JR: Addressed

Replace with EGP221

JR: Noted

2022 Financial Assura… Estimate For… (with pre-plat constru…

Cursory comments provided. Quatities in section 2 will be verified once the construction plans for these items are included in the resubmittal and the drainage report provides a clear narrative on what is being constructed with the early grading application.

Updated: 3/21/2022

Saddlehorn Ranch Filing 2 Improveme	**…FORMATION**	
	…3/21/2022	**SF-21-033**
Project Name	**…Date**	**PCD File No.**

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining	
SECTION 1 - GRADING AND EROSION CONTROL (Construction and Permanent BMPs)								
* Earthwork								*
less than 1,000; $5,300 min		CY	$ 8.00	=	$ -		$ -	*
1,000-5,000; $8,000 min		CY	$ 6.00	=	$ -		$ -	*
5,001-20,000; $30,000 min		CY	$ 5.00	=	$ -		$ -	*
20,001-50,000; $100,000 min		CY	$ 3.50	=	$ -		$ -	*
50,001-200,000; $175,000 min	50,633	CY	$ 2.50	=	$ 175,000.00		$ 175,000.00	*
greater than 200,000; $500,000 min		CY	$ 2.00	=	$ -		$ -	*
* Permanent Seeding (inc. noxious weed mgmnt.)	6	AC	$ 828.00	=	$ 5,266.08		$ 5,266.08	*
* Mulching	6	AC	$ 777.00	=	$ 4,662.00		$ 4,662.00	*
* Permanent Erosion Control Blanket	0	SY	$ 6.00	=	$ -		$ -	*
* Permanent Pond/BMP Construction	See Below	CY	$ -	=			$ -	*
* Permanent Pond/BMP (provide engineer's estimate)		EA		=	$ -		$ -	*
*30" RCP		LF	$ 100.00	=	$ -		$ -	*
*Detention Outlet Structure		EA	$ 5,000.…		-		$ -	
*Concrete/Riprap Forebay		EA	$ 3,000.…				$ -	
*Concrete Trickle Channel		CY	$ 95…				$ -	
*Detention Emergency Spillway		EA	$ 4,000.…				$ -	
*Drainageway riprap, d50 size from 6" to 24"		Tons	$ 83.…		-		$ -	
*30" - Flared End Section (FES)		EA	$ 600.00	=	$ -		$ -	
*Permanent WQ Feature (EDB)	1	EA	$ 5,000.00		$ 5,000.00		$ 5,000.00	
*Gravel Maintenance Access Road	1,046	SY	$ 45.00		$ 47,070.00		$ 47,070.00	
					$ -		$ -	
Safety Fence	8,102	LF	$ 3.00	=	$ 24,306.00		$ 24,306.00	
Temporary Erosion Control Blanket	3,642	SY	$ 3.00	=	$ 10,926.00		$ 10,926.00	
Vehicle Tracking Control	2	EA	$ 2,453.00	=	$ 4,906.00		$ 4,906.00	
Silt Fence	11,010	LF	$ 2.60	=	$ 28,626.00		$ 28,626.00	
Temporary Seeding	13	AC	$ 650.00	=	$ 8,450.00		$ 8,450.00	
Temporary Mulch	13	AC	$ 777.00	=	$ 10,101.00		$ 10,101.00	
Erosion Bales	0	EA	$ 26.00	=	$ -		$ -	
Erosion Logs/Straw Waddle	0	LF	$ 5.00	=	$ -		$ -	
Rock Check Dams	38	EA	$ 518.00	=	$ 19,684.00		$ 19,684.00	
Inlet and Outlet Protection	17	EA	$ 173.00	=	$ 2,941.00		$ 2,941.00	
Sediment Basin	3	EA	$ 1,824.00	=	$ 5,472.00		$ 5,472.00	
Concrete Washout Basin		EA	$		-		$ -	
					-		$ -	
[insert items not listed but part of construction plans]							$ -	
								*
MAINTENANCE (35% of Construction I					31,887.10		$ 31,887.10	*
* - Subject to defect warranty financial assurance. A minimum of 20% shall be retained until final acceptance (MAXIMUM OF 80% COMPLETE ALLOWED)		**Section 1 Subtotal**		=	**$ 384,297.18**		**$ 384,297.18**	*
SECTION 2 - PUBLIC IMPROVEMENTS *								*
ROADWAY IMPROVEMENTS								*
								*
Mobilization/Construction Traffic Control		LS	$ 50,000.00	=	$ -		$ -	*
Removal of Asphalt (Full Depth)		SY	$ 10.00		$ -		$ -	*
Removal of Asphalt (Planing-4")		SY	$ 5.00		$ -		$ -	*
Removal of Striping		LF	$ 1.00		$ -		$ -	*
Removal of Fencing		LF	$ 5.00		$ -		$ -	*
Aggregate Base Course (135 lbs/cf)		Tons	$ 29.00	=	$ -		$ -	*
Aggregate Base Course (135 lbs/cf)		CY	$ 52.00		$ -		$ -	*
Asphalt Pavement (3" thick)		SY	$ 14.50		$ -		$ -	*
Asphalt Pavement (4" thick)		SY	$ 20.00		$ -		$ -	*
Asphalt Pavement (6" thick)		SY	$ 30.00		$ -		$ -	*
Asphalt Pavement (147 lbs/cf) __" thick		Tons	$ 91.00	=	$ -		$ -	*
Raised Median, Paved		SF	$ 8.30	=	$ -		$ -	*
Regulatory Sign/Advisory Sign		EA	$ 311.00	=	$ -		$ -	*
Guide/Street Name Sign		EA	$ 250.00	=	$ -		$ -	*
Epoxy Pavement Marking		SF	$ 14.00	=	$ -		$ -	*
Thermoplastic Pavement Marking		SF	$ 24.00	=	$ -		$ -	*
Barricade - Type 3		EA	$ 207.00	=	$ -		$ -	*
Delineator - Type I		EA	$ 25.00	=	$ -		$ -	*
Curb and Gutter, Type A (6" Vertical)		LF	$ 31.00	=	$ -		$ -	*

Remove. Permanent EDB is not being constructed at this time.

JR: Permanent EBD removed

Update. The GEC plans only show a single proposed TSB or update the plans to clearly label the other two TSBs being constructed.

JR: FAE updated to only show temporary sediment basin 1

see comment on GEC

JR: Noted

PROJECT INFORMATION		
Saddlehorn Ranch Filing 2 Improvements Early Gradin	3/21/2022	SF-21-033
Project Name	Date	PCD File No.

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining	
Curb and Gutter, Type B (Median)		LF	$ 31.00	=	$ -		$ -	*
Curb and Gutter, Type C (Ramp)		LF	$ 31.00	=	$ -		$ -	*
4" Sidewalk (common areas only)		SY	$ 50.00	=	$ -		$ -	*
5" Sidewalk		SY	$ 62.00	=	$ -		$ -	*
6" Sidewalk		SY	$ 75.00	=	$ -		$ -	*
8" Sidewalk		SY	$ 99.00		$ -		$ -	*
Pedestrian Ramp		EA	$ 1,190.00	=	$ -		$ -	*
Cross Pan, local (8" thick, 6' wide to include return)		LF	$ 63.00	=	$ -		$ -	*
Cross Pan, collector (9" thick, 8' wide to include return)		LF	$ 95.00		$ -		$ -	*
Curb Chase		EA	$ 1,532.00	=	$ -		$ -	
Guardrail Type 3 (W-Beam)		LF	$ 51.00	=	$ -		$ -	*
Guardrail Type 7 (Concrete)		LF	$ 75.00	=	$ -		$ -	*
Guardrail Impact Attenuator		EA	$ 3,899.00	=	$ -		$ -	*
Sound Barrier Fence (CMU block, 6' high)		LF	$ 81.00		$ -		$ -	*
Sound Barrier Fence (panels, 6' high)		LF	$ 83.00	=	$ -		$ -	*
Electrical Conduit, Size =		LF	$ 17.00	=	$ -		$ -	*
Traffic Signal, complete intersection		EA	$ 439,875	=	$ -		$ -	*
Traffic Signal, complete intersection		EA	$ 439,875	=	$ -		$ -	*
[insert items not listed but part of construction plans]				=	$ -		$ -	*
STORM DRAIN IMPROVEMENTS								*
Concrete Box Culvert (M Standard), Size (W x H)		LF		=	$ -		$ -	*
18" Reinforced Concrete Pipe	80	LF	$ 67.00	=	$ 5,360.00		$ 5,360.00	*
24" Reinforced Concrete Pipe	100	LF	$ 81.00	=	$ 8,100.00		$ 8,100.00	*
19" x 30" Horizontal Elliptical Reinforced Concrete Pipe		LF	$ 100.00	=	$ -		$ -	*
54" Corrugated Steel Pipe		LF	$ 269.00	=	$ -		$ -	
32" CMP		LF	$ 120.00	=	$ -		$ -	
60" Corrugated Steel Pipe		LF	$ 290.00	=	$ -		$ -	*
66" Corrugated Steel Pipe		LF	$ 352.00	=	$ -		$ -	*
72" Corrugated Steel Pipe		LF	$ 414.00	=	$ -		$ -	*
18" - Flared End Section (FES)	2	EA	$ 402.00		$ 804.00		$ 804.00	*
18" - Flared End Section (FES)		EA	$ 402.00		$ -		$ -	*
24" - Flared End Section (FES)	4	EA	$ 486.00		$ 1,944.00		$ 1,944.00	*
19" x 30" - Flared End Section (FES)		EA	$ 600.00		$ -		$ -	*
30" - Flared End Section (FES)		EA	$ 600.00		$ -		$ -	*
32" Flared End Section (FES)		EA	$ 650.00	=	$ -		$ -	*
Flared End Section (FES) CSP Size = (unit cost = 6x pipe unit cost)		EA		=	$ -		$ -	*
End Treatment- Headwall		EA		=	$ -		$ -	*
End Treatment- Wingwall		EA		=	$ -		$ -	*
End Treatment - Cutoff Wall		EA		=	$ -		$ -	*
Curb Inlet (Type R) L=5', Depth < 5'		EA	$ 5,736.00	=	$ -		$ -	*
Curb Inlet (Type R) L=5', 5' ≤ Depth < 10'		EA	$ 7,440.00	=	$ -		$ -	*
Curb Inlet (Type R) L =5', 10' ≤ Depth < 15'		EA	$ 8,637.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', Depth < 5'		EA	$ 7,894.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', 5' ≤ Depth < 10'		EA	$ 8,136.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', 10' ≤ Depth < 15'		EA	$ 10,185.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', Depth < 5'		EA	$ 10,265.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', 5' ≤ Depth < 10'		EA	$ 11,005.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', 10' ≤ Depth < 15'		EA	$ 12,034.00	=	$ -		$ -	*
Curb Inlet (Type R) L =20', Depth < 5'		EA	$ 10,940.00	=	$ -		$ -	*
Curb Inlet (Type R) L =20', 5' ≤ Depth < 10'		EA	$ 12,075.00	=	$ -		$ -	*
Grated Inlet (Type C), Depth < 5'		EA	$ 4,802.00	=	$ -		$ -	
Grated Inlet (Type D), Depth < 5'		EA	$ 5,932.00	=	$ -		$ -	*
Storm Sewer Manhole, Box Base		EA	$ 12,034.00	=	$ -		$ -	
Storm Sewer Manhole, Slab Base		EA	$ 6,619.00	=	$ -		$ -	
Geotextile (Erosion Control)		SY	$ 6.20	=	$ -		$ -	
Rip Rap, d50 size from 6" to 24"		Tons	$ 83.00	=	$ -		$ -	
Rip Rap, Grouted		Tons	$ 98.00	=	$ -		$ -	
Drainage Channel Lining, Concrete		CY	$ 590.00	=	$ -		$ -	
Drainage Channel Lining, Rip Rap		CY	$ 116.00	=	$ -		$ -	
Drainage Channel Lining, Grass		AC		=	$ -		$ -	
Drainage Channel Lining, Other Stabilization				=	$ -		$ -	
				=	$ -		$ -	
[insert items not listed but part of construction plans]				=	$ -		$ -	
* - Subject to defect warranty financial assurance. A minimum of 20% shall be retained until final acceptance (MAXIMUM OF 80% COMPLETE ALLOWED)			**Section 2 Subtotal**	**=**	**$ 16,208.00**		**$ 16,208.00**	
SECTION 3 - COMMON DEVELOPMENT IMPROVEMENTS (Private or District and NOT Maintained by EPC)**								
ROADWAY IMPROVEMENTS								
				=	$ -		$ -	
				=	$ -		$ -	

PROJECT INFORMATION		
Saddlehorn Ranch Filing 2 Improvements Early Gradin	3/21/2022	SF-21-033
Project Name	Date	PCD File No.

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining
				=	$ -		$ -

Adjust print area

JR: Addressed

PROJECT INFORMATION		
Saddlehorn Ranch Filing 2 Improvements Early Gradin	3/21/2022	SF-21-033
Project Name	Date	PCD File No.

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining
				=	$ -		$ -
STORM DRAIN IMPROVEMENTS	(Exception: Permanent Pond/BMP shall be itemized under Section 1)						
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
					$ -		$ -
				=	$ -		$ -
WATER SYSTEM IMPROVEMENTS							
Water Main Pipe (PVC), Size 8"		LF	$ 66.00	=	$ -		$ -
Water Main Pipe (PVC), Size 12"		LF	$ 100.00		$ -		$ -
Water Main Pipe (Ductile Iron), Size 8"		LF	$ 78.00	=	$ -		$ -
					$ -		$ -
Gate Valves, 8"		EA	$ 1,923.00	=	$ -		$ -
Gate Valves, 12"		EA	$ 2,900.00		$ -		$ -
Fire Hydrant Assembly, w/ all valves		EA	$ 6,828.00	=	$ -		$ -
Water Service Line Installation, inc. tap and valves		EA	$ 1,370.00	=	$ -		$ -
Fire Cistern Installation, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
SANITARY SEWER IMPROVEMENTS							
Sewer Main Pipe (PVC), Size 8"		LF	$ 66.00	=	$ -		$ -
Sanitary Sewer Manhole, Depth < 15 feet		EA	$ 4,540.00	=	$ -		$ -
Sanitary Service Line Installation, complete		EA	$ 1,451.00	=	$ -		$ -
Sanitary Sewer Lift Station, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
LANDSCAPING IMPROVEMENTS	(For subdivision specific condition of approval, or PUD)						
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
** - Section 3 is not subject to defect warranty requirements		**Section 3 Subtotal**		**=**	**$ -**		**$ -**
AS-BUILT PLANS (Public Improvements inc. Permanent WQCV BMPs)		LS		=	$ -		$ -
POND/BMP CERTIFICATION (inc. elevations and volume calculations)		LS		=	$ -		$ -

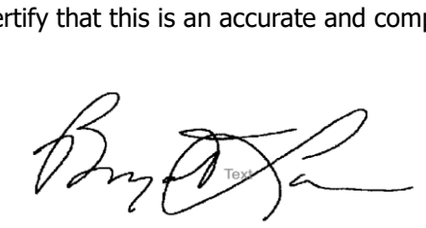
Total Construction Financial Assurance **$ 400,505.18**
(Sum of all section subtotals plus as-builts and pond/BMP certification)

Total Remaining Construction Financial Assurance (with Pre-Plat Construction) **$ 400,505.18**
(Sum of all section totals less credit for items complete plus as-builts and pond/BMP certification)

Total Defect Warranty Financial Assurance **$ 40,227.22**
(20% of all items identified as (*). To be collateralized at time of preliminary acceptance)

Approvals

I hereby certify that this is an accurate and complete estimate of costs for the work as shown on the Grading and Erosion Control Plan and Construction Drawings associated with the Project.



Engineer (P.E. Seal Required)

Approved by Owner / Applicant — Date

Approved by El Paso County Engineer / ECM Administrator — Date

SADDLEHORN RANCH - FILING NO. 2

A PARCEL OF LAND LOCATED IN THE SOUTH HALF OF SECTION 3 AND THE NORTH HALF OF SECTION 10 TOWNSHIP 13 SOUTH, RANGE 64 WEST OF THE 6TH P.M., EL PASO COUNTY, STATE OF COLORADO

GRADING AND EROSION CONTROL PLANS

JR: Noted

Revise title to "Pre-Development Grading and Erosion Control Plans"

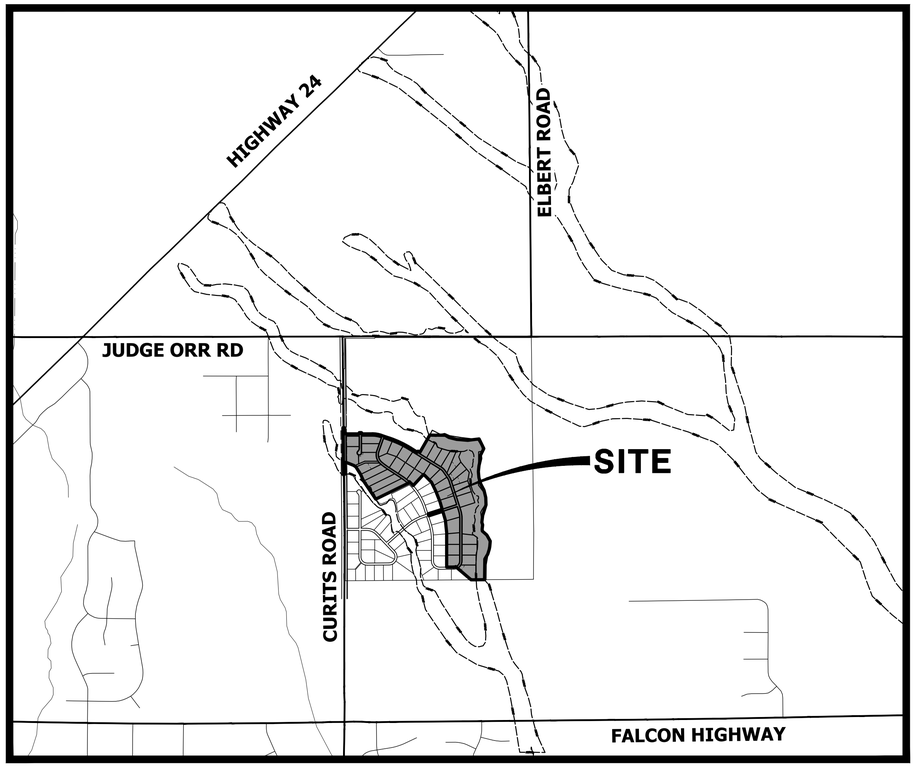
EPC STORMWATER REVIEW COMMENTS ARE SHOWN IN ORANGE BOXES WITH BLACK TEXT

811 Know what's below. Call before you dig.

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

ABBREVIATIONS

AC	ACRE
AD	ALGEBRAIC DIFFERENCE
AH	AHEAD
ARCH	ARCHITECT
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASSY	ASSEMBLY
AVE	AVENUE
BB	BOX BASE
BK	BACK
BNDY	BOUNDARY
BOP	BOTTOM OF PIPE
BOV	BLOW OFF VALVE
BFV	BUTTERFLY VALVE
BLVD	BOULEVARD
BW	BOTTOM OF WALL
C&G	CURB & GUTTER
CATV	CABLE TELEVISION
CB	CATCH BASIN
CBC	CONCRETE BOX CULVERT
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CDS	CUL-DE-SAC
CF	CUBIC FOOT
CFS	CUBIC FEET PER SECOND
CIP	COMPLETE IN PLACE
CL	CENTER LINE
CLOMR	CONDITIONAL LETTER OF MAP REVISION
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COCS	CITY OF COLORADO SPRINGS
CONC	CONCRETE
CR	CIRCLE
CSP	CORRUGATED STEEL PIPE
CSU	COLORADO SPRINGS UTILITIES
CT	COURT
CTRB	CONCRETE THRUST REDUCER BLOCK
CY	CUBIC YARD
DBPS	DRAINAGE BASIN PLANNING STUDY
DE	DRAINAGE EASEMENT
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DR	DRIVE
DRC	DESIGN REVIEW COMMITTEE
DU	DWELLING UNITS
DY	DAY
E	EAST
EA	EACH
EGL	ENERGY GRADE LINE
EL	ELEVATION
ELEC	ELECTRIC
EOA	EDGE OF ASPHALT
EPC	EL PASO COUNTY
ERCP	ELLIPTICAL RCP
ESMT	EASEMENT
EST	ESTIMATE
EX	EXISTING
FDP	FINAL DEVELOPMENT PLAN
FDR	FINAL DRAINAGE REPORT
FES	FLARED END SECTION
FF	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLOWLINE
FIL	FILING
FO	FIBER OPTIC CABLE
GB	GRADE BREAK
GE	GAS EASEMENT
GIS	GEOGRAPHIC INFORMATION SYSTEM
GL	GAS LINE
GPS	GLOBAL POSITIONING SYSTEM
GV	GATE VALVE
HBP	HOT BITUMINOUS PAVEMENT
HC	HANDICAP
HDC	HIGH DEFLECTION COUPLING
HDPE	HIGH DENSITY POLYETHYLENE
HGL	HYDRAULIC GRADE LINE
HMA	HOT MIX ASPHALT
HOA	HOME OWNERS ASSOCIATION
HP	HIGH POINT
HR	HOUR
I	INLET
IE	IRRIGATION EASEMENT
INT	INTERSECTION
INV	INVERT
IRR	IRRIGATION
KB	KICK (THRUST) BLOCK
LB	POUND
LE	LANDSCAPE EASEMENT
LF	LINEAR FOOT
LN	LANE
LOMR	LETTER OF MAP REVISION
LP	LOW POINT
LS	LUMP SUM
LT	LEFT
MAX	MAXIMUM
M/D	MOISTURE DENSITY
MDDP	MASTER DEVELOPMENT DRAINAGE PLAN
MH	MANHOLE
MIN	MINIMUM
MS	MOUNTABLE SIDEWALK
N	NORTH
NRCP	NON-REINFORCED CONCRETE PIPE
ODP	OFFICIAL DEVELOPMENT PLAN
OHE	OVERHEAD ELECTRIC
OHU	OVERHEAD UTILITY
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PCR	POINT OF CURB RETURN
PDP	PRELIMINARY DEVELOPMENT PLAN
PE	PROFESSIONAL ENGINEER
PI	POINT OF INTERSECTION
PKWY	PARKWAY
PL	PROPERTY LINE
PR	PROPOSED
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCBC	REINFORCED CONCRETE BOX CULVERT
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
ROW	RIGHT OF WAY
RT	RIGHT
S	SOUTH
STE	STEEL
SAN	SANITARY SEWER
SF	SQUARE FOOT
ST	STREET
STA	STATION
STM	STORM SEWER
SY	SQUARE YARD
SY-IN	SQUARE YARD INCH
TB	THRUST BLOCK
TBC	TOP BACK OF CURB
TBW	TOP BACK OF WALK
TEL	TELEPHONE
TN	TON
TOA	TOP OF ASPHALT
TOB	TOP OF BOX
TOC	TOP OF CURB OR CONCRETE
TOF	TOP OF FOUNDATION
TOP	TOP OF PIPE
TW	TOP OF WALL
TYP	TYPICAL
UDFCD	URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UE	UTILITY EASEMENT
U&DE	UTILITY & DRAINAGE EASEMENT
UGE	UNDERGROUND ELECTRIC
VCP	VITRIFIED CLAY PIPE
VPC	VERTICAL POINT OF CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
VTC	VEHICLE TRACKING CONTROL
W	WEST
WL	WATER LINE
WM	WATER MAIN
WRD	WATER RESOURCES DEPARTMENT
WS	WATER SURFACE
WSE	WATER SURFACE ELEVATION
WTR	WATER
YR	YEAR



VICINITY MAP

SCALE: 1" = 2000'

EARTHWORK SUMMARY TABLE	
NET CUT (CY)	50,633
NET FILL (CY)	46,469
NET EXPORT (CY)	4,164
* 1' ROAD CUT	
* 10% COMPACTION	

SHEET INDEX

1 – COVER SHEET
2 – LEGEND & NOTES
3 – TYPICAL SECTIONS
4 – GRADING & EROSION CONTROL SITE PLAN
4.1 – EARLY GRADING IMPROVEMENTS
5–7 – GRADING & EROSION CONTROL PLANS
8–14 – GRADING & EROSION CONTROL DETAILS

CONTACTS:

OWNER	GORILLA CAPITAL, LLC 1342 HIGH STREET EUGENE, OR 97401 P~541-393-9043
DEVELOPER	ROI PROPERTY GROUP, LLC 2495 RIGDON STREET NAPA, CALIFORNIA 94558 P~707-633-9700
ENGINEER/SURVEYOR	JR ENGINEERING, LLC ATTN: BRYAN LAW 5475 TECH CENTER DRIVE, SUITE 235 COLORADO SPRINGS, CO 80919 P~(303) 267-6254
FIRE PROTECTION DISTRICT	FALCON FIRE PROTECTION 12072 ROYAL COUNTY DOWN ROAD FALCON, CO 80831 P~(719) 495-4050
DISTRICT	SADDLEHORN RANCH METRO DISTRICT

J·R ENGINEERING

BENCHMARK:

THE VERTICAL DATUM IS BASED OFF AN OPUS SOLUTION RAN ON CONTROL POINT #100 (NO. 4 REBAR) AND IS ADJUSTED TO NGVD 1929, ELEVATION 6754.61.

BASIS OF BEARINGS:

THE WEST LINE OF SECTION 3, T3S, R64W, 6TH P.M., MONUMENTED BY A 3-1/4" ALUMINUM CAP STAMPED "PLS 17496" IN A RANGE BOX AT THE NORTHWEST CORNER OF SECTION 3 AND A NO. 8 REBAR IN A RANGE BOX AT THE SOUTHWEST CORNER OF SECTION 3, BEARING N00°32'28"W AS REFERENCED TO COLORADO STATE PLANE CENTRAL ZONE.

THE LOCATIONS OF EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL ABOVE GROUND AND UNDERGROUND UTILITIES.

OWNER/DEVELOPER STATEMENT

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

BILL GUMAN — DATE

WILLIAM GUMAN AND ASSOCIATES
731 NORTH WEBER STREET
COLORADO SPRINGS, CO 80903

EL PASO COUNTY STATEMENT

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 COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTORS DISCRETION.

JENNIFER IRVINE, P.E. — DATE

COUNTY ENGINEER/ECM ADMINISTRATOR

ENGINEER'S STATEMENT

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS PLANS.

BRYAN T. LAW, P.E. — DATE
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

JR: Note Added

Add "PCD File No. EGP221"

PREPARED FOR
ROI PROPERTY GROUP, LLC
2495 RIGDON STREET
NAPA, CALIFORNIA
(707) 365-6891
BRADY WILLIAMS

J·R ENGINEERING
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

No.	REVISION	BY	DATE

H-SCALE	1"=2000'
V-SCALE	N/A
DATE	1/2/22
DESIGNED BY	NQJ
DRAWN BY	NQJ
CHECKED BY	

SADDLEHORN RANCH – FILING NO. 2

COVER SHEET

SHEET 1 OF 14

JOB NO. 2514204

GRADING AND EROSION CONTROL STANDARD NOTES

1. CONSTRUCTION MAY NOT COMMENCE UNTIL A CONSTRUCTION PERMIT IS OBTAINED FROM PLANNING AND COMMUNITY DEVELOPMENT AND A PRECONSTRUCTION CONFERENCE IS HELD WITH PLANING AND COMMUNITY DEVELOPMENT INSPECTIONS.
2. STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF-SITE WATERS, INCLUDING WETLANDS.
3. NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
4. A SEPARATE STORMWATER MANAGEMENT PLAN (SMWP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
5. ONCE THE ESQCP IS APPROVED AND A "NOTICE TO PROCEED" HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY STAFF.
6. CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
7. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
8. TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
9. FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
10. ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT AFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
11. EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
12. COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
13. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF SITE.
14. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
15. DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
16. EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
17. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
18. WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
19. TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
20. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
21. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
22. NO CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ONSITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
23. BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
24. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
25. OWNER/DEVELOPER AND THEIR AGENTS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
26. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
27. PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
28. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
29. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY ENTECH ENGINEERING, INC. ON APRIL 29, 2019 AND SHALL BE CONSIDERED A PART OF THESE PLANS.
30. AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (1) ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL DIVISION
WQCD - PERMITS
4300 CHERRY CREEK DRIVE SOUTH
DENVER, CO 80246-1530
ATTN: PERMITS UNIT

Upload a copy of the soils report.

