

Tech Contractors
ENGINEERING GROUP

June 4, 2018

Len Kendall
El Paso County Planning and Community Development
2880 International Cir
Colorado Springs, CO 80910

RE: Drainage Conformance Letter
Lot 4, the Shops Filing 1 at Meridian Ranch

Dear Mr. Kendall

The attached short form drainage report is to serve as a statement of compliance for the development of Lot 4 of the Shops Filing 1 at Meridian Ranch commercial property with the *Preliminary/Final Drainage Report for Meridian Ranch Filing 4B, The Shops at Meridian Ranch* (the REPORT) prepared by Tech Contractors, dated April 2014, and approved on September 9, 2014. The REPORT provides hydrologic and hydraulic analysis for the development located at the northeast corner of Meridian Road and Stapleton Drive in El Paso County, Colorado.

Sincerely

Thomas A. Kerby, PE
Tech Contractors
11886 Stapleton Drive
Falcon, CO 80831
719.495.7444

Add PCD
File No.
"PPR18033"

Telephone No.: 719.495.7444

11886 Stapleton Dr
Falcon CO. 80831

Billing Address
P. O. Box 80036
San Diego, CA 92138

CERTIFICATIONS

Design Engineer's Statement:

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

Thomas A. Kerby, P.E. #31429

Date

Owner/Developer's Statement:

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

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

Date

El Paso County:

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

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

Date

Introduction

This short report was prepared for the commercial Lot 4 of the Shops Filing 1 at Meridian Ranch. The report shows the drainage for developed lot is in substantial conformance with the original calculations established with the *Preliminary/Final Drainage Report for Meridian Ranch Filing 4B, The Shops at Meridian Ranch* (the REPORT) prepared by Tech Contractors, dated April 2014, and approved on September 9, 2014. The REPORT provides hydrologic and hydraulic analysis for the development located at the northeast corner of Meridian Road and Stapleton Drive in El Paso County, Colorado.

Background

Lot 4 approximately 3.4 acres in size and is located near the southeast corner of Tourmaline Dr. and Meridian Rd. The lot was originally graded with development of Meridian Ranch Filing 4B in 2014 and slopes generally in a southeasterly direction toward Fleece Flower Way and the main roadway for the Shops development.

The first phase of commercial construction occurred within Lot 3, which included the utility and private storm drain system and the construction of the main roadway through the commercial center and the development of Lot 3 of The Shops Filing 1 at Meridian Ranch. A drainage letter showing Lot 3's compliance with the REPORT was approved by the County on August 20, 2015.

The REPORT anticipated runoff from the commercial areas, collectively referred to as The Shops (Lots 1-4, The Shops Filing 1 at Meridian Ranch), to be discharged to the storm drain system constructed as a part of Meridian Ranch Filing 4B. Said storm sewer system will ultimately discharge developed flows from Filing 4B, including The Shops, to the main stem of the Bennett Ranch Channel then convey the flow downstream to the Bennett Regional Detention Pond. The Bennett Regional Detention Pond was designed and constructed as a regional facility providing detention and water quality for all areas within the Bennett Ranch Drainage Basin within the Woodmen Hills Filings 10 & 11 and Meridian Ranch including the flows from The Shops Filing 1 at Meridian Ranch. The Bennett Pond has been adequately sized such that 100 YR developed will be detained and released at (or below) the pre-developed flow rate for the same event.

When regional water quality capture volume facilities are present, BMPs are still required onsite to address water quality and channel stability for the reach of the drainageway upstream of the regional facility. In accordance with MS4 permits and regulations, BMPs must be implemented prior to discharges to a State Water from areas of "New Development and Significant Redevelopment." Therefore, if a regional BMP is utilized downstream of a discharge from a development into a State Water, additional BMPs are required to protect the State Water between the development site and the regional facility. However, these BMPs may not have to be as extensive as would normally be required, as long as they are adequate to protect the State Water upstream of the regional BMP.

A BMP SNOUT stormwater quality system was installed with the construction of the storm drain system for Meridian Ranch Filing 4 to meet the initial water quality protection prior to releasing the flow to the State Water in the Bennett Channel. The SNOUT reduces gross pollutants such

Identify who owns and maintains the SNOUT

Provide evidence that the SNOOT can provide WQCV

as floatables and trash as well as free oils and sediments. The SNOOT meets or exceeds the requirement to the Maximum Extent Practicable to prevent "pollution of the receiving waters in excess of the pollution permitted by an applicable water quality standard or applicable antidegradation requirement." The SNOOT is an approved BMP by the EPA.

When a regional or subregional facility is selected to treat the WQCV for a development, the remaining three steps in the Four Step Process should still be implemented. For example, minimizing runoff volumes on the developed property by disconnecting impervious area and infiltrating runoff onsite (Step 1) can potentially reduce regional WQCV requirements, conveyance system costs, and costs of the regional/subregional facility. Stream stabilization requirements (Step 3) must still be evaluated and implemented, particularly if identified in a master drainage plan. Finally, specific source controls (Step 4 BMPs) such as materials coverage should be implemented onsite, even if a regional/subregional facility is provided downstream.

Drainage Analysis

The anticipated developed flows from The Shops were accounted for in two basins within the REPORT; basin 4 and basin 9. The flows from basin 4 originate from the Shops on-site flows and were expected to discharge directly into the previously- constructed Filing 4B storm drain system via pipe (Design Point X01). The off-site flows are from basin 9 were expected to be captured by an existing 15' Type R inlet located near the intersection of Meridian Ranch Blvd & Stapleton Dr.

The analysis completed for the initial phase of the Shops, Lot 3 along with portions of the adjacent roadways, showed 35 cfs during the 5 YR event and 68 cfs for the 100 YR event for the on-site flows discharged to the pipe connection at design point X01.

The storm drainage analysis for this phase of the Shops Filing 1 at Meridian Ranch yields a 10 YR event flow of 36 cfs and 59 cfs for the 100 YR at the pipe connection at design point X01 entering Meridian Ranch Filing 4B. A comparison of the different flow rates from the various drainage studies can be found in the table below.

Table 1 Design Flow Rates for Design Point X01

	Minor Storm (5-yr/10-yr)	Major Storm (100-yr)
Filing 4B/The Shops - FDR, 2014	38 ¹	70
The Shops, Lot 3 - Drainage Letter, 2015	35 ¹	68
The Shops, Lot 4 - Drainage Letter, 2018	36 ²	58

¹ Drainage analysis Minor Storm based on 5-year return period.

² Drainage analysis Minor Storm based on 10-year return period.

This letter shows the development of Lot 4 of the Shops Filing 1 at Meridian Ranch is in substantial

conformance with the original Final Drainage Report for the Shops Filing 1 and will not adversely impact downstream facilities, as those facilities were designed to convey developed flows from all areas within The Shops. Upon full build-out of The Shops (according to the planned layout of Lot 4, the existing layout of Lot 3 & the conceptual layout of Lots 1 & 2) as presented in the attached Developed Drainage Basin map), the resulting developed flows will be less than the REPORT's expected flows at Design Point X01.

Drainage and Bridge Fees

There are no Drainage and Bridge Fees with this project as the fees were paid at the time of the recordation of the Shops Filing 1 at Meridian Ranch on August 12, 2015.

Drainage Calculations

COMPOSITE 'C' FACTORS									
PROJECT: Lot 4, Shops Filing 1					5/25/2018				
BASIN DESIGNATION	AREA (AC.)					COMPOSITE FACTOR		Percent Impervious	
	UNDEV	PAVEMENT	ROOF	LAWN	TOTAL	10-year	100-year		
Basin 4, Filing 4B/ Shops Filing 1 FDR	A	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015 Approved August 20, 2015			1.97	0.55	0.70		
	B				1.08	0.47	0.65		
	C				2.25	0.83	0.89		
	E				1.29	0.83	0.89		
	F				0.22	0.83	0.86		
	G					0.06			0.11
	H		0.95	0.32	0.33	1.60	0.73		0.80
	I-1		1.50	0.48		1.98	0.88		0.92
	I-2		0.06	0.40	0.32	0.78	0.52		0.63
	J	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015 Approved August 20, 2015			1.30	0.79	0.91		
	K				0.83	0.81	0.87		
	L				1.19	0.73	0.84		
	N				0.41	0.35	0.65		
	OS-1				6.22	0.67	0.73		
	OS-2				0.69	0.71	0.81		
TOTAL		2.57	1.20	0.76	15.8	0.72	0.82	90.0%	

