436	126	85	47	18	11	4
FG15	0.1217	84	62	44	25	15	6
FG14	0.0359	49	38	29	18	12	6
FG14-G17	0.0359	49	38	29	18	12	6

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)
G17a	0.1576	117	88	64	38	23	11
FG15a	0.0156	30	23	18	12	8	4
G17	0.6168	222	153	87	49	27	13
G17-G18	0.6168	222	153	87	49	27	13
FG16	0.0773	135	105	79	51	34	18
G18	0.6941	249	182	131	81	51	26
G18-POND E	0.6941	249	181	131	80	51	26
FG31	0.0922	123	97	74	48	33	19
FG30	0.0400	82	65	50	33	23	13
FG30-PONDHS	0.0400	81	64	49	33	22	13
POND HS	0.1322	159	113	63	37	27	16
FG17a	0.0694	117	91	69	44	29	16
FG17a-POND E	0.0694	116	90	68	44	29	16
FG18	0.0688	64	48	34	20	12	5
FG18-POND E	0.0688	63	48	34	20	12	5
FG19	0.0464	80	63	48	32	22	12
FG17c	0.0313	34	24	16	7	3	1
FG17b	0.0214	42	33	26	17	12	7
POND E	1.0636	299	202	117	44	20	9
FG20	0.0109	31	26	21	16	13	9
H08-H09	1.0745	301	204	118	44	20	11
FG34	0.0922	64	43	27	12	5	1
G13	0.0922	64	43	27	12	5	1
POND I	0.0922	49	33	19	8	3	2
G14	0.0922	49	33	19	8	3	2
G14-G15	0.0922	49	33	19	8	3	2
FG35	0.0566	39	26	16	7	3	0
G15	0.1488	77	49	28	11	5	2
G15-G08	0.1488	77	49	28	11	5	2
FG37	0.0797	48	31	19	7	2	0
FG36	0.0281	15	10	6	2	1	0
FG36-G08	0.0281	15	10	6	2	1	0
G08	0.2566	129	80	46	18	7	2
FH01	0.1377	186	143	105	65	41	20
POND H	0.1377	53	30	17	7	5	3
H12	0.1377	53	30	17	7	5	3

A second major tributary begins onsite and flows across the southwestern part of the basin toward Eastonville Road. The runoff will be collected in storm sewers and conveyed southeasterly toward Eastonville Road to the proposed detention Pond E. The detention facility will release at rates equal to or below the existing flow rate for the full spectrum of design storms into the existing drainage courses southeast of Eastonville Road. The detention pond discharges into two existing FEMA mapped drainage courses with in the 4-Way Ranch subdivision located on the southeast side of Eastonville Road near DPs H08 and H09.

A smaller channel in the northeast corner of Meridian Ranch will be collected in a combination of storm sewers and open channels and conveyed southeasterly toward the proposed detention Pond I where the pond will discharge to the El Paso County Falcon Regional Park. The detention facility will release near DP G14 at a rate equal to or below the existing flow rate for the full spectrum of design storms into the existing drainage course within the Regional Park and drain southeasterly to Eastonville Road near DP G08.

Table 5 - Allowable Discharge Rates from Meridian Ranch

MERIDIAN RANCH DISCHARGE KEY DESIGN POINTS					
	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)
37 - JUDGE ORR ROAD	2117	1391	834	338	131
G12 - POND G OUTLET REGIONAL PARK	596	399	242	96	34
G06 - EASTONVILLE RD[1]	628	418	254	101	36
H08 - EASTONVILLE ROAD	227	149	89	35	13
H09 - EASTONVILLE ROAD	80	53	31	13	5
G14 - POND I OUTLET REGIONAL PARK	59	40	25	11	4
G08 - EASTONVILLE RD[1]	122	81	49	20	8
H12 - STAPLETON DRIVE EASTONVILLE ROAD	70	46	27	10	3

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

Haegler Ranch Basin

The runoff begins near the south east corner of Meridian Ranch within FH1. The runoff will be conveyed through the proposed development to the proposed Pond H. The outlet structure discharges through a 36" RCP. The discharge at DP H12 is not to exceed the existing flow rate for the full spectrum of design storms.

Table 6 - Detention Pond Summary

POND	BASIN	PEAK INFLOW CFS	PEAK OUTFLOW CFS	STORAGE ELEV. FT	STORAGE VOL. AC-FT
EX POND A	BENNETT	675	557	7144.0	10.7
EX POND B	BENNETT	879	688	7082.9	13.2
EX POND C	BENNETT	848	749	7073.7	19.7
EX POND D	GIECK	473	126	7056.9	24.5
EX POND E	GIECK	626	300[1]	6973.0[2]	36.7[2]
EX POND F	GIECK	299	181	7136.2	8.8
PR POND G	GIECK	642	596[1]	7033.3[2]	14.3[2]
PR POND H	HAEGLER	186	70[1]	6973.4[2]	7.8[2]
PR POND I	GIECK	64	59[1]	7071.6[2]	1.1[2]
EX BENNETT	BENNETT	1823	1409	6973.9	87

[1] Approximate discharge rate = historic peak rate

[2] Estimated value, actual value based on final design

Values do not match the Drainage Map

MAJOR DRAINAGE STRUCTURES

Several major drainage crossings exist along Eastonville Road either are or were undersized for the historic flow rates generated upstream. Ten locations were identified in the original Meridian Ranch MDDP in 2000 at the beginning of the project as existing road crossings along Eastonville Road that

Revise. Per UDFCD DCM regarding Full Spectrum "The maximum allowable 100-yr release rate should not exceed 90% of the approved predevelopment release rate..."

were undersized to convey existing flow. Several of the crossings have been replaced to date, while several others will require replacement with improvements to Eastonville Road. Please see Table 7: Major Drainage Structures for the status of the several crossings and a summary of the estimated equivalent pipe size necessary for each crossing. The actual size and type of conduit will be determined during final design.