JR: Noted

LAYER LINETYPE LEGEND

	EXISTING	PROPOSED
PHASE LINE		
MATCH LINE		
SECTION LINE		
BOUNDARY LINE		
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
R.O.W. A LINE	A	A
CENTERLINE		
CITY LIMITS		
WIRE FENCE	X	X
CHAIN LINK FENCE	O	●
WOOD FENCE	◇	◆
MASONRY FENCE	□	■
GUARDRAIL		
CONC. BARRIER		
CABLE TV	TV	TV
ELECTRIC	E	E
FIBER OPTIC	FO	FO
GAS MAIN	G	G
IRRIGATION MAIN	IRR	IRR
OIL/PETRO. MAIN	O	O
OVERHEAD UTILITY	OHU	OHU
SANITARY SEWER	S	●
STORM DRAIN		
TELEPHONE	T	T
WATER MAIN	W	W
RAW WATER LINE	RWL	RWL
SWALE/WATERWAY FLOWLINE		
DIVERSION DITCH		
DIVERSION CHANNEL		
MAJOR DRAINAGE BASIN		
MINOR DRAINAGE BASIN		
TOP OF SLOPE		
TOE OF SLOPE		
EDGE OF WATER		
INDEX CONTOUR	6100	6100
INTERMEDIATE CONTOUR		
DEPRESSION CONT. (INDEX)	6100	6100
DEPRESSION CONT. (INTER)		
TOP OF CUTS		
TOE OF FILLS		
CUT AND FILL LINE		C/F
SILT FENCE	SF	SF
100 YEAR FLOODPLAIN	100YR	100YR
500 YEAR FLOODPLAIN	500YR	500YR
FLOODWAY	FLDWY	FLDWY
BASE FLOOD ELEVATION		
EDGE OF WETLANDS		
STONE WALL		
STORMWATER FLOW ARROWS		1.00%

UTILITIES LEGEND

	EXISTING	PROPOSED
STORM SEWER		
MANHOLE	Ⓓ	◉
STORM INLET		▣
AREA INLET - SQUARE	□	
AREA INLET - ROUND	○	
FLARED END SECTION	▷	◁
RIPRAP		
SANITARY SEWER		
LINE MARKER	Mkr San	
SERVICE MARKER	Ⓢ	
CLEAN-OUT	○-	-○
MANHOLE W/ DIRECTIONAL FLOW ARROW	Ⓢ	◉
WATER LINE		
LINE MARKER	Mkr W	
SERVICE MARKER	Ⓦ	
FIRE HYDRANT		
FIRE CONNECTION		
MANHOLE	Ⓦ	●
BEND		
BLOW-OFF VALVE		
WELL	WELL	WELL
METER	Ⓦ	●
VALVE	⋈	
REDUCER		
THRUST BLOCK		
CROSS		
PLUG W/ THRUST BLOCK		
TEE		
REVERSE ANCHOR		
ANODE		
AIR & VACUUM VALVE ASSEMBLY		
TRANSMISSION BLOW-OFF ASSEMBLY		
GAS LINE		
MARKER	Mkr G	
SERVICE MARKER	Ⓖ	
METER	Ⓖ	●
VALVE	⋈	⋈
PLUG	⊏	⊏
TEE		
DRY UTILITIES		
CABLE TV MARKER	Mkr TV	
CABLE TELEVISION PEDESTAL	TV	
ELECTRIC MARKER	Mkr E	
ELECTRIC SERVICE MARKER	Ⓔ	
ELECTRICAL PEDESTAL	E	
ELECTRICAL METER	Ⓔ	
ELECTRICAL MANHOLE	Ⓔ	
FIBER-OPTIC MARKER	Mkr FO	
IRRIGATION PEDESTAL	I	
TELEPHONE MARKER	Mkr T	
TELEPHONE PEDESTAL	T	
TELEPHONE MANHOLE	Ⓣ	
UTILITY POLE	-o-	-o-
GUY ANCHOR	⇐	
GUY POLE	○	

STORM WATER MANAGEMENT

	KEY	SYMBOL
CHECK DAM	CD	
CONSTRUCTION ROAD STABILIZATION	CRS	
CURB SOCK INLET PROTECTION	CS	
CONCRETE WASHOUT AREA	CWA	
DIVERSION DITCH AND DIKE, TEMPORARY	DD	
DIVERSION CHANNEL, TEMPORARY	DV	
DEWATERING	DW	
EROSION CONTROL BLANKET	ECB	
INLET FILTER	IF	
INLET PROTECTION	IP	
MULCHING	MU	
OUTLET PROTECTION	OP	
PAVED FLUME	PF	
PERMENENT SEEDING	PS	
REINFORCED CONCRETE DAM	RCD	
ROUGH CUT STREET CONTROL	RCS	
SEDIMENT BASIN	SB	
SEDIMENT CONTROL LOG	SCL	
SILT FENCE	SF	
SURFACE ROUGHENING	SR	
STABILIZED STAGING AREA	SSA	
SEDIMENT TRAP	ST	
STRAW BALE BARRIER	STB	
TERRACING	TER	
TEMPORARY SEEDING	TS	
TEMPORARY STREAM CROSSING CULVERT/BRIDGE	TSC C	
TEMPORARY STREAM CROSSING FORD TYPE	TSC F	
TEMPORARY SLOPE DRAIN	TSD	
VEHICLE TRACKING CONTROL	VTC	
VEHICLE TRACKING CONTROL WITH WASH RACK	WR	
CONSTRUCTION MARKER	CM	
LIMITS OF CONSTRUCTION	LOC	

The signature block on the cover sheet is sufficient. The engineer's statement on subsequent sheets may be removed.

Note that engineer's PE Stamp with signature and date of signature will be required on every sheet on the final approved plan set.

JR:Noted

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
ROI PROPERTY GROUP, LLC
2495 RIGDON STREET
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No.	REVISION	BY	DATE

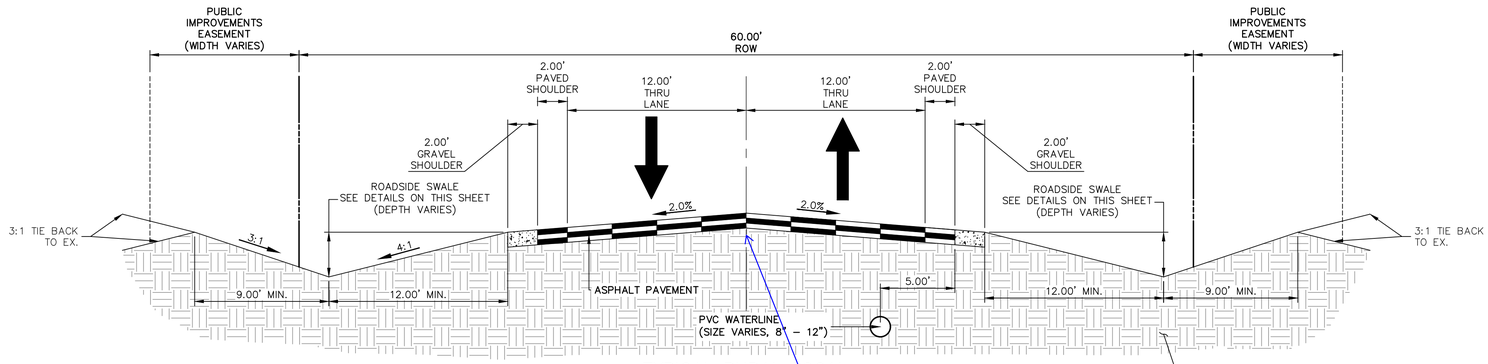
H-SCALE	N/A	DATE	1/2/22	DESIGNED BY	NQJ
V-SCALE	N/A			DRAWN BY	NQJ
				CHECKED BY	

SADDLEHORN RANCH - FILING NO. 2

GRADING & EROSION CONTROL NOTES & LEGEND

SHEET 2 OF 14

JOB NO. 2514204



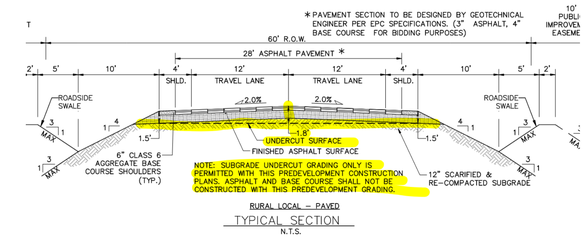
TYPICAL RURAL LOCAL

POSTED SPEED LIMIT = 30 MPH, DESIGN SPEED LIMIT = 30 MPH

SCALE: 1" = 5'

Update to show the early grading limits. See the example below.

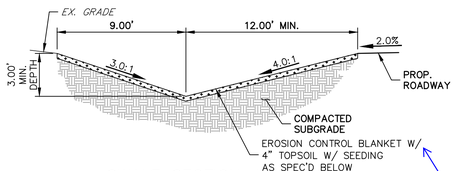
JR: Note added



RURAL LOCAL – PAVED

TYPICAL SECTION

N.T.S.



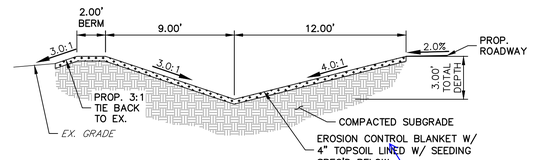
SWALE SECTION A–A

SCALE: 1"=5'

SWALE SEED MIX:
EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

Update label to identify the specific ECB product.

JR: Noted, label updated



SWALE SECTION B–B

SCALE: 1"=5'

SWALE SEED MIX:
EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

Update label to identify the specific ECB product.

JR: Noted, label updated

ROADSIDE SWALE NOTES

1. SWALE SECTION A–A PROVIDES MINIMUM SWALE DIMENSIONS. IN AREAS WHERE 3:1 TIE BACK TO EXISTING DOES NOT PROIVDE MINIMUM SWALE DEPTH, SWALE TO BE CUT DEEPER SUCH THAT 3' DEPTH IS PROVIDED RELATIVE TO EXISTING GRADE.
2. SWALE SECTION B–B TO BE USED IN FILL AREAS OF ROADWAY WHERE CUTTING SWALE DEEPER TO ACHIEVE 3.0' DEPTH RELATIVE TO EXISTING GRADE CAN NOT BE ACHIEVED DUE TO DOWN STREAM GRADE REQUIREMENTS. 2.0' BERM MUST BE PROVIDED TO MITIGATE FUTURE EROSION.

EARLY GRADING NOTES

1. NO PAVEMENT SHOWN IN THE ABOVE ROAD SECTION SHALL BE PROPOSED WITH ANY EARLY GRADING IMPROVEMENTS.
2. ALL PROPOSED TEMPORARY CULVERTS SHALL BE 18" CMP. TEMPORARY CULVERT LOCATIONS CAN BE FOUND ON SHEET 4.1.
3. ALL TEMPORARY SWALE CONNECTIONS SHALL MATCH FUTURE CULVERT GRADES. TEMPORARY SWALE CONNECTION LOCATIONS CAN BE FOUND ON SHEET 4.1.
4. ALL INITIAL BMPS SHALL BE INSTALLED PRIOR TO ANY GRADING ONSITE.
5. ALL CHECK DAMS AND INLET/OUTLET PROTECTIONS SHALL BE INSTALLED AND MAINTAINED ~~WHILE GRADING OPERATIONS ARE BEING PERFORMED ONSITE.~~ until 70% vegetation has been achieved and removal is approved by EPC

JR: Note updated

6. NO GRADING IMPROVEMENTS SHALL BE PERFORMED WITHIN THE CURTIS ROAD ROW AS PART OF THE EARLY GRADING IMPROVEMENTS FOR THIS SITE.

5 3 0 5 10

ORIGINAL SCALE: 1" = 5'

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

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H-SCALE	1"=5'	DESIGNED BY	NQJ	
V-SCALE	N/A	DRAWN BY	NQJ	
DATE	1/2/22	CHECKED BY		

SADDLEHORN RANCH – FILING NO. 2

TYPICAL SECTIONS

SHEET 3 OF 14

JOB NO. 2514204

220 110 0 220 440

ORIGINAL SCALE: 1" = 220'

JR: Noted

address Stormwater comments from SF2133 GEC_v2

Know what's below. Call before you dig.

Delete. Signature block on the cover sheet is sufficient. Typical comment for subsequent sheets.

JR: Noted

OWNER/DEVELOPER STATEMENT

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BILL GUMAN — DATE

WILLIAM GUMAN AND ASSOCIATES
731 NORTH WEBER STREET
COLORADO SPRINGS, CO 80903

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BRYAN T. LAW, P.E. — DATE
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

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PREPARED FOR
ROI PROPERTY GROUP, LLC
2495 RIGDON STREET
NAPA, CALIFORNIA
(707) 365-6891
BRADY WILLIAMS

J·R ENGINEERING
A Westrian Company
Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

No.	REVISION	BY	DATE

H-SCALE	1"=220'
V-SCALE	N/A
DATE	1/2/22
DESIGNED BY	GVT
DRAWN BY	GVT
CHECKED BY	

SADDLEHORN RANCH – FILING NO. 2

GRADING & EROSION CONTROL SITE PLAN

SHEET 4 OF 14

JOB NO. 2514204

install temporary swale in order to direct stormwater to TSB

JR: Temporary 18" CMP culverts to be installed during early grading

TEMPORARY SWALE CONNECTION

PROPOSED 18" RCP CULVERT

PROPOSED 18" RCP CULVERT

PROPOSED ROADSIDE SWALE (TYP.)

ESTACADO PLACE

SAN ISIDRO TRAIL

BENITO WELLS TRAIL

EL RAICENO TRAIL

DEL CERRO TRAIL

TRACT B

TRACT C

TRACT A

NON-JURISDICTIONAL WETLAND

DRAINAGEWAY MS-06

TEMPORARY SWALE CONNECTION

PROPOSED ROADSIDE SWALE (TYP.)

EXISTING ROADSIDE SWALE (TYP.)

TEMPORARY 18" CMP CULVERT

EXISTING CULVERTS (TYP.)

JR: Temporary dual 24" RCP's to be installed with early grading

While utilizing pond as a TSB, a temporary swale or culvert should be installed here

PROPOSED DUAL 24" RCP CULVERTS

PROPOSED POND F

EXISTING CULVERTS (TYP.)

EXISTING ROADSIDE SWALE (TYP.)

CURTIS ROAD

TRUCHAS TRAIL

HAEGLER TRANCH TRIBUTARY 6

OSCURO TRAIL

SADDLEHORN RANCH FILING 1

ZARAGOZA TRAIL

CARRANZA TRAIL

100YR

LEGEND

EARLY GRADING TEMPORARY IMPROVEMENTS

EARLY GRADING EXCLUDED AREAS

N

200 100 0 200 400

ORIGINAL SCALE: 1" = 200'

OWNER/DEVELOPER STATEMENT

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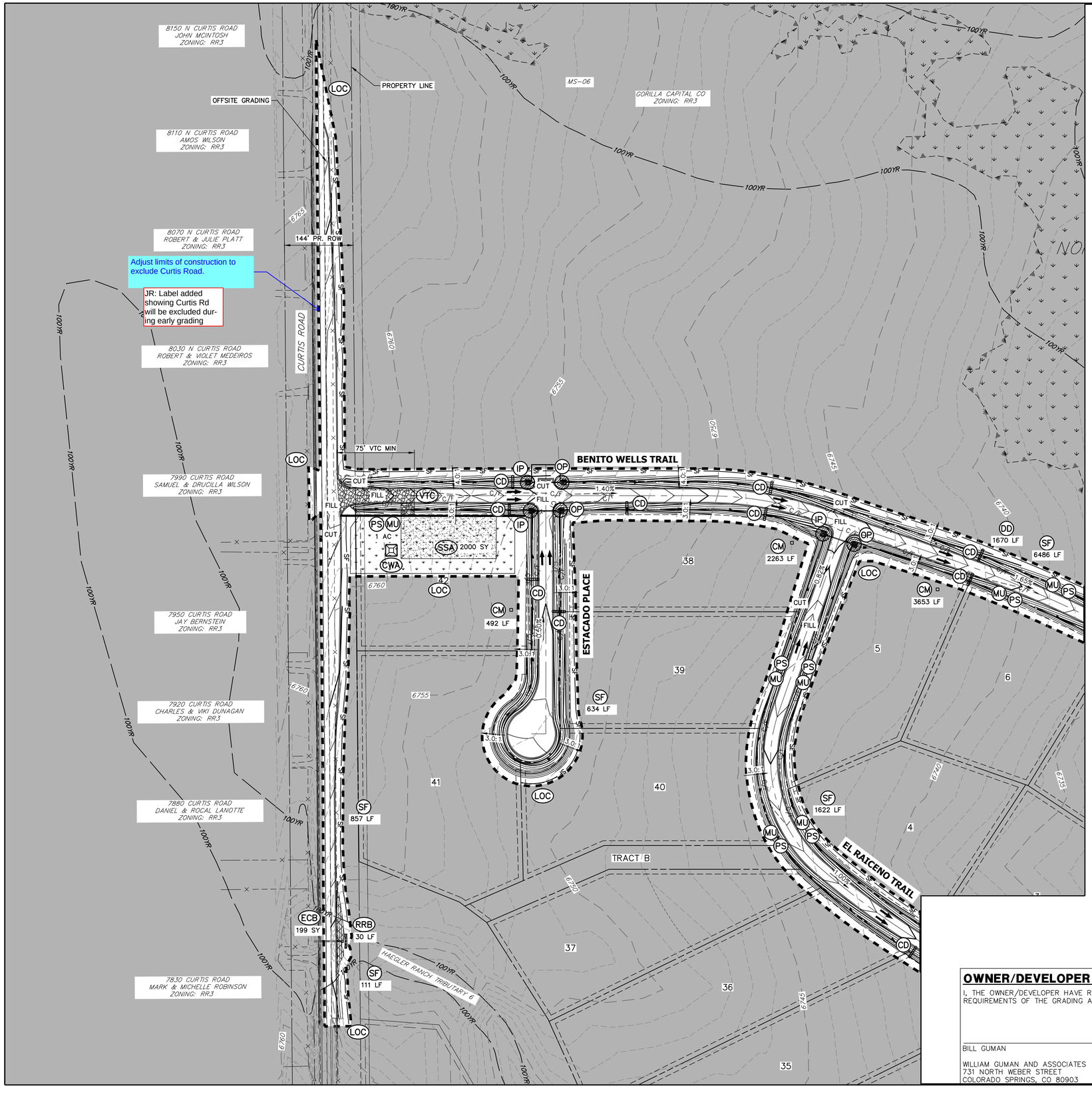
SADDLEHORN RANCH – FILING NO. 2

EARLY GRADING IMPROVEMENTS

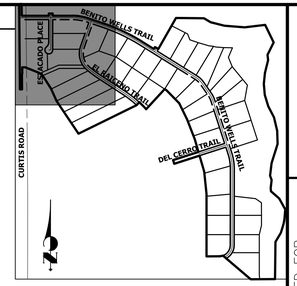
SHEET 4.1 OF 14

JOB NO. 2514204



LEGEND

- SEDIMENT BASIN (SB) — TOE / TOP
- SILT FENCE (SF) — SF
- STABILIZED STAGING AREA (SSA)
- CONSTRUCTION MARKER (CM)
- VEHICLE TRACKING CONTROL (VTC)
- TEMPORARY STOCK PILE (TSP)
- EROSION CONTROL BLANKET (ECB)
- INLET PROTECTION (IP)
- OUTLET PROTECTION (OP)
- DIVERSION DITCH AND DIKE, TEMPORARY (DD)
- CUT AND FILL LINE — C/F — C/F —
- LIMITS OF CONSTRUCTION/DISTURBANCE (LOC)
- CONCRETE WASHOUT AREA (CWA)
- MULCHING & PERMANENT SEEDING (MU) (PS)
- TEMPORARY SLOPE DRAIN (TSD)
- REINFORCED ROCK BERM (RRB)
- CHECK DAM (CD)
- ROCK SOCK (RS)
- CONSTRUCTION MARKERS (CM)



KEY MAP
N.T.S

100 50 0 100 200
ORIGINAL SCALE: 1" = 100'

NOTES

1. REFER TO THE STORMWATER MANAGEMENT PLAN (SWMP) FOR A DETAILED DESCRIPTION OF THE MAINTENANCE PROGRAMS FOR EROSION CONTROL FACILITIES.
2. SEE SHEET 3 FOR SWALE TYPICAL CROSS SECTIONS THAT INCLUDES SWALE LINING DETAIL.
3. ALL DISTURBED AREAS NOT TO BE PAVED SHALL BE PERMANENTLY SEEDED PER THE PAWNEE BUTTES SEED INC – "LOW GROW NATIVE MIX" OR APPROVED EQUAL. SEE SHEET 3 FOR SEED MIX DETAILS.12.7 TOTAL ACRES OF SEEDING ESTIMATED.
4. P.I.E = PUBLIC IMPROVEMENTS EASEMENT
5. EXISTING VEGETATION CONSISTS OF NATIVE MEADOW GRASSES (APPROX. 70% COVERAGE) DETERMINED THROUGH A COMBINATION OF FIELD VERIFICATION AND AERIAL INSPECTION.
6. NO BATCH PLANTS WILL BE UTILIZED ON SITE.

BMP PHASING

INITIAL (09/2021 – 10/2021):
1) INSTALL VTC
2) INSTALL CWA
3) ESTABLISH SSA
4) INSTALL CONSTRUCTION MARKERS
5) INSTALL SILT FENCE
6) INSTALL SEDIMENT BASINS
7) INSTALL DIVERSION DITCHES

INTERIM (10/2021 – 04/2022):
1) LOCATE/INSTALL TEMPORARY STOCKPILE
2) MAINTAIN ALL BMPS
3) INSTALL RRBS
4) INSTALL INLET AND OUTLET PROTECTION
5) INSTALL EROSION CONTROL BLANKETS

FINAL (04/2022 – 09/2022):
1) INSTALL MULCH AND PERMANENT SEEDING IN ALL DISTURBED AREAS
2) REMOVE SILT FENCE AFTER STABILIZED, INLET & OUTLET PROTECTION, RRBS, EROSION CONTROL BLANKETS, VTC, CWA, CONSTRUCTION MARKERS, SEDIMENT BASINS, DIVERSION DITCHES, SSA, AND TEMPORARY STOCKPILES

FINAL STABILIZATION ANTICIPATED 06/2023.

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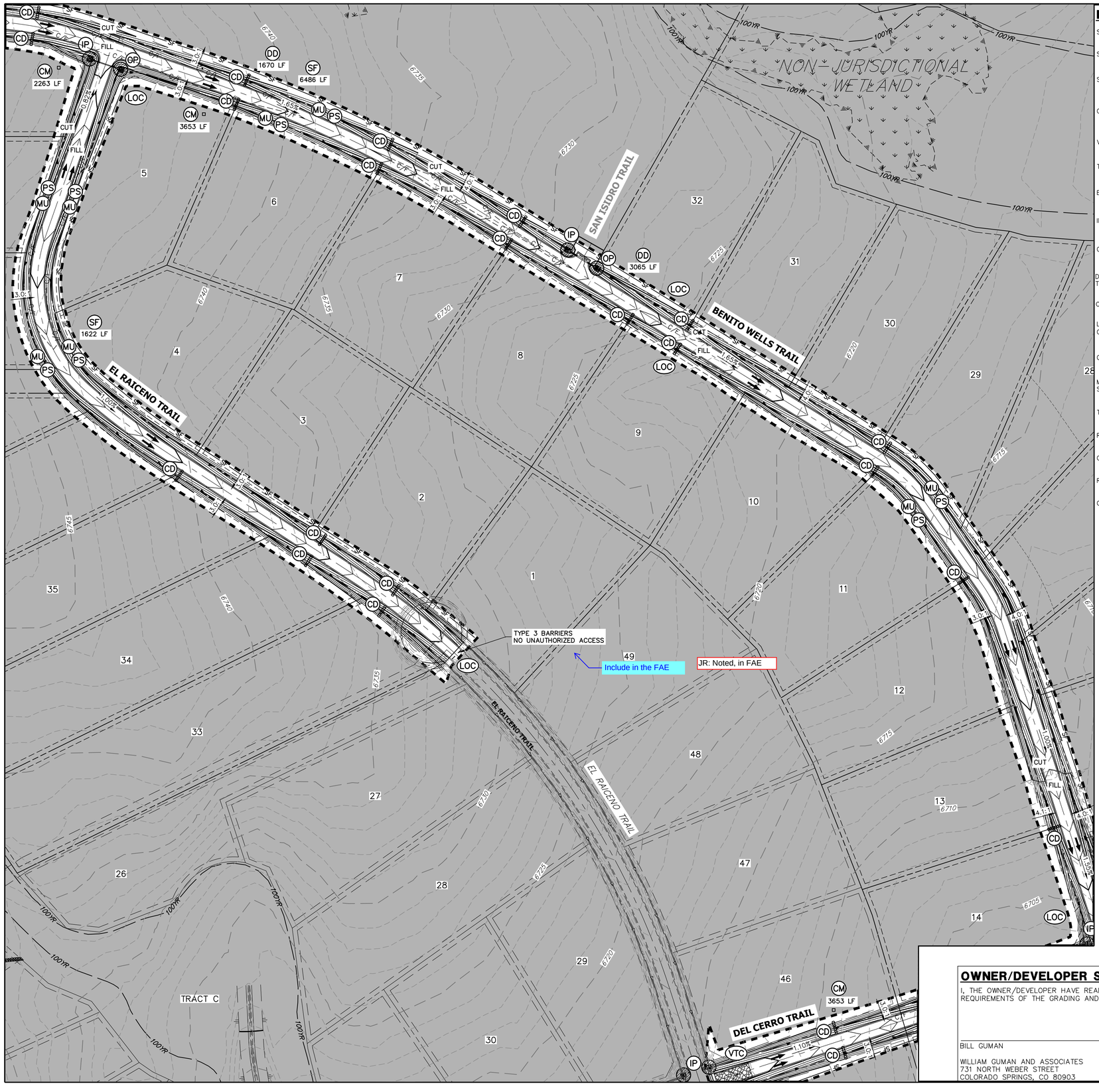
SADDLEHORN RANCH – FILING NO. 2

GRADING & EROSION CONTROL PLANS

SHEET 5 OF 14

JOB NO. 2514204



LEGEND

SEDIMENT BASIN	SB	TOE / TOP
SILT FENCE	SF	SF
STABILIZED STAGING AREA	SSA	
CONSTRUCTION MARKER	CM	
VEHICLE TRACKING CONTROL	VTC	
TEMPORARY STOCK PILE	TSP	
EROSION CONTROL BLANKET	ECB	
INLET PROTECTION	IP	
OUTLET PROTECTION	OP	
DIVERSION DITCH AND DIKE, TEMPORARY	DD	
CUT AND FILL LINE		C/F C/F
LIMITS OF CONSTRUCTION/DISTURBANCE	LOC	
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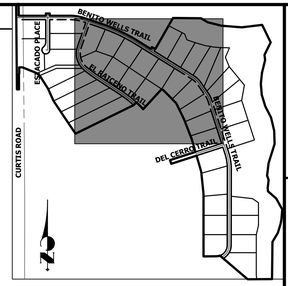

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FINAL STABILIZATION ANTICIPATED 06/2023.

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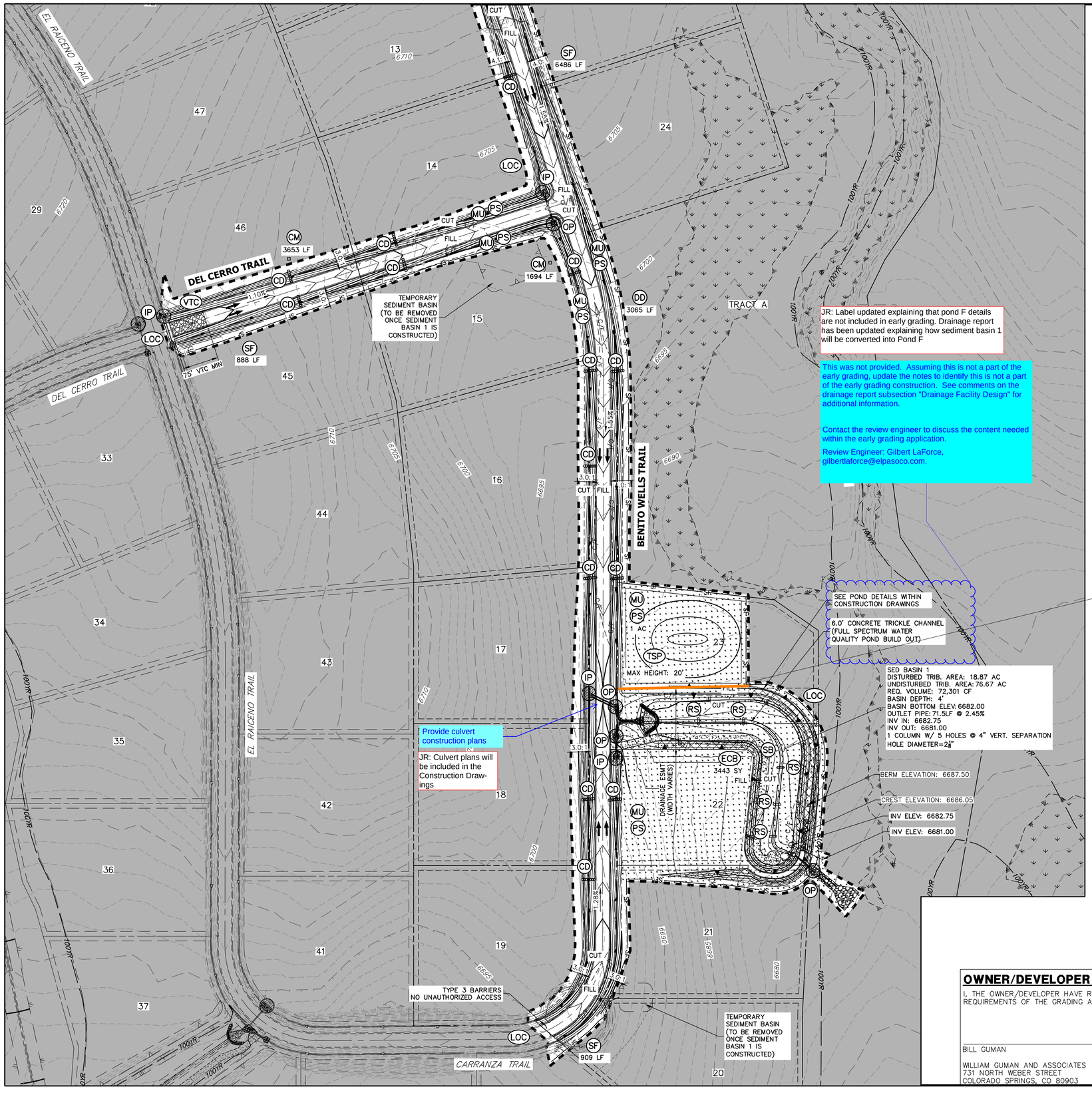
SADDLEHORN RANCH – FILING NO. 2

GRADING & EROSION CONTROL PLANS

SHEET 6 OF 14

JOB NO. 2514204


EL RAICENO TRAIL
DEL CERRO TRAIL
BENITO WELLS TRAIL
CARRANZA TRAIL
CURTIS ROAD
TRACT A
CUT
FILL
SF
6486 LF
CD
LOC
IP
MU
PS
OP
CM
3653 LF
1694 LF
VTC
SF
888 LF
75' VTC MIN
TEMPORARY SEDIMENT BASIN (TO BE REMOVED ONCE SEDIMENT BASIN 1 IS CONSTRUCTED)
DD
3065 LF
SD
SEE POND DETAILS WITHIN CONSTRUCTION DRAWINGS
6.0' CONCRETE TRICKLE CHANNEL (FULL SPECTRUM WATER QUALITY POND BUILD OUT)
1 AC
TSP
MAX HEIGHT: 20'
SED BASIN 1
DISTURBED TRIB. AREA: 18.87 AC
UNDISTURBED TRIB. AREA: 76.67 AC
REQ. VOLUME: 72,301 CF
BASIN DEPTH: 4'
BASIN BOTTOM ELEV: 6682.00
OUTLET PIPE: 71.5LF @ 2.45%
INV IN: 6682.75
INV OUT: 6681.00
1 COLUMN W/ 5 HOLES @ 4" VERT. SEPARATION
HOLE DIAMETER=28"
ECB
3443 SY
RS
SB
DRAINAGE ESMT (WIDTH VARIES)
BERM ELEVATION: 6687.50
CREST ELEVATION: 6686.05
INV ELEV: 6682.75
INV ELEV: 6681.00
Provide culvert construction plans
JR: Culvert plans will be included in the Construction Drawings
add silt fence to keep stockpile sediment from running off into TSB
JR: Silt Fence added
TYPE 3 BARRIERS NO UNAUTHORIZED ACCESS
TEMPORARY SEDIMENT BASIN (TO BE REMOVED ONCE SEDIMENT BASIN 1 IS CONSTRUCTED)
909 LF
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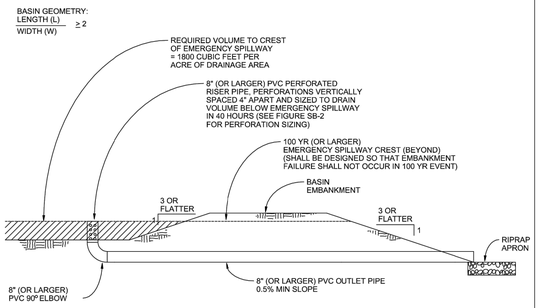


SEDIMENT BASIN
NTS

SEDMENT BASIN NOTES

INSTALLATION REQUIREMENTS

1. SEDIMENT BASINS SHALL BE INSTALLED BEFORE ANY CLEARING AND/OR GRADING IS UNDERTAKEN.

2. THE AREA UNDER WHICH THE EMBANKMENT IS TO BE INSTALLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ALL VEGETATION AND ROOT MAT.