TIME OF CONCENTRATION

Rational Calculations

PROJECT: **Lot 4, Shops Filing 1**

DATE: 5/25/2018

TIME OF CONCENTRATION																										
SUBBASIN DATA			INIT./OVERLAND TIME (T _i)				TRAVEL TIME (T _t)						TOTAL	T _c Check (Urbanized Basins)		FINAL T _c										
BASIN DESIGNATION	C ₁₀	AREA (AC)	LENGTH (FT)	ΔH	SLOPE %	T _i (Min.)*	LENGTH (FT)	ΔH	SLOPE %	CONVEYANCE TYPE	VEL. (FPS)	T _t (Min.)**	T _i +T _t (Min.)	L (FT)	T _c = (L/180) + 10	(min)										
A	0.55	1.97	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015 Approved August 20, 2015													12.4										
B	0.47	1.08																								6.7
C	0.83	2.25																								7.3
E	0.83	1.29																								6.3
F	0.83	0.22																								5.5
G	0.43	0.17	71	6.0	8.5%	5.1	75	1	1.0%	p	2.0	0.6	5.7	146.00	10.8	5.7										
H	0.73	1.60	50	2.0	4.0%	5.0	735	17	2.3%	p	3.0	4.0	9.0	785.00	14.4	9.0										
I-1	0.88	1.98	87	3.5	4.0%	5.0	575	14	2.3%	P	3.1	3.1	8.1	662.00	13.7	8.1										
I-2	0.52	0.78	41	5.5	13.4%	5.0	307	4	1.1%	L	0.7	6.8	11.8	348.00	11.9	11.8										
J	0.79	1.30	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015 Approved August 20, 2015													7.4										
K	0.81	0.83																								7.0
L	0.73	1.19																								7.8
N	0.35	0.41																								11.3
OS-1	0.67	6.22																								11.3
OS-2	0.71	0.69														20.8										

Notes: * T_i = 1.8 (1.1-C₅)L^{0.5}/S^{1/3}
 ** T_t = (11.9 L³/H)^{0.385} x 60

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

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

PROJECT: **Lot 4, Shops Filing 1**

Date: 5/25/2018

DESIGN POINT	DIRECT RUNOFF											TOTAL RUNOFF						OVERLAND TRAVEL TIME								
	BASIN	AREA (AC)	T _c (Min.)	I (in./hr.)		COEFF. ©		CA		Q		Sum T _c (min.)	I (in./hr.)		CA		Q		DESTINATION DP	CONVEYANCE	COEFFICIENT C _v	SLOPE %	VEL. (FPS)	LENGTH (FT)	TRAVEL TIME TT	
				(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)		(10 YR)	(100 YR)	(10 YR)	(100 YR)										
1	A	1.97	12.4	4.44	6.39	0.55	0.70	1.08	1.38	4.8	8.8							4.8	8.8							
2	B	1.08	6.7	5.52	7.94	0.47	0.65	0.51	0.70	2.8	5.6							2.8	5.6							
3	C	2.25	7.3	5.37	7.73	0.83	0.89	1.87	2.00	10	15							10	15							
11	E	1.29	6.3	5.63	8.10	0.83	0.89	1.07	1.15	6.0	9.3	22.6	3.39	4.87	1.56	1.71		6.0	9.3							
6	F	0.22	5.5	5.86	8.44	0.83	0.86	0.18	0.19	1.1	1.6							1.1	1.6							
7	G	0.17	5.7	5.81	8.36	0.43	0.57	0.08	0.10	0.4	0.8							0.4	0.8							
8	H	1.60	9.0	5.00	7.19	0.73	0.80	1.16	1.28	5.8	9.2							5.8	9.2							
DP1	I-1	1.98	8.1	5.18	7.46	0.88	0.92	1.74	1.83	9.0	14							9.0	14	8	P	20.0	1.20%	2.2	84	0.6
8												9.0	5.00	7.19	2.90	3.11			14	22						
CB1	I-2	0.78	11.8	4.52	6.51	0.52	0.63	0.40	0.49	1.8	3.2							1.8	3.2							
10	J	1.30	7.4	5.34	7.69	0.79	0.91	1.03	1.18	5.5	9.1							5.5	9.1							
5	K	0.83	7.0	5.44	7.83	0.81	0.87	0.67	0.72	3.7	5.7							3.7	5.7							
12	L	1.19	7.8	5.25	7.56	0.73	0.84	0.87	1.00	4.6	7.6							4.6	7.6							
14	N	0.41	11.3	4.60	6.62	0.35	0.65	0.14	0.27	0.7	1.8							0.7	1.8							
OS	OS-1	6.22	11.3	4.60	6.62	0.67	0.73	4.17	4.54	19	30							19	30							
DP2	OS-2	0.69	20.8	3.54	5.09	0.71	0.81	0.49	0.56	1.7	2.8							2	3	11	P	20.0	3.25%	3.6	400	1.8

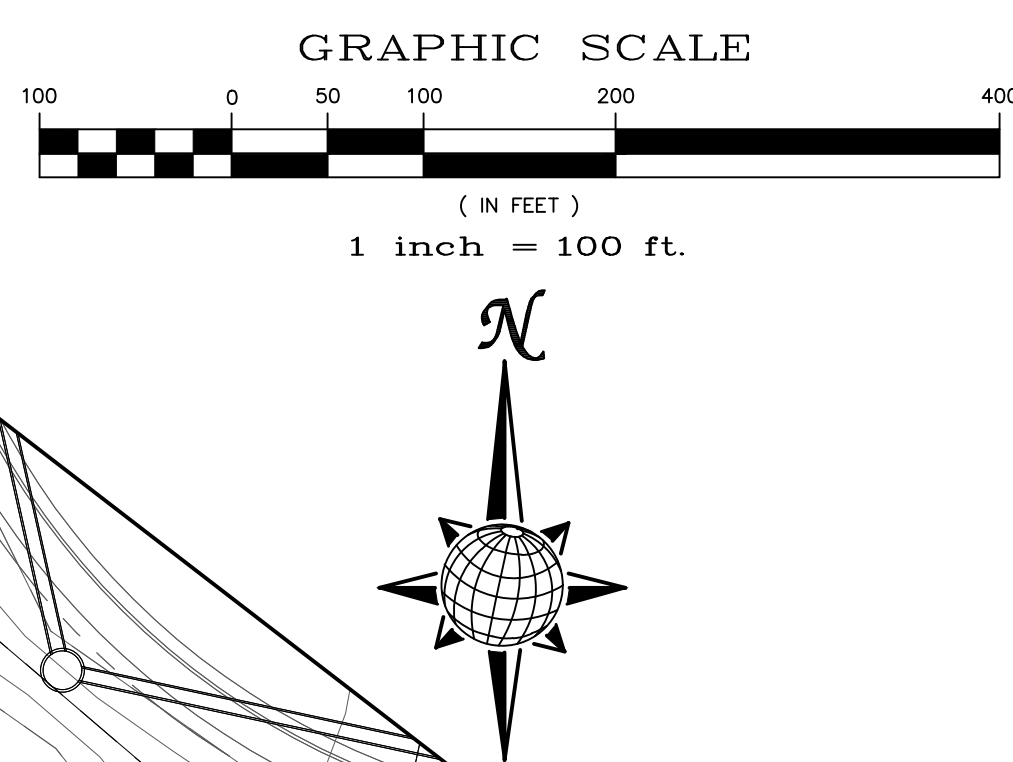
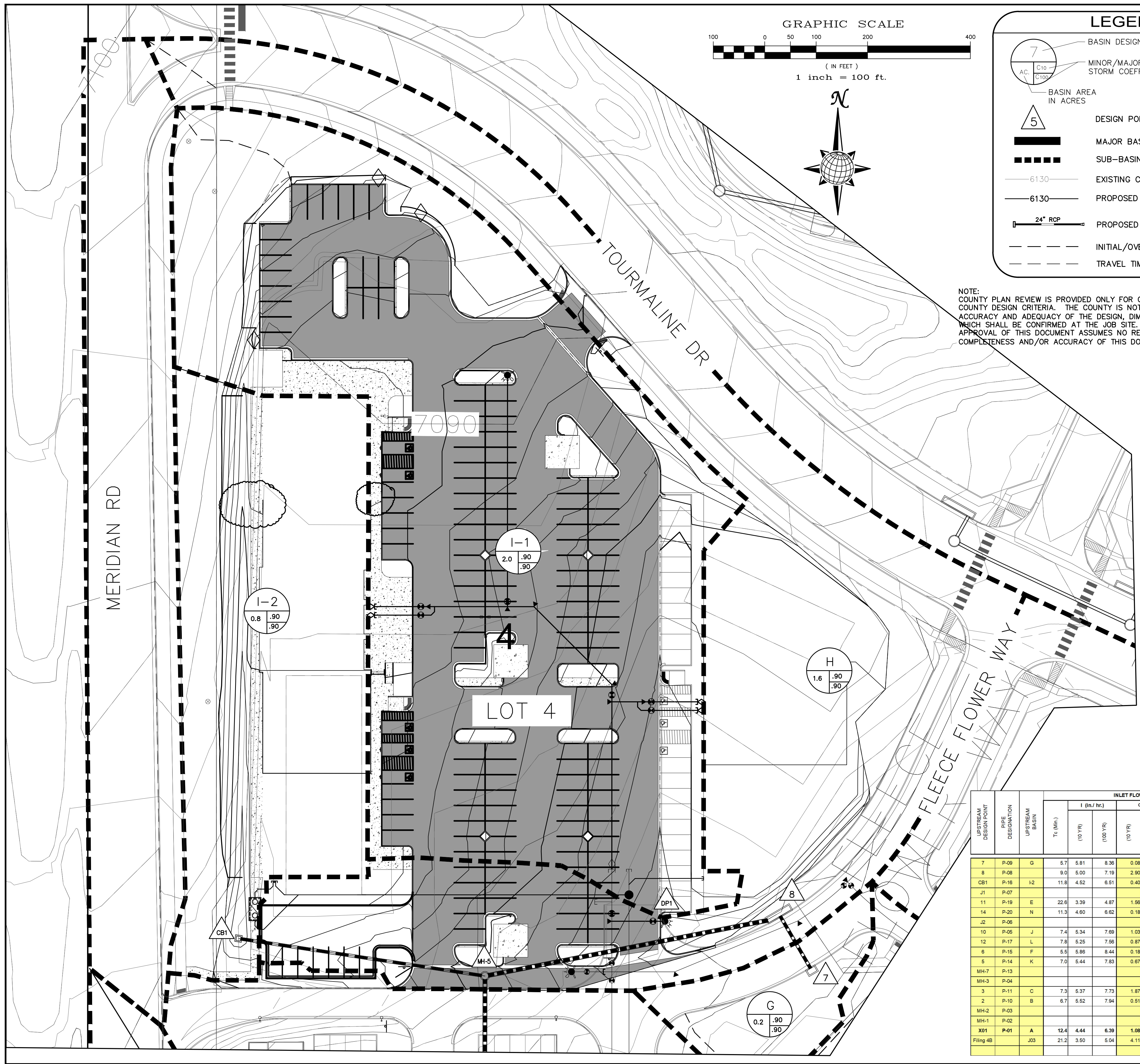
TYPE OF SURFACE		C _v
HEAVY MEADOW	H	3
TILLAGE/FIELD	T	5
RIPRAP (not buried)	R	7
SHORT PASTURE AND LAWNS	L	7
NEARLY BARE GROUND	B	10
GRASSED WATERWAY	G	15
PAVED AREAS	P	20