Table 7 - Major Drainage Structures

DESIGN POINT	ROAD NAME	BASIN	100-YR PEAK FLOW RATE	PROPOSED CULVERT TYPE	ESTIMATED EQUIVALENT CULVERT SIZE[3]
B10	LONDONDERRY ROAD	BENNETT	793	EXISTING	EX. CONSPAN
POND B	LONDONDERRY ROAD	BENNETT	688	EXISTING	EX. CONSPAN
POND C	MERIDIAN RANCH BLVD	BENNETT	749	EXISTING	EX. CONSPAN
B26	STAPLETON DRIVE	BENNETT	1621	EXISTING	EX. DBL 9'x9' & 10'x10' BOX RCB
B19	STAPLETON DRIVE	BENNETT	146	EXISTING	EX. 48" RCP
H08	EASTONVILLE ROAD	GIECK	227	EXISTING	EX. 3-48" RCP
H09	EASTONVILLE ROAD	GIECK	80	EXISTING	EX. 2-36" RCP
H12	EASTONVILLE ROAD	HAEGLER	70	EXISTING	EX. 4'x2' RCB
G08A[1]	REX ROAD	GIECK	331	BOX	2-8'x4' RCB
G10[1]	REX ROAD	GIECK	166	BOX	10'x4' RCB
H13[2]	EASTONVILLE ROAD	GIECK	71	CULVERT	2-30" RCP
G6[2]	EASTONVILLE ROAD	GIECK	628	BOX	3-7'x3' RCB
G8[2]	EASTONVILLE ROAD	GIECK	122	BOX	2-5'x3' RCB
G15[2]	REX ROAD	GIECK	80	CULVERT	2-36" RCP

[1] FUTURE INTERIOR CULVERT CROSSING

[2] OFFSITE CULVERT BY OTHERS (FOR REFERENCE ONLY)

[3] ACTUAL CULVERT SIZE AND TYPE DETERMINED AT FINAL DESIGN.

The proposed structures located along Eastonville Road will require large multiple cell box culverts or pipes. The flows also justify requiring that the pipes be upgraded to convey the flow under Eastonville Road. The outlet for Pond H is an existing 4' x 2' reinforced concrete box. The existing Pond E requires two outlet control structures to the discharge. Temporary CMP riser structures will be replaced with permanent concrete structures the permanent concrete outlet pipes have been installed along with the appropriate culverts under Eastonville Road. The culvert crossing under Eastonville Road downstream of Pond G may require a triple 7' x 3' reinforced concrete box, or equivalent. The culvert crossing under Eastonville Road downstream of Pond I may require a double 5' x 3' reinforced concrete box, or equivalent.

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 detention 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. Final erosion control plans will be prepared with final plat submittal.

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

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

Four Step Process

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

Step 1: Employ Runoff Reduction Practices

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

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

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

Step 2: Stabilize Drainageways

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

Step 3: Provide Water Quality Capture Volume (WQCV)

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

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

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

Detention Pond

The existing detention ponds will act as the primary sedimentation control facility for the areas upstream. Runoff will be 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.

Analyze and provide a narrative regarding the impact to downstream development moving forward with the design change to 90% release.

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 2012. Prepared by Tech Contractors.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

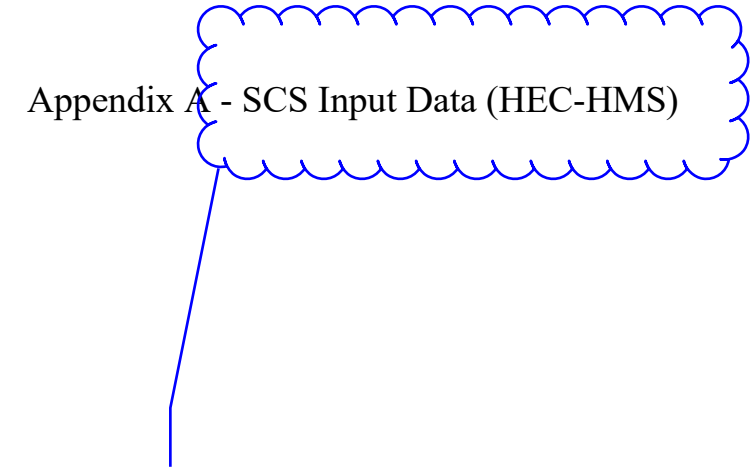
22. Final Drainage Report for the Vistas Filing 1 at Meridian Ranch. July 2016. Prepared by Tech Contractors.

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.

Appendices

Appendix A - SCS Input Data (HEC-HMS)



Include a disc with the HEC-HMS modeling.

Input Data

Meridian Ranch 2017 MDDP UPDATE

BASIN	AREA		CURVE NO.	LAG TIME (min)	
	(acre)	(mi^2)			
HISTORIC					
OS01	998	1.5594	62.9	35.5	*
OS02	142	0.2219	64.5	25.5	*
OS03	127	0.1984	63.2	23.6	*
OS04	87	0.1359	61.0	21.4	*
HB01	15	0.0234	61.0	12.6	*
HB02	68	0.1063	61.0	16.2	*
HB03	81	0.1266	61.0	13.2	*
HB04	39	0.0609	61.0	14.4	*
HB05	88	0.1375	61.0	15.6	*
HB06	105	0.1641	61.0	18.0	*
HB07	20	0.0313	61.0	10.2	*
HB08	86	0.1344	61.0	21.6	*
HB09	195	0.3047	61.0	33.0	*
HB10	195	0.3047	61.0	24.0	*
HB12	51	0.0797	61.0	18.0	*
B-11	72	0.1125	61.0	25.8	*
B-13	180	0.2813	61.0	33.0	*
B-14	258.5	0.4039	61.0	34.2	*
B-15	48	0.0750	61.0	27.0	*
* From approved Meridian Ranch MDDP dated Aug 2015					
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	99	0.1547	65.0	29.5	
OS10	152	0.2375	65.0	27.9	
OS11	64	0.1000	64.1	30.0	
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	
HG17	85	0.1328	61.9	29.9	
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	
HH01	63	0.0984	61.0	16.6	