3. THE OUTLET OF THE BASIN SHALL BE DESIGNED TO DRAIN ITS VOLUME IN 40 HOURS.

4. THE OUTLET IS TO BE LOCATED AT THE FURTHEST DISTANCE FROM THE INLET OF THE BASIN. BAFFLES MAY BE NEEDED TO INCREASE THE FLOW LENGTH AND SETTLING TIME.

5. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 15% PASSING A #200 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.

6. EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 698.

7. WHEN A BASIN IS INSTALLED NEAR A RESIDENTIAL AREA, FOR SAFETY REASONS, A SIGN SHALL BE POSTED AND THE AREA SECURED WITH A FENCE.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SEDIMENT BASINS AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.

2. SEDIMENT BASINS SHALL BE CLEANED OUT BEFORE SEDIMENT HAS FILLED HALF THE VOLUME OF THE BASIN.

3. SEDIMENT BASINS SHALL REMAIN OPERATIONAL AND PROPERLY MAINTAINED UNTIL THE SITE AREA IS PERMANENTLY STABILIZED WITH ADEQUATE VEGETATIVE COVER AND/OR OTHER PERMANENT STRUCTURE AS APPROVED BY THE CITY.

City of Colorado Springs Stormwater Quality	Figure SB-1 Sediment Basin Construction Detail and Maintenance Requirements

See comment on Appendix D (pg 58 of 190) of the drainage report

JR: Sendiment basin sizing calcs along with orifice sizing calcs have been added to early grading drainage report

Required Area per Row (in^2)

Design Volume (acre-ft)	Depth at Outlet (ft)								
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
2	15.04	7.71	5.10	3.76	2.95	2.41	2.02	1.73
1	7.52	3.86	2.55	1.88	1.48	1.21	1.01	0.87
0.6	4.51	2.31	1.53	1.13	0.89	0.72	0.61	0.52
0.4	3.01	1.54	1.02	0.75	0.59	0.48	0.40	0.35
0.2	1.50	0.77	0.51	0.38	0.30	0.24	0.20	0.17
0.1	0.75	0.39	0.26	0.19	0.15	0.12	0.10	0.09
0.06	0.45	0.23	0.15	0.11	0.09	0.07	0.06	0.05
0.04	0.30	0.15	0.10	0.08	0.06	0.05	0.04	0.03
0.02	0.15	0.08	0.05	0.04	0.03	0.02	0.02	0.02
0.01	0.08	0.04	0.03	0.02	0.01	0.01	0.01	0.01

TABLE SB-1

Circular Perforation Sizing

Hole Diameter (in)	Hole Diameter (in)	Area per Row (in^2) n = 1	n = 2	n = 3
1/4	0.250	0.05	0.10	0.15
5/16	0.313	0.08	0.15	0.23
3/8	0.375	0.11	0.22	0.33
7/16	0.438	0.15	0.30	0.45
1/2	0.500	0.20	0.39	0.59
9/16	0.563	0.25	0.50	0.75
5/8	0.625	0.31	0.61	0.92
11/16	0.688	0.37	0.74	1.11
3/4	0.750	0.44	0.88	1.33
7/8	0.875	0.60	1.20	1.80
1	1.000	0.79	1.57	2.36
1 1/8	1.125	0.99	1.99	2.98
1 1/4	1.250	1.23	2.45	3.68
1 3/8	1.375	1.48	2.97	4.45
1 1/2	1.500	1.77	3.53	5.30
1 5/8	1.625	2.07	4.15	6.22
1 3/4	1.750	2.41	4.81	7.22
1 7/8	1.875	2.76	5.52	8.28
2	2.000	3.14	6.28	9.42
n = Number of columns of perforations				
Minimum steel plate thickness		1/4"	5/16"	3/8"

TABLE SB-2

City of Colorado Springs Stormwater Quality	Figure SB-2 Outlet Sizing Application Techniques and Maintenance Requirements

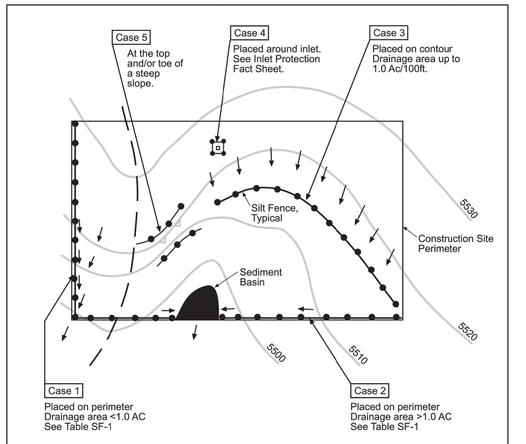


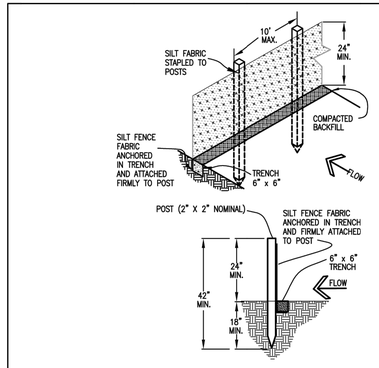
Table SF-1

Silt Fence Used as Perimeter Control	Case 1		Case 2
	DA < 0.25 AC	0.25 < DA < 1 AC	DA > 1.0 AC
Continuous Grade	OK (1)	OK (1)	OK (1)
Area of Concentrated Flow	OK	NO (2)	NO (3)

(1) Temporary Swale or Straw Bale Barrier may be used as alternative to a Silt Fence.
(2) Check Dam may also be used as alternative to Silt Fence at low point.
(3) Sediment Basin is required for concentrated flow from drainage areas > 1.0 AC.

City of Colorado Springs Storm Water Quality	Figure SF-1 Silt Fence Application Examples

DEN/M/153722.CS.CB/FigSF-1/9-99



SILT FENCE

SILT FENCE NOTES

INSTALLATION REQUIREMENTS

1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.

3. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.

4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL OR WOOD POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.

5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6" AND SHALL NOT EXTEND MORE THAN 3' ABOVE THE ORIGINAL GROUND SURFACE.

6. ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.

7. THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES; HIGHER FENCES MAY INPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.

2. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.

3. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE CITY.

City of Colorado Springs Stormwater Quality	Figure SF-2 Silt Fence Construction Detail and Maintenance Requirements

Know what's **below.**
Call before you dig.

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
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BRADY WILLIAMS

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No.	REVISION	BY	DATE

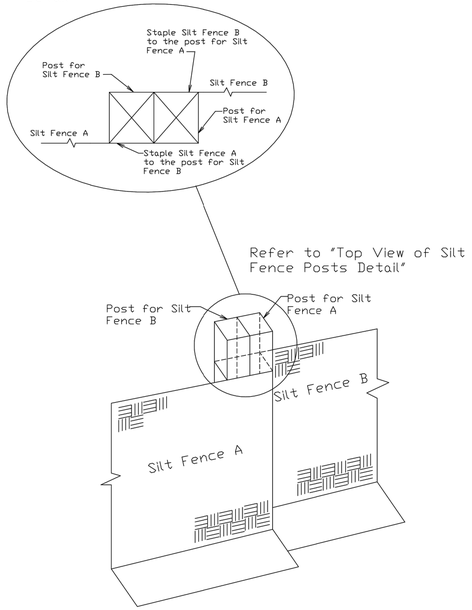
H-SCALE	N/A
V-SCALE	N/A
DATE	1/2/22
DESIGNED BY	NQJ
DRAWN BY	NQJ
CHECKED BY	

SADDLEHORN RANCH – FILING NO. 2

GRADING AND EROSION CONTROL DETAILS

SHEET 8 OF 14

JOB NO. 2514204



City of Colorado Springs
Stormwater Quality

Figure SF-3
Silt Fence Joint Tying
Construction Detail and Maintenance Requirements

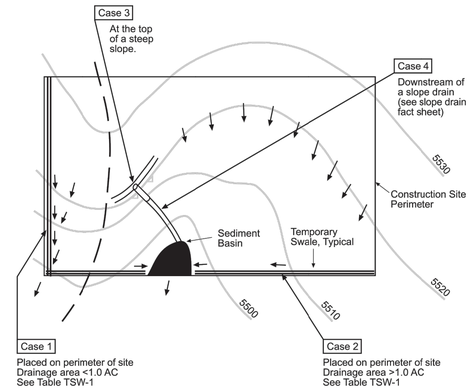


Table TSW-1

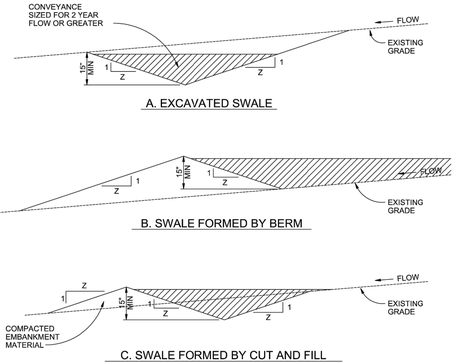
Temporary Swale Used as Perimeter Control	Case 1 DA < 1.0 AC	Case 2 DA > 1.0 AC
Continuous Grade	OK (1)	OK (1)
Area of Concentrated Flow	NO (3)	NO (2)

(1) Silt Fence or Straw Bale Barrier may be used as alternative to a Temporary Swale.
(2) With Temporary Swales Sediment Basin is required for concentrated flow from drainage areas > 1.0 AC.
(3) Check Dam is required at concentrated flow for drainage areas >1.0 acres.

City of Colorado Springs
Storm Water Quality

Figure TSW-1
Temporary Swale
Application Examples

DEN/M/153722.CS.CB/FigTSW-1/9-99



TEMPORARY SWALE
NTS

TEMPORARY SWALE NOTES

INSTALLATION REQUIREMENTS

1. TEMPORARY SWALES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

2. THE AREA UNDER WHICH THE EMBANKMENT IS TO BE INSTALLED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ALL VEGETATION AND ROOT MAT.

3. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 15% PASSING A #200 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.

4. EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 698.

5. SWALES WITH SLOPE > 2% SHALL BE LINED, SEE FIGURE TSW-3.

6. SWALES ARE TO DRAIN INTO A SEDIMENT BASIN OR OTHER STABILIZED OUTLET.

7. Z SHALL BE 3 OR GREATER.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SWALES AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL.

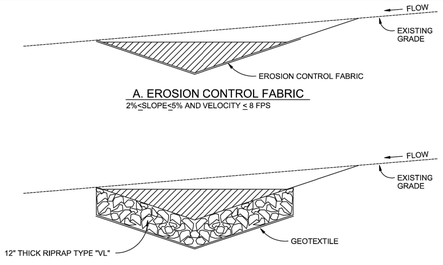
2. SWALES SHALL BE ROUTINELY CLEARED OF ANY DEBRIS OR ACCUMULATION OF SEDIMENT.

3. ERODED SLOPES OR DAMAGED LININGS SHALL IMMEDIATELY BE REPAIRED.

4. TEMPORARY SWALES SHALL REMAIN OPERATIONAL AND PROPERLY MAINTAINED UNTIL THE SITE AREA IS PERMANENTLY STABILIZED WITH ADEQUATE VEGETATIVE COVER AND/OR OTHER PERMANENT STRUCTURE AS APPROVED BY THE CITY.

City of Colorado Springs
Stormwater Quality

Figure TSW-2
Temporary Swale
Construction Detail and Maintenance Requirements



SWALE LINING
NTS

SWALE LINING NOTES

INSTALLATION REQUIREMENTS

1. REFER TO THE EROSION CONTROL BLANKETS FACTSHEET FOR PROPER INSTALLATION OF EROSION CONTROL FABRIC LINING.

2. SWALES WITH EASILY EROSIVE SOILS AND SLOPES LESS THAN 2%, SHALL BE LINED WITH EROSION CONTROL FABRIC.

3. VELOCITIES FOR EROSION CONTROL FABRICS SHALL NOT EXCEED 8 FPS. SWALES WITH VELOCITIES GREATER THAN 8 FPS SHALL BE LINED WITH RIP RAP.

MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SWALE LININGS AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL AND WEEKLY DURING PERIODS OF NO RAINFALL.

2. DAMAGED LININGS SHALL IMMEDIATELY BE REPAIRED.

3. REFER TO THE EROSION CONTROL BLANKETS FACTSHEET FOR PROPER MAINTENANCE.

4. DISPLACED RIPRAP OR COARSE AGGREGATE IS TO BE REPLACED AS SOON AS POSSIBLE.

5. SWALE LININGS ARE TO REMAIN IN PLACE AND BE PROPERLY MAINTAINED UNTIL THE TEMPORARY SWALE IS REMOVED.

City of Colorado Springs
Stormwater Quality

Figure TSW-3
Swale Linings
Construction Detail and Maintenance

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SHEET 9 OF 14

JOB NO. 2514204

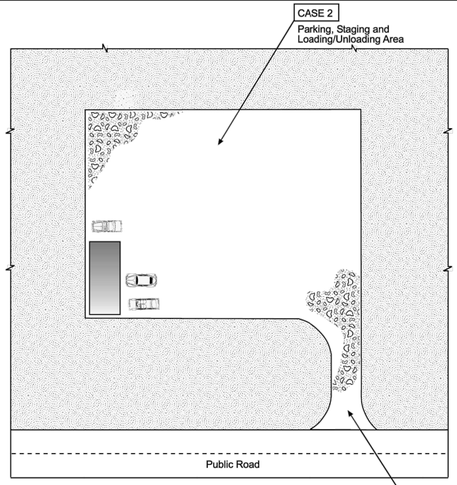
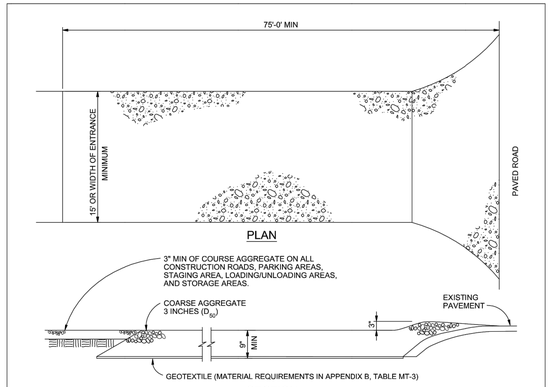


Table VT-1

	Case 1	Case 2
Gravel Thickness	9"	3"
Filter Fabric	YES	NO

City of Colorado Springs Storm Water Quality	Figure VT-1 Vehicle Tracking Application Examples

DEN/M/153722.CS.CB/FigVT-1/9-99



VEHICLE TRACKING

NTS

VEHICLE TRACKING NOTES

INSTALLATION REQUIREMENTS

1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.

2. CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.

3. AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.

4. CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.

5. CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.

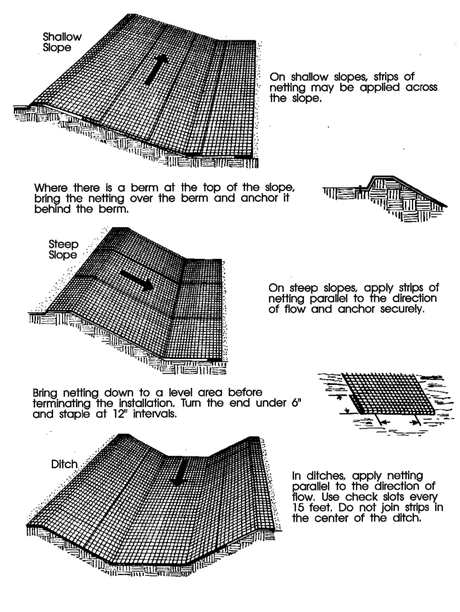
2. STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.

3. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.

4. STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.

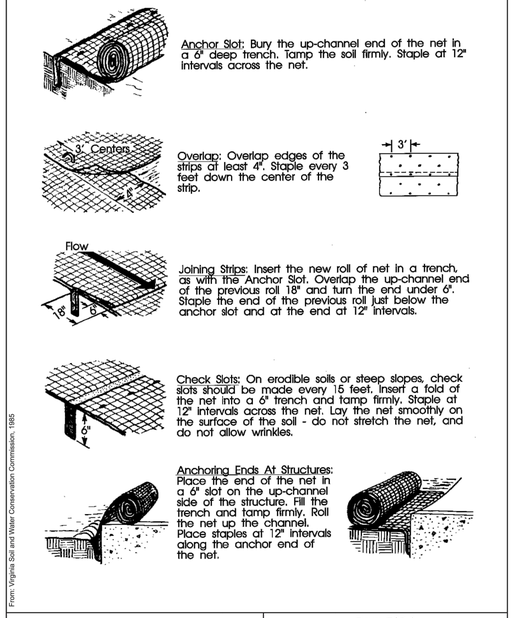
5. OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.

City of Colorado Springs Stormwater Quality	Figure VT-2 Vehicle Tracking Application Examples



City of Colorado Springs Storm Water Quality	Figure ECB-1 Erosion Control Blanket Application Examples

DEN/M/153722.CS.CB/FigECB-1/9-99



City of Colorado Springs Storm Water Quality	Figure ECB-2 Erosion Control Blanket Installation Requirements

DEN/M/153722.CS.CB/FigECB-2/9-99

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V-SCALE	N/A
DATE	1/2/22
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SADDLEHORN RANCH – FILING NO. 2

GRADING AND EROSION CONTROL DETAILS

Know what's **below.** **Call** before you dig.

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

SHEET 10 OF 14

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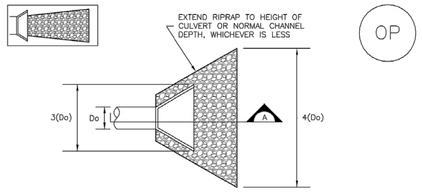
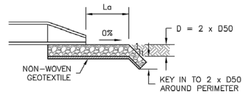


TEMPORARY OUTLET PROTECTION PLAN



SECTION A

TABLE OP-1. TEMPORARY OUTLET PROTECTION SIZING TABLE			
PIPE DIAMETER, Do (INCHES)	DISCHARGE, Q (CFS)	APRON LENGTH, La (FT)	RIPRAP D50 DIAMETER MIN (INCHES)
8	2.5 5	5 10	4 6
12	5 10	10 13	4 6
18	10 20 30 40	10 16 23 26	6 9 12 16
24	30 40 50 60	16 26 26 30	9 9 12 16

OP-1. TEMPORARY OUTLET PROTECTION

TEMPORARY OUTLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF OUTLET PROTECTION.
   -DIMENSIONS OF OUTLET PROTECTION.

2. DETAIL IS INTENDED FOR PIPES WITH SLOPE ≤ 10%. ADDITIONAL EVALUATION OF RIPRAP SIZING AND OUTLET PROTECTION DIMENSIONS REQUIRED FOR STEEPER SLOPES.

3. TEMPORARY OUTLET PROTECTION INFORMATION IS FOR OUTLETS INTENDED TO BE UTILIZED LESS THAN 2 YEARS.

TEMPORARY OUTLET PROTECTION INSPECTION AND MAINTENANCE NOTES

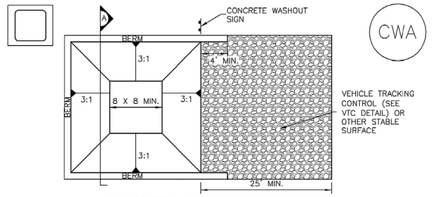
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

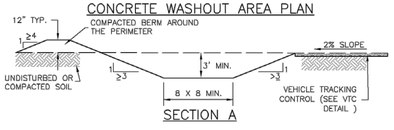
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM AURORA, COLORADO AND PREVIOUS VERSION OF VOLUME 3, NOT AVAILABLE IN AUTOCAD)



CONCRETE WASHOUT AREA PLAN



SECTION A

CWA-1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -CWA INSTALLATION LOCATION.

2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.

3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.

4. CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8'. SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.

5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.

6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.

7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.

8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.

5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.

6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.

7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Know what's below. Call before you dig.

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

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DATE

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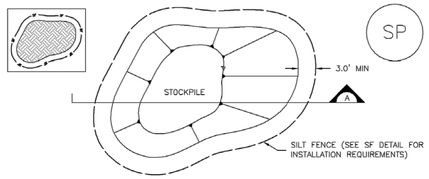
SADDLEHORN RANCH – FILING NO. 2

GRADING AND EROSION CONTROL DETAILS

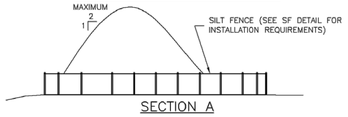
SHEET 11 OF 14

JOB NO. 2514204

Stockpile Management (SP) MM-2



STOCKPILE PROTECTION PLAN



SECTION A

SP–1. STOCKPILE PROTECTION

STOCKPILE PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   –LOCATION OF STOCKPILES.
   –TYPE OF STOCKPILE PROTECTION.

2. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.

3. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30–60 DAYS).

4. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

MM-2 Stockpile Management (SM)

STOCKPILE PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

STOCKPILE PROTECTION MAINTENANCE NOTES

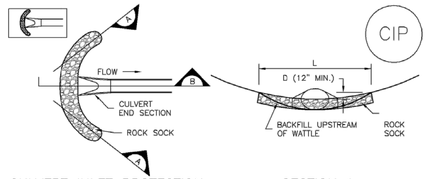
4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.

5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

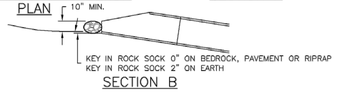
(DETAILS ADAPTED FROM PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Inlet Protection (IP) SC-6



CULVERT INLET PROTECTION PLAN



SECTION A

SECTION B

CIP–1. CULVERT INLET PROTECTION

CULVERT INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF CULVERT INLET PROTECTION.

2. SEE ROCK SOCK DESIGN DETAIL FOR ROCK GRADATION REQUIREMENTS AND JOINTING DETAIL.

CULVERT INLET PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

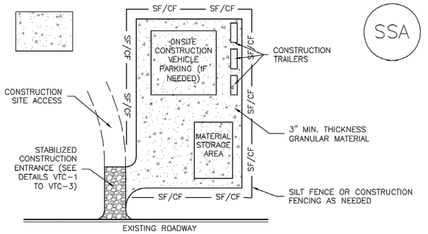
4. SEDIMENT ACCUMULATED UPSTREAM OF THE CULVERT SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS ½ THE HEIGHT OF THE ROCK SOCK.

5. CULVERT INLET PROTECTION SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Stabilized Staging Area (SSA) SM-6



SSA–1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   –LOCATION OF STAGING AREA(S).
   –CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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GRADING AND EROSION CONTROL DETAILS

ENGINEER'S STATEMENT

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COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

SHEET 12 OF 14

JOB NO. 2514204

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

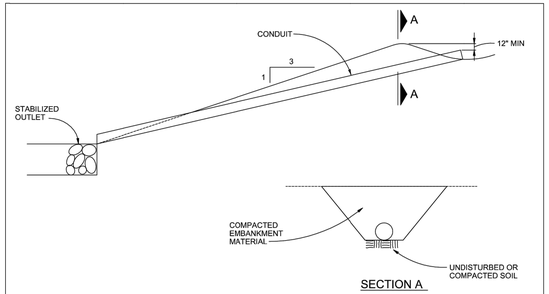
5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)



SECTION A

SLOPE DRAIN
NTS

SLOPE DRAIN NOTES

INSTALLATION REQUIREMENTS

1. THE SLOPE DRAIN IS TO BE DESIGNED TO CONVEY THE PEAK RUNOFF FOR THE 2-YEAR STORM.

2. PIPE MATERIAL MAY INCLUDE CORRUGATED METAL, OR RIGID OR FLEXIBLE PLASTIC.

3. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL WITH A MINIMUM OF 15% PASSING A #200 SIEVE. EXCAVATED SOIL CAN BE USED IF IT MEETS THIS REQUIREMENT.

4. EMBANKMENT IS TO BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AND WITHIN 2% OF OPTIMUM MOISTURE CONTENT ACCORDING TO ASTM D 698.

5. SLOPE DRAIN SECTIONS ARE TO BE SECURELY FASTENED TOGETHER AND HAVE WATERTIGHT FITTINGS.

6. THE OUTLET IS TO BE STABILIZED AND, UNLESS THE DRAIN DISCHARGES DIRECTLY TO A SEDIMENT BASIN, A TEMPORARY SURFACE IS TO BE PROVIDED TO CONVEY FLOWS DOWN STREAM.

7. IMMEDIATELY STABILIZE ALL AREAS DISTURBED BY INSTALLATION OR REMOVAL OF THE PIPE SLOPE DRAIN.

MAINTENANCE REQUIREMENTS

1. INLET AND OUTLET POINTS ARE TO BE CHECKED REGULARLY, AND AFTER HEAVY STORMS FOR CLOGGING AND OVERCHARGING. ANY BREAKS IN THE PIPE ARE TO BE PROMPTLY REPAIRED, AND CLOGS REMOVED AS NEEDED.

2. WATER IS NOT TO BYPASS OR UNDERCUT THE INLET OR PIPE. IF THESE PROBLEMS DO EXIST, THE HEADWALL NEEDS TO BE REINFORCED WITH COMPACT EARTH OR SANDBAGS.

3. THE OUTLET POINT IS TO BE FREE OF EROSION, AND, IF NECESSARY, ADDITIONAL OUTLET PROTECTION SHOULD BE INSTALLED.

4. CONSTRUCTION TRAFFIC IS NOT TO CROSS THE SLOPE DRAIN AND MATERIALS ARE NOT TO BE PLACED ON IT.

5. THE SLOPE DRAIN IS TO REMAIN IN PLACE UNTIL THE SLOPE HAS BEEN COMPLETELY STABILIZED OR UP TO 30 DAYS AFTER PERMANENT SLOPE STABILIZATION.

City of Colorado Springs Stormwater Quality	Figure SD-1 Slope Drain Construction Detail and Maintenance Requirements

MULCHING NOTES

INSTALLATION REQUIREMENTS

1. ALL DISTURBED AREAS MUST BE MULCHED WITHIN 21 DAYS AFTER FINAL GRADE AND SEEDED AREAS ARE TO BE MULCHED WITHIN 24 HOURS AFTER SEEDING.

2. MATERIAL USED FOR MULCH CAN BE CERTIFIED CLEAN, WEED- AND SEED-FREE LONG STEMMED FIELD OR MARSH HAY, OR STRAW OF OATS, BARLEY, WHEAT, RYE, OR TRITICALE CERTIFIED BY THE COLORADO DEPARTMENT OF AGRICULTURE WEED FREE FORAGE CERTIFICATION PROGRAM.

3. HYDRAULIC MULCHING MATERIAL SHALL CONSIST OF VIRGIN WOOD FIBER MANUFACTURED FROM CLEAN WHOLE WOOD CHIPS. WOOD CHIPS CANNOT CONTAIN ANY GROWTH OR GERMINATION INHIBITORS OR BE PRODUCED FROM RECYCLED MATERIAL. GRAVEL CAN ALSO BE USED.

4. MULCH IS TO BE APPLIED EVENLY AT A RATE OF 2 TONS PER ACRE.

5. MULCH IS TO BE ANCHORED EITHER BY CRIMPING (TUCKING MULCH FIBERS 4 INCHES INTO THE SOIL) USING NETTING (USED ON SMALL AREAS WITH STEEP SLOPES), OR WITH A TACKIFIER.