**STORM DRAINAGE SYSTEM DESIGN
INLET CALCULATIONS**

PROJECT: **Lot 4, Shops Filing 1**

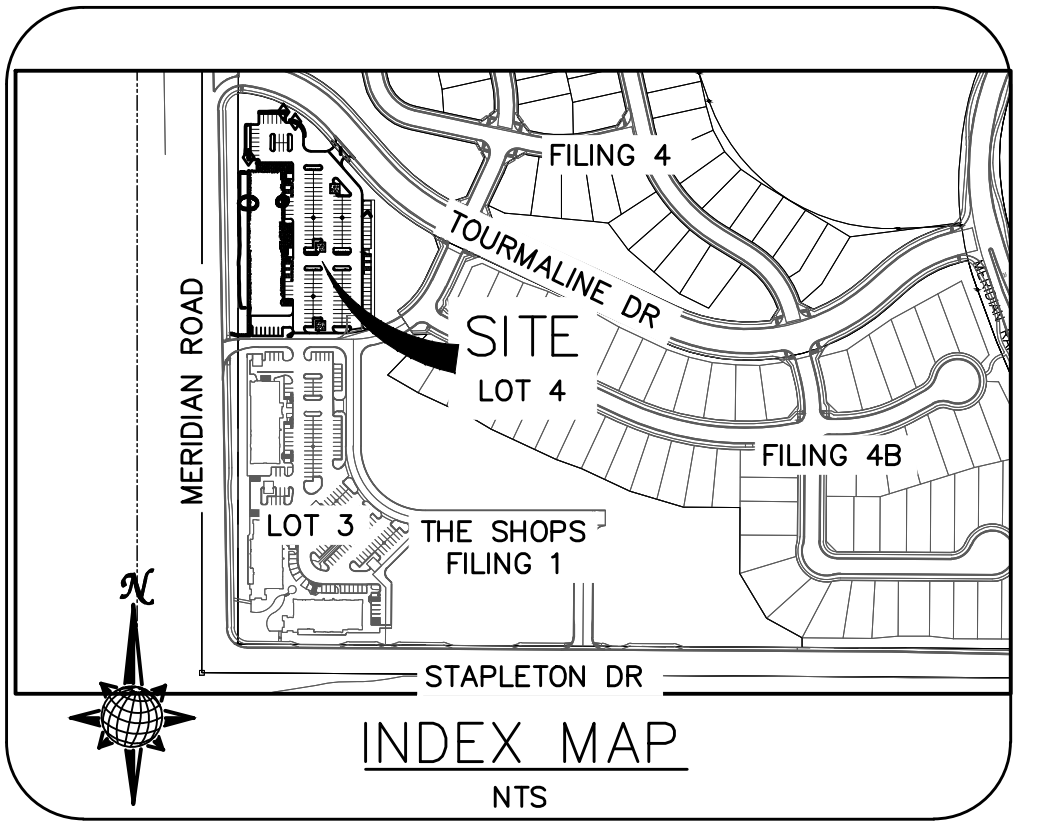
Date: 5/25/2018

DP	Inlet size L(i)	Proposed or Existing	INLET TYPE	CROSS SLOPE	STREET SLOPE	T _c	Q _{Total}		Q _{Capture}				Q _{Flow-by}				DEPTH (max)		SPREAD	
							Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	CA _{eqv.} (10-yr)	CA _{eqv.} (100-yr)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	CA _{eqv.} (10-yr)	CA _{eqv.} (100-yr)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)
7	5	EXIST	SUMP	2.0%		5.7	0.4	0.8	0.4	0.8	0.08	0.10	-	-	-	-	0.50	0.70		
8	15	EXIST	SUMP	2.0%		9.0	14.5	22	14.5	22	2.90	3.11	-	-	-	-	0.50	0.70		
CB1	TYPE C	EXIST	SUMP	2.0%		11.8	1.8	3.2	1.8	3.2	0.40	0.49	-	-	-	-	0.22	0.32		



LEGEND

- 7 BASIN DESIGNATION
- AC. C10
C100 MINOR/MAJOR STORM COEFFICIENT
- 5 BASIN AREA IN ACRES
- 5 DESIGN POINT DESIGNATION
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- EXISTING CONTOUR
- PROPOSED CONTOUR
- 24" RCP PROPOSED STORM SEWER
- INITIAL/OVERLAND TIME (Ti)
- TRAVEL TIME (Tt)