BASIN	AREA		CURVE NO.	LAG TIME (min)	
	(acre)	(mi^2)			
FUTURE					
OS01	998	1.5594	62.9	35.5	*
OS02	142	0.2219	64.5	25.5	*
OS03	127	0.1984	63.2	23.6	*
OS04	87	0.1359	61.0	21.4	*
DB01	46	0.0719	69.7	13.7	*
DB02	33	0.0516	69.0	10.5	*
DB03	45	0.0703	65.8	15.0	*
DB04	27	0.0422	66.8	15.3	*
DB05	25	0.0384	68.0	19.1	*
DB06	14	0.0219	84.0	14.6	*
DB07	16	0.0254	70.0	11.7	*
DB08	19	0.0297	64.9	11.9	*
DB09	12	0.0189	75.0	9.6	*
DB10	23	0.0364	75.0	13.7	*
DB11	62	0.0969	72.0	18.4	*
DB12	29	0.0453	78.2	12.7	*
DB13	45	0.0703	73.9	18.6	*
DB14	36	0.0556	78.0	14.6	*
DB15	79	0.1234	67.1	21.8	*
DB16	37	0.0578	78.5	16.4	*
DB17	3	0.0048	98.0	7.4	*
DB18	22	0.0346	80.0	13.4	*
DB19	18	0.0281	72.6	16.2	*
DB20	9	0.0147	78.7	15.2	*
DB21	33	0.0519	65.6	13.6	*
DB22	33	0.0516	80.0	14.8	*
DB23	11	0.0172	91.6	11.3	*
DB24	34	0.0531	78.5	13.3	*
DB25	14	0.0211	80.0	9.7	*
DB26	44	0.0692	85.8	16.1	†
DB27	101	0.1578	69.2	23.9	†
DB28	33	0.0516	78.4	17.6	†
DB29	61	0.0959	70.3	23.9	†
FB01	37	0.0584	77.9	21.4	†
FB02	20	0.0311	81.8	14.0	†
WH-24	85	0.1325	79.0	16.0	**
WH-26	54	0.0839	62.0	25.1	**
WH-27	14	0.0217	62.0	8.6	**
WH-28	26	0.0398	78.3	17.7	**
WH-29	33	0.0511	78.0	16.6	**
WH-30	10	0.0159	68.6	6.0	**
WH-31	26	0.0406	80.0	13.2	**
WH-32	29	0.0458	62.0	6.0	**
WH-33	4	0.0064	80.0	13.0	**
WH-34	29	0.0453	75.0	14.4	**
WH-35	99	0.1547	68.0	15.0	**
WH-36	48	0.0750	63.0	15.6	**

* From approved Meridian Ranch MDDP dated Aug 2015

† From approved Meridian Ranch Final Drainage Reports (Stonebridge Filing 2, Oct 2016)

** From Retrofit Drainage Analysis for Bennett Regional Detention Pond, Jun 2014)

BASIN	AREA		CURVE NO.	LAG TIME (min)
	(acre)	(mi^2)		
FUTURE				
OS05	37	0.0578	61.0	15.2
OS06	84	0.1313	61.0	18.7
OS07	21	0.0328	63.1	15.4
OS08	26	0.0406	65.7	15.9
OS09	99	0.1547	65.0	29.5
FG01	72	0.1127	63.4	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	59	0.0922	66.9	28.7
FG06	12	0.0188	68.0	15.3
FG08A	48	0.0750	76.8	13.3
FG08B	40	0.0630	76.7	16.6
FG09	31	0.0484	71.7	20.8
FG10	62	0.0963	72.0	37.7
FG11	40	0.0625	78.2	23.2
FG12	21	0.0328	80.0	16.1
FG13	42	0.0656	66.3	29.6
FG14	23	0.0359	78.0	20.9
FG15	78	0.1217	72.4	42.8
FG15a	10	0.0156	78.7	11.2
FG16	50	0.0773	78.8	13.0
FG17a	44	0.0694	78.1	14.4
FG17b	14	0.0214	79.9	11.4
FG17c	20	0.0313	65.2	11.8
FG18	44	0.0688	73.7	30.1
FG19	30	0.0464	80.0	15.3
FG20	7	0.0109	92.9	10.1
FG21	42	0.0656	66.9	22.0
FG22	41	0.0641	66.9	27.4
FG23	52	0.0813	66.5	26.5
FG24	67	0.1041	64.9	22.7
FG25	14	0.0219	70.8	26.6
FG26	52	0.0813	72.5	24.8
FG27a	17	0.0259	65.5	31.4
FG27b	33	0.0508	77.2	24.3
FG28	13	0.0203	65.6	17.5
FG29	66	0.1031	61.3	23.3
FG30	26	0.0400	80.0	10.4
FG31	59	0.0922	80.0	24.0
FG32	26	0.0402	80.0	13.6
FG33	19	0.0302	71.2	12.7
FG34	59	0.0922	63.7	22.7
FG35	36	0.0566	62.7	20.7
FG36	18	0.0281	61.0	24.9
FG37	51	0.0797	61.0	21.8
FH01	88	0.1377	75.7	18.5
FH02	9	0.0139	98.0	10.9