6. HYDRAULIC MULCHING AND TACKIFIERS ARE NOT TO BE USED IN THE PRESENCE OF FREE SURFACE WATER.

MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL MULCHED AREAS.

2. MULCH IS TO BE REPLACED IMMEDIATELY IN THOSE AREAS IT HAS BEEN REMOVED, AND IF NECESSARY THE AREA SHOULD BE RESEEDED.

City of Colorado Springs Stormwater Quality	Figure MU-1 Mulching Construction Detail and Maintenance Requirements

Check Dams (CD) EC-12

Description

Check dams are temporary grade control structures placed in drainage channels to limit the erosivity of stormwater by reducing flow velocity. Check dams are typically constructed from rock, gravel bags, sand bags, or sometimes, proprietary devices. Reinforced check dams are typically constructed from rock and wire gabion. Although the primary function of check dams is to reduce the velocity of concentrated flows, a secondary benefit is sediment trapping upstream of the structure.

Photograph CD-1. Rock check dams in a roadside ditch. Photo courtesy of WWE.

Appropriate Uses

Use as a grade control for temporary drainage ditches or swales until final soil stabilization measures are established upstream and downstream. Check dams can be used on mild or moderately steep slopes. Check dams may be used under the following conditions:

- As temporary grade control facilities along waterways until final stabilization is established.
- Along permanent swales that need protection prior to installation of a non-erodible lining.
- Along temporary channels, ditches or swales that need protection where construction of a non-erodible lining is not practicable.
- Reinforced check dams should be used in areas subject to high flow velocities.

Design and Installation

Place check dams at regularly spaced intervals along the drainage swale or ditch. Check dams heights should allow for pools to develop upstream of each check dam, extending to the downstream toe of the check dam immediately upstream.

When rock is used for the check dam, place rock mechanically or by hand. Do not dump rocks into the drainage channel. Where multiple check dams are used, the top of the lower dam should be at the same elevation as the toe of the upper dam.

When reinforced check dams are used, install erosion control fabric under and around the check dam to prevent erosion on the upstream and downstream sides. Each section of the dam should be keyed in to reduce the potential for washout or undermining. A rock apron upstream and downstream of the dam may be necessary to further control erosion.

Check Dams	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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No.	REVISION	BY	DATE

H-SCALE	N/A
V-SCALE	N/A
DATE	1/2/22
DESIGNED BY	NQJ
DRAWN BY	NQJ
CHECKED BY	

Know what's below. Call before you dig.

SADDLEHORN RANCH – FILING NO. 2

GRADING AND EROSION CONTROL DETAILS

ENGINEER'S STATEMENT

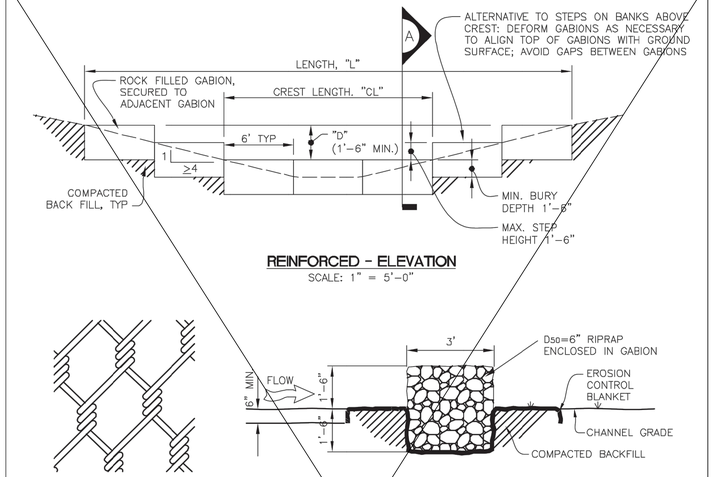
PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

SHEET 13 OF 14

JOB NO. 2514204



REINFORCED - ELEVATION

SCALE: 1" = 5'-0"

BLOW UP OF TWISTED WIRE GABION

SCALE: NTS

REINFORCED - SECTION A

SCALE: 1/2" = 1'-0"

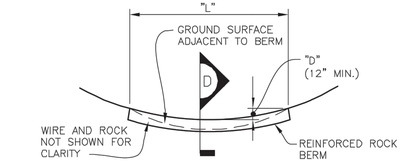
REINFORCED CHECK DAM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATIONS OF CHECK DAMS.
   - CHECK DAM TYPE (CHECK DAM OR REINFORCED CHECK DAM).
   - LENGTH, "L", CREST LENGTH, "CL", AND DEPTH, "D".
2. CHECK DAMS INDICATED ON INITIAL GESC PLAN SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND-DISTURBING ACTIVITIES.
3. REINFORCED CHECK DAMS, GABIONS SHALL HAVE GALVANIZED TWISTED WIRE NETTING WITH A MAXIMUM OPENING DIMENSION OF 4-1/2" AND A MINIMUM WIRE THICKNESS OF 0.10". WIRE "HOG RINGS" AT 4" SPACING OR OTHER APPROVED MEANS SHALL BE USED AT ALL GABION SEAMS AND TO SECURE THE GABION TO THE ADJACENT GABION.
4. RIPRAP UTILIZED FOR CHECK DAMS SHALL HAVE A D_{50} MEDIAN STONE SIZE OF 6".
5. THE CHECK DAM SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 1'-6".
6. EROSION BLANKET SHALL BE PLACED IN THE REINFORCED CHECK DAM TRENCH EXTENDING A MINIMUM OF 1'-6" ON BOTH THE UPSTREAM AND DOWNSTREAM SIDES OF THE REINFORCED CHECK DAM.

REINFORCED CHECK DAM MAINTENANCE NOTES

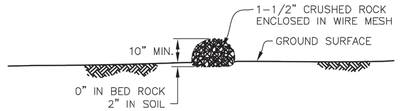
1. THE GESC MANAGER SHALL INSPECT CHECK DAMS WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT AS NECESSARY.
2. SEDIMENT ACCUMULATED UPSTREAM OF CHECK DAMS SHALL BE REMOVED WHEN THE SEDIMENT DEPTH UPSTREAM OF CHECK DAM IS WITHIN ½ OF THE HEIGHT OF THE CREST.
3. CHECK DAMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED BY THE TOWN.
4. WHEN CHECK DAMS ARE REMOVED, EXCAVATIONS SHALL BE FILLED WITH SUITABLE COMPACTED BACK FILL. ANY DISTURBED AREA SHALL BE DRILL SEEDED AND CRIMP MULCHED AND COVERED WITH EROSION CONTROL BLANKET OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE TOWN.

RCD — REINFORCED CHECK DAM — 11



DETAIL A

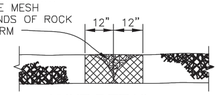
SCALE: 1" = 5'-0"



SECTION D

SCALE: 1/2" = 1'-0"

ANY GAP AT JOINT SHALL BE FILLED WITH 1 1/2" CRUSHED ROCK AND WRAPPED WITH ADDITIONAL WIRE MESH SECURED TO ENDS OF ROCK REINFORCED BERM



JOINT DETAIL

SCALE: 1/2" = 1'-0"

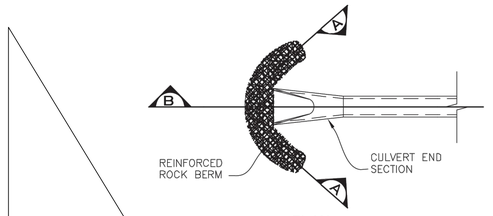
REINFORCED ROCK BERM INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATIONS OF REINFORCED ROCK BERMS.
   - LENGTH, "L", AND DEPTH, "D" DIMENSIONS.
2. REINFORCED ROCK BERM SECTION APPLIES TO CULVERT INLET FILTER AND INLET PROTECTION.
3. CRUSHED ROCK SHALL BE FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON SHEET 14 (1-1/2" MINUS). RECYCLED CONCRETE MEETING THIS GRADATION MAY BE USED.
4. WIRE MESH SHALL BE FABRICATED OF 10 GAUGE WIRE TWISTED INTO A MESH WITH A MAXIMUM OPENING OF 1.0 INCH (COMMONLY TERMED "CHICKEN WIRE"). ROLL WIDTH SHALL BE 48-INCHES.
5. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6-INCH CENTERS ALONG ALL JOINTS AND AT 2-INCH CENTERS ON ENDS OF BERM.
6. FOR CONCENTRATED FLOW AREAS THE ENDS OF THE REINFORCED ROCK BERM SHALL BE 12" HIGHER THAN THE CENTER OF THE BERM.

REINFORCED ROCK BERM MAINTENANCE NOTES

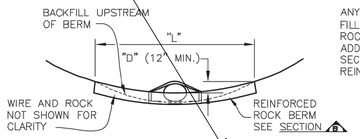
1. THE GESC MANAGER SHALL INSPECT REINFORCED ROCK BERM WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT AS NECESSARY.
2. SEDIMENT ACCUMULATED UPSTREAM OF REINFORCED ROCK BERM SHALL BE REMOVED WHEN THE SEDIMENT DEPTH UPSTREAM OF FILTER IS WITHIN 5 INCHES OF THE CREST.
3. REINFORCED ROCK BERMS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED.
4. WHEN REINFORCED ROCK BERMS ARE REMOVED, ANY DISTURBED AREA SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE TOWN.

RRB — REINFORCED ROCK BERM — 12



PLAN

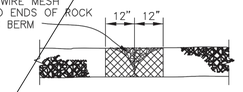
SCALE: 1" = 5'-0"



SECTION A

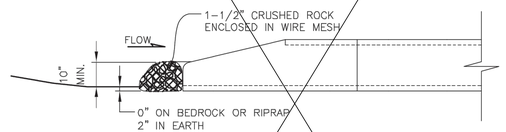
SCALE: 1" = 5'-0"

ANY GAP AT JOINT SHALL BE FILLED WITH 1-1/2" CRUSHED ROCK AND WRAPPED WITH ADDITIONAL WIRE MESH SECURED TO ENDS OF ROCK REINFORCED BERM



JOINT DETAIL

SCALE: 1/2" = 1'-0"



SECTION B

SCALE: 1/2" = 1'-0"

INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   - LOCATIONS OF CULVERT INLET FILTERS.
   - LENGTH, "L", AND DEPTH, "D".
2. CRUSHED ROCK SHALL BE FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON SHEET 14 (1-1/2" MINUS). RECYCLED CONCRETE MEETING THIS GRADATION MAY BE USED.
3. WIRE MESH SHALL BE FABRICATED OF 10 GAUGE WIRE TWISTED INTO A MESH WITH A MAXIMUM OPENING OF 1.0 INCH (COMMONLY TERMED "CHICKEN WIRE").
4. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6-INCH CENTERS ALONG ALL JOINTS AND AT 2-INCH CENTERS ON ENDS OF BERM.
5. THE ENDS OF THE REINFORCED ROCK BERM SHALL BE 12" HIGHER THAN THE CENTER OF THE BERM.

MAINTENANCE NOTES

1. THE GESC MANAGER SHALL INSPECT CULVERT INLET FILTER WEEKLY, DURING AND AFTER ANY STORM EVENT AND MAKE REPAIRS OR CLEAN OUT AS NECESSARY.
2. SEDIMENT ACCUMULATED UPSTREAM OF CULVERT INLET FILTER SHALL BE REMOVED WHEN THE SEDIMENT DEPTH UPSTREAM OF FILTER IS ½ THE HEIGHT OF THE REINFORCED ROCK BERM.
3. RRB FOR CULVERT PROTECTION ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS APPROVED BY THE TOWN.
4. WHEN CULVERT INLET FILTERS ARE REMOVED, ANY DISTURBED AREA SHALL BE DRILL SEEDED AND CRIMP MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE TOWN.

RRC — RRB FOR CULVERT PROTECTION — 13

	Sheet Revisions			NOTE: SCALES SHOWN ARE FOR 22"x34" SHEETS; ADJUST ACCORDINGLY FOR 11"x17" SHEETS.
R1	3/11	GESC MANUAL UPDATES	DVD	
R2	5/15	GESC MANUAL UPDATES	DVD	

TOWN OF CASTLE ROCK COLORADO

UTILITIES DEPARTMENT
Stormwater Engineering Division

GESC — GRADING, EROSION, AND SEDIMENT CONTROL

GESC PLAN STANDARD NOTES AND DETAILS

SHEET 7 OF 14

Know what's below. Call before you dig.

ENGINEER'S STATEMENT

PREPARED UNDER MY DIRECT SUPERVISION AND ON BEHALF OF JR ENGINEERING

BRYAN T. LAW, P.E.
COLORADO P.E. 25043
FOR AND ON BEHALF OF JR ENGINEERING, LLC

DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, JR ENGINEERING APPROVES THEIR USE ONLY FOR THE PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

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No.	REVISION	BY	DATE

H-SCALE	N/A
V-SCALE	N/A
DATE	1/2/22
DESIGNED BY	NQJ
DRAWN BY	NQJ
CHECKED BY	

SADDLEHORN RANCH – FILING NO. 2

GRADING AND EROSION CONTROL DETAILS

SHEET 14 OF 14

JOB NO. 2514204

FINAL DRAINAGE REPORT
FOR
SADDLEHORN RANCH – FILING 2

JR: Noted

Update to "Saddlehorn Ranch Filing 2 Early Grading"

Prepared For:
ROI Property Group, LLC
2495 Rigdon Street
Napa, CA 94558
(707) 365-6891

June 4, 2021
Project No. 25142.04

Prepared By:
JR Engineering, LLC
5475 Tech Center Drive
Colorado Springs, CO 80919
719-593-2593

El Paso County PCD File No.:
SF-21-033

Replace with EGP221

JR: Noted file No. has been updated

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 El Paso County for drainage reports and said report is in conformity with the 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.

Mike Bramlett, Colorado P.E. # 32314 Date
For and On Behalf of JR Engineering, LLC

DEVELOPER'S STATEMENT:

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

Business Name: ROI Property Group, LLC

By: _____

Title: _____
Address: 2495 Rigdon Street
Napa, CA 94558

El Paso County:

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

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

Conditions:

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2. Major Drainageway - Ex. 100 Year Flow Comparison
3. Pond Summary

PURPOSE

This document is the Final Drainage report for Filing 2 of Saddlehorn Ranch. The purpose of this report is to:

JR: Noted, title and purpose have been updated to reflect current project state

Update title and purpose. This drainage report is specific to the necessary facilities for early grading operations. A subsequent FDR for Filing 2 with all permanent hydrology/hydraulics will be required with the final plat application.

1. Identify on-site and off-site drainage patterns.
2. Recommend storm water facilities to collect a development to appropriate discharge and/or
3. Recommend water quality and detention faci historic.
4. Demonstrate compliance with surrounding major drainage basin planning studies, master development drainage plans and flood insurance studies.

GENERAL LOCATION AND DESCRIPTION

Location

The proposed Saddlehorn Ranch Filing 2, known as "Filing 2" from herein, is a parcel of land located in Section 3 and 10, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. Saddlehorn Ranch is an 824 acre, rural, single family-development. Filing 2 is 176 acres and is comprised of 42 lots of the overall Saddlehorn Ranch development. Saddlehorn Ranch is bound by Judge Orr Road to the North and Curtis Road to the West. To the East, Saddlehorn Ranch is bound by undeveloped land owned by Brent Houser Enterprises, LLC. To the south, Saddlehorn Ranch is bound by undeveloped properties owned by Carolyn Gudzunas and Faye Reynolds. Filing 2 is bound by future filings to the North and East while it is bound by Curtis Road to the West and to the South by Saddlehorn Filing 1. A vicinity map is presented in Appendix A.

Currently, there are two major Drainageway that will receive flows from Filing 2: Haegler Ranch Tributary 6 (T-6) and Haegler Ranch Main Stem 6 (MS-06). These Drainageways were analyzed, both hydrologically and hydraulically, in the following reports:

- Haegler Ranch Basin Drainage Basin Planning Study (DBPS), May 2009.
- Santa Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision, June 2004.
- Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch, May 2020.

The impact of these Drainageways and planning studies on the proposed development will be discussed later in the report.

Description of Property

Filing 2 is currently unoccupied and undeveloped. The existing ground cover is sparse vegetation and open space, typical of a Colorado rolling range land condition. In general, Filing 2 slopes from northwest to southeast and the existing drainageways follows this topography.

Per a NRCS web soil survey of the area, Filing 2 is made up of Type A and D soils. Type A soils cover roughly 79% of Filing 2 while Type D soils cover 21% of Filing 2. Group A soils have a high infiltration rate when thoroughly wet. Type D soils have a very slow infiltration when thoroughly wet. A NRCS soil survey map has been presented in Appendix A.

Floodplain Statement

Based on the FEMA FIRM Map number 08041C0558G, dated December 7, 2018, Filing 2 lies within Zone AE and Zone X. Zone AE is defined as area subject to inundation by the 1-percent-annual-chance flood event. Zone X is defined as area outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. All proposed residential development within Filing 2 will occur in Zone X. The FIRM Map has been presented in Appendix A.

DRAINAGE BASINS AND SUB-BASINS

Existing Major Basin Descriptions

Filing 2 lies within Haegler Ranch Drainage Basin based on the "*Haegler Ranch Drainage Basin Planning Study*" prepared by URS Corporation in May 2009.

The Haegler Ranch Drainage Basin covers approximately 16.6 square miles in unincorporated El Paso County, CO. The Haegler Ranch Drainage Basin is tributary to Black Squirrel Creek. In its existing condition, the basin is comprised of rolling rangeland with poor vegetative cover associated with Colorado's semi-arid climate. The natural Drainageways within the basin are typically shallow and wide with poorly defined flow paths in most areas. Anticipated land use for the basin includes residential and commercial development. Residential developments will range from 0.125 – 5 acre lots with a mix of low, medium and high density developments.

As part of its drainage research, JR Engineering reviewed the following drainage studies, reports and LOMRs:

- Haegler Ranch Drainage Basin Planning Study prepared by URS Corporation in May 2009
- Santa Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision prepared by Tri-Core Engineering in June 2004.
- Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch, prepared by JR Engineering, May 2020.

The "*Haegler Ranch Drainage Basin Planning Study*" was used to establish a stormwater management plan for the existing and future stormwater infrastructure needs within the Haegler Ranch Drainage Basin. Based on provided drainage maps and analysis, in the existing condition Haegler Ranch contributes a total of 710 cfs onto the site. Of the 710 cfs, 590 cfs crosses Curtis Road in an existing 24" CMP onto the site. Major Drainageway MS-06 conveys the stormwater through the site and to its off-site confluence with Major Drainageway MS-05. The remaining 120 cfs crosses Curtis Road in an existing 36" CMP onto the site. Major Drainageway T-6 conveys the stormwater through the site and to its off-site confluence with Major Drainageway MS-05. Both Curtis Road culverts are undersized for existing and future flows and

overtopping occurs locally near the culvert crossings. Overtopping at the intersection of Curtis Road and T-6 is contained within the 100-year floodplain and will not affect proposed lots. The overtopping at the intersection of MS-06 and Curtis Road is not contained within the 100-year floodplain limits. Therefore, at time of Final Drainage Report for Saddlehorn Filing 3, berming will be provided that will protect proposed lots from overtopping flows.

The *Haegler Ranch DBPS* evaluated two detention alternatives for the drainage basin: region and sub regional. In the regional approach, it is recommended the existing 36" CMP be upsized to a 60" RCP. In the sub-regional approach, this culvert is recommended to be left in its existing condition.

The existing 36" CMP culvert will not be upsized within the context of this report and development. The culvert is owned by El Paso County and timing of improvements, if any, will be controlled by the County.

Furthermore, the *Haegler Ranch DBPS* recommends channel improvements within drainageways MS-06 and T-6. Per the *Haegler Ranch DBPS*, all recommended channel sections are trapezoidal with side slopes of 4:1 and a maximum depth of five feet. Within the limits of the site, three (3) channel bottom widths are recommended for MS-06. The first reach, from station 0+00 – 31+34, is proposed with a 15' bottom width, the second reach from 31+34 to 74+61, MS-06 is proposed with a 30' bottom width, and the last reach from station 74+61 - 103+62 is proposed with a 20' channel bottom. All MS-06 channel improvements will be proposed with the Filing 3 improvements. Per the Haegler Ranch DBPS sub-regional detention alternative, channel and culvert improvements are only proposed through proposed developments, or where the existing conditions are undersized. For the Filing 2 development, no existing conditions are undersized for the development and the proposed Pond F prevents any negative impacts to the drainageway. Discussions with the county during the preliminary planning phase also determined that the proposed MS-06 improvements would be constructed with the San Isidro culvert crossing improvements, and with the Saddlehorn Filing 3 and Filing 5 developments. All Drainageway T-6 improvements have been proposed with the Filing 1 improvements. See recommended channel improvement sheets from the *Haegler Ranch DBPS* presented in Appendix E.

Based on flood impacts, stream stability and cost effectiveness, this study recommended a sub-regional detention approach. This allows future development anywhere in the basin with the construction of an associated sub-regional pond. However, based on the *Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch*, Filing 2 will utilize an on-site full spectrum water quality and detention pond instead. This full spectrum detention pond will limit developed discharge into the MS-06 Drainageway to less than historic rates.

The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR was executed on Haegler Ranch Tributary 2, 3, and 4. The LOMR revised the onsite effective flood zone from Zone A to Zone AE. See FIRM Map Panel 08041C0558G for limits of LOMR study and revised flood zones, presented in Appendix E.

Of the three drainageways that were evaluated in the LOMR, Haegler Ranch Tributary 3 and 4 run adjacent to Filing 2. Within the boundary of the proposed development, Haegler Ranch Tributary 3 is

synonymous with MS-06 and Haegler Ranch Tributary 4 is synonymous with T-6 from the *Haegler Ranch DBPS*. The purpose of the LOMR was to revise the flood hazard depicted in the current Flood Insurance Study. Per the LOMR, an existing 100-year flow of 130 cfs crosses onto Filing 1 in Haegler Ranch Tributary 4. The off-site flow of 130 cfs carried within Tributary 4 was used to design the 84" RCP culvert and associated channel improvements outlined in the Filing 1 report. The off-site flow of 505 cfs carried with Tributary 3 through the site will be used to design the culvert crossing at San Isidro Trail with Filing 3.

See Table 2 for comparison of Drainageway identification and the naming convention used within the context of this report. See Table 3 for a comparison of 100-year flows as calculated in the aforementioned DBPS and LOMR. An existing conditions drainage map is presented in Appendix E.

Table 1: Major Drainageway Naming Convention

Major Drainageway Naming Conventions			
Saddlehorn Ranch MDDP/PDR:	Per Haegler Ranch DBPS:	Per Geick Ranch DBPS:	Per Sante Fe Springs LOMR:
MS-06	Main Stem (MS-06)	N/A*	Haegler Ranch Tributary 3
T-6	Tributary 6 (T-6)	N/A*	Haegler Ranch Tributary 4

Table 2: Major Drainageway – Ex. 100-Year Flow Comparison

Major Drainageways: 100-Year Flow Comparison				
Drainageway Name	Contributing Area (sq. mi.)	Q_{100} Per Haegler Ranch DBPS:	Q_{100} Per Geick Ranch DBPS:	Q_{100} Per Sante Fe Springs LOMR:
MS-06 @ Curtis Road	1.05	590 cfs	N/A*	505 cfs
T-6 @ Curtis Road	0.39	120 cfs	N/A*	130 cfs

*N/A: Flow regime outside limits of study.

The *Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch* proposed the overall drainage facility design for Saddlehorn Ranch. Within the context of this report, onsite drainage basins the associated full spectrum water quality pond were established. As it pertains to Filing 2, one full spectrum water quality pond is recommended. Roadside ditches and local street culverts will be utilized to capture and convey Filing 2's runoff to the water quality pond. The proposed water quality pond will discharge into Drainageway MS-06 at less than historic rates.

All improvements to the Drainageway T-6, were proposed with the Filing 1 improvements. These improvements included an 84" reinforced concrete pipe (RCP) culvert at the crossing of Del Cerro Trail and Drainageway T-6, in addition to channel improvements up and downstream of the culvert. These culvert and channel improvements were designed to ensure a no-rise scenario in the floodplain.

Existing Sub-basin Drainage

On-site, existing sub-basin drainage patterns are generally from northwest to southeast by way of Drainageway T-6 and MS-06. On-site areas flow directly into these drainageways which also bypass off-site flows through the site.

On-site, existing drainage basins were established based upon existing topography and the limits of the 100-year floodplain. These existing sub-basins were analyzed in the *Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch.* An existing drainage map has been provided in Appendix E.

Proposed Sub-basin Drainage

The proposed Filing 2 basin delineation is as follows;

Basin F consists of Sub-Basins F1-F10 combining for a total of 93.35 acres. In its existing condition, Basin F is rolling rangeland and runoff generally flows southeast towards Drainageway MS-06. In the proposed condition, Basin F will be rural 2.5 acre lots, paved roadway, and will include Pond F. Runoff from this basin will be collected in road side ditches and conveyed along Benito Wells Trail to Pond F. Pond F will be a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway MS-06.

Basin G consists of Sub-basins G1-G2 combining for a total of 18.8 acres. In its existing condition, Basin G is rolling rangeland and runoff generally flows south and east to Drainageway MS-06. In the proposed condition, Basin G will be rural 2.5 acre lots and paved roadway. Sub-basins G1 & G2 are tributary to Pond G, which was part of the Filing 1 improvements. In the *Final Drainage Report for Saddlehorn – Filing 1,* Sub-basins G1 and G2 were referenced as F-G1 & F-G2. These were analyzed as developed basins within the context of the Filing 1 report to adequately size ditches, culverts, and water quality pond for the fully developed future condition. Runoff from this basin will be collected in road side ditches and conveyed south along El Raiceno Trail and west along Carranza Trail to Pond G. Pond G is a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway T-6.

Basin UD consists of Sub-basins UD1-UD5 combining for a total of 92.13 acres. In their existing condition, these basins are rolling rangeland. Runoff from Basin UD1generally flows south and east to Drainageway T-6. Basins UD2, UD4, & UD5 generally flow south and east to Drainageway MS-06. Basin UD-3 represents Drainageway MS-06 and the runoff generated along the Filing 2 boundary. In the proposed condition, Basins UD1, UD2, UD4, and UD5 will be rural 2.5 acre lots with an Imperviousness = 6.2% and will be excluded from permanent stormwater quality management per Section I.7.1.B.5 of the ECM – Stormwater Quality Policy and Procedures.

Basin OS consi[illegible]combining for a total of 2.77 acres of offsite area. In their existing conditi[illegible]adway (Curtis Road) and undeveloped area. In the proposed condition, Basi[illegible]oved with 8' of pavement width and the stretch of Curtis Road within basin OS[illegible]eceleration lane for access to Filing 2. Basin OS1-OS2 will follow existing[illegible]ow on-site prior to being captured in a roadside swale and conveyed to Po[illegible]into Drainageway MS-06. Basin OS3 will not be detained in Pond F due to i[illegible]', as well as Section I.7.1.C.1.a of the ECM – Stormwater Quality Policy [illegible]to 20%, not exceeding 1 acre, of the development site area can be excluded from permanent stormwater quality. The improvements along Curtis Road would add 42,240 ft^2 over the length of one mile and therefore meet the exclusion present in Section I.7.1.B.2.

Update. The early grading is constructing a Temporary sediment basin at this time. See additional comments on the next page

A summary table of proposed basin parameters and flow rates is presented in Appendix B.

Basin F runoff along with runoff from Sub-Basins OS1 and OS2 will be captured in roadside ditches and conveyed to the proposed full spectrum water quality and detention pond. This full spectrum pond will release treated flows at less than historic rates to minimize adverse impacts downstream. Pond discharge into Major Drainageway MS-06.

JR: Noted, a paragraph has been added explaining early grading improvements

See Table 3 below for proposed Filing 2 pond parameters.

Table 3: Pond Summary

Tributary Sub-Basin	Pond Name	Tributary Acres	WQ Volume (ac-ft)	Total Detention Volume (ac-ft)	Provided Volume (ac-ft)	Maximum 100-Year Discharge (cfs)
F	POND F	95.54	0.684	2.911	3.011	38.5

JR: Table 3 is for Pond F not temporary sediment basin 1

DRAINAGE DESIGN CRITERIA

[illegible]ent Criteria Reference

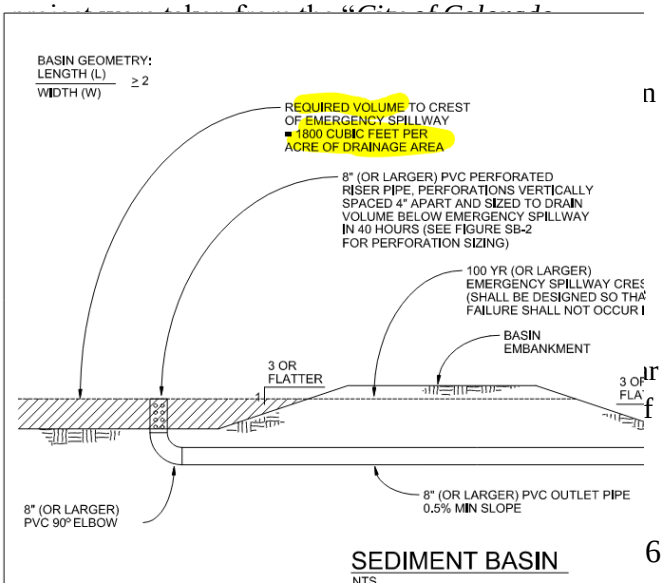
Storm drainage analysis and design criteria for the [illegible] *Spring/El Pas[illegible]Manua[illegible]* 1994, the "*Ur[illegible]n Manu[illegible]*" 3.2.1 of Chapt[illegible]gs Drai[illegible] adopted by El[illegible]

Update the pond summary table. The required volume does not match the detail provided in the Grading and Erosion Control Plan.