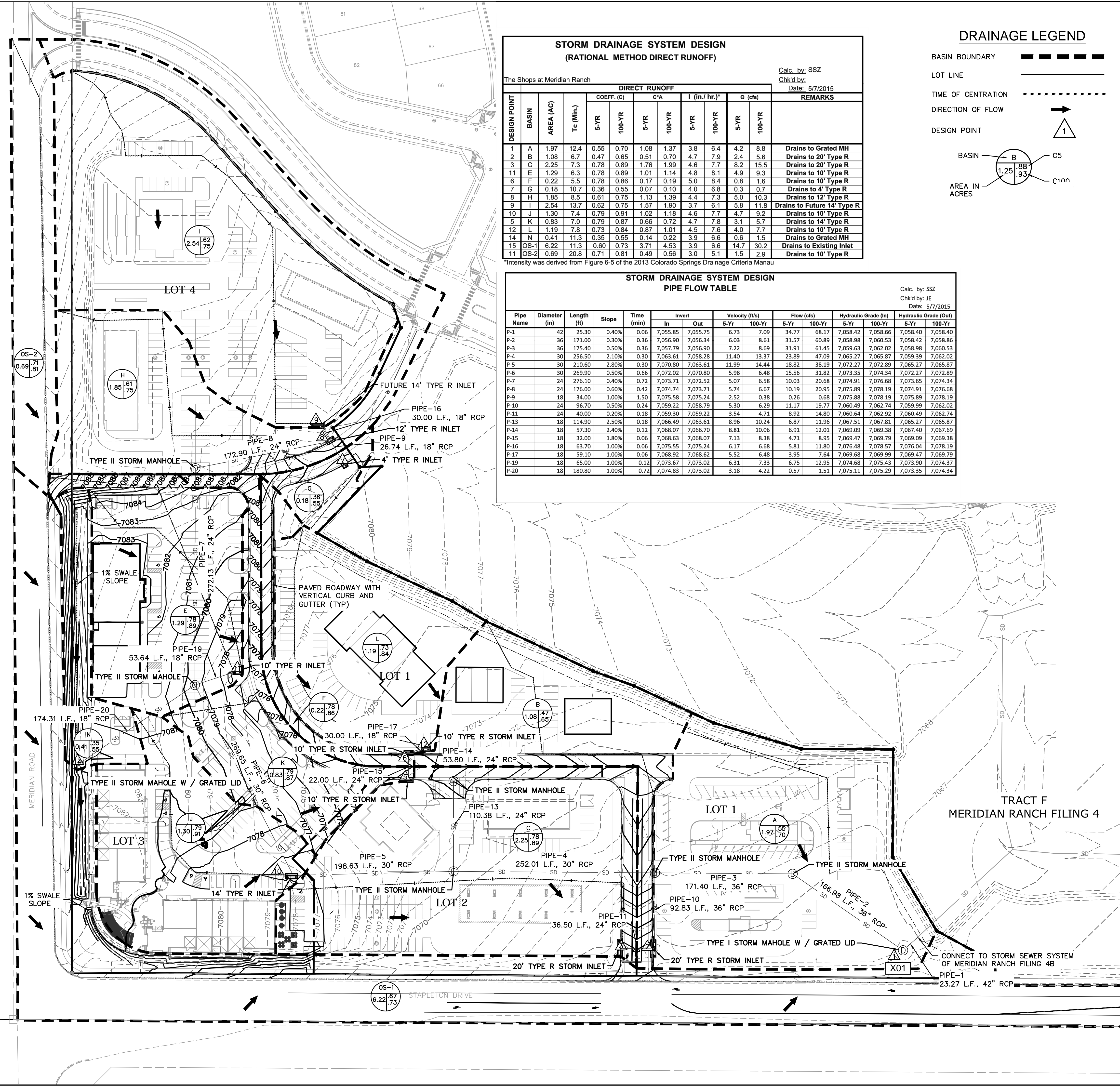
PROJECT BENCHMARK
 INTERSECTION OF WOODMEN RD AND MERIDIAN ROAD AT SW CORNER (BRASS CAP W/ NO. GF-9)
 ELEVATION = 6874.00

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

BASIN DESIGNATION	AREA (AC.)				COMPOSITE FACTOR		Percent Impervious
	UNDEV	PAVEMENT	ROOF	LAWN	10-year	100-year	
A					1.97	0.55	0.70
B	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				1.08	0.47	0.65
C	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				2.25	0.83	0.89
E	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				1.29	0.83	0.89
F	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				0.22	0.83	0.86
G		0.06		0.11	0.17	0.43	0.57
H		0.95	0.32	0.33	1.60	0.73	0.80
I-1		1.50	0.48		1.98	0.88	0.92
I-2		0.06	0.40	0.32	0.78	0.52	0.63
J	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				1.30	0.79	0.91
K	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				0.83	0.81	0.87
L	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				1.19	0.73	0.84
N	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				0.41	0.35	0.65
OS-1	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				6.22	0.67	0.73
OS-2	From Lot 3, Shops Filing 1 at Meridian Ranch Drainage Letter by Olsson Associates, Dated May 7, 2015				0.69	0.71	0.81

UPSTREAM DESIGN POINT	PIPE DESIGNATION	UPSTREAM BASIN	INLET FLOW						SYSTEM FLOW						TRAVEL TIME								
			I (in./hr.)		CA		Q		I (in./hr.)		CA		Q		PIPE DIA.	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL (FPS)	TRAVEL TIME (Tt)		
			(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)	(10 YR)	(100 YR)									
7	P-09	G	5.7	5.81	8.36	0.08	0.10	0.4	0.8					0.4	0.8	18	0.013	8	1.00%	34	6.0	0.1	
8	P-08	B	9.0	5.00	7.19	2.90	3.11	14.5	22.4	9.0	5.00	7.19	2.97	3.21	15	23	24	0.013	MH-5	0.60%	176	5.6	0.6
CB1	P-16	I-2	11.8	4.52	6.51	0.40	0.49	1.8	3.2					1.8	3.2	18	0.013	MH-5	7.58%	142	16.4	0.1	
J1	P-07	J								12.0	4.50	6.48	3.38	3.70	15	24	24	0.013	MH-4	0.40%	276	4.6	1.0
11	P-19	E	22.6	3.39	4.87	1.56	1.71	5.3	8.3					5.3	8.3	18	0.013	MH-4	1.00%	65	6.0	0.2	
14	P-20	N	11.3	4.60	6.62	0.18	0.19	0.8	1					0.8	1.3	18	0.013	MH-4	1.00%	181	6.0	0.5	
J2	P-06	J								22.8	3.37	4.85	5.12	5.60	17	27	30	0.013	10	0.60%	270	5.9	0.8
10	P-05	J	7.4	5.34	7.69	1.03	1.18	5.5	9.1	23.6	3.32	4.77	6.15	6.76	20	32	30	0.013	MH-3	2.80%	211	14.0	0.3
12	P-17	L	7.8	5.25	7.56	0.87	1.00	4.6	7.6					4.6	7.6	18	0.013	8	1.00%	59	6.0	0.2	
6	P-15	F	5.5	5.86	8.44	0.16	0.19	1.1	1.6	8.0	5.22	7.51	1.05	1.19	5.5	8.9	18	0.013	5	1.80%	32	8.0	0.1
5	P-14	K	7.0	5.44	7.83	0.67	0.72	3.7	5.7	8.0	5.20	7.48	1.72	1.91	9.0	14	18	0.013	MH-7	2.40%	57	9.2	0.1
MH-7	P-13	MH-7						8.1	5.18	7.45	1.72	1.91	8.9	14	18	0.013	MH-3	2.50%	115	8.4	0.2		
MH-3	P-04	MH-3						23.8	3.30	4.74	7.87	8.69			26	41	30	0.013	MH-2	2.10%	257	12.1	0.4
3	P-11	C	7.3	5.37	7.73	1.87	2.00	10.0	15.5					10	15	24	0.013	2	0.20%	40	3.2	0.2	
2	P-10	B	6.7	5.52	7.94	0.51	0.70	2.8	5.6	7.5	5.32	7.66	2.38	2.70	13	21	24	0.013	MH-2	0.50%	97	5.1	0.3
MH-2	P-03	MH-2						24.2	3.27	4.71	10.25	11.40	34	54	36	0.013	MH-1	0.50%	175	6.7	0.4		
MH-1	P-02	MH-1						24.6	3.24	4.66	10.25	11.40	33	53	36	0.013	MD1	0.30%	171	5.2	0.5		
X01	P-01	A	12.4	4.44	6.39	1.08	1.38	4.8	8.8	25.2	3.20	4.61	11.33	12.78	36	59	42	0.013	Filing 4B	0.40%	21	6.2	0.1
Filing 4B	J03	J03	21.2	3.50	5.04	4.11	4.68	14	24	25.2	3.20	4.60	15.44	17.46	49	80	48	0.013	J04	0.50%	447	8.1	0.9

Scale		AS SHOWN		DRI	
Drawn by	TAK	Checked by	RG	Date	JUNE 2018
Sheet Number	DRI				
LOT 4 - THE SHOPS FILING 1 FINAL DRAINAGE PLAN FIGURE X					
MERIDIAN RANCH					
TECH CONSTRUCTION CORP. 10305 ANGELES ROAD PEYTON, CO 80831 TELEPHONE: 719.495.7444 FAX: 719.495.7608					
No.	Revisions	Date	Init.	Appr.	Date
-	-	-	-	-	-



STORM DRAINAGE SYSTEM DESIGN (RATIONAL METHOD DIRECT RUNOFF)