Appendix B - HEC-HMS Results

HISTORIC 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)
OS02	0.2219	148	102	65	30	13	3
B01	0.2219	148	102	65	30	13	3
B01-B07	0.2219	148	102	65	30	13	3
OS03	0.1984	130	88	55	23	9	2
B02-B03	0.1984	129	88	55	23	9	2
HB01	0.0234	19	13	8	3	1	0
B03	0.2218	140	95	59	25	10	2
B03-B07	0.2218	140	94	59	25	10	2
OS04	0.1359	83	54	32	12	4	1
B04-B05	0.1359	82	54	32	12	4	1
HB03	0.1266	103	68	41	15	5	1
B05	0.2625	144	91	52	20	7	1
B05-B07	0.2625	144	91	52	20	7	1
HB02	0.1063	77	51	30	11	4	0
HB04	0.0609	47	31	19	7	2	0
B07	0.8734	519	344	207	86	33	6
B07-B12	0.8734	518	343	207	86	33	6
HB05	0.1375	102	67	40	15	5	1
HB06	0.1641	111	73	43	16	5	1
B12	1.175	679	440	259	103	40	7
B12-PB	1.175	677	440	259	103	39	7
HB07	0.0313	29	19	12	4	1	0
POND B	1.2063	688	446	262	105	40	7
PB-19	1.2063	687	444	261	104	40	7
OS01	1.5594	757	510	316	136	55	11
OS01-B19	1.5594	756	509	315	136	55	11
HB08	0.1344	81	53	32	12	4	1
HB09	0.3047	138	90	54	21	7	1
B19	3.2048	1563	1041	635	266	105	20
B19-B26	3.2048	1563	1039	634	266	105	20
HB10	0.3047	172	113	67	26	9	1
HB12	0.0797	54	36	21	8	3	0
HB12-B26	0.0797	54	35	21	8	3	0
B26	3.5892	1737	1147	693	288	113	21
26-32	3.5892	1734	1146	693	287	113	21
B-11	0.1125	60	40	23	9	3	0
32	3.7017	1782	1177	709	293	115	22
32-37	3.7017	1782	1175	708	293	115	22
B-14	0.4039	178	117	70	27	10	2
B-13	0.2813	127	83	50	19	7	1
36	0.6852	306	200	119	47	17	3
36-37	0.6852	305	200	119	47	17	3
B-15	0.075	39	26	15	6	2	0
37	4.4619	2117	1391	834	338	131	25
OS06	0.1313	87	57	34	13	4	1
OS06-G02	0.1313	86	57	34	13	4	1
OS05	0.0578	48	32	19	7	2	0
OS05-G01	0.0578	47	31	19	7	2	0
HG01	0.0547	35	23	14	5	2	0
G01	0.1125	82	54	32	12	4	0
G01-G02	0.1125	81	53	32	12	4	0
HG02	0.0906	49	32	19	7	2	0
G02	0.3344	216	142	85	32	10	1
G02-G03	0.3344	215	141	84	32	10	1
HG03	0.1828	82	54	32	13	5	1
OS07	0.0328	28	19	12	5	2	0
OS07-G03	0.0328	27	19	12	5	2	0

HISTORIC 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)
G03	0.55	323	213	127	49	16	2
G03-G04	0.55	322	212	127	49	16	2
OS09	0.1547	96	67	43	20	9	2
OS09-G04	0.1547	96	67	43	20	9	2
HG04	0.0891	42	28	17	6	2	0
HG05	0.1125	52	34	20	8	3	0
OS08	0.0406	39	27	18	9	4	1
OS08-G04	0.0406	38	27	18	8	4	1
G04	0.9469	551	367	223	89	32	5
G04-G05	0.9469	548	366	222	88	31	5
HG06A	0.1375	51	34	20	8	3	1
G05	1.0844	596	399	242	96	34	6
G05-G06	1.0844	596	397	241	96	34	6
HG06B	0.1031	35	23	14	6	2	0
G06	1.1875	628	418	254	101	36	6
HG07	0.0984	50	32	19	7	3	0
HG07-G11	0.0984	50	32	19	7	3	0
HG08	0.1328	77	51	30	11	4	1
G11	0.2312	122	79	47	18	6	1
G11-G12	0.2312	121	79	47	18	6	1
HG09	0.1781	76	50	30	12	4	1
G12	0.4093	196	128	76	29	10	2
G12-H08	0.4093	196	128	76	29	10	2
HG10	0.1375	40	26	16	7	3	1
H08	0.5468	227	149	89	35	13	2
HG14	0.2297	83	55	33	13	5	1
HG13	0.0844	59	40	25	11	4	1
G07	0.0844	59	40	25	11	4	1
G07-G08	0.0844	59	40	25	11	4	1
G08	0.3141	122	81	49	20	8	1
HG15	0.2563	71	47	28	12	5	1
H13	0.2563	71	47	28	12	5	1
HG11	0.2047	80	53	31	13	5	1
H09	0.2047	80	53	31	13	5	1
HH01	0.0984	70	46	27	10	3	0
H12	0.0984	70	46	27	10	3	0
HG12	0.1297	60	39	23	9	3	1
H10	0.1297	60	39	23	9	3	1