Additionally, update the name to Sed Basin 1 per the GEC.

Hydrolog[illegible]

All hydrologic[illegible]"El Pas[illegible] "Urban Draina[illegible]ct Urba[illegible] 3. Onsite drai[illegible]igned b[illegible] (major) storm[illegible]ulations[illegible] the CCSDCM, for the sub-basins that directly imp[illegible] Rational method calculations are presented in App[illegible]



SEDIMENT BASIN

Urban Drainage and Flood Control District's UD-Detention, Version 4.04 workbook was used for pond sizing. Required detention volumes and allowable release rates were designed per USDCM and CCS/EPCDCM. Pond sizing spreadsheets are presented in Appendix D.

Hydraulic Criteria

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) was used for roadside ditch design. Ditches were checked for velocity and capacity per the CCS/EPCDCM Section 12.3.2.2. In order to check both capacity and velocity, a cross section analysis was performed on the roadside swales using the basin's maximum runoff Q and the proposed uniform slope of the swale. The runoff quantities, street grades, and the USDCM Manual's UD-Inlet spread sheet were utilized to determine the size of storm drain inlets and street capacities. Swale cross sections have been presented in Appendix C.

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) was used for local road crossing culvert design. Culvert size was determined based on 100-year flows and hydraulic criteria from EPCDCM Chapter 9 –Culvert Design. All local road crossing culvert design reports are presented in Appendix C.

DRAINAGE FACILITY DESIGN

General Concept

The proposed stormwater conveyance system was designed to convey the developed Filing 2 runoff to a full spectrum water quality and detention pond (Pond F) via roadside ditches and local street culverts. Pond F was designed to release at less than historic rates to minimize adverse impacts downstream.

All improvements aforementioned to Drainageway MS-06 shall be proposed with the Saddlehorn Filing 3 nts. All improvements aforementioned to Drainageway T-6 have been proposed with the Filing 1 Improvements. Outfall protection from Pond F is the only improvement to ay MS-06 proposed with the Filing 2 improvements.

JR: Noted, section added describing the current early grading improvements and how they will be converted to final design

Details

Four Step Process to Minimize Adverse Impacts of Urbanization

mplemented the
udes reducing
CV), and

e family
elopment which
ap lined
or increased

Update to discuss what is currently being constructed with the early grading. Per the early grading GEC this is being used as Temporary Sediment Basin with temporary outlet control.

Add a statement in your own words explaining that this will be converted to a permanent EDB pond for FSD. Also state that final design will be provided with the subsequent final drainage report submitted with Filing 2 plat application.

In the narrative specifically identify improvements/facilities being constructed to final buildout and include the supporting calculations.

Also describe facilities being constructed as temporary that will be removed and replaced with the the final plat application. Also include they hydraulic calculations for these improvements.

Step 2, Stabilize Drainageways: Filing 2 utilizes roadside ditches with culvert crossings throughout. These roadside ditches direct the on-site development flows to the proposed detention pond within the project that releases at or below historic rates into Drainageway MS-06. Based upon the proposed reduction in released flows compared to the pre-developed flows, no impact to downstream Drainageway MS-06 is anticipated.

Step 3, Provide WQCV: Runoff from this development is treated through capture and slow release of the WQCV in a full spectrum water quality and detention pond that is designed per current El Paso County drainage criteria.

Step 4 Consider the need for Industrial and Commercial BMP's: No industrial or commercial uses are proposed within this development. However, a site specific storm water quality and erosion control plan and narrative are prepared in conjunction with this report. Site specific temporary source control BMPs as well as permanent BMP's are detailed in this plan and narrative to protect receiving waters.

Water Quality

In accordance with Section 13.3.2.1 of the CCS/EPCDCM, fu
provided for all developed basins. Outlet structure release rate
minimize adverse impacts to downstream stormwater facilitie
designs are presented in Appendix D.

Update. This is a false statement. The grading and erosion control plan and associated collateral is required because the project is distu
greater than 1 acre, not be
FDR was submitted.

JR: Noted, section updated

Erosion Control Plan

The El Paso County Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate must be submitted with each Final Drainage Report. The Erosion Control Plan for Filing 2 is submitted concurrently with this report.

Update. To Early Grading Erosion Control Plan. Please scrub through the entire document to make this distinction.

For your information: A Grading & Erosion Control Plan will still be required with the final plat for the final design.

Maintenance

ure the function and effectiveness of the stormwater infrastru
ion, routine maintenance, restorative maintenance, rehabilitat
rainage structures within the any platted County ROW will b
All proposed drainage structures within easements or tracts w
e Metropolitan No. 1. Vegetation in the natural and improved
1 improvements is the responsibility of 824 Acre Metropolitan District No. 1. T
wing, seeding and weed control activities. An Inspection & Maintenance Plan is
ith this drainage report that details the required maintenance activities and intervals to
unction of all stormwater infrastructure in the future.

Update statement. The Operation & Maintenance Plan will be submitted with the subsequent final plat application.

JR: Noted, section updated

Bridge Fees

Drainage and Bridge Fees are due at time of final platting. An estimate of basin fees for the proposed
within Haeg
he overall
n for low density lots
expenses are detailed
below.

JR: Noted, section updated

Update the drainage fee section. Simplify in your own words to state Haegler Ranch drainage and bridge fees will be calculated with the subsequent Filing 2 Final Drainage Report.
Drainage fees are not required with this early grading permit application.

Total Filing 2 Platted Acr
Total Filing 2 Impervious

JR: Noted, section updated

Filing 2 Fee Totals (Prior to Reductions):

JR: Removed

Bridge Fees
$ 1,640/ac x 17.7 ac = $29,028

Drainage Fees
$11,113/ac x 17.7 ac = $196,700

Filing 2 Drainage Fee Reduction: 25% Reduction for Low Density Lots: $196,700 x 25% = $49,175

Filing 2 Fee Totals (After Reductions):

Bridge Fees
$ 1,640/ac x 17.7 ac = $29,028

Drainage Fees
$196,700 - $49,175 = $145,858

Construction Cost Opinion

Cost opinion has been presented in Appendix A.

SUMMARY

The proposed development remains consistent with pre-development drainage conditions with the construction of the recommended drainage improvements, including ditches, culverts, detention ponds and drainage channel improvements. The proposed development will not adversely affect the offsite major drainageways or surrounding development. This report meets the latest El Paso County Drainage Criteria requirements for this site and is in accordance with the PDR/MDDP for Saddlehorn Ranch.

REFERENCES:

1. City of Colorado Springs Drainage Criteria Manual Volume 1, City of Colorado Springs, CO, May 2014.

2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Revision.

3. Master Development Drainage Plan and Preliminary Drainage Report for Saddlehorn Ranch, JR Engineering, May 2020.

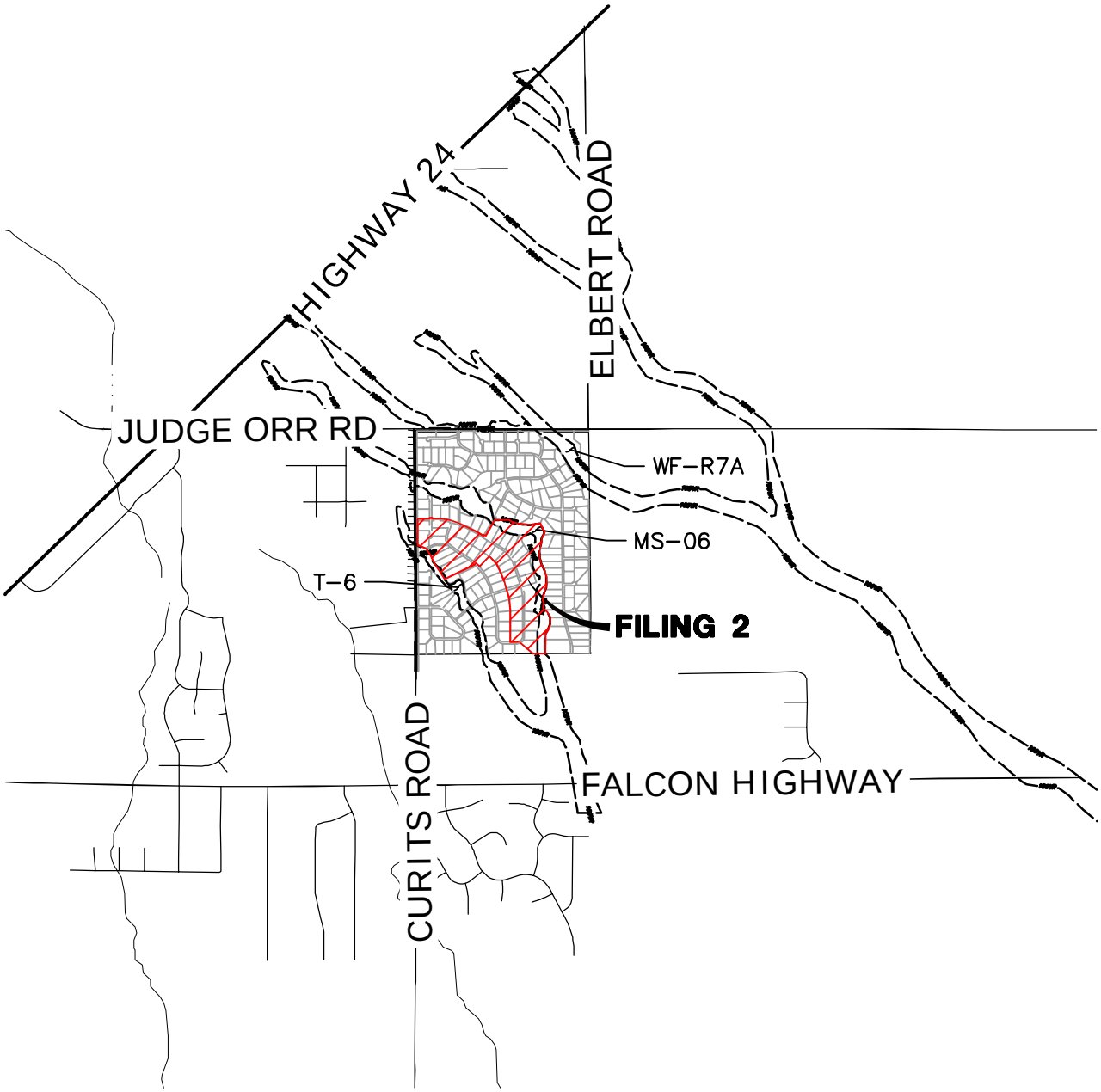
4. Haegler Ranch Drainage Basin Planning Study, URS Corporation, May 2009.

5. The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR, Federal Emergency Management Agency, October 20, 2004.

6. Final Drainage Report for Saddlehorn Ranch – Filing 1, JR Engineering, May 7, 2020

APPENDIX A

FIGURES AND EXHIBITS



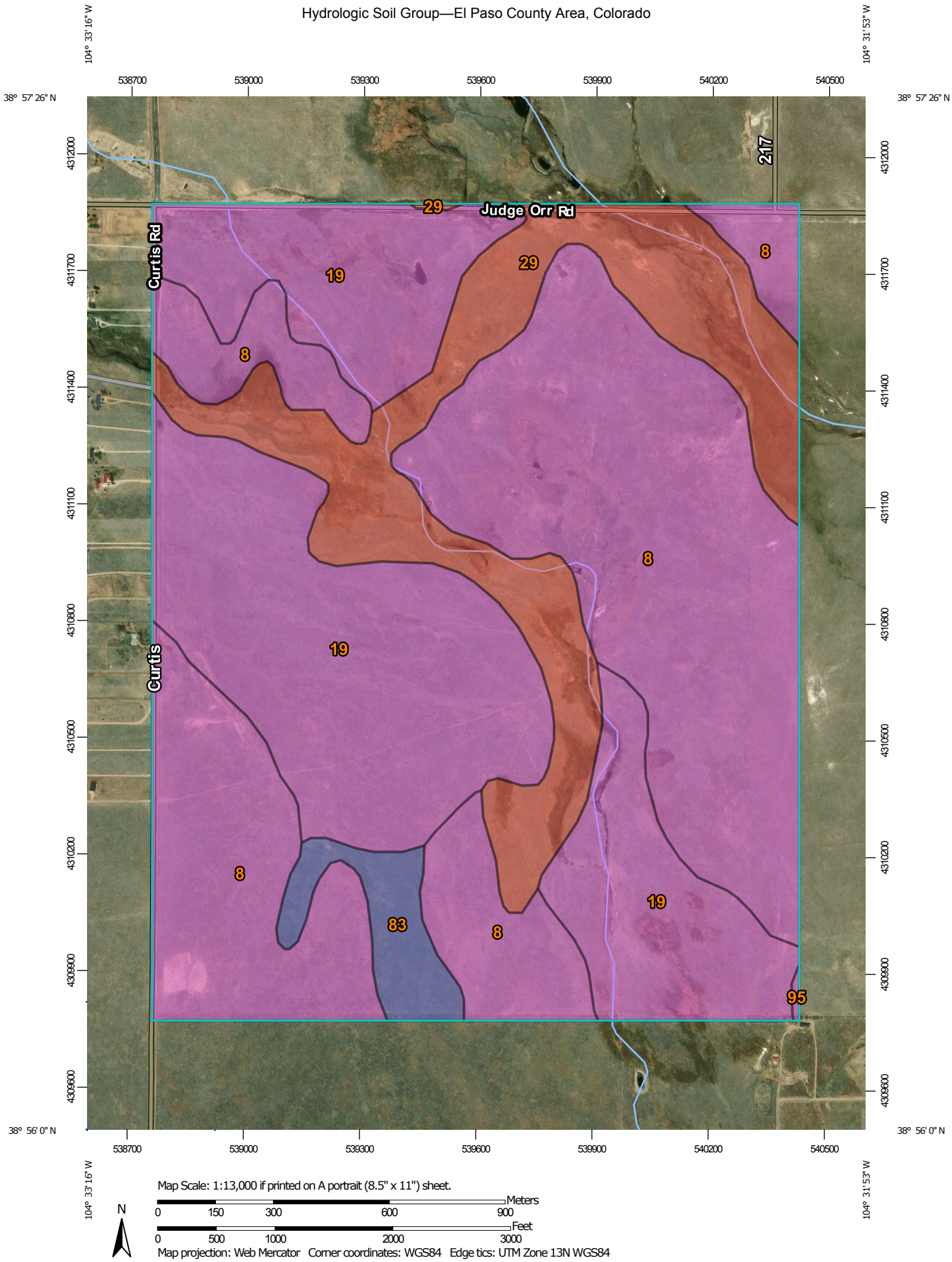
5000 2500 0 5000 10000

ORIGINAL SCALE: 1" = 5000'

VICINITY MAP
SADDLEHORN RANCH FILING 2
25142.04
6/4/21
SHEET 1 OF 1

J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com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104° 31' 53" W
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539000
539300
539600
539900
540200
540500
38° 57' 26" N
38° 56' 0" N
4312000
4311700
4311400
4311100
4310800
4310500
4310200
4309900
4309600
Judge Orr Rd
Curtis Rd
Curtis
217
29
19
8
83
95
Map Scale: 1:13,000 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Date(s) aerial images were photographed: May 22, 2016—Aug 17, 2017

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	388.3	44.6%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	307.3	35.3%
29	Fluvaquentic Haplaquolls, nearly level	D	150.0	17.2%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	24.6	2.8%
95	Truckton loamy sand, 1 to 9 percent slopes	A	0.6	0.1%
Totals for Area of Interest			**870.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

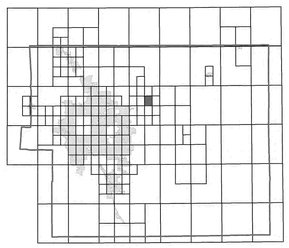
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

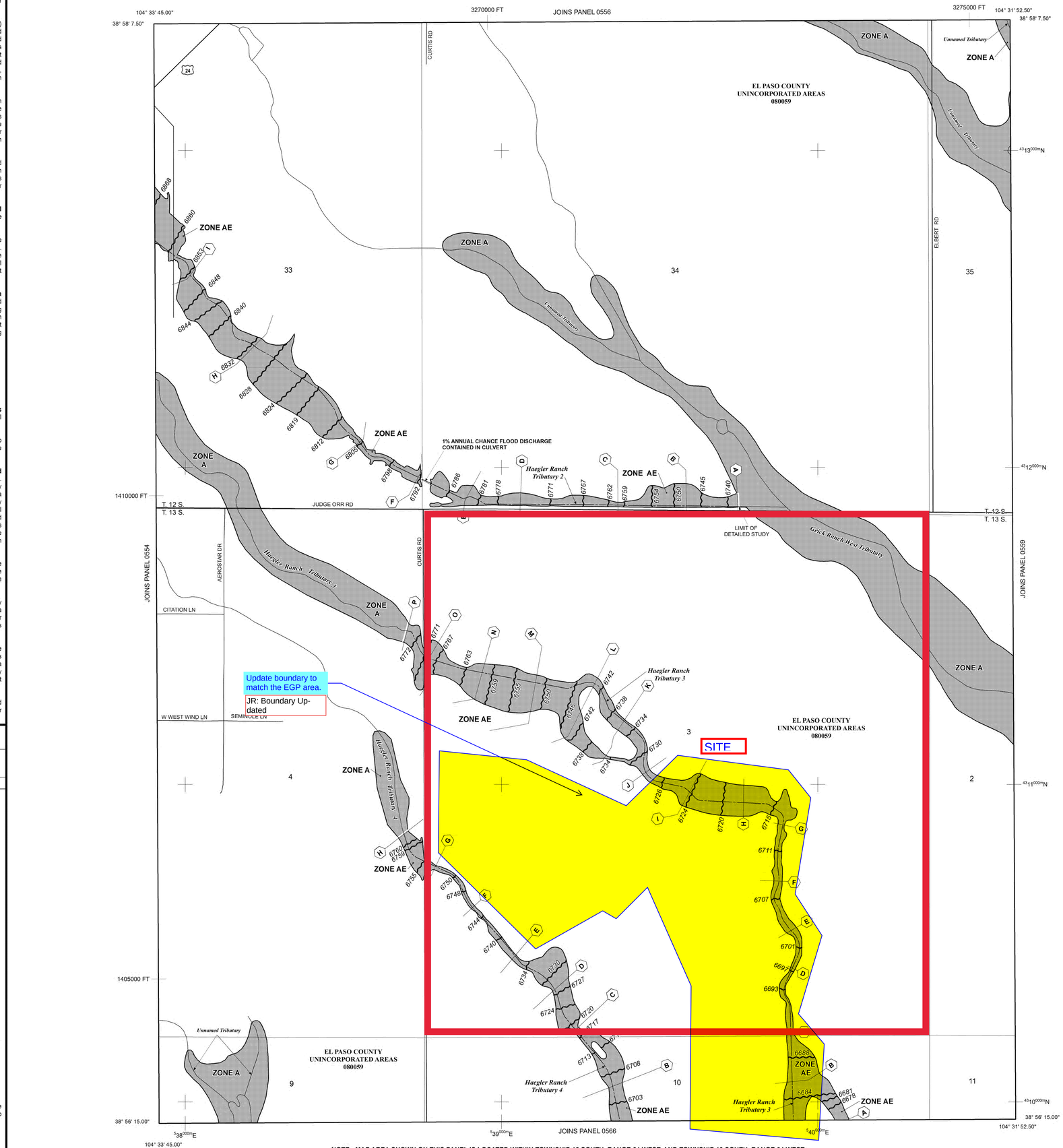
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 12 SOUTH, RANGE 64 WEST, AND TOWNSHIP 13 SOUTH, RANGE 64 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary
Floodway boundary
Zone D Boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A Cross section line
23 — 23 Transect line
97° 07' 30.00" / 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0558G

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 558 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0558	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0558G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

Update cost estimate to only include improvements associated with the early grading.

JR: Noted

Update to EGP221

JR: Noted. FAE has been updated to only include early grading improvements.

2021 Financial Assurance Estir
(with pre-plat construction)

Updated: 12/22/2020

ATION			
Saddlehorn Ranch Filing 2 Improvements	**2**	**SF-21-033**	
Project Name		**PCD File No.**	

Description	Quantity	Units	Cost		Total	(with Pre-Plat Construction) % Complete	Remaining
SECTION 1 - GRADING AND EROSION CONTROL (Construction and Permanent BMPs)							
* Earthwork							
less than 1,000; $5,300 min		CY	$ 8.00	=	$ -		$ -
1,000-5,000; $8,000 min		CY	$ 6.00	=	$ -		$ -
5,001-20,000; $30,000 min		CY	$ 5.00	=	$ -		$ -
20,001-50,000; $100,000 min		CY	$ 3.50	=	$ -		$ -
50,001-200,000; $175,000 min	50,633	CY	$ 2.50	=	$ 175,000.00		$ 175,000.00
greater than 200,000; $500,000 min		CY	$ 2.00	=	$ -		$ -
* Permanent Seeding (inc. noxious weed mgmnt.)	6	AC	$ 828.00	=	$ 5,266.08		$ 5,266.08
* Mulching	6	AC	$ 777.00	=	$ 4,662.00		$ 4,662.00
* Permanent Erosion Control Blanket	0	SY	$ 6.00	=	$ -		$ -
* Permanent Pond/BMP Construction	See Below	CY	$ -	=			$ -
* Permanent Pond/BMP (provide engineer's estimate)		EA		=	$ -		$ -
*30" RCP	44	LF	$ 100.00	=	$ 4,400.00		$ 4,400.00
*Detention Outlet Structure	1	EA	$ 5,000.00	=	$ 5,000.00		$ 5,000.00
*Concrete/Riprap Forebay	1	EA	$ 3,000.00	=	$ 3,000.00		$ 3,000.00
*Concrete Trickle Channel	330	CY	$ 95.00	=	$ 31,350.00		$ 31,350.00
*Detention Emergency Spillway	1	EA	$ 4,000.00		$ 4,000.00		$ 4,000.00
*Drainageway riprap, d50 size from 6" to 24"	694	Tons	$ 83.00		$ 57,602.00		$ 57,602.00
*30" - Flared End Section (FES)	1	EA	$ 600.00	=	$ 600.00		$ 600.00
*Permanent WQ Feature (EDB)	1	EA	$ 5,000.00		$ 5,000.00		$ 5,000.00
*Gravel Maintenance Access Road	1,046	SY	$ 45.00		$ 47,070.00		$ 47,070.00
					$ -		$ -
Safety Fence	8,102	LF	$ 3.00	=	$ 24,306.00		$ 24,306.00
Temporary Erosion Control Blanket	3,642	SY	$ 3.00	=	$ 10,926.00		$ 10,926.00
Vehicle Tracking Control	2	EA	$ 2,453.00	=	$ 4,906.00		$ 4,906.00
Silt Fence	11,010	LF	$ 2.60	=	$ 28,626.00		$ 28,626.00
Temporary Seeding	13	AC	$ 650.00	=	$ 8,450.00		$ 8,450.00
Temporary Mulch	13	AC	$ 777.00	=	$ 10,101.00		$ 10,101.00
Erosion Bales	0	EA	$ 26.00	=	$ -		$ -
Erosion Logs/Straw Waddle	0	LF	$ 5.00	=	$ -		$ -
Rock Check Dams	36	EA	$ 518.00	=	$ 18,648.00		$ 18,648.00
Inlet Protection	17	EA	$ 173.00	=	$ 2,941.00		$ 2,941.00
Sediment Basin	1	EA	$ 1,824.00	=	$ 1,824.00		$ 1,824.00
Concrete Washout Basin	1	EA	$ 932.00	=	$ 932.00		$ 932.00
				=	$ -		$ -
[insert items not listed but part of construction plans]					$ -		$ -
MAINTENANCE (35% of Construction BMPs)				=	$ 30,573.90		$ 30,573.90
* - Subject to defect warranty financial assurance. A minimum of 20% shall			**Section 1 Subtotal**	**=**	**$ 485,183.98**		**$ 485,183.98**
SECTION 2 - PUBLIC IMPROVEMENTS *							
ROADWAY IMPROVEMENTS							
Mobilization/Construction Traffic Control	1	LS	$ 50,000.00	=	$ 50,000.00		$ 50,000.00
Removal of Asphalt (Full Depth)	210	SY	$ 10.00		$ 2,100.00		$ 2,100.00
Removal of Asphalt (Planing-4")	837	SY	$ 5.00		$ 4,185.00		$ 4,185.00
Removal of Striping	7,534	LF	$ 1.00		$ 7,534.00		$ 7,534.00
Removal of Fencing	1,096	LF	$ 5.00		$ 5,480.00		$ 5,480.00
Aggregate Base Course (135 lbs/cf)	5,080	Tons	$ 29.00	=	$ 147,320.00		$ 147,320.00
Aggregate Base Course (135 lbs/cf)		CY	$ 52.00		$ -		$ -
Asphalt Pavement (3" thick)		SY	$ 14.50		$ -		$ -
Asphalt Pavement (4" thick)		SY	$ 20.00		$ -		$ -
Asphalt Pavement (6" thick)		SY	$ 30.00		$ -		$ -
Asphalt Pavement (147 lbs/cf) _" thick	20,805	Tons	$ 91.00	=	$ 1,893,255.00		$ 1,893,255.00
Raised Median, Paved		SF	$ 8.30	=	$ -		$ -
Regulatory Sign/Advisory Sign	7	EA	$ 311.00	=	$ 2,177.00		$ 2,177.00
Guide/Street Name Sign	13	EA	$ 250.00	=	$ 3,250.00		$ 3,250.00
Epoxy Pavement Marking	4,122	SF	$ 14.00	=	$ 57,708.00		$ 57,708.00
Thermoplastic Pavement Marking	87	SF	$ 24.00	=	$ 2,097.60		$ 2,097.60
Barricade - Type 3	8	EA	$ 207.00	=	$ 1,656.00		$ 1,656.00
Delineator - Type I		EA	$ 25.00	=	$ -		$ -
Curb and Gutter, Type A (6" Vertical)		LF	$ 31.00	=	$ -		$ -

PROJECT INFORMATION		
Saddlehorn Ranch Filing 2 Improvements	1/2/2022	SF-21-033
Project Name	Date	PCD File No.

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	Remaining	
Curb and Gutter, Type B (Median)		LF	$ 31.00	=	$ -		$ -	*
Curb and Gutter, Type C (Ramp)		LF	$ 31.00	=	$ -		$ -	*
4" Sidewalk (common areas only)		SY	$ 50.00	=	$ -		$ -	*
5" Sidewalk		SY	$ 62.00	=	$ -		$ -	*
6" Sidewalk		SY	$ 75.00	=	$ -		$ -	*
8" Sidewalk		SY	$ 99.00		$ -		$ -	*
Pedestrian Ramp		EA	$ 1,190.00	=	$ -		$ -	*
Cross Pan, local (8" thick, 6' wide to include return)		LF	$ 63.00	=	$ -		$ -	*
Cross Pan, collector (9" thick, 8' wide to include return)		LF	$ 95.00		$ -		$ -	*
Curb Chase		EA	$ 1,532.00	=	$ -		$ -	
Guardrail Type 3 (W-Beam)		LF	$ 51.00	=	$ -		$ -	*
Guardrail Type 7 (Concrete)		LF	$ 75.00	=	$ -		$ -	*
Guardrail Impact Attenuator		EA	$ 3,899.00	=	$ -		$ -	*
Sound Barrier Fence (CMU block, 6' high)		LF	$ 81.00		$ -		$ -	*
Sound Barrier Fence (panels, 6' high)		LF	$ 83.00	=	$ -		$ -	*
Electrical Conduit, Size =		LF	$ 17.00	=	$ -		$ -	*
Traffic Signal, complete intersection		EA	$ 439,875	=	$ -		$ -	*
Traffic Signal, complete intersection		EA	$ 439,875	=	$ -		$ -	*
[insert items not listed but part of construction plans]				=	$ -		$ -	*
STORM DRAIN IMPROVEMENTS								*
Concrete Box Culvert (M Standard), Size (W x H)		LF		=	$ -		$ -	*
18" Reinforced Concrete Pipe	223	LF	$ 67.00	=	$ 14,941.00		$ 14,941.00	*
24" Reinforced Concrete Pipe	123	LF	$ 81.00	=	$ 9,963.00		$ 9,963.00	*
19" x 30" Horizontal Elliptical Reinforced Concrete Pipe	68	LF	$ 100.00	=	$ 6,800.00		$ 6,800.00	*
54" Corrugated Steel Pipe		LF	$ 269.00	=	$ -		$ -	
32" CMP	16	LF	$ 100.00	=	$ 1,600.00		$ 1,600.00	
60" Corrugated Steel Pipe		LF	$ 290.00	=	$ -		$ -	*
66" Corrugated Steel Pipe		LF	$ 352.00	=	$ -		$ -	*
72" Corrugated Steel Pipe		LF	$ 414.00	=	$ -		$ -	*
18" - Flared End Section (FES)	6	EA	$ 402.00		$ 2,412.00		$ 2,412.00	*
18" - Flared End Section (FES)	8	EA	$ 402.00		$ 3,216.00		$ 3,216.00	*
24" - Flared End Section (FES)	4	EA	$ 486.00		$ 1,944.00		$ 1,944.00	*
19" x 30" - Flared End Section (FES)	2	EA	$ 600.00		$ 1,200.00		$ 1,200.00	*
30" - Flared End Section (FES)	2	EA	$ 600.00		$ 1,200.00		$ 1,200.00	*
32" Flared End Section (FES)	1	EA	$ 600.00	=	$ 600.00		$ 600.00	*
Flared End Section (FES) CSP Size = (unit cost = 6x pipe unit cost)		EA		=	$ -		$ -	*
End Treatment- Headwall		EA		=	$ -		$ -	*
End Treatment- Wingwall		EA		=	$ -		$ -	*
End Treatment - Cutoff Wall		EA		=	$ -		$ -	*
Curb Inlet (Type R) L=5', Depth < 5'		EA	$ 5,736.00	=	$ -		$ -	*
Curb Inlet (Type R) L=5', 5' ≤ Depth < 10'		EA	$ 7,440.00	=	$ -		$ -	*
Curb Inlet (Type R) L =5', 10' ≤ Depth < 15'		EA	$ 8,637.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', Depth < 5'		EA	$ 7,894.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', 5' ≤ Depth < 10'		EA	$ 8,136.00	=	$ -		$ -	*
Curb Inlet (Type R) L =10', 10' ≤ Depth < 15'		EA	$ 10,185.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', Depth < 5'		EA	$ 10,265.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', 5' ≤ Depth < 10'		EA	$ 11,005.00	=	$ -		$ -	*
Curb Inlet (Type R) L =15', 10' ≤ Depth < 15'		EA	$ 12,034.00	=	$ -		$ -	*
Curb Inlet (Type R) L =20', Depth < 5'		EA	$ 10,940.00	=	$ -		$ -	*
Curb Inlet (Type R) L =20', 5' ≤ Depth < 10'		EA	$ 12,075.00	=	$ -		$ -	*
Grated Inlet (Type C), Depth < 5'		EA	$ 4,802.00	=	$ -		$ -	
Grated Inlet (Type D), Depth < 5'		EA	$ 5,932.00	=	$ -		$ -	*
Storm Sewer Manhole, Box Base		EA	$ 12,034.00	=	$ -		$ -	
Storm Sewer Manhole, Slab Base		EA	$ 6,619.00	=	$ -		$ -	
Geotextile (Erosion Control)		SY	$ 6.20	=	$ -		$ -	
Rip Rap, d50 size from 6" to 24"	476	Tons	$ 83.00	=	$ 39,508.00		$ 39,508.00	
Rip Rap, Grouted		Tons	$ 98.00	=	$ -		$ -	
Drainage Channel Lining, Concrete		CY	$ 590.00	=	$ -		$ -	
Drainage Channel Lining, Rip Rap		CY	$ 116.00	=	$ -		$ -	
Drainage Channel Lining, Grass		AC		=	$ -		$ -	
Drainage Channel Lining, Other Stabilization				=	$ -		$ -	
				=	$ -		$ -	
[insert items not listed but part of construction plans]				=	$ -		$ -	
* - Subject to defect warranty financial assurance. A minimum of 20% shall			**Section 2 Subtotal**	**=**	**$ 2,266,446.60**		**$ 2,266,446.60**	
SECTION 3 - COMMON DEVELOPMENT IMPROVEMENTS (Private or District and NOT Maintained by EPC)**								
ROADWAY IMPROVEMENTS								
				=	$ -		$ -	
				=	$ -		$ -	
				=	$ -		$ -	

PROJECT INFORMATION		
Saddlehorn Ranch Filing 2 Improvements	1/2/2022	SF-21-033
Project Name	Date	PCD File No.