The Shops at Meridian Ranch
 Calc. by: SSZ
 Chk'd by: JE
 Date: 5/7/2015

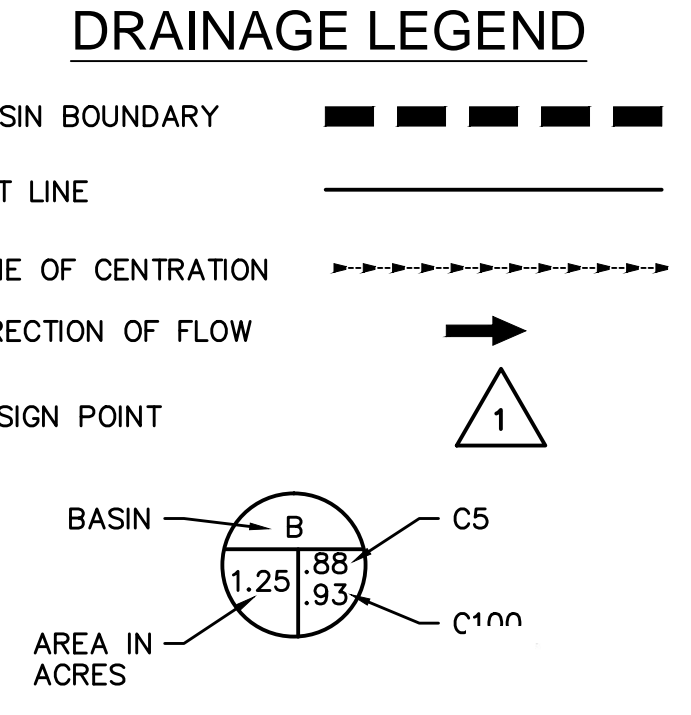
DESIGN POINT	BASIN	AREA (AC)	Tc (Min.)	COEFF. (C)				C*A		I (in./hr.)*		Q (cfs)	REMARKS
				5-YR	100-YR	5-YR	100-YR	5-YR	100-YR	5-YR	100-YR		
1	A	1.97	12.4	0.55	0.70	1.08	1.37	3.8	6.4	4.2	8.8	Drains to Grated MH	
2	B	1.08	6.7	0.47	0.65	0.51	0.70	4.7	7.9	2.4	5.6	Drains to 20' Type R	
3	C	2.25	7.3	0.78	0.89	1.76	1.99	4.6	7.7	8.2	15.5	Drains to 20' Type R	
11	E	1.29	6.3	0.78	0.89	1.01	1.14	4.8	8.1	4.9	9.3	Drains to 10' Type R	
8	F	0.22	5.5	0.78	0.86	0.17	0.19	5.0	8.4	0.8	1.6	Drains to 10' Type R	
7	G	0.18	10.7	0.38	0.55	0.07	0.10	4.0	6.8	0.3	0.7	Drains to 4' Type R	
8	H	1.85	8.5	0.61	0.75	1.13	1.39	4.4	7.3	5.0	10.3	Drains to 12' Type R	
9	I	2.54	13.7	0.62	0.75	1.57	1.90	3.7	6.1	5.8	11.8	Drains to Future 14' Type R	
10	J	1.30	7.4	0.79	0.91	1.02	1.18	4.6	7.7	4.7	9.2	Drains to 10' Type R	
5	K	0.83	7.0	0.79	0.87	0.66	0.72	4.7	7.8	3.1	5.7	Drains to 14' Type R	
12	L	1.19	7.8	0.73	0.84	0.87	1.01	4.5	7.6	4.0	7.7	Drains to 10' Type R	
14	N	0.41	11.3	0.35	0.55	0.14	0.22	3.9	6.6	0.6	1.5	Drains to Grated MH	
15	OS-1	6.22	11.3	0.60	0.73	3.71	4.53	3.9	6.6	14.7	30.2	Drains to Existing Inlet	
11	OS-2	0.69	20.8	0.71	0.81	0.49	0.56	3.0	5.1	1.5	2.9	Drains to 10' Type R	

*Intensity was derived from Figure 6-5 of the 2013 Colorado Springs Drainage Criteria Manual

STORM DRAINAGE SYSTEM DESIGN PIPE FLOW TABLE

Calc. by: SSZ
 Chk'd by: JE
 Date: 5/7/2015

Pipe Name	Diameter (in)	Length (ft)	Slope	Time (min)	Invert		Velocity (ft/s)		Flow (cfs)		Hydraulic Grade (ft)			
					In	Out	5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr	5-Yr	100-Yr
P-1	42	25.30	0.40%	0.06	7.055.85	7.055.75	6.73	7.09	34.77	68.17	7.058.42	7.058.66	7.058.40	7.058.40
P-2	36	171.00	0.30%	0.36	7.056.90	7.056.34	6.03	6.41	31.57	60.89	7.058.98	7.060.53	7.058.42	7.058.86
P-3	36	175.40	0.50%	0.36	7.057.79	7.056.90	7.22	8.69	31.91	61.45	7.059.63	7.062.02	7.058.98	7.060.53
P-4	30	256.50	2.10%	0.30	7.063.61	7.058.28	11.40	13.37	23.89	47.09	7.065.27	7.065.87	7.059.39	7.062.02
P-5	30	210.60	2.80%	0.30	7.070.80	7.063.61	11.99	14.44	18.82	38.19	7.072.27	7.072.89	7.065.27	7.065.87
P-6	30	269.90	0.50%	0.66	7.072.02	7.070.80	5.98	6.48	15.56	31.82	7.073.35	7.074.34	7.072.27	7.072.89
P-7	24	276.10	0.40%	0.72	7.073.71	7.072.52	5.07	6.58	10.03	20.68	7.074.91	7.076.68	7.073.65	7.074.34
P-8	24	176.00	0.60%	0.42	7.074.74	7.073.71	5.74	6.67	10.19	20.95	7.075.89	7.078.19	7.074.91	7.076.68
P-9	18	34.00	1.00%	1.50	7.075.58	7.075.24	2.52	3.38	0.26	0.68	7.075.89	7.078.19	7.075.89	7.078.19
P-10	24	96.70	0.50%	0.24	7.059.22	7.058.79	5.30	6.29	11.17	19.77	7.060.49	7.062.74	7.059.99	7.062.02
P-11	24	40.00	0.20%	0.18	7.059.30	7.059.22	3.54	4.71	8.92	14.80	7.060.64	7.062.92	7.060.49	7.062.74
P-13	18	114.90	2.50%	0.18	7.066.49	7.063.61	8.96	10.24	6.87	11.96	7.067.51	7.067.81	7.065.27	7.065.87
P-14	18	57.30	2.40%	0.12	7.068.07	7.066.70	8.81	10.06	6.91	12.01	7.069.09	7.069.38	7.067.40	7.067.69
P-15	18	32.00	1.80%	0.06	7.068.63	7.068.07	7.13	8.38	4.71	8.95	7.069.47	7.069.79	7.069.09	7.069.38
P-16	18	63.70	1.00%	0.06	7.075.53	7.075.24	6.17	6.68	5.81	11.80	7.076.48	7.078.57	7.076.04	7.078.19
P-17	18	59.10	1.00%	0.06	7.068.92	7.068.62	5.52	6.48	3.95	7.64	7.069.68	7.069.99	7.068.47	7.069.79
P-19	18	65.00	1.00%	0.12	7.073.67	7.073.02	6.31	7.33	6.75	12.95	7.074.68	7.075.43	7.073.90	7.074.37
P-20	18	180.80	1.00%	0.72	7.074.83	7.073.02	3.18	4.22	0.57	1.51	7.075.11	7.075.29	7.073.35	7.074.34