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)
OS01	1.5594	757	510	316	136	55	11
DB16	0.0578	92	72	54	35	23	13
B10	1.6172	793	537	335	147	62	13
B10-B11	1.6172	793	537	335	147	62	13
DB17	0.0048	15	13	11	9	7	6
B11	1.6220	795	538	336	148	63	15
B11-POND C	1.6220	794	538	336	148	62	15
DB21	0.0519	54	38	25	12	5	1
DB18	0.0346	64	50	39	26	18	10
DB19	0.0281	36	27	20	11	7	3
DB20	0.0147	24	19	15	9	6	3
POND C	1.7513	749	507	310	128	50	11
POND C-B16	1.7513	749	507	309	128	50	11
DB25	0.0211	45	35	27	18	12	7
B16	1.7724	754	511	313	130	51	11
B16-B17	1.7724	754	510	312	130	51	11
DB26	0.0682	136	110	88	62	46	29
B17	1.8406	778	529	326	138	56	34
B17-B18	1.8406	778	529	326	138	56	34
OS03	0.1984	130	88	55	23	9	2
DB01	0.0719	90	66	46	25	14	5
B01	0.2703	199	138	89	42	19	5
B01-B02	0.2703	199	138	89	42	19	5
OS02	0.2219	148	102	65	30	13	3
DB02	0.0516	71	52	36	20	10	3
B02	0.5438	380	263	169	79	36	9
B02-POND A	0.5438	379	263	169	79	36	9
OS04	0.1359	83	54	32	12	4	1
DB03	0.0703	70	49	32	16	7	2
B03	0.2062	145	98	61	26	10	2
B03-B04	0.2062	145	98	60	25	10	2
DB04	0.0422	44	31	21	10	5	1
DB05	0.0384	37	27	18	9	5	1
B04	0.2868	218	149	94	42	18	4
B04-B05	0.2868	218	149	94	42	18	4
DB06	0.0219	44	35	28	19	14	9
B05	0.3087	253	176	115	55	25	10
B05-POND A	0.3087	252	176	114	55	25	10
DB07	0.0254	35	26	18	10	6	2
DB08	0.0297	32	22	15	7	3	0
POND A	0.9076	557	401	244	98	34	6
POND A-B06	0.9076	557	400	244	98	34	6
DB09	0.0189	34	26	19	12	8	4
B06	0.9265	565	407	248	100	35	6
B06-B07	0.9265	564	406	247	99	35	6
DB11	0.0969	114	85	60	35	20	8
DB10	0.0364	56	43	32	19	12	6
B07	1.0598	652	469	286	116	42	15
B07-B09	1.0598	651	468	285	116	42	14
DB12	0.0453	81	63	48	31	21	11
B09	1.1051	677	486	296	121	45	19
B09-POND B	1.1051	676	485	296	121	45	19
DB15	0.1234	105	75	50	25	12	3
DB13	0.0703	89	67	49	29	18	8
DB14	0.0556	93	72	54	35	23	12
POND B	1.3544	688	539	337	140	69	30

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 B-B12	1.3544	688	539	336	140	69	30
DB22	0.0516	91	72	55	36	25	14
DB23	0.0172	45	38	31	23	18	13
B12	1.4232	714	562	352	148	83	38
B12-B14	1.4232	714	562	352	148	83	38
DB24	0.0531	94	73	56	36	24	13
B14	1.4763	743	577	363	162	92	46
B14-B15	1.4763	742	576	362	162	92	46
DB28	0.0516	79	61	46	30	20	11
B15	1.5279	783	595	375	179	107	56
B15-B18	1.5279	781	595	374	179	107	56
DB27	0.1578	140	101	70	37	20	7
DB29	0.0959	89	65	46	25	14	5
B26	3.6222	1621	1178	735	316	186	95
B26-27	3.6222	1621	1177	735	316	185	94
FB-01	0.0630	81	63	47	29	19	10
FB01-27a	0.0630	81	63	47	29	19	10
FB-02	0.0375	75	60	47	32	23	14
B19	0.1005	146	114	87	57	38	21
B19-27	0.1005	146	114	87	56	38	21
27	3.7227	1663	1209	756	337	213	108
27-32	3.7227	1662	1208	755	336	212	107
WH-24	0.1325	217	170	129	84	56	31
WH-26	0.0839	49	33	20	8	3	0
WH-27	0.0217	23	16	10	4	1	0
30	0.2381	271	205	150	91	59	31
30-31	0.2381	270	205	149	91	59	31
WH-28	0.0398	60	47	36	23	15	8
31	0.2779	330	252	185	114	74	39
31-32	0.2779	329	251	185	113	73	39
WH-29	0.0511	80	62	47	30	20	11
WH-31	0.0406	75	59	46	30	21	12
WH-30	0.0159	26	19	13	7	4	1
32	4.1082	1815	1302	817	457	287	139
WH32	0.0458	54	38	24	10	4	0
BEN POND	4.1540	1409	1000	607	259	105	46
WH-33	0.0064	12	9	7	5	3	2
33	4.1604	1411	1001	607	259	105	46
33-37	4.1604	1410	1001	607	259	105	46
WH35	0.1550	171	124	84	44	22	6
WH34	0.0450	68	52	38	23	15	7
B34-36	0.0450	68	52	38	23	15	7
36	0.2000	239	176	122	67	37	13
36-37	0.2000	238	174	121	66	37	13
WH36	0.0750	63	43	27	11	4	1
37	4.4354	1449	1031	627	269	109	50
FG01	0.1127	58	40	25	11	5	1
OS05	0.0578	43	29	17	6	2	0
G1	0.1705	83	55	34	14	6	1
G1-G2	0.1705	83	55	34	14	6	1
OS06	0.1313	87	57	34	13	4	1
G1a	0.1313	87	57	34	13	4	1
G1a-G2	0.1313	87	57	34	13	4	1
FG02	0.0391	35	24	16	7	3	1
G2	0.3409	200	132	80	32	12	2
G2-G3	0.3409	199	132	80	32	12	2
FG03	0.0203	26	19	13	7	1	1