Description	Quantity	Units	Unit Cost		Total	(with Pre-Plat Construction) % Complete	(with Pre-Plat Construction) Remaining
				=	$ -		$ -
STORM DRAIN IMPROVEMENTS	(Exception: Permanent Pond/BMP shall be itemized under Section 1)						
				=	$ -		$ -
				=	$ -		$ -
				=	$ -		$ -
					$ -		$ -
				=	$ -		$ -
WATER SYSTEM IMPROVEMENTS							
Water Main Pipe (PVC), Size 8"	6,800	LF	$ 66.00	=	$ 448,800.00		$ 448,800.00
Water Main Pipe (PVC), Size 12"	1,696	LF	$ 100.00		$ 169,600.00		$ 169,600.00
Water Main Pipe (PVC), Size 6"	243	LF	$ 66.00		$ 16,038.00		$ 16,038.00
Water Main Pipe (Ductile Iron), Size 8"		LF	$ 78.00	=	$ -		$ -
					$ -		$ -
Gate Valves, 8"	22	EA	$ 1,923.00	=	$ 42,306.00		$ 42,306.00
Gate Valves, 12"	6	EA	$ 2,900.00		$ 17,400.00		$ 17,400.00
Fire Hydrant Assembly, w/ all valves	18	EA	$ 6,828.00	=	$ 122,904.00		$ 122,904.00
Water Service Line Installation, inc. tap and valves	42	EA	$ 1,370.00	=	$ 57,540.00		$ 57,540.00
Fire Cistern Installation, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
SANITARY SEWER IMPROVEMENTS							
Sewer Main Pipe (PVC), Size 8"		LF	$ 66.00	=	$ -		$ -
Sanitary Sewer Manhole, Depth < 15 feet		EA	$ 4,540.00	=	$ -		$ -
Sanitary Service Line Installation, complete		EA	$ 1,451.00	=	$ -		$ -
Sanitary Sewer Lift Station, complete		EA		=	$ -		$ -
				=	$ -		$ -
[insert items not listed but part of construction plans]				=	$ -		$ -
LANDSCAPING IMPROVEMENTS	(For subdivision specific condition of approval, or PUD)						
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
		EA		=	$ -		$ -
** - Section 3 is not subject to defect warranty requirements		**Section 3 Subtotal**		**=**	**$ 874,588.00**		**$ 874,588.00**
AS-BUILT PLANS (Public Improvements inc. Permanent WQCV BMPs)		LS	$ 10,000.00	=	$ 10,000.00		$ 10,000.00
POND/BMP CERTIFICATION (inc. elevations and volume calculations)		LS	$ 10,000.00	=	$ 10,000.00		$ 10,000.00

Total Construction Financial Assurance **$ 3,646,218.58**
(Sum of all section subtotals plus as-builts and pond/BMP certification)

Total Remaining Construction Financial Assurance (with Pre-Plat Construction) **$ 3,646,218.58**
(Sum of all section totals less credit for items complete plus as-builts and pond/BMP certification)

Total Defect Warranty Financial Assurance **$ 490,274.94**
(20% of all items identified as (*). To be collateralized at time of preliminary acceptance)

Approvals

I hereby certify that this is an accurate and complete estimate of costs for the work as shown on the Grading and Erosion Control Plan and Construction Drawings associated with the Project.

Engineer (P.E. Seal Required)

APPENDIX B

HYDROLOGIC CALCULATIONS

JR: Noted

NOTE: The majority of the hydrology/hydraulic calculation presented with this early grading application is for information only and not reviewed in detail with the early grading.

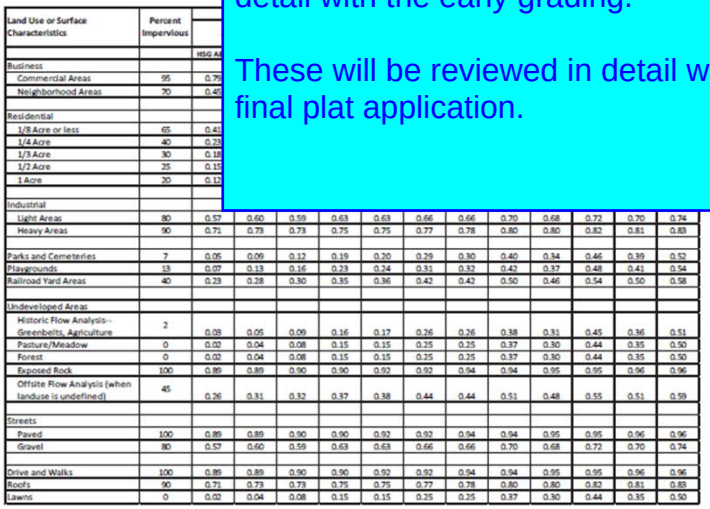
These will be reviewed in detail with the final plat application.

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: Saddlehorn Ranch
Location: El Paso County

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

Basin ID	Total Area (ac)	Paved Roads			2.5 Acre Rural Lots			Lawns			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
F1	4.93	45%	0.97	8.9%	6.2%	3.96	5.0%	2%	0.00	0.0%	13.8%
F2	3.77	45%	1.44	17.2%	6.2%	2.33	3.8%	2%	0.00	0.0%	21.0%
F3	33.31	45%	2.99	4.0%	6.2%	30.32	5.6%	2%	0.00	0.0%	9.7%
F4	14.38	45%	0.80	2.5%	6.2%	13.58	5.9%	2%	0.00	0.0%	8.4%
F5	19.25	45%	2.66	6.2%	6.2%	16.59	5.3%	2%	0.00	0.0%	11.6%
F6	7.67	45%	0.98	5.7%	6.2%	6.69	5.4%	2%	0.00	0.0%	11.2%
F7	2.37	45%	2.37	45.0%	6.2%	0.00	0.0%	2%	0.00	0.0%	45.0%
F8	2.93	45%	2.93	45.0%	6.2%	0.00	0.0%	2%	0.00	0.0%	45.0%
F9	0.87	45%	0.87	45.0%	6.2%	0.00	0.0%	2%	0.00	0.0%	45.0%
F10	3.87	45%	0.00	0.0%	6.2%	2.20	3.5%	2%	1.67	0.9%	4.4%
G1	17.59	45%	1.35	3.5%	6.2%	16.24	5.7%	2%	0.00	0.0%	9.2%
G2	1.21	45%	1.21	45.0%	6.2%	0.00	0.0%	2%	0.00	0.0%	45.0%
UD1	16.50	45%	0.00	0.0%	6.2%	16.50	6.2%	2%	0.00	0.0%	6.2%
UD2	23.67	45%	0.00	0.0%	6.2%	23.67	6.2%	2%	0.00	0.0%	6.2%
UD3	44.34	45%	0.00	0.0%	6.2%	0.00	0.0%	2%	44.34	2.0%	2.0%
UD4	1.80	45%	0.00	0.0%	6.2%	1.80	6.2%	2%	0.00	0.0%	6.2%
UD5	5.82	45%	0.00	0.0%	6.2%	5.82	6.2%	2%	0.00	0.0%	6.2%
OS1	1.35	100%	0.53	39.3%	6.2%	0.00	0.0%	2%	0.82	1.2%	40.5%
OS2	0.84	100%	0.42	50.0%	6.2%	0.00	0.0%	2%	0.42	1.0%	51.0%
OS3	0.58	100%	0.18	31.0%	6.2%	0.00	0.0%	2%	0.40	1.4%	32.4%
TOTAL	207.05										9.2%



Land Use or Surface Characteristics	Percent Impervious												
		HSG A											
Business													
Commercial Areas	95	0.79											
Neighborhood Areas	70	0.49											
Residential													
1/8 Acre or less	65	0.41											
1/4 Acre	40	0.23											
1/3 Acre	30	0.18											
1/2 Acre	25	0.15											
1 Acre	20	0.12											
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis--Greenbelts, Agriculture	2	0.08	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

2.5 Acre Rural Lots - Comp. % Impervious Calculation			
Total Area (ac)	Area (ac) - Roofs (90%)	Area (ac)- Drives (100%)	Area (ac) - Lawns (2%)
2.50	0.068	0.046	2.39
Comp % Imperviousness	6.20%		

Roads w/ Roadside Ditches - Comp. % Impervious Calculation		
Area* (ac)	Area - Ditch (5%)	Area - Roads (100%)
0.2124	0.1320	0.0804
Comp % Imperviousness	0.41	

*Area based on 250 LF roadway from CL to outside edge of roadside ditch

The above conservatively rounded to 45%.

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

bdivision: Saddlehorn Ranch
Location: El Paso County

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

Basin ID	Total Area (ac)	Basins Total Weighted % Imp.	Hydrologic Soil Group			Hydrologic Soil Group			Minor Coefficients			Major Coefficients			Basins Total Weighted C_5	Basins Total Weighted C_{100}
			Area A (ac)	Area B (ac)	Area C/D (ac)	% A (ac)	% B (ac)	% C/D (ac)	$C_{5,A}$	$C_{5,B}$	$C_{5,C/D}$	$C_{100,A}$	$C_{100,B}$	$C_{100,C/D}$		
F1	4.93	13.8%	4.93	0.00	0.00	100%	0%	0%	0.07	0.10	0.15	0.22	0.49	0.54	0.07	0.22
F2	3.77	21.0%	3.77	0.00	0.00	100%	0%	0%	0.12	0.16	0.21	0.27	0.52	0.57	0.12	0.27
F3	33.31	9.7%	32.92	0.00	0.39	99%	0%	1%	0.04	0.07	0.11	0.19	0.47	0.52	0.04	0.19
F4	14.38	8.4%	14.38	0.00	0.00	100%	0%	0%	0.04	0.06	0.10	0.17	0.47	0.52	0.04	0.17
F5	19.25	11.6%	10.03	0.00	9.22	52%	0%	48%	0.05	0.08	0.13	0.20	0.48	0.53	0.09	0.36
F6	7.67	11.2%	7.67	0.00	0.00	100%	0%	0%	0.05	0.08	0.13	0.20	0.48	0.53	0.05	0.20
F7	2.37	45.0%	2.00	0.00	0.37	84%	0%	16%	0.31	0.36	0.40	0.46	0.64	0.67	0.32	0.49
F8	2.93	45.0%	2.12	0.00	0.81	72%	0%	28%	0.31	0.36	0.40	0.46	0.64	0.67	0.34	0.52
F9	0.87	45.0%	0.87	0.00	0.00	100%	0%	0%	0.31	0.36	0.40	0.46	0.64	0.67	0.31	0.46
F10	3.87	4.4%	3.87	0.00	0.00	100%	0%	0%	0.02	0.03	0.07	0.14	0.45	0.50	0.02	0.14
UD1	16.50	6.2%	16.50	0.00	0.00	100%	0%	0%	0.03	0.04	0.09	0.16	0.46	0.51	0.03	0.16
UD2	23.67	6.2%	15.82	0.00	7.85	67%	0%	33%	0.03	0.04	0.09	0.16	0.46	0.51	0.05	0.27
UD3	44.34	2.0%	20.64	0.00	23.70	47%	0%	53%	0.01	0.01	0.05	0.13	0.44	0.49	0.03	0.32
UD4	1.80	6.2%	1.56	0.00	0.24	87%	0%	13%	0.03	0.04	0.09	0.16	0.46	0.51	0.03	0.20
UD5	5.82	6.2%	5.82	0.00	0.00	100%	0%	0%	0.03	0.04	0.09	0.16	0.46	0.51	0.03	0.16
G1	17.59	9.2%	17.59	0.00	0.00	100%	0%	0%	0.04	0.06	0.11	0.18	0.47	0.52	0.04	0.18
G2	1.21	45.0%	1.21	0.00	0.00	100%	0%	0%	0.31	0.36	0.40	0.46	0.64	0.67	0.31	0.46
OS1	1.35	40.5%	1.35	0.00	0.00	100%	0%	0%	0.27	0.32	0.37	0.43	0.62	0.65	0.27	0.43

OS2	0.84	51.0%	0.84	0.00	0.00	100%	0%	0%	0.36	0.41	0.45	0.51	0.67	0.69	0.36	0.51
OS3	0.58	32.4%	0.58	0.00	0.00	100%	0%	0%	0.20	0.25	0.30	0.36	0.58	0.62	0.20	0.36
TOTAL	207.05	9.2%	164.47	0.00	42.58	79%	0%	21%	---	---	---	---	---	---	0.06	0.25

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.84i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{C/D} = 0.83i^{1.122}$	$C_{C/D} = 0.82i+0.035$	$C_{C/D} = 0.74i+0.132$	$C_{C/D} = 0.56i+0.319$	$C_{C/D} = 0.49i+0.393$	$C_{C/D} = 0.41i+0.484$	$C_{C/D} = 0.32i+0.588$

Where:

i = % imperviousness (expressed as a decimal)

C_A = Runoff coefficient for Natural Resources Conservation Service (NRCS) HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Saddlehorn Ranch
Location: El Paso County

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_t (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
F1	4.93	A	14%	0.07	0.22	300	1.7%	26.9	546	0.5%	15.0	1.1	8.6	35.4	846.0	35.4	35.4
F2	3.77	A	21%	0.12	0.27	300	1.4%	27.7	249	1.0%	15.0	1.5	2.8	30.4	549.0	25.9	25.9
F3	33.31	A	10%	0.04	0.19	300	1.3%	30.6	2488	1.5%	15.0	1.8	22.5	53.1	2788.0	56.9	53.1
F4	14.38	A	8%	0.04	0.17	300	2.1%	26.0	583	1.7%	15.0	2.0	5.0	31.0	883.0	31.9	31.0
F5	19.25	A	12%	0.09	0.36	300	1.7%	26.5	1524	1.1%	15.0	1.6	16.1	42.6	1824.0	46.8	42.6
F6	7.67	A	11%	0.05	0.20	300	1.7%	27.5	690	1.0%	15.0	1.5	7.7	35.2	990.0	35.0	35.0
F7	2.37	A	45%	0.32	0.49	48	2.0%	7.7	2354	1.4%	15.0	1.8	22.1	29.8	2402.0	40.0	29.8
F8	2.93	A	45%	0.34	0.52	12	22.0%	1.7	3016	1.2%	15.0	1.6	30.6	32.3	3028.0	48.3	32.3
F9	0.87	A	45%	0.31	0.46	12	22.0%	1.8	946	1.2%	15.0	1.6	9.6	11.4	958.0	27.8	11.4
F10	3.87	A	4%	0.02	0.14	139	4.4%	14.2	489	0.5%	20.0	1.4	5.8	19.9	628.0	37.2	19.9
UD1	16.50	A	6%	0.03	0.16	118	1.8%	17.4	819	1.8%	7.0	0.9	14.5	31.9	937.0	35.3	31.9
UD2	23.67	A	6%	0.05	0.27	300	1.3%	30.2	209	1.3%	7.0	0.8	4.4	34.6	509.0	28.0	28.0
UD3	44.34	A	2%	0.03	0.32	290	1.6%	28.0	4562	1.2%	15.0	1.7	46.1	74.1	4852.0	100.1	74.1
UD4	1.80	A	6%	0.03	0.20	300	1.0%	33.4	144	1.0%	7.0	0.7	3.4	36.8	444.0	27.4	27.4
UD5	5.82	A	6%	0.03	0.16	300	4.1%	21.1	126	4.1%	7.0	1.4	1.5	22.6	426.0	26.0	22.6
G1	17.59	A	9%	0.04	0.18	300	1.5%	29.0	1399	1.1%	15.0	1.6	14.8	43.8	1699.0	46.1	43.8
G2	1.21	A	45%	0.31	0.46	12	22.0%	1.8	1378	1.1%	15.0	1.6	14.6	16.4	1390.0	32.7	16.4

STANDARD FORM SF-2
TIME OF CONCENTRATION

Subdivision: Saddlehorn Ranch
Location: El Paso County

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

SUB-BASIN DATA						INITIAL/OVERLAND (T_i)			TRAVEL TIME (T_t)					*tc* CHECK (URBANIZED BASINS)			FINAL
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (ft)	S_o (%)	t_i (min)	L_t (ft)	S_t (%)	K	VEL. (ft/s)	t_t (min)	COMP. t_c (min)	TOTAL LENGTH (ft)	Urbanized t_c (min)	t_c (min)
OS1	1.35	A	40%	0.27	0.43	55	3.4%	7.4	754	0.5%	15.0	1.1	11.8	19.3	809.0	31.2	19.3
OS2	0.84	A	51%	0.36	0.51	55	3.9%	6.3	491	0.5%	15.0	1.1	7.7	14.0	546.0	24.5	14.0
OS3	0.58	A	32%	0.20	0.36	174	3.2%	14.5	73	1.7%	7.0	0.9	1.3	15.9	247.0	21.2	15.9

NOTES:

$$t_c = t_i + t_t$$

Where:

t_c = computed time of concentration (minutes)

t_i = overland (initial) flow time (minutes)

t_t = channelized flow time (minutes).

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$ Equation 6-4

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_o = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = $K\sqrt{S_o}$
K = NRCS conveyance factor (see Table 6-2).

Use a minimum t_c value of 5 minutes for urbanized areas and a minimum t_c value of 10 minutes for areas that are not considered urban. Use minimum values even when calculations result in a lesser time of concentration.

Equation 6-2 $$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_o^{0.33}}$$

Where:

t_i = overland (initial) flow time (minutes)
C_5 = runoff coefficient for 5-year frequency (from Table 6-4)
L_i = length of overland flow (ft)
S_o = average slope along the overland flow path (ft/ft).

Equation 6-3 $$t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

Where:

t_c = minimum time of concentration for first design point when less than t_c from Equation 6-1.
L_t = length of channelized flow path (ft)
i = imperviousness (expressed as a decimal)
S_t = slope of the channelized flow path (ft/ft).

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

Equation 6-5

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: Saddlehorn Ranch
Location: El Paso County
Design Storm: 5-Year

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	OS2	OS2	0.84	0.36	14.0	0.31	3.62	1.1					1.1	0.31	1.85					379	2.7	2.3	Roadside Swale Swale conveyance to DP 1.0
	1	F1	4.93	0.07	35.4	0.34	2.23	0.8					0.8	0.34	0.50					0	1.4	0.0	Roadside Swale Swale conveyance to DP 1.0
	1.0								35.4	0.65	2.23	1.5	1.5	0.65	1.4					564	2.4	4.0	Sum of DP OS2 and DP 1 Swale conveyance to DP 1.1
	2	F2	3.77	0.12	25.9	0.44	2.70	1.2					1.2	0.44	1.0					0	2.0	0.0	Roadside Swale Swale conveyance to DP 1.1
	1.1								39.4	1.09	2.07	2.3	2.3	1.09	1.5					2922	2.4	19.9	Sum of DP 1.0 and DP 2 Swale conveyance to DP 1.2
	3	F3	33.31	0.04	53.1	1.49	1.63	2.4					2.4	1.49	1.5					0	2.4	0.0	Roadside Swale Swale conveyance to DP 1.2
	4	F4	14.38	0.04	31.0	0.52	2.43	1.3					1.3	0.52	1.6					0	2.5	0.0	Roadside Swale Swale conveyance to DP 1.2
	1.2								59.3	3.10	1.46	4.5	4.5	3.10	1.0					1003	2.0	8.4	Sum of DP 1.1, DP 3, and DP 4 Swale conveyance to DP 1.3
	5	F5	19.25	0.09	42.6	1.75	1.95	3.4					3.4	1.75	1.0					0	2.0	0.0	Roadside Swale Swale conveyance to DP 1.3
	1.3								67.6	4.85	1.26	6.1				6.1	4.85	0.5	24	62	4.7	0.2	Sum of DP 1.2 and DP 5 Culvert conveyance to DP 1.6
	OS1	OS1	1.35	0.27	19.3	0.37	3.15	1.2					1.2	0.37	1.8					379	2.7	2.4	Roadside Swale Swale conveyance to DP 1.4
	6	F6	7.67	0.05	35.0	0.40	2.25	0.9					0.9	0.40	1.0					0	2.0	0.0	Roadside Swale Swale conveyance to DP 1.4
	1.4								35.0	0.77	2.25	1.7	1.7	0.77	1.4					1672	2.4	11.8	Sum of DP OS1 and DP 6 Swale conveyance to DP 1.5
	7	F7	2.37	0.32	29.8	0.77	2.49	1.9					1.9	0.77	1.4					0	2.4	0.0	Roadside Swale Swale conveyance to DP 1.5
	1.5								46.8	1.54	1.82	2.8	2.8	1.54	1.4					2987	2.4	21.0	Sum of DP 1.4 and DP 7 Swale conveyance to DP 1.6
	8	F8	2.93	0.34	32.3	0.98	2.37	2.3					2.3	0.98	1.3					0	2.3	0.0	Roadside Swale Swale conveyance to DP 1.6
	9	F9	0.87	0.31	11.4	0.27	3.94	1.1					1.1	0.27	1.3					86	2.3	0.6	Roadside Swale Swale conveyance to DP 1.6
	1.6								67.8	7.64	1.26	9.6	9.6	7.64	1.4					489	2.4	3.4	Sum of DP 1.3, DP 1.5, DP 8, and DP 9 Pond conveyance to DP 1.7
	10	F10	3.87	0.02	19.9	0.06	3.10	0.2					0.2	0.06	1.0					0	2.0	0.0	Proposed Pond F Pond conveyance to DP 1.7
	1.7								67.8	7.70	1.26	9.7											Sum of DP 1.6 and DP 10 Outlet structure release into Drainageway MS-06
	11	G1	17.59	0.04	43.8	0.72	1.91	1.4															Roadside Swale Swale conveyance to DP 11, Ultimately outfall into the existing Pond G
	12	G2	1.21	0.31	16.4	0.38	3.39	1.3															Roadside Swale Swale conveyance to DP 12, Ultimately outfall into the existing Pond G

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Saddlehorn Ranch
Location: El Paso County
Design Storm: 5-Year

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	13	UD1	16.50	0.03	31.9	0.41	2.39	1.0															Overland Flow Sheet flow into Drainageway T-6
	14	UD2	23.67	0.05	28.0	1.07	2.58	2.8															Overland Flow Sheet flow into Drainageway MS-06
	15	UD3	44.34	0.03	74.1	1.33	1.13	1.5															Overland Flow Sheet flow into Drainageway MS-06
	16	UD4	1.80	0.03	27.4	0.06	2.62	0.2															Overland Flow Sheet flow into Drainageway MS-06
	17	UD5	5.82	0.03	22.6	0.15	2.91	0.4															Overland Flow Sheet flow into Drainageway MS-06
	OS3	OS3	0.58	0.20	15.9	0.12	3.44	0.4															Overland Flow Sheet flow into Drainageway T-6

Notes:
Street and Pipe C*A values are determined by Q/i using the catchment's intensity value.

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Saddlehorn Ranch
Location: El Paso County
Design Storm: 100-Year

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	OS2	OS2	0.84	0.51	14.0	0.43	6.08	2.6					2.6	0.43	1.85					379	2.7	2.3	Roadside Swale
																							Swale conveyance to DP 1.0
	1	F1	4.93	0.22	35.4	1.07	3.75	4.0					4.0	1.07	0.50					0	1.4	0.0	Roadside Swale
																							Swale conveyance to DP 1.0
	1.0								35.4	1.50	3.75	5.6	5.6	1.50	1.4					564	2.4	4.0	Sum of DP OS2 and DP 1
																							Swale conveyance to DP 1.1
	2	F2	3.77	0.27	25.9	1.03	4.53	4.7					4.7	1.03	1.0					0	2.0	0.0	Roadside Swale
																							Swale conveyance to DP 1.1
	1.1								39.4	2.53	3.48	8.8	8.8	2.53	1.5					2922	2.4	19.9	Sum of DP 1.0 and DP 2
																							Swale conveyance to DP 1.2
	3	F3	33.31	0.19	53.1	6.33	2.73	17.3					17.3	6.33	1.5					0	2.4	0.0	Roadside Swale
																							Swale conveyance to DP 1.2
	4	F4	14.38	0.17	31.0	2.52	4.08	10.3					10.3	2.52	1.6					0	2.5	0.0	Roadside Swale
																							Swale conveyance to DP 1.2
	1.2								59.3	11.38	2.45	27.9	27.9	11.38	1.0					1003	2.0	8.4	Sum of DP 1.1, DP 3, and DP 4
																							Swale conveyance to DP 1.3
	5	F5	19.25	0.36	42.6	6.90	3.28	22.6					22.6	6.90	1.0					0	2.0	0.0	Roadside Swale
																							Swale conveyance to DP 1.3
	1.3								67.6	18.28	2.12	38.7				38.7	18.28	0.5	24	62	12.3	0.1	Sum of DP 1.2 and DP 5
																							Culvert conveyance to DP 1.6
	OS1	OS1	1.35	0.43	19.3	0.58	5.28	3.1					3.1	0.58	1.8					379	2.7	2.4	Roadside Swale
																							Swale conveyance to DP 1.4
	6	F6	7.67	0.20	35.0	1.51	3.78	5.7					5.7	1.51	1.0					0	2.0	0.0	Roadside Swale
																							Swale conveyance to DP 1.4
	1.4								35.0	2.09	3.78	7.9	7.9	2.09	1.4					1672	2.4	11.8	Sum of DP OS1 and DP 6
																							Swale conveyance to DP 1.5
	7	F7	2.37	0.49	29.8	1.17	4.18	4.9					4.9	1.17	1.4					0	2.4	0.0	Roadside Swale
																							Swale conveyance to DP 1.5
	1.5								46.8	3.26	3.05	9.9	9.9	3.26	1.4					2987	2.4	21.0	Sum of DP 1.4 and DP 7
																							Swale conveyance to DP 1.6
	8	F8	2.93	0.52	32.3	1.52	3.98	6.0					6.0	1.52	1.3					0	2.3	0.0	Roadside Swale
																							Swale conveyance to DP 1.6
	9	F9	0.87	0.46	11.4	0.40	6.61	2.6					2.6	0.40	1.3					86	2.3	0.6	Roadside Swale
																							Swale conveyance to DP 1.6
	1.6								67.8	23.46	2.11	49.5	49.5	23.46	1.4					489	2.4	3.4	Sum of DP 1.3, DP 1.5, DP 8, and DP 9
																							Pond conveyance to DP 1.7
	10	F10	3.87	0.14	19.9	0.56	5.20	2.9					2.9	0.56	1.0					0	2.0	0.0	Proposed Pond F
																							Pond conveyance to DP 1.7
	1.7								67.8	24.02	2.11	50.7											Sum of DP 1.6 and DP 10
																							Outlet structure release into Drainageway MS-06
	11	G1	17.59	0.18	43.8	3.20	3.21	10.3															Roadside Swale
																							Swale conveyance to DP 11, Ultimately outfall into the existing Pond G
	12	G2	1.21	0.46	16.4	0.56	5.69	3.2															Roadside Swale
																							Swale conveyance to DP 12, Ultimately outfall into the existing Pond G

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Saddlehorn Ranch
Location: El Paso County
Design Storm: 100-Year

Project Name: Saddlehorn Ranch
Project No.: 25142.04
Calculated By: AAM
Checked By: TBD
Date: 6/4/21

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				SWALE			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
	13	UD1	16.50	0.16	31.9	2.61	4.01	10.5															Overland Flow Sheet flow into Drainageway T-6
	14	UD2	23.67	0.27	28.0	6.50	4.33	28.2															Overland Flow Sheet flow into Drainageway MS-06
	15	UD3	44.34	0.32	74.1	14.26	1.89	26.9															Overland Flow Sheet flow into Drainageway MS-06
	16	UD4	1.80	0.20	27.4	0.37	4.39	1.6															Overland Flow Sheet flow into Drainageway MS-06
	17	UD5	5.82	0.16	22.6	0.92	4.88	4.5															Overland Flow Sheet flow into Drainageway MS-06
	OS3	OS3	0.58	0.36	15.9	0.21	5.77	1.2															Overland Flow Sheet flow into Drainageway T-6

Notes:
Street and Pipe C*A values are determined by Q/i using the catchment's intensity value.