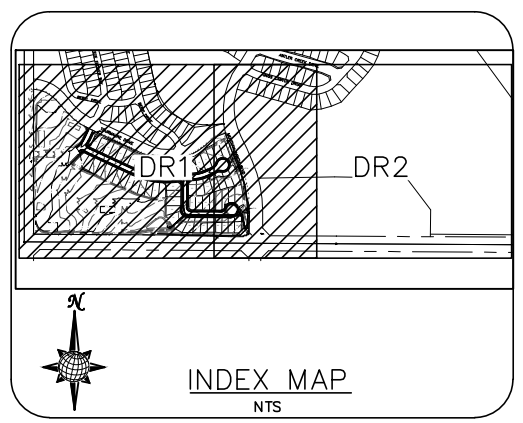
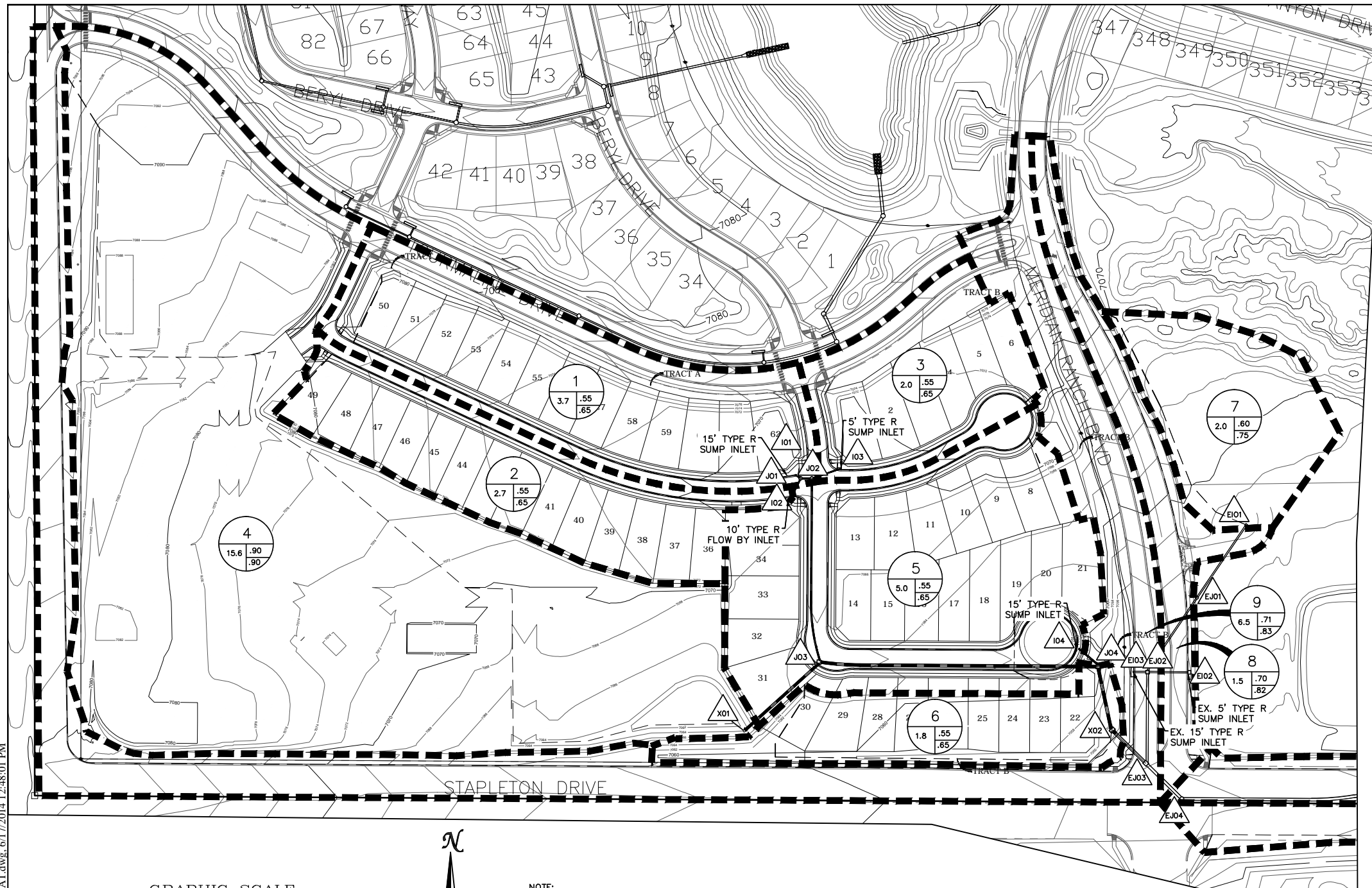


Identify what this document is
 Show where the proposed SNOOT is located

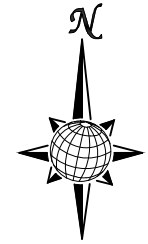
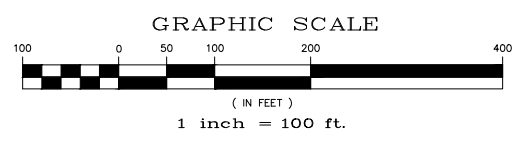
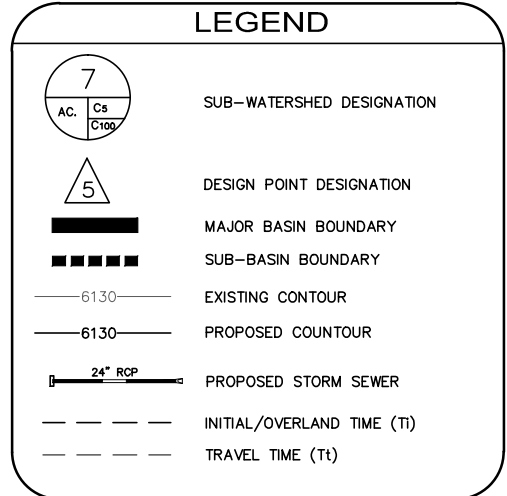
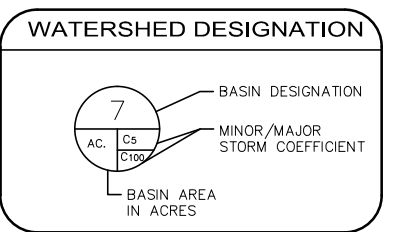
- and redevelopment. The control measures for applicable development sites shall meet one of the following base design standards listed below:
- WQCV Standard: The control measure(s) is designed to provide treatment and/or infiltration of the WQCV and:
 - 100% of the applicable development site is captured, except the permittee may exclude up to 20 percent, not to exceed 1 acre, of the applicable development site area when the permittee has determined that it is not practicable to capture runoff from portions of the site that will not drain towards control measures. In addition, the permittee must also determine that the implementation of a separate control measure for that portion of the site is not practicable (e.g., driveway access that drains directly to street).
 - Evaluation of the minimum drain time shall be based on the pollutant removal mechanism and functionality of the control measure implemented. Consideration of drain time shall include maintaining vegetation necessary for operation of the control measure (e.g., wetland vegetation).
 - Pollutant Removal Standard: The control measure(s) is designed to treat at a minimum the 80th percentile storm event. The control measure(s) shall be designed to treat stormwater runoff in a manner expected to reduce the event mean concentration of total suspended solids (TSS) to a median value of 30 mg/L or less.
 - 100% of the applicable development site is captured, except the permittee may exclude up to 20 percent not to exceed 1 acre of the applicable development site area when the permittee has determined that it is not practicable to capture runoff from portions of the site that will not drain towards control measures. In addition, the permittee must also determine that the implementation of a separate control measure for that portion of the site is not practicable (e.g., driveway access that drains directly to street).
 - Runoff Reduction Standard: The control measure(s) is designed to infiltrate into the ground where site geology permits, evaporate, or evapotranspire a quantity of water equal to 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration. This base design standard can be met through practices such as green infrastructure. "Green infrastructure" generally refers to control measures that use vegetation, soils, and natural processes or mimic natural processes to manage stormwater. Green infrastructure can be used in place of or in addition to low impact development principles.
 - Applicable Development Site Draining to a Regional WQCV Control Measure: The regional WQCV control measure must be designed to accept the drainage from the applicable development site. Stormwater from the site must not discharge to a water of the state before being discharged to the regional WQCV control measure. The regional WQCV control measure must meet the requirements of the WQCV in Part I, E, 4, a, iv(A).
 - 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, 20 percent of the total impervious surface of the applicable development site must first drain to a control measure covering an area equal to 10 percent of the total impervious surface 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:

This is an excerpt from the MS4 permit. Include a narrative and analysis showing that the SNOOT meets this criteria of the MS4 permit.