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)
FG04	0.0172	23	16	11	6	3	1
G3	0.3784	222	147	89	36	13	3
G3-POND F	0.3784	221	147	89	36	13	3
FG05	0.0922	65	46	30	15	7	2
FG06	0.0188	21	15	10	5	3	1
POND F	0.4894	181	126	65	17	8	2
POND F-G7	0.4894	181	126	65	17	8	2
FG21	0.0656	55	39	26	13	6	2
OS07	0.0328	28	19	12	5	2	0
OS07-G7	0.0328	27	19	12	5	2	0
G7	0.5878	223	151	77	22	10	3
G7-G8	0.5878	223	151	77	22	10	3
FG22	0.0641	46	33	22	11	5	1
G8	0.6519	261	172	87	29	12	3
G8-G8A	0.6519	261	172	87	29	12	3
FG23	0.0813	59	42	27	13	6	2
OS08	0.0406	39	27	18	9	4	1
OS11-G8A	0.0406	39	27	18	9	4	1
G8A	0.7738	331	209	105	46	21	6
G8A-G9	0.7738	331	209	105	46	21	6
FG25	0.0219	19	14	10	6	3	1
G9	0.7957	349	219	115	51	24	7
G9-G11	0.7957	348	219	115	51	24	7
OS09	0.1547	96	67	43	20	9	2
OS09-G10	0.1547	96	67	43	20	9	2
FG24	0.1047	77	54	34	16	7	1
G10	0.2594	166	115	74	34	15	3
G10-G11	0.2594	166	115	73	34	15	3
FG26	0.0813	81	61	43	25	15	6
FG27B	0.0508	61	48	35	22	14	7
FG27A	0.0259	16	11	7	3	2	0
FG27A-G11	0.0259	16	11	7	3	2	0
G11	1.2131	632	400	258	125	62	18
FG28	0.0203	18	13	8	4	2	0
POND G	1.2334	549	348	187	66	31	9
G12	1.2334	549	348	187	66	31	9
G12-G06	1.2334	548	348	187	66	31	9
FG29	0.1031	60	40	24	9	3	0
FG32	0.0402	74	58	45	29	20	11
FG32-G06	0.0402	73	58	44	29	20	11
G06	1.3767	591	374	203	73	35	12
FG10	0.0963	71	53	37	21	12	5
FG08A	0.0750	125	97	73	46	30	15
FG08A-G05	0.0750	125	97	72	45	30	15
FG08B	0.0630	94	72	54	34	22	11
FG08B-G05	0.0630	93	72	54	34	22	11
FG11	0.0625	81	63	47	30	20	11
FG09	0.0484	52	39	27	16	9	4
FG09-G05	0.0484	52	39	27	16	9	4
G05	0.3452	385	295	217	133	84	42
FG13	0.0656	44	31	20	10	5	1
FG12	0.0328	55	44	33	22	15	8
POND D	0.4436	126	85	47	18	11	4
POND D-G17	0.4436	126	85	47	18	11	4
FG15	0.1217	84	62	44	25	15	6
FG14	0.0359	49	38	29	18	12	6
FG14-G17	0.0359	49	38	29	18	12	6

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)
G17a	0.1576	117	88	64	38	23	11
FG15a	0.0156	30	23	18	12	8	4
G17	0.6168	222	153	87	49	27	13
G17-G18	0.6168	222	153	87	49	27	13
FG16	0.0773	135	105	79	51	34	18
G18	0.6941	249	182	131	81	51	26
G18-POND E	0.6941	249	181	131	80	51	26
FG31	0.0922	123	97	74	48	33	19
FG30	0.0400	82	65	50	33	23	13
FG30-PONDHS	0.0400	81	64	49	33	22	13
POND HS	0.1322	159	113	63	37	27	16
FG17a	0.0694	117	91	69	44	29	16
FG17a-POND E	0.0694	116	90	68	44	29	16
FG18	0.0688	64	48	34	20	12	5
FG18-POND E	0.0688	63	48	34	20	12	5
FG19	0.0464	80	63	48	32	22	12
FG17c	0.0313	34	24	16	7	3	1
FG17b	0.0214	42	33	26	17	12	7
POND E	1.0636	299	202	117	44	20	9
FG20	0.0109	31	26	21	16	13	9
H08-H09	1.0745	301	204	118	44	20	11
FG34	0.0922	64	43	27	12	5	1
G13	0.0922	64	43	27	12	5	1
POND I	0.0922	49	33	19	8	3	2
G14	0.0922	49	33	19	8	3	2
G14-G15	0.0922	49	33	19	8	3	2
FG35	0.0566	39	26	16	7	3	0
G15	0.1488	77	49	28	11	5	2
G15-G08	0.1488	77	49	28	11	5	2
FG37	0.0797	48	31	19	7	2	0
FG36	0.0281	15	10	6	2	1	0
FG36-G08	0.0281	15	10	6	2	1	0
G08	0.2566	129	80	46	18	7	2
FH01	0.1377	186	143	105	65	41	20
POND H	0.1377	53	30	17	7	5	3
H12	0.1377	53	30	17	7	5	3

Appendix C - Detention Pond Information

EXISTING DETENTION PONDS
FINAL FUTURE CONDITION
Simulation Run: F-100 YR Reservoir: POND A
BENNETT RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	675 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:14
Peak Outflow:	557(CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:26
Total Inflow :	80.1 (AC-FT)	Peak Storage:	10.7 (AC-FT)
Total Outflow:	77.2 (AC-FT)	Peak Elevation:	7144.0 (FT)

Simulation Run: F-100 YR Reservoir: POND B
BENNETT RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	879 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:22
Peak Outflow:	688(CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:42
Total Inflow :	129.4 (AC-FT)	Peak Storage:	13.2 (AC-FT)
Total Outflow:	128.6 (AC-FT)	Peak Elevation:	7082.9 (FT)

Simulation Run: F-100 YR Reservoir: POND C
BENNETT RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.