APPENDIX C

HYDRAULIC CALCULATIONS

Appendix C will be reviewed on resubmittal once construction plans for the culverts being installed with early grading is submitted.

Make sure labeling matches the plans and clearly identify if it's a temporary or permanent culvert.

JR: Noted, calculations have been added for culverts during early grading. The swale calculations were not updated, as the swales were sized for the 100-year storm in the developed condition. In the early grading phase, the reduced composite impervious values will ensure the swales function as intended.

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP01 Design Point 1.0 (Q5=1.5 cfs Q100=5.6 cfs)

Invert Elev Dn (ft)	=	6750.42
Pipe Length (ft)	=	56.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	6750.70
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

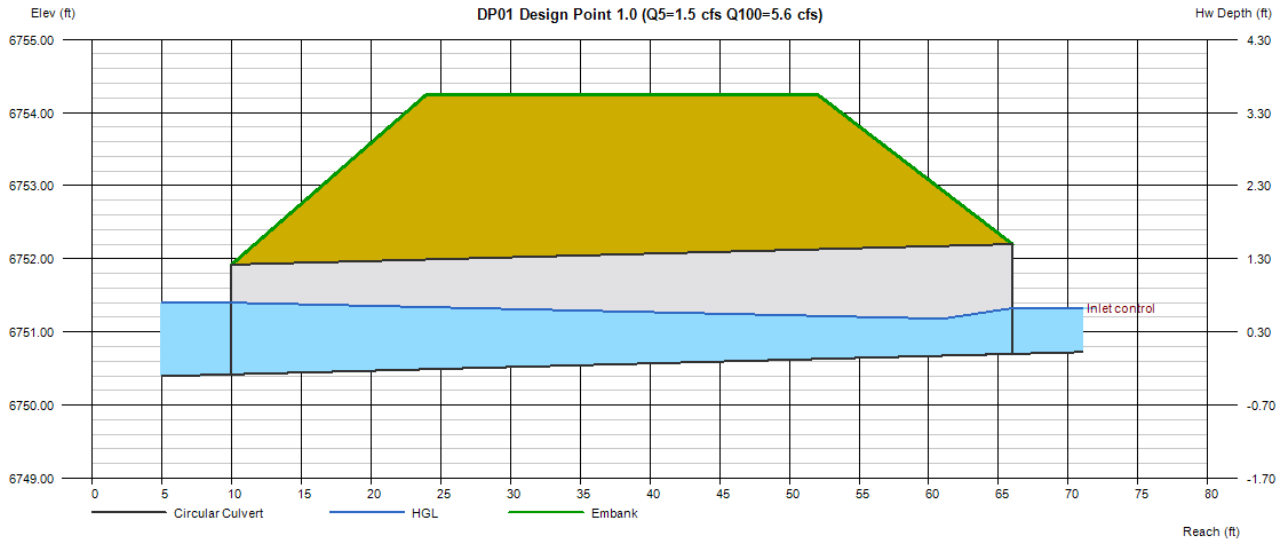
Top Elevation (ft)	=	6754.25
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.50
Qmax (cfs)	=	5.60
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.50
Qpipe (cfs)	=	1.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.23
Veloc Up (ft/s)	=	3.27
HGL Dn (ft)	=	6751.40
HGL Up (ft)	=	6751.16
Hw Elev (ft)	=	6751.33
Hw/D (ft)	=	0.42
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP02 Design Point 1.1 (Q5=2.3 cfs Q100=8.8 cfs)

Invert Elev Dn (ft)	=	6740.39
Pipe Length (ft)	=	63.00
Slope (%)	=	0.98
Invert Elev Up (ft)	=	6741.01
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

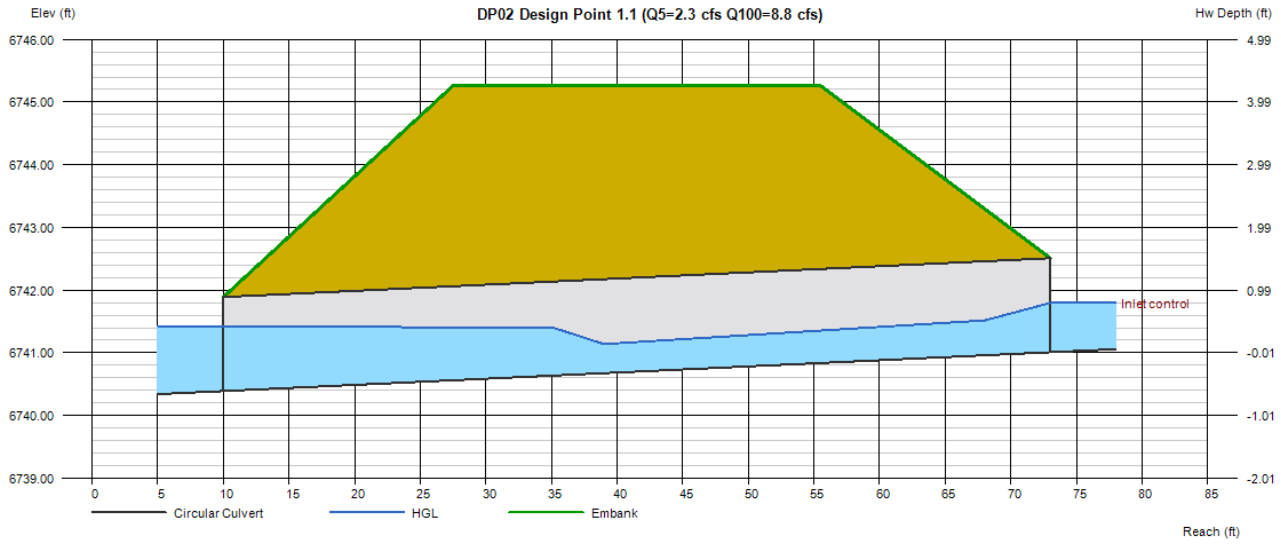
Top Elevation (ft)	=	6745.26
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	2.30
Qmax (cfs)	=	8.80
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.30
Qpipe (cfs)	=	2.30
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.77
Veloc Up (ft/s)	=	3.71
HGL Dn (ft)	=	6741.43
HGL Up (ft)	=	6741.58
Hw Elev (ft)	=	6741.80
Hw/D (ft)	=	0.52
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP03 Design Point 1.2 (Q5=4.5 cfs Q100=27.9 cfs)

Invert Elev Dn (ft)	=	6697.50
Pipe Length (ft)	=	63.00
Slope (%)	=	0.63
Invert Elev Up (ft)	=	6697.90
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

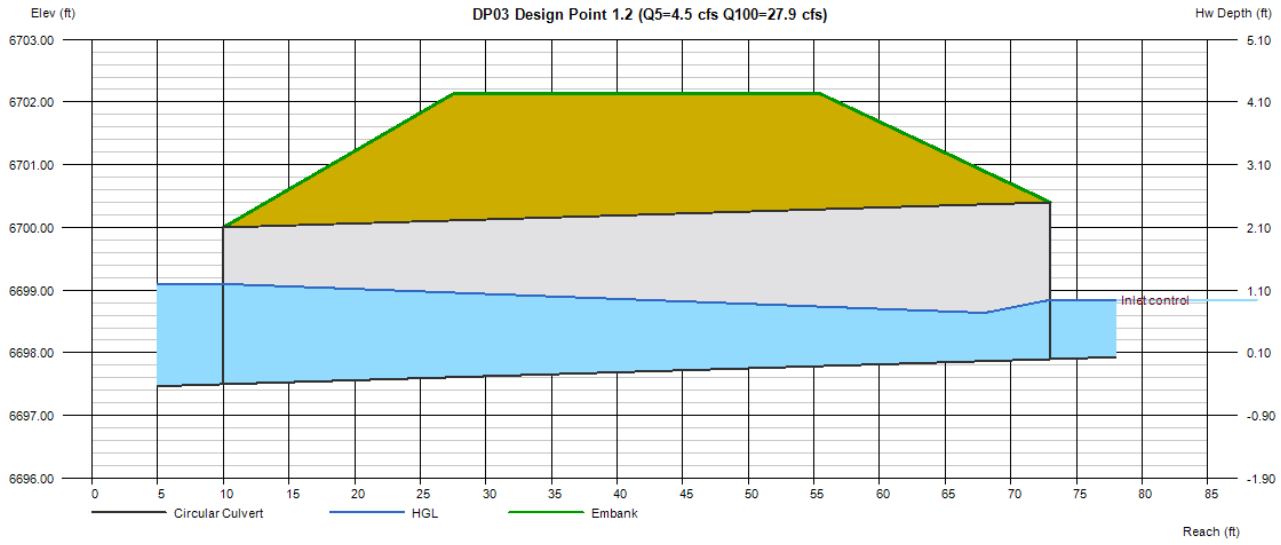
Top Elevation (ft)	=	6702.13
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	4.50
Qmax (cfs)	=	27.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.50
Qpipe (cfs)	=	4.50
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.36
Veloc Up (ft/s)	=	4.01
HGL Dn (ft)	=	6699.10
HGL Up (ft)	=	6698.60
Hw Elev (ft)	=	6698.84
Hw/D (ft)	=	0.38
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP06 Design Point 1.3 (Q5=6.1 cfs Q100=38.7 cfs)

Invert Elev Dn (ft)	=	6686.49
Pipe Length (ft)	=	61.50
Slope (%)	=	0.29
Invert Elev Up (ft)	=	6686.67
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

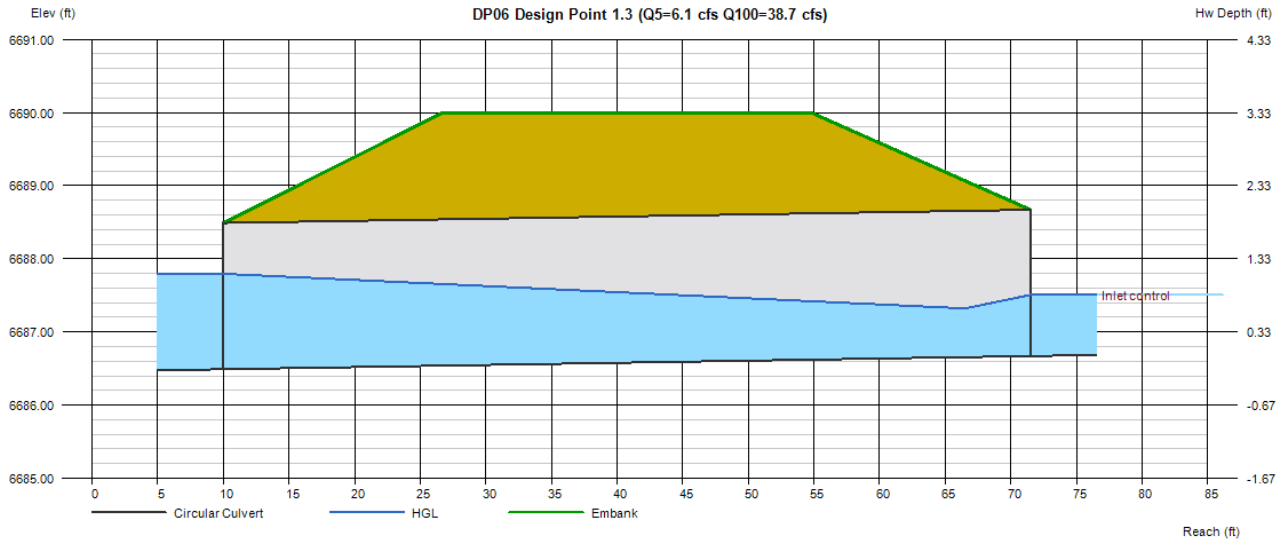
Top Elevation (ft)	=	6690.00
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	6.10
Qmax (cfs)	=	38.70
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	6.10
Qpipe (cfs)	=	6.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.41
Veloc Up (ft/s)	=	3.77
HGL Dn (ft)	=	6687.80
HGL Up (ft)	=	6687.28
Hw Elev (ft)	=	6687.51
Hw/D (ft)	=	0.42
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP04 Design Point 1.4 (Q5=1.7 cfs Q100=7.9 cfs)

Invert Elev Dn (ft)	=	6750.98
Pipe Length (ft)	=	68.00
Slope (%)	=	1.40
Invert Elev Up (ft)	=	6751.93
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

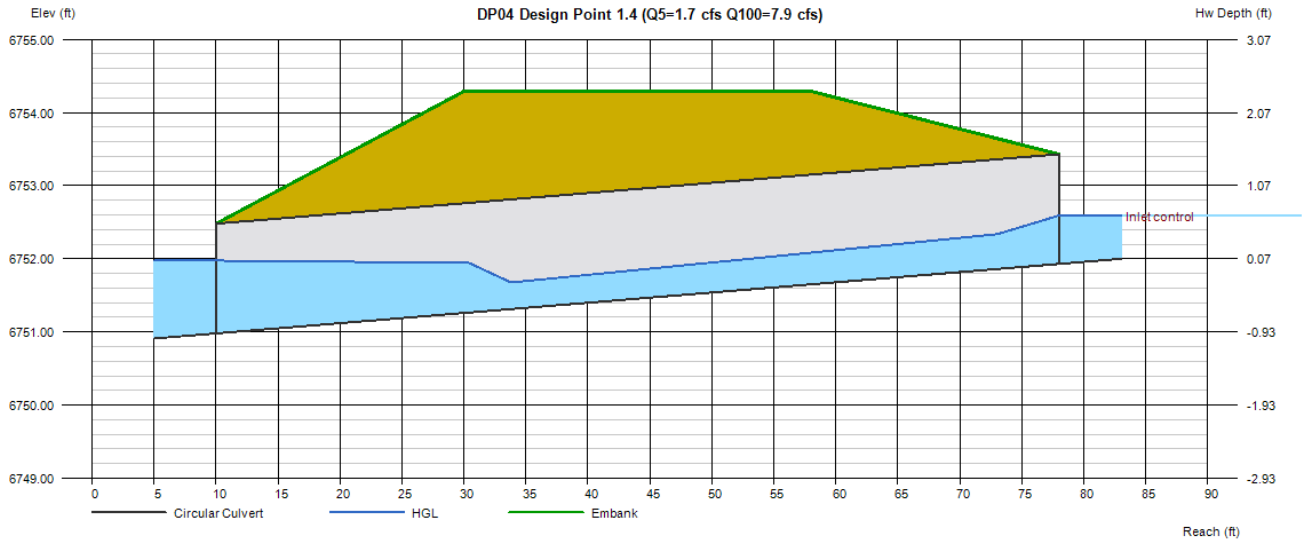
Top Elevation (ft)	=	6754.29
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.70
Qmax (cfs)	=	7.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.70
Qpipe (cfs)	=	1.70
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.37
Veloc Up (ft/s)	=	3.39
HGL Dn (ft)	=	6751.98
HGL Up (ft)	=	6752.42
Hw Elev (ft)	=	6752.59
Hw/D (ft)	=	0.44
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Dec 20 2021

DP05 Design Point 1.5 (Q5=2.8 cfs Q100=9.9 cfs)

Invert Elev Dn (ft)	=	6724.66
Pipe Length (ft)	=	68.00
Slope (%)	=	1.00
Invert Elev Up (ft)	=	6725.34
Rise (in)	=	19.0
Shape	=	Elliptical
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Horizontal Ellipse Concrete
Culvert Entrance	=	Square edge w/headwall (H)
Coeff. K,M,c,Y,k	=	0.01, 2, 0.0398, 0.67, 0.5

Embankment

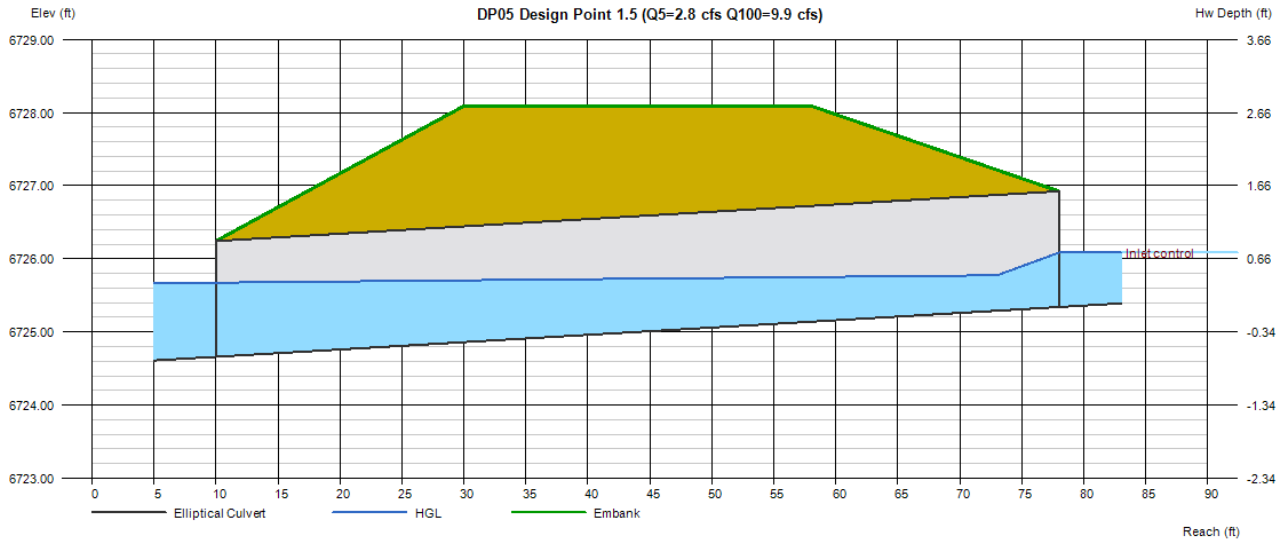
Top Elevation (ft)	=	6728.09
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	2.80
Qmax (cfs)	=	9.90
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.80
Qpipe (cfs)	=	2.80
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.29
Veloc Up (ft/s)	=	4.39
HGL Dn (ft)	=	6725.67
HGL Up (ft)	=	6725.78
Hw Elev (ft)	=	6726.08
Hw/D (ft)	=	0.47
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Dec 2 2021

DP07 Design Point 9 (Q5=1.1 cfs Q100=2.6 cfs)

Invert Elev Dn (ft)	=	6686.99
Pipe Length (ft)	=	36.00
Slope (%)	=	0.86
Invert Elev Up (ft)	=	6687.30
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

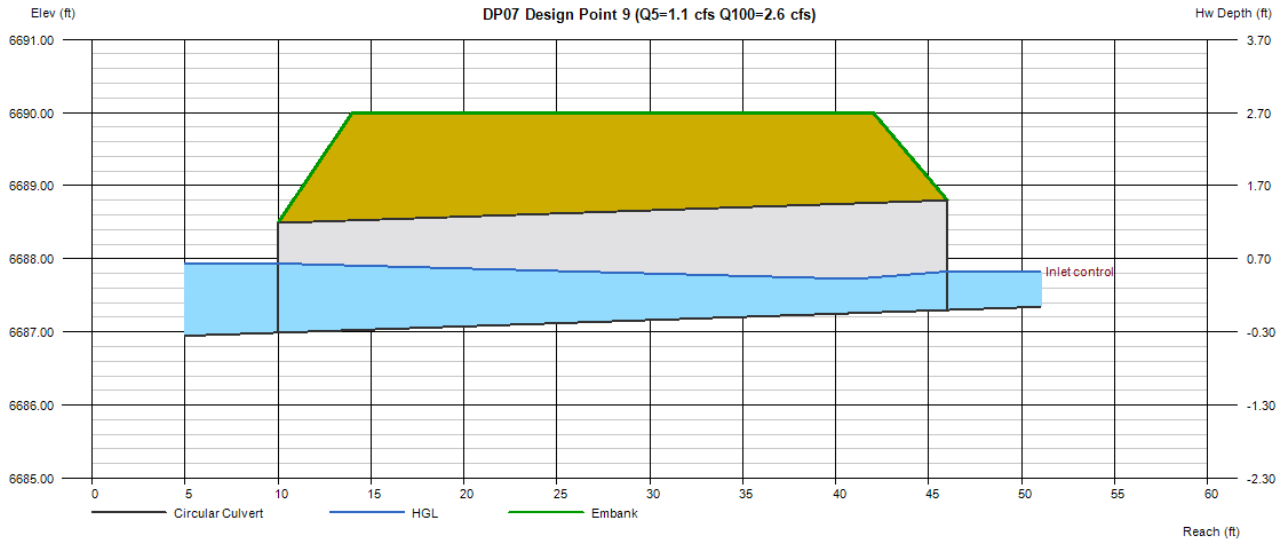
Top Elevation (ft)	=	6690.00
Top Width (ft)	=	28.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.10
Qmax (cfs)	=	2.60
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.10
Qpipe (cfs)	=	1.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	0.94
Veloc Up (ft/s)	=	3.00
HGL Dn (ft)	=	6687.94
HGL Up (ft)	=	6687.69
Hw Elev (ft)	=	6687.83
Hw/D (ft)	=	0.35
Flow Regime	=	Inlet Control



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.0 Swale (5-Year) (FR: 0.39)

Triangular

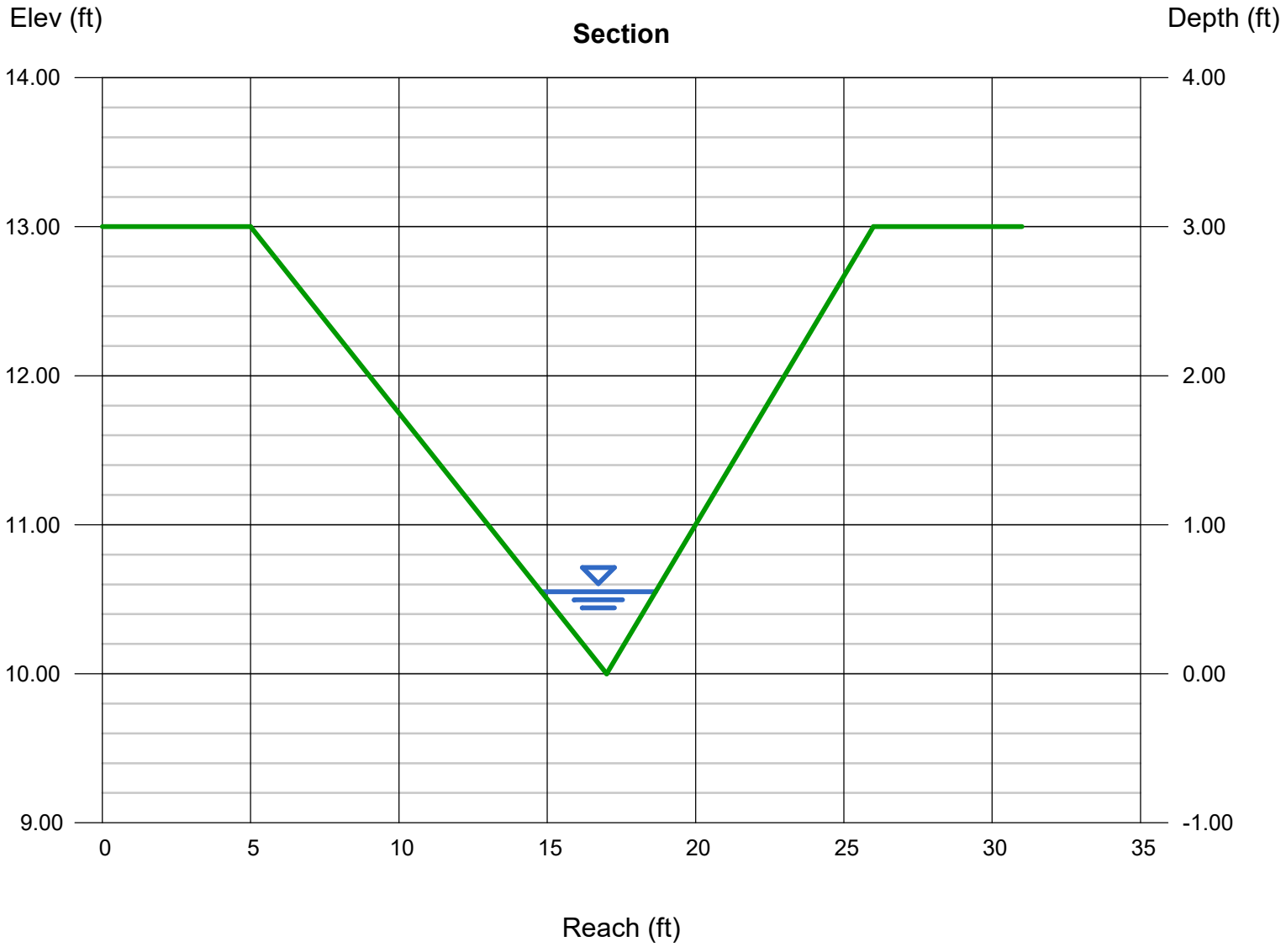
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.50

Highlighted

Depth (ft)	= 0.55
Q (cfs)	= 1.500
Area (sqft)	= 1.06
Velocity (ft/s)	= 1.42
Wetted Perim (ft)	= 4.01
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 3.85
EGL (ft)	= 0.58



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.0 Swale (100-Year) (FR: 0.42)

Triangular

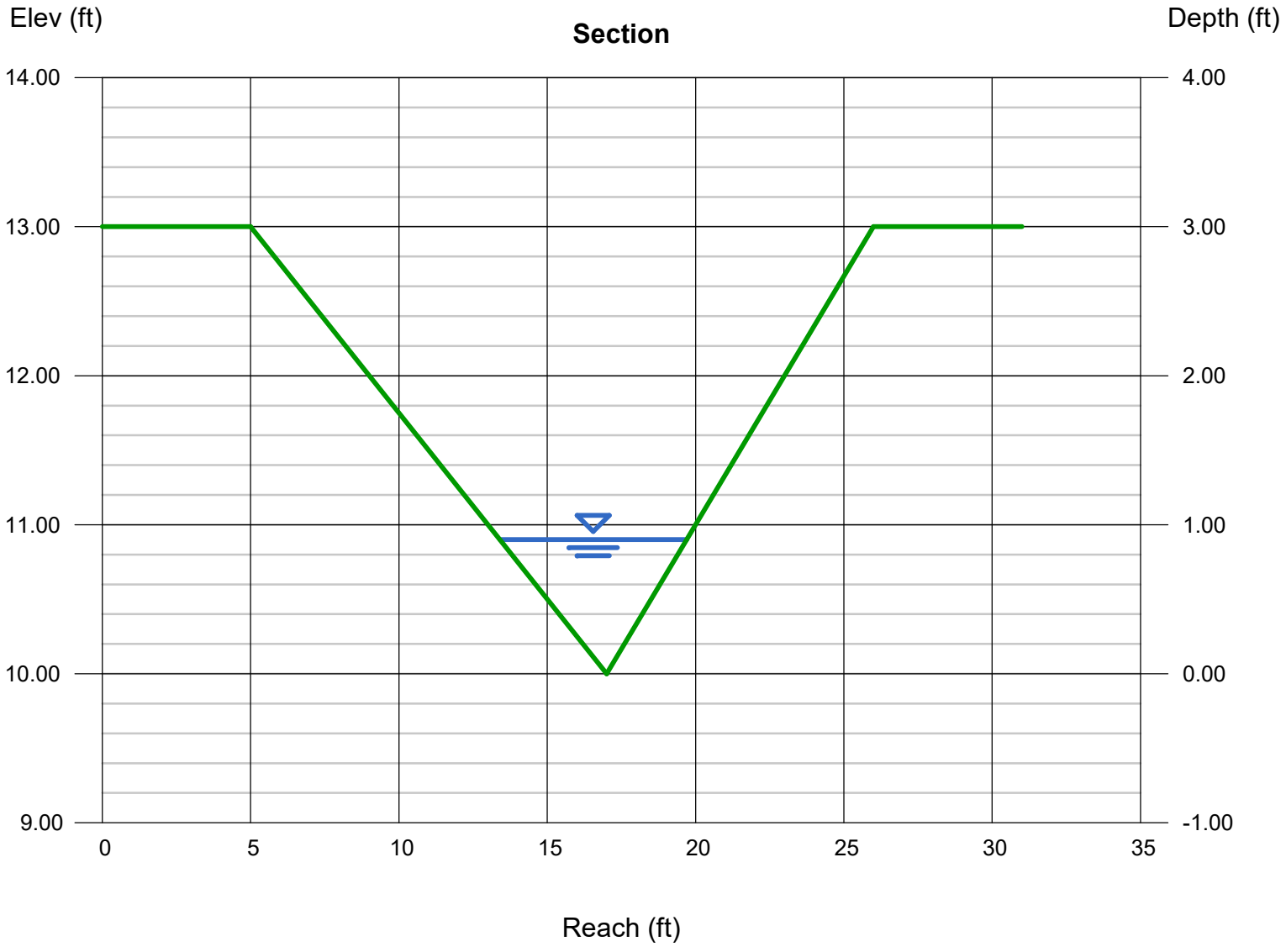
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.60