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



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

DESIGN POINT	BASIN	AREA (AC)	DIRECT RUNOFF				TOTAL RUNOFF				OVERLAND TRAVEL TIME							
			Tc (Min.)	I (in./hr.) (5 YR)	COEFF. C (100 YR)	CA (5 YR)	Q (100 YR)	Sum Tc (min.)	I (in./hr.) (5 YR)	CA (5 YR)	Q (100 YR)	DITCH OR GUTTER	ROUGHNESS	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL (FPS)	TRAVEL TIME Tt
EJ01	1	3.7	18.9	2.90	0.55	2.03	2.40	5.9	13									
EJ02	2	2.7	20.6	2.77	0.55	0.65	1.47	1.74	4.1	9								
EJ03	3	2.0	18.9	2.90	0.55	0.65	1.10	1.30	3.2	7								
X01	4	15.6	21.0	2.74	0.90	0.90	14.00	14.00	38	71								
EJ04	5	5.0	17.8	2.99	0.55	0.65	2.75	3.25	8.2	18.0	26.6	2.41	4.46	3.2	4.0	8.2	18.0	
X02	6	1.8	17.0	3.06	0.55	0.65	0.96	1.14	2.9	6.4								
EJ01	7	1.9	15.3	3.22	0.60	0.75	1.14	1.43	3.7	9								
EJ02	8	1.5	10.9	3.73	0.70	0.82	1.04	1.22	3.9	8								
EJ03	9	6.5	23.7	2.57	0.71	0.83	4.62	5.35	11.9	25								
EJ04	10	1.8	14.9	3.26	0.64	0.75	1.38	1.56	4.5	9								
EJ05	11	2.0	15.0	3.25	0.62	0.78	1.52	1.69	4.9	10								

UPSTREAM BASIN	UPSTREAM DESIGN POINT	INLET FLOW						SYSTEM FLOW						TRAVEL TIME									
		Tc (Min.)	I (in./hr.) (5 YR)	I (in./hr.) (100 YR)	CA (5 YR)	CA (100 YR)	Q (5 YR)	Q (100 YR)	Sum Tc (min.)	I (in./hr.) (5 YR)	I (in./hr.) (100 YR)	CA (5 YR)	CA (100 YR)	Q (5 YR)	Q (100 YR)	PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL (FPS)	TRAVEL TIME Tt	
1	EJ01	18.9	2.90	5.37	2.03	2.40	5.9	12.9							5.9	12.9	18	0.013	EJ01	2.44%	8.19	9.3	0.0
2	EJ02	20.6	2.77	5.13	0.98	0.98	2.7	5							2.7	5.0	18	0.013	EJ01	1.26%	31.85	6.7	0.1
3	EJ03	18.9	2.90	5.37	1.10	1.30	3.2	7.0	20.7	2.76	5.12	3.01	3.38	8.3	17.3	24	0.013	EJ02	1.51%	13.27	8.9	0.0	
4	X01	21.0	2.74	5.08	14.00	14.00	38.4	71	20.7	2.76	5.12	4.11	4.68	11.4	23.9	24	0.013	EJ03	2.30%	294.09	11.0	0.4	
5	EJ04	17.8	2.99	5.54	2.75	3.25	8.2	18.0	21.2	2.73	5.06	18.12	18.68	38.4	71.1	42	0.013	EJ03	1.00%	160.00	10.5	0.3	
6	X02	17.0	3.06	5.67	0.96	1.14	2.9	6.4	22.1	2.67	4.94	20.87	21.93	49.5	94.5	48	0.013	EJ04	0.50%	447.12	8.1	0.9	
7	EJ01	15.3	3.22	5.97	1.14	1.43	3.7	8.5						8.2	18.0	24	0.013	EJ04	4.63%	41.03	15.5	0.0	
8	EJ02	10.9	3.73	6.92	1.04	1.22	3.9	8.4	22.1	2.66	4.94	21.83	23.07	55.7	108.4	48	0.013	X02	6.99%	100.70	30.3	0.1	
9	EJ03	23.7	2.57	4.76	4.62	5.35	11.9	25.4						58.2	113.9	48	0.013	EJ03	0.73%	70.95	9.8	0.1	
10	EJ04	14.9	3.26	6.04	1.17	1.17	3.8	7.1	23.7	2.57	4.75	6.80	7.99	3.7	8.5	24	0.013	EJ01	0.50%	140.90	5.1	0.5	
11	EJ05	15.0	3.25	6.02	1.27	1.25	4.1	7.6	15.7	3.17	5.88	1.14	1.43	3.6	8.4	24	0.013	EJ02	1.95%	142.90	10.1	0.2	
	EJ06								23.7	2.57	4.75	6.80	7.99	3.9	8.4	24	0.013	EJ02	1.47%	62.00	8.8	0.1	
	EJ07								23.9	2.56	4.73	28.63	31.05	11.9	25.4	24	0.013	EJ02	5.10%	18.00	16.3	0.0	
	EJ08								24.1	2.55	4.72	28.63	31.05	11.9	25.4	24	0.013	EJ03	2.20%	147.90	14.0	0.2	
	EJ09								24.8	2.50	4.64	28.63	31.05	71.7	144.1	48	0.013	EJ04	0.50%	82.40	8.1	0.2	
	EJ10								25.4	2.47	4.58	28.63	31.05	70.7	142.1	48	0.013	EJ05	0.50%	348.98	8.1	0.7	
	EJ11								25.8	2.45	4.53	28.63	31.05	70.1	140.8	48	0.013	EJ06	0.50%	300.38	8.1	0.6	
	EJ12								26.3	2.42	4.49	29.81	32.22	3.8	7.1	18	0.013	EJ07	1.50%	353.92	14.0	0.4	
	EJ13								26.3	2.42	4.48	29.81	32.22	72.2	144.7	48	0.013	EJ08	1.30%	353.47	13.1	0.5	
	EJ14								26.3	2.42	4.48	31.08	33.48	4.1	7.6	18	0.013	EJ09	1.10%	42.12	12.0	0.1	
	EJ15								26.3	2.42	4.48	31.08	33.48	75.2	150.1	48	0.013	EJ10	6.00%	41.67	14.6	0.0	
	EJ16																		051	0.40%	393.21	7.2	0.9

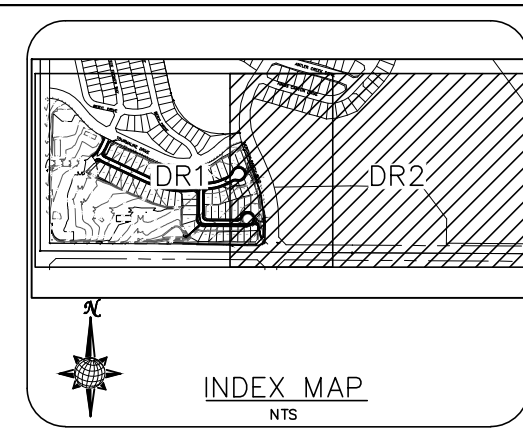
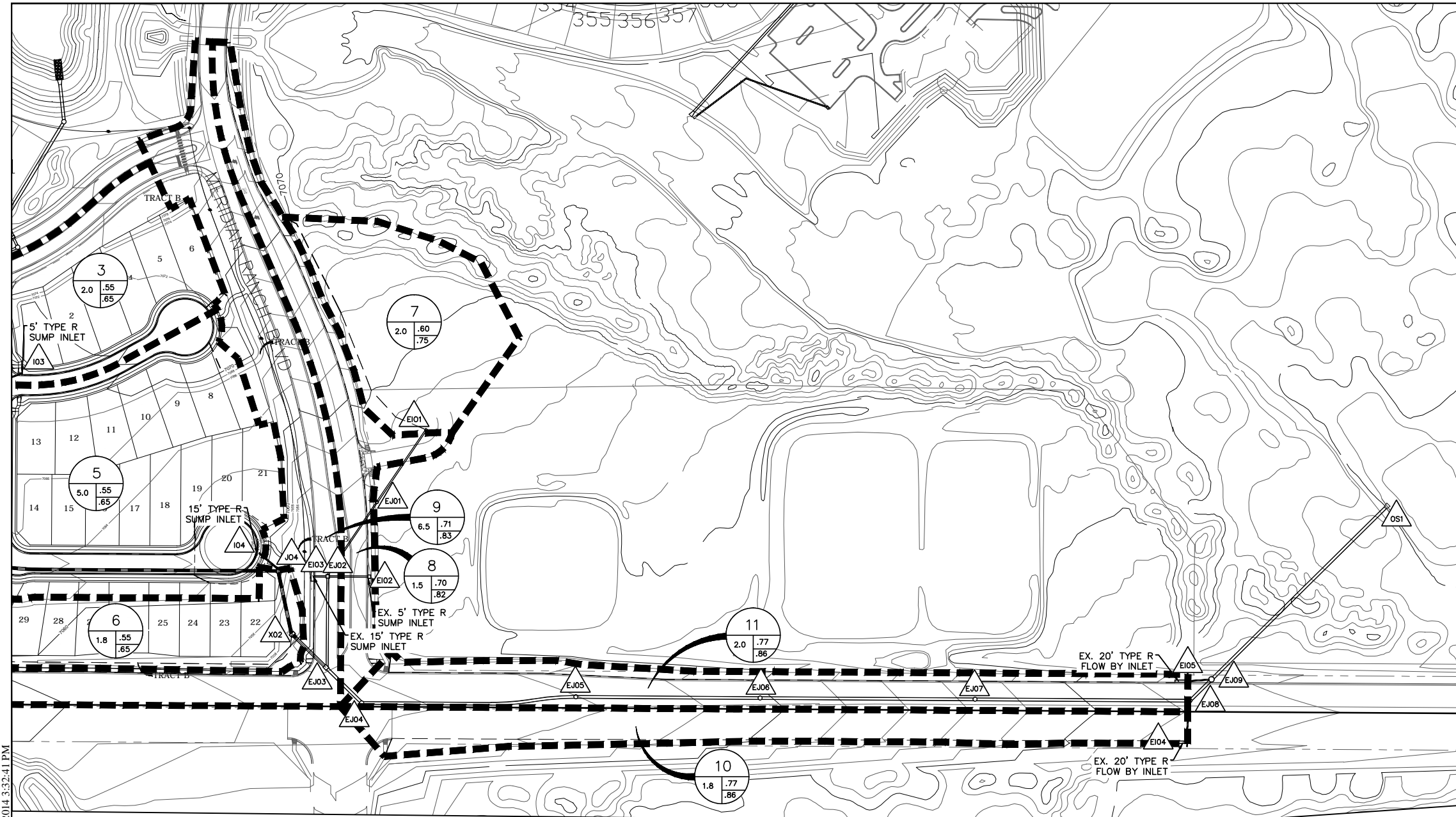
TECH CONSTRUCTION CORP.
 10305 ANGELES ROAD
 PEYTON, CO 80831
 TELEPHONE: 719.495.7444
 FAX: 719.495.7608