Volume Units: AC-FT

Computed Results:

Peak Inflow:	848 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:32
Peak Outflow:	749(CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:46
Total Inflow :	146.1 (AC-FT)	Peak Storage:	19.7 (AC-FT)
Total Outflow:	141.3 (AC-FT)	Peak Elevation:	7073.7 (FT)

Simulation Run: F-100 YR Reservoir: POND D
GIECK RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

Peak Inflow:	473 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:14
Peak Outflow:	126(CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:04
Total Inflow :	55.4 (AC-FT)	Peak Storage:	24.5 (AC-FT)
Total Outflow:	45.3 (AC-FT)	Peak Elevation:	7056.9 (FT)

Simulation Run: F-100 YR Reservoir: POND E
GIECK RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

Peak Inflow:	626 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:16
Peak Outflow:	300(CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:14
Total Inflow :	129.1 (AC-FT)	Peak Storage:	36.7 (AC-FT)
Total Outflow:	111.6 (AC-FT)	Peak Elevation:	6973.1 (FT)

Simulation Run: F-100 YR Reservoir: POND F
GIECK RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

Peak Inflow:	299 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:18
Peak Outflow:	181(CFS)	Date/Time of Peak Outflow:	01Jul2015, 12:44
Total Inflow :	39.9 (AC-FT)	Peak Storage:	8.8 (AC-FT)
Total Outflow:	37.8 (AC-FT)	Peak Elevation:	7136.2 (FT)

Simulation Run: F-100 YR Reservoir: BENNET REGIONAL POND
BENNETT RANCH BASIN

Start of Run:	01Jul2015, 00:00	Basin Model:	Future SCS
End of Run:	02Jul2015, 00:00	Meteorologic Model:	SCS TYPE IIA 100YR
Compute Time:	08Oct2017 10:28:34	Control Specifications:	24 HR-2 MIN.
		Volume Units:	AC-FT

Computed Results:

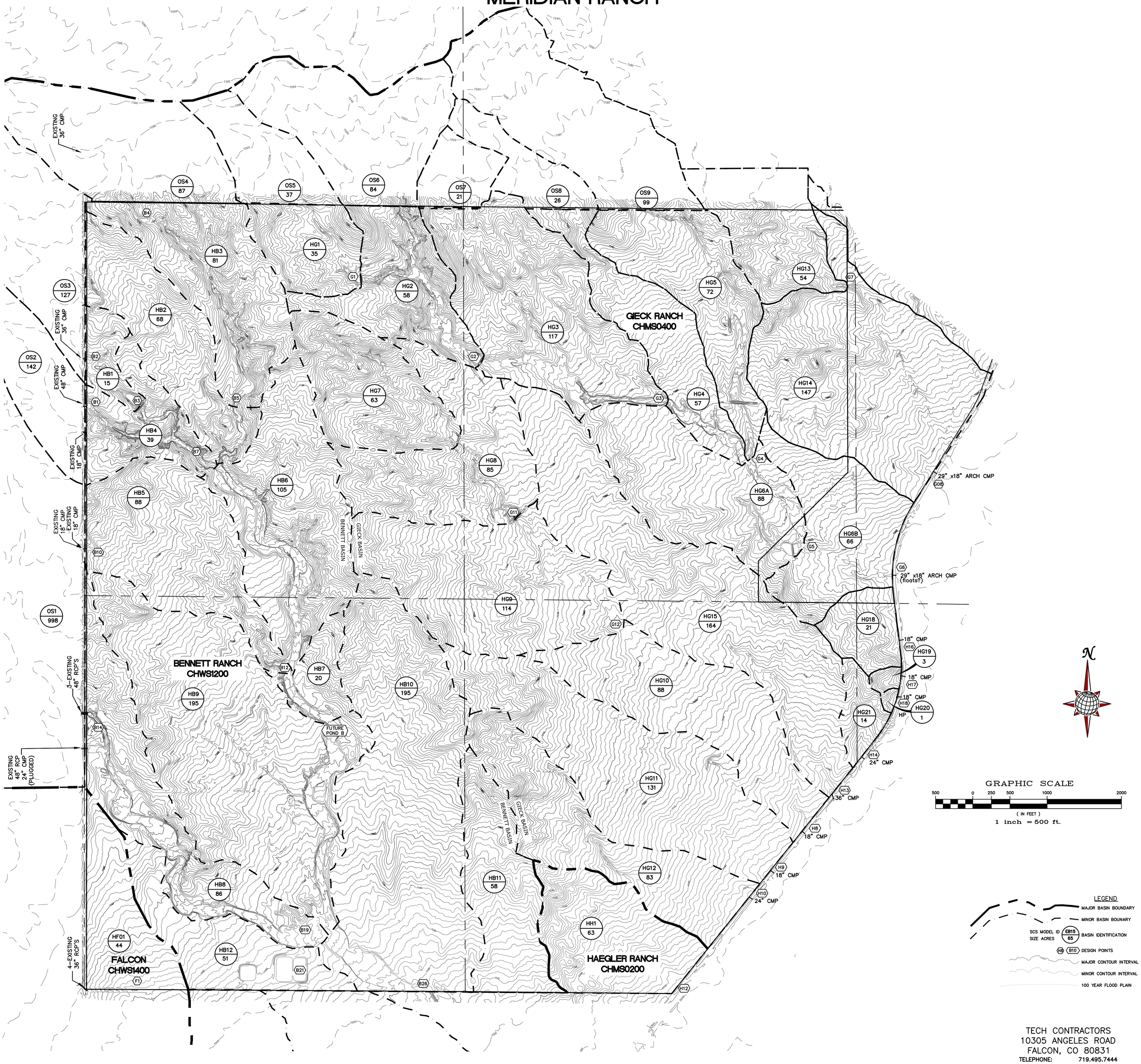
Peak Inflow:	1823 (CFS)	Date/Time of Peak Inflow:	01Jul2015, 12:38
Peak Outflow:	1409(CFS)	Date/Time of Peak Outflow:	01Jul2015, 13:16
Total Inflow :	400.8 (AC-FT)	Peak Storage:	87.0 (AC-FT)
Total Outflow:	381.0 (AC-FT)	Peak Elevation:	6973.9 (FT)