Highlighted

Depth (ft)	= 0.90
Q (cfs)	= 5.600
Area (sqft)	= 2.83
Velocity (ft/s)	= 1.98
Wetted Perim (ft)	= 6.56
Crit Depth, Yc (ft)	= 0.70
Top Width (ft)	= 6.30
EGL (ft)	= 0.96



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.1 Swale (5-Year) (FR: 0.51)

Triangular

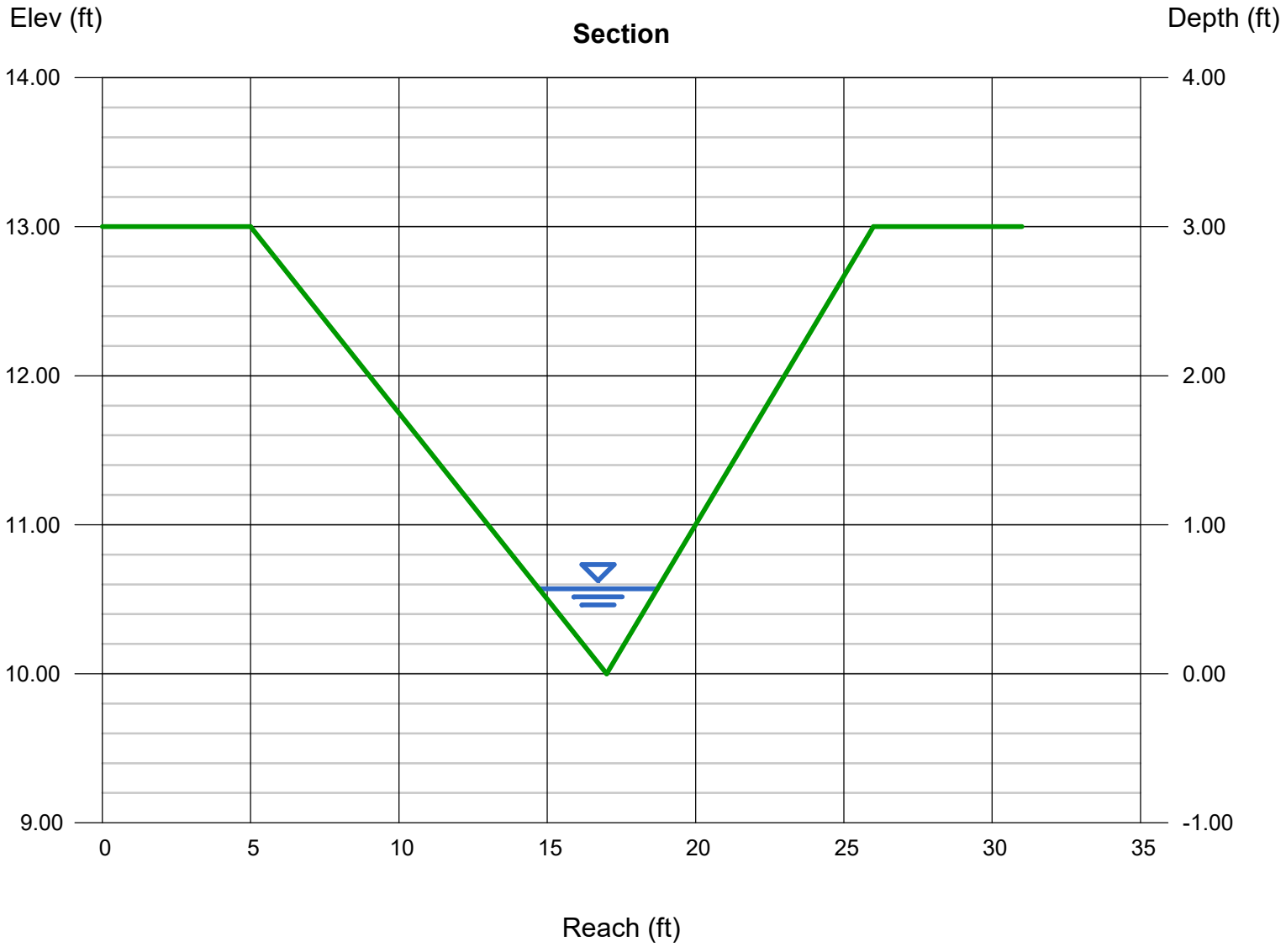
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.57
Q (cfs)	= 2.300
Area (sqft)	= 1.14
Velocity (ft/s)	= 2.02
Wetted Perim (ft)	= 4.15
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 3.99
EGL (ft)	= 0.63



Channel Report

DP 1.1 Swale (100-Year) (FR: 0.55)

Triangular

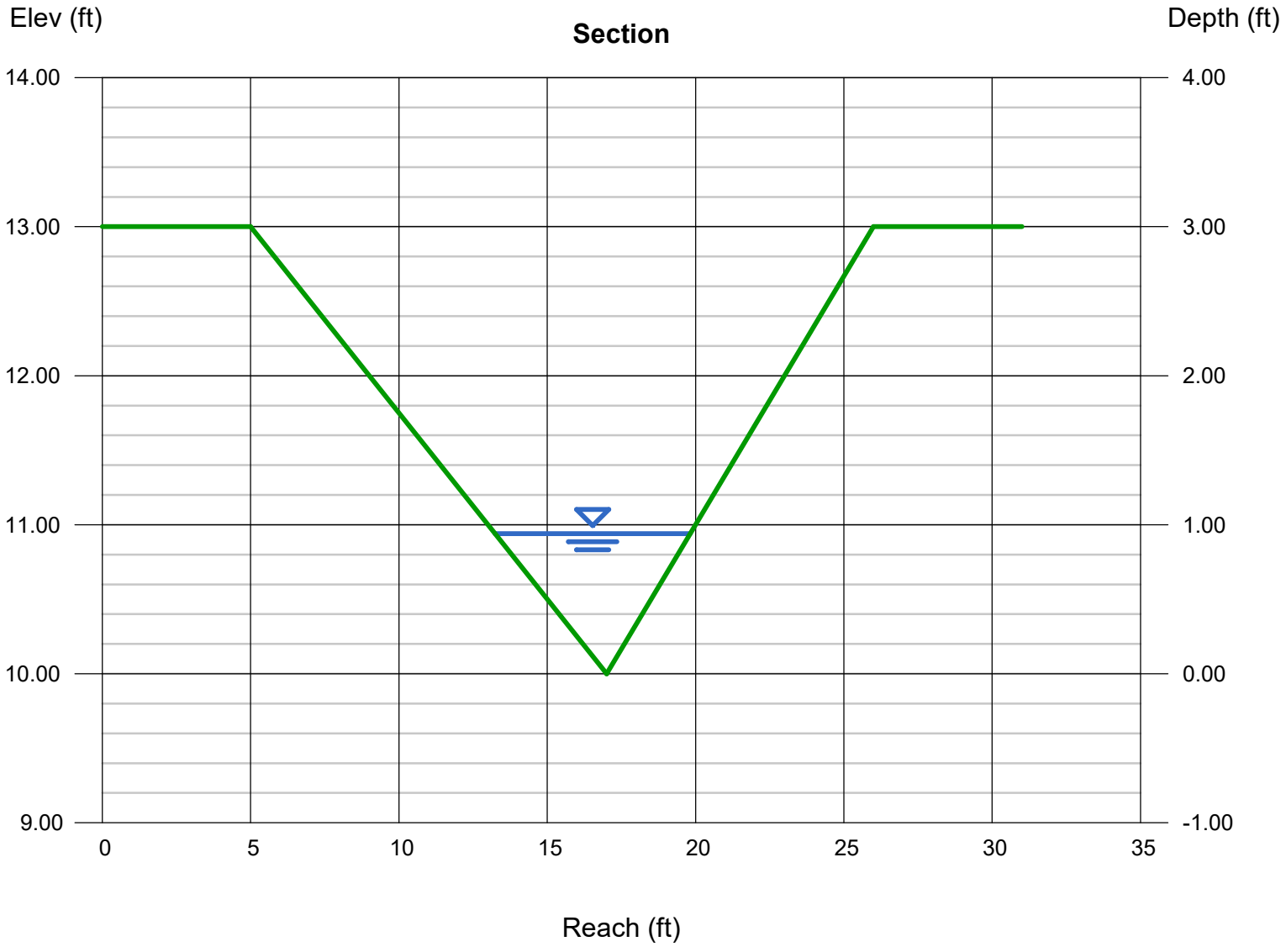
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.80

Highlighted

Depth (ft)	= 0.94
Q (cfs)	= 8.800
Area (sqft)	= 3.09
Velocity (ft/s)	= 2.85
Wetted Perim (ft)	= 6.85
Crit Depth, Yc (ft)	= 0.83
Top Width (ft)	= 6.58
EGL (ft)	= 1.07



Channel Report

DP 1.2 Swale (5-Year) (FR: 0.59)

Triangular

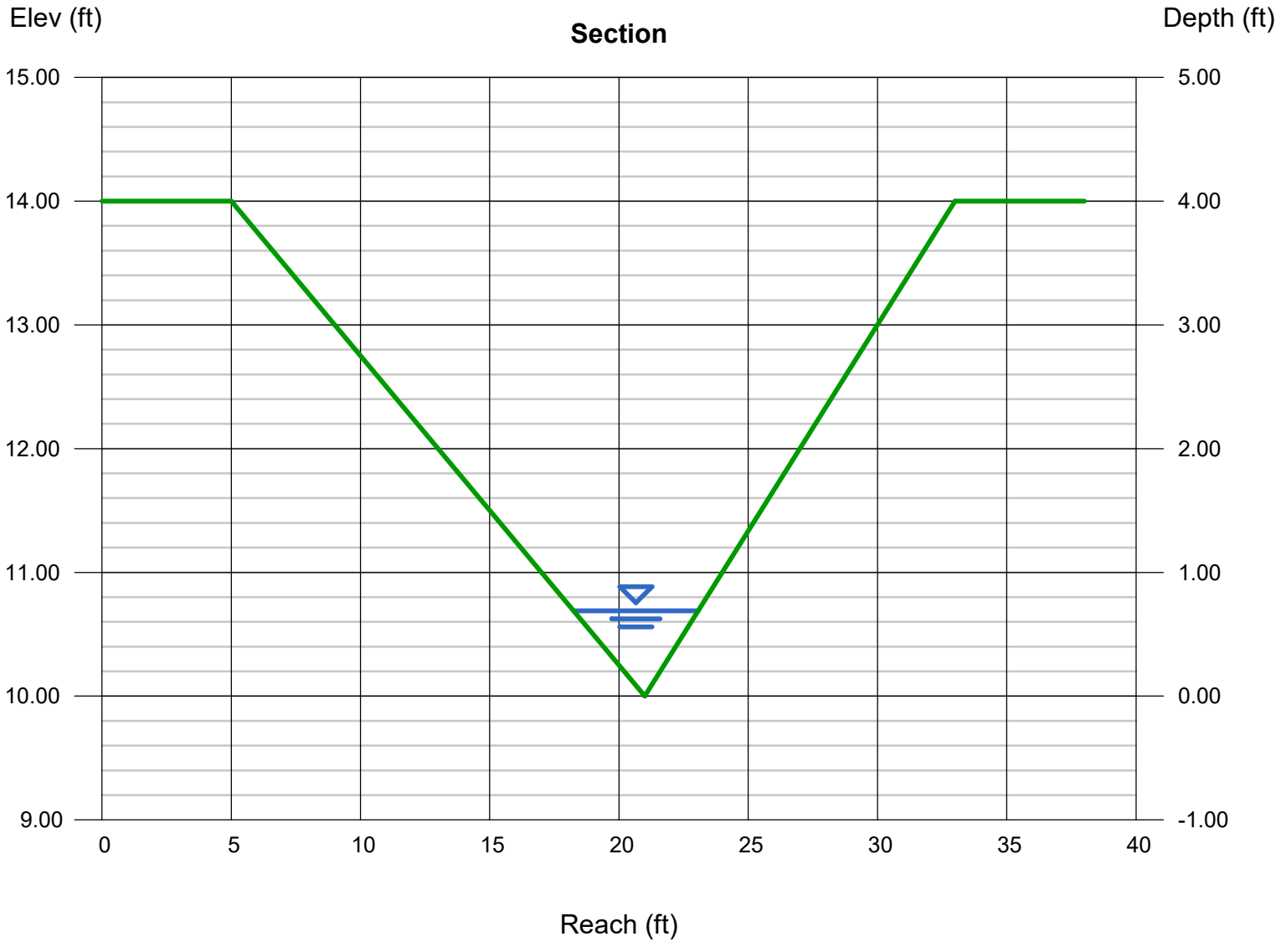
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.35
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.50

Highlighted

Depth (ft)	= 0.69
Q (cfs)	= 4.500
Area (sqft)	= 1.67
Velocity (ft/s)	= 2.70
Wetted Perim (ft)	= 5.03
Crit Depth, Yc (ft)	= 0.64
Top Width (ft)	= 4.83
EGL (ft)	= 0.80



Channel Report

DP 1.2 Swale (100-Year) (FR: 0.66)

Triangular

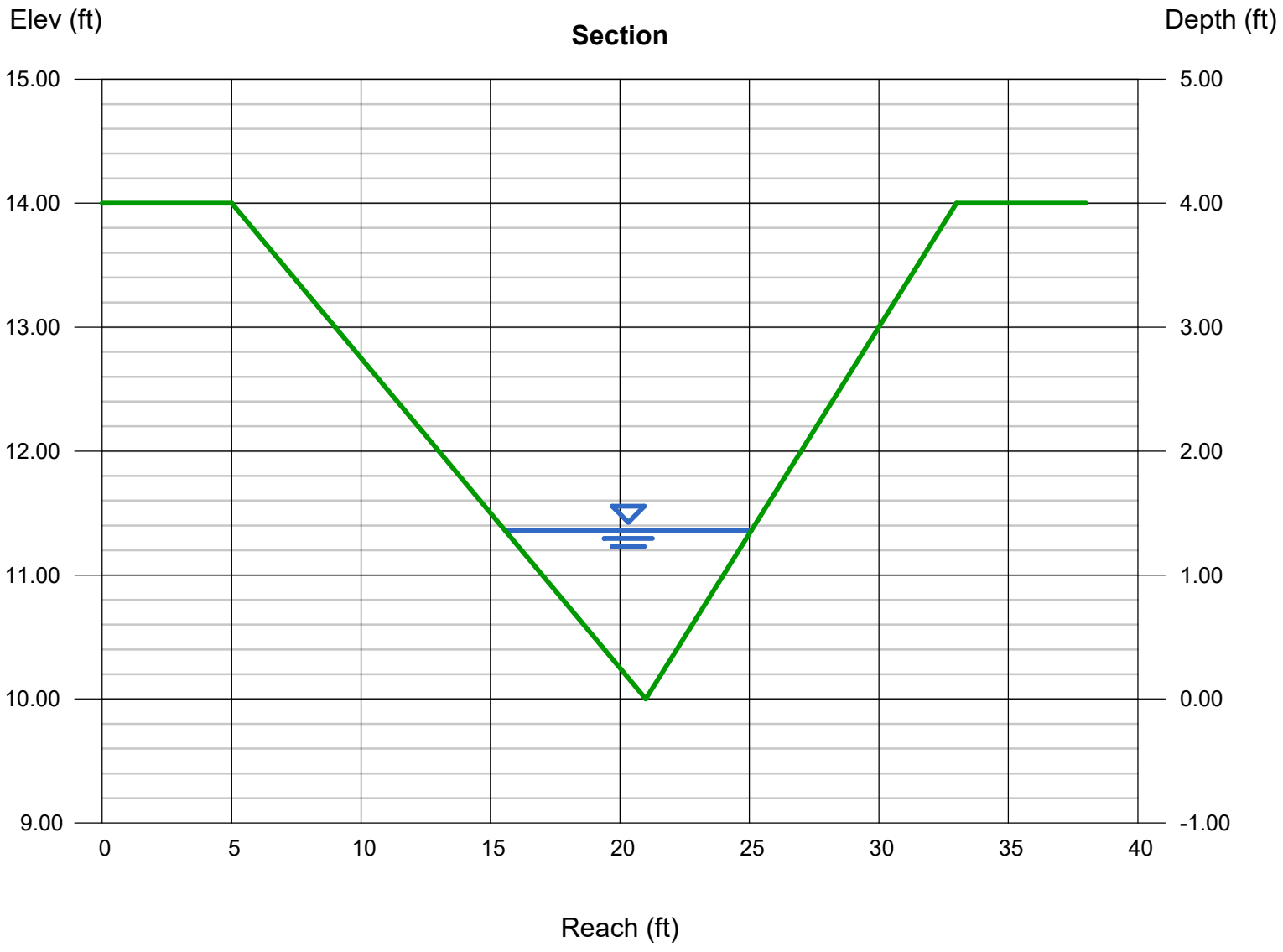
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.35
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 27.90

Highlighted

Depth (ft)	= 1.36
Q (cfs)	= 27.90
Area (sqft)	= 6.47
Velocity (ft/s)	= 4.31
Wetted Perim (ft)	= 9.91
Crit Depth, Yc (ft)	= 1.32
Top Width (ft)	= 9.52
EGL (ft)	= 1.65



Channel Report

DP 1.3 Swale (5-Year) (FR: 0.54)

Triangular

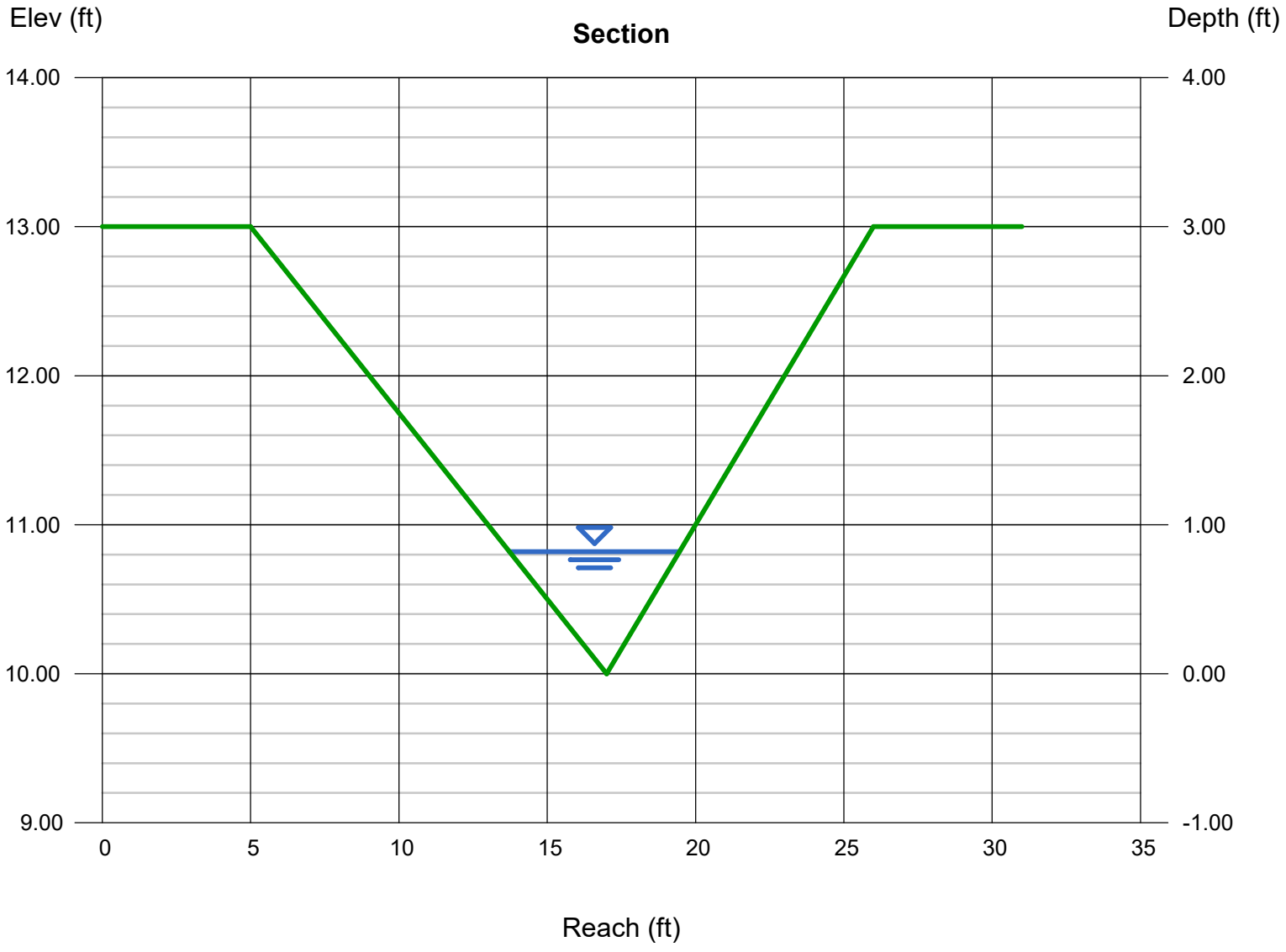
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.10

Highlighted

Depth (ft)	= 0.82
Q (cfs)	= 6.100
Area (sqft)	= 2.35
Velocity (ft/s)	= 2.59
Wetted Perim (ft)	= 5.97
Crit Depth, Yc (ft)	= 0.72
Top Width (ft)	= 5.74
EGL (ft)	= 0.92



Channel Report

DP 1.3 Swale (100-Year) (0.60)

Triangular

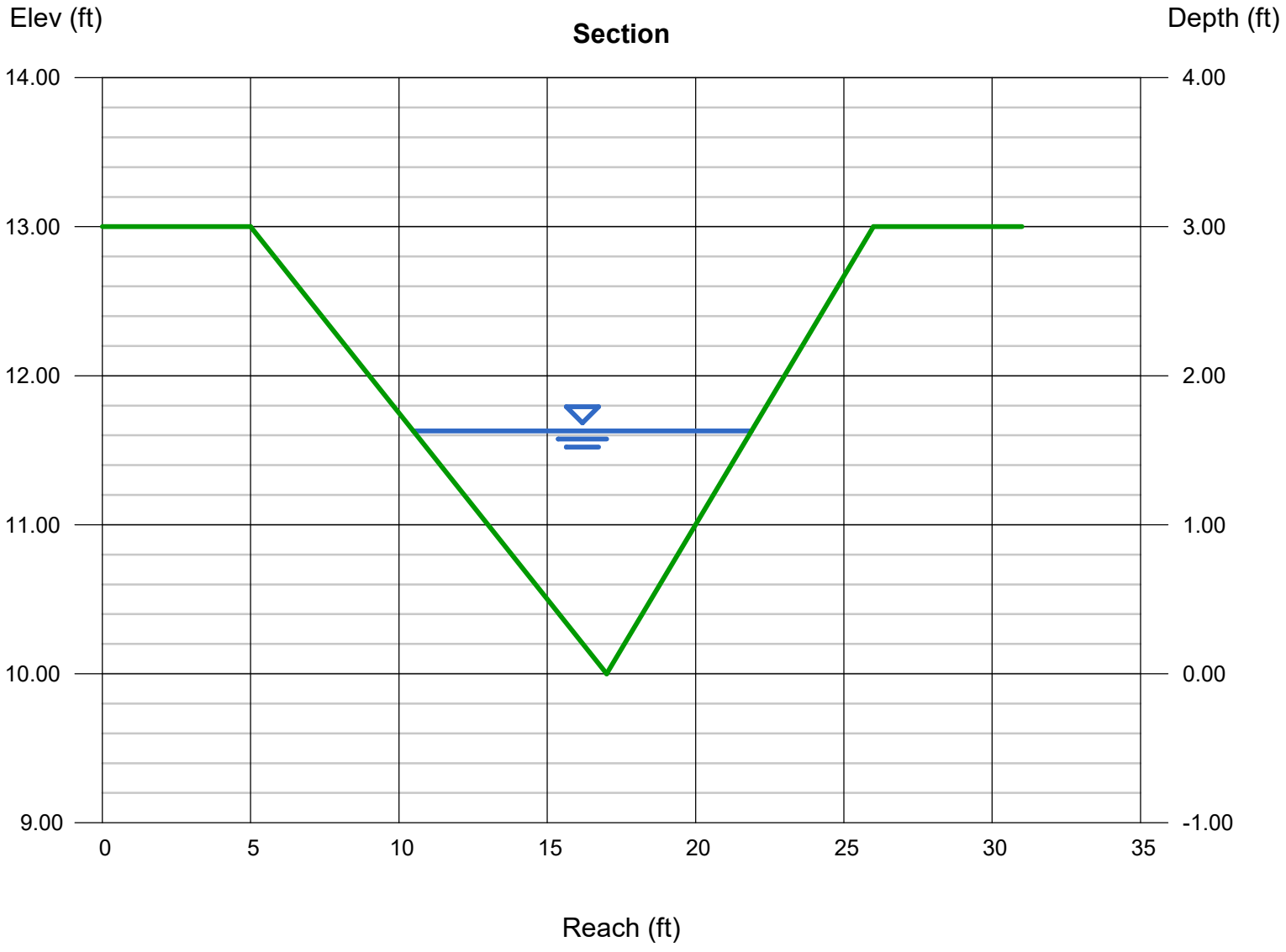
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 38.70

Highlighted

Depth (ft)	= 1.63
Q (cfs)	= 38.70
Area (sqft)	= 9.30
Velocity (ft/s)	= 4.16
Wetted Perim (ft)	= 11.88
Crit Depth, Yc (ft)	= 1.51
Top Width (ft)	= 11.41
EGL (ft)	= 1.90



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.4 Swale (5-Year) (FR: 0.64)

Triangular

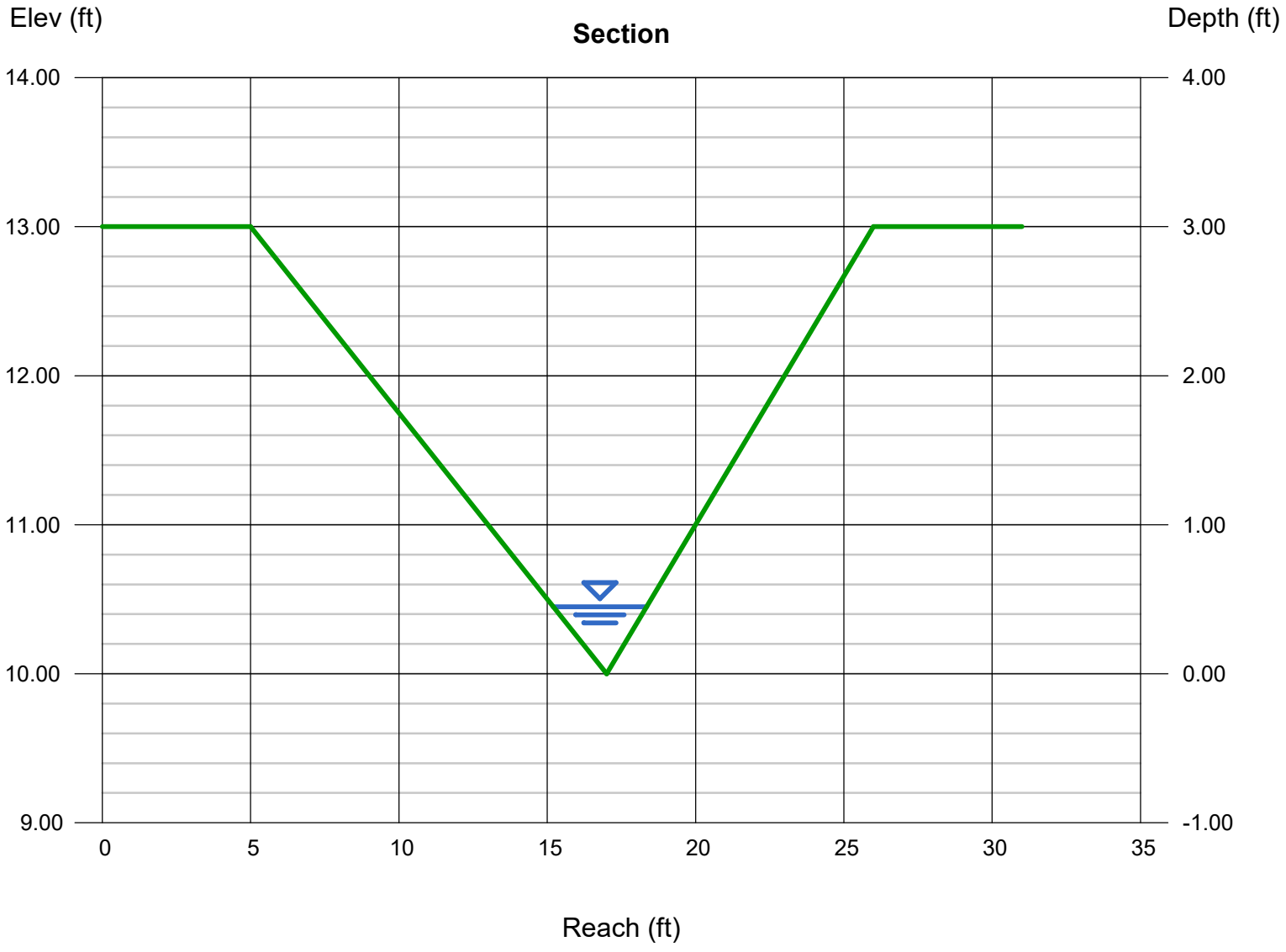
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.87
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.70

Highlighted

Depth (ft)	= 0.45
Q (cfs)	= 1.700
Area (sqft)	= 0.71
Velocity (ft/s)	= 2.40
Wetted Perim (ft)	= 3.28
Crit Depth, Yc (ft)	= 0.43
Top Width (ft)	= 3.15
EGL (ft)	= 0.54



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.4 Swale (100-Year) (FR: 0.70)

Triangular