MERIDIAN RANCH

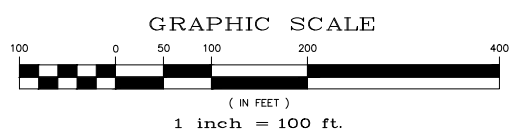
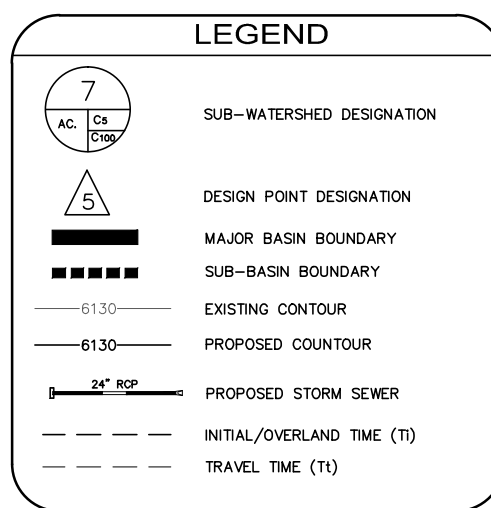
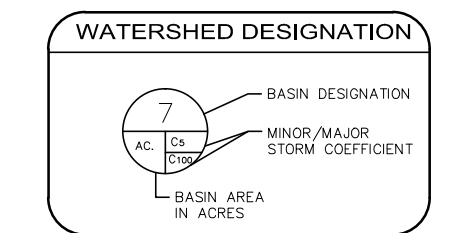
MERIDIAN RANCH FLNG 4B
 FINAL DRAINAGE PLAN
 FIGURE 6

Scale AS SHOWN
 Sheet Number
 Drawn by Log
 Checked by TAC
 Date JUNE 2014
 DRI

No.	Revisions	Date	Inst.	Appr.	Date



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



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DESIGN POINT	BASIN	AREA (AC)	DIRECT RUNOFF				TOTAL RUNOFF				OVERLAND TRAVEL TIME							
			Tc (min.)	I (in./hr.)	COEFF. C	CA	Q	Sum Tc (min.)	I (in./hr.)	CA	Q	DITCH OR BUTTER	ROUGHNESS	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME Tt
EJ01	1	3.7	18.9	2.90	5.37	0.55	0.65	2.03	2.40	5.9	13							
EJ02	2	2.7	20.6	2.77	5.13	0.55	0.65	1.47	1.74	4.1	9							
EJ03	3	2.0	18.9	2.90	5.37	0.55	0.65	1.10	1.30	3.2	7							
XJ01	4	15.6	21.0	2.74	5.08	0.90	0.90	14.00	14.00	38.4	71							
EJ04	5	5.0	17.8	2.99	5.54	0.55	0.65	2.75	3.25	8.2	18.0	26.6	2.41	4.46	3.2	4.0		
XJ02	6	1.8	17.0	3.06	5.67	0.55	0.65	0.96	1.14	2.9	6							
EJ01	7	1.9	15.3	3.22	5.97	0.60	0.75	1.14	1.43	3.7	9							
EJ02	8	1.5	10.9	3.73	6.92	0.70	0.82	1.04	1.22	3.9	8							
EJ03	9	6.5	23.7	2.57	4.76	0.71	0.83	4.62	5.35	11.9	25							
EJ04	10	1.8	14.9	3.25	6.04	0.75	0.85	1.38	1.58	4.5	9							
EJ05	11	2.0	15.0	3.25	6.02	0.78	0.87	1.52	1.69	4.9	10							

UPSTREAM BASIN	UPSTREAM DESIGN POINT	Tc (min.)	INLET FLOW						Sum Tc (min.)	SYSTEM FLOW						TRAVEL TIME					
			I (in./hr.)		CA		Q			I (in./hr.)		CA		Q		PIPE DIA	ROUGHNESS (n)	DESTINATION DP	SLOPE %	LENGTH (FT)	VEL. (FPS)
1	EJ01	18.9	2.90	5.37	2.03	2.40	5.9	12.9													
2	EJ02	20.6	2.77	5.13	0.98	0.98	2.7	5													
3	EJ03	18.9	2.90	5.37	1.10	1.30	3.2	7.0													
4	XJ01	21.0	2.74	5.08	14.00	14.00	38.4	71													
5	EJ04	17.8	2.99	5.54	2.75	3.25	8.2	18.0													
6	XJ02	17.0	3.06	5.67	0.96	1.14	2.9	6.4													
7	EJ01	15.3	3.22	5.97	1.14	1.43	3.7	8.5													
8	EJ02	10.9	3.73	6.92	1.04	1.22	3.9	8.4													
9	EJ03	23.7	2.57	4.76	4.62	5.35	11.9	25.4													
10	EJ04	14.9	3.25	6.04	1.17	1.17	3.8	7.1													
11	EJ05	15.0	3.25	6.02	1.27	1.25	4.1	7.6													

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TECH CONSTRUCTION CORP.
 10305 ANGELES ROAD
 PEYTON, CO 80831
 TELEPHONE: 719.495.7444
 FAX: 719.495.7608

MERIDIAN RANCH

MERIDIAN RANCH FLING 4B
 FINAL DRAINAGE PLAN
 FIGURE 6

Scale AS SHOWN
 Sheet Number DR2

Drawn by Log
 Checked by TAC
 Date JUNE 2014

No.	Revisions	Date	Inst.	Appr.	Date

Markup Summary

dsdgrimm (7)

Provide evidence that the SNOUT can provide WQCV

free oils and sediments. The SNOUT meets or exceeds the best practicable to prevent "pollution of the receiving waters in accordance with an applicable water quality standard or applicable water quality criteria. The SNOUT is an approved BMP by the EPA.

facility is selected to treat the WQCV for a development, the

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Provide evidence that the SNOUT can provide WQCV

Identify what this document is

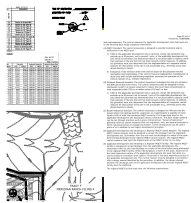
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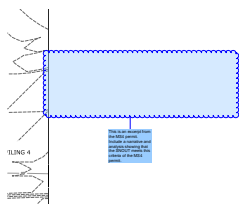
Show where the proposed SNOUT is located

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Show where the proposed SNOUT is located



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This is an excerpt from the MS4 permit. Include a narrative and analysis showing that the SNOUT meets this criteria of the MS4 permit.

Add PCD File No. "PPR18033"

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Add PCD File No. "PPR18033"

is 136

of the regional facility in accordance with MS4 permits and regulations, BMPs must be implemented prior to discharges to a State Water from areas of "New Development and Significant Redevelopment". Therefore, if a regional BMP is related to discharges of a discharge from a development into a State Water, additional BMPs are required to protect the State Water between the development site and the regional facility. However, these BMPs may not have to be as extensive as would normally be required, as long as they are adequate to protect the State Water upstream of the regional BMP.

A BMP SNOUT stormwater quality system was installed with the construction of the storm drain system for Maridian Ranch Filing #4 to meet the initial water quality protection prior to release the flow to the State Water in the Bennett Channel. The SNOUT reduces gross pollutants such

Identify who owns and maintains the SNOUT

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Identify who owns and maintains the SNOUT