FUTURE POND ESTIMATES

POND G	GIECK RANCH BASIN	14.3 AC-FT	7033.3
POND H	HAEGLER RANCH BASIN	7.8 AC-FT	6973.4
POND I	GIECK RANCH BASIN	1.1 AC-FT	7071.6

I

MASTER DEVELOPMENT DRAINAGE PLAN
MERIDIAN RANCH



N

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)

1 inch = 500 ft.

LEGEND

- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNARY
- SCS MODEL ID / SIZE ACRES — EB15 / 65 — BASIN IDENTIFICATION
- H8 B10 DESIGN POINTS
- MAJOR CONTOUR INTERVAL
- MINOR CONTOUR INTERVAL
- 100 YEAR FLOOD PLAIN

HISTORIC CONDITIONS - SCS MAP

JUNE 2017

TECH CONTRACTORS
10305 ANGELES ROAD
FALCON, CO 80831
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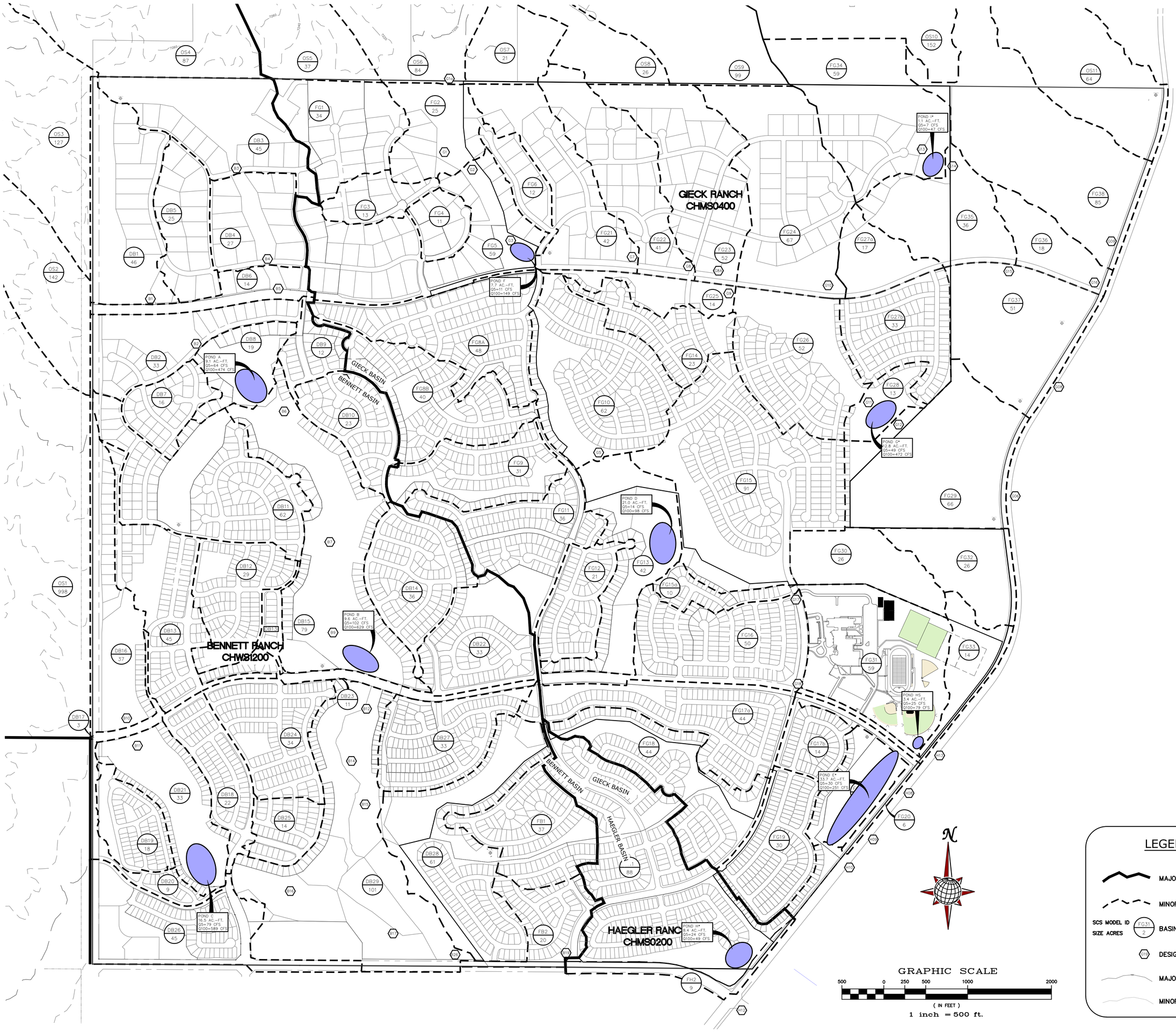
FIGURE 4

MASTER DEVELOPMENT DRAINAGE PLAN
MERIDIAN RANCH



*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

JUNE 2017

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FIGURE 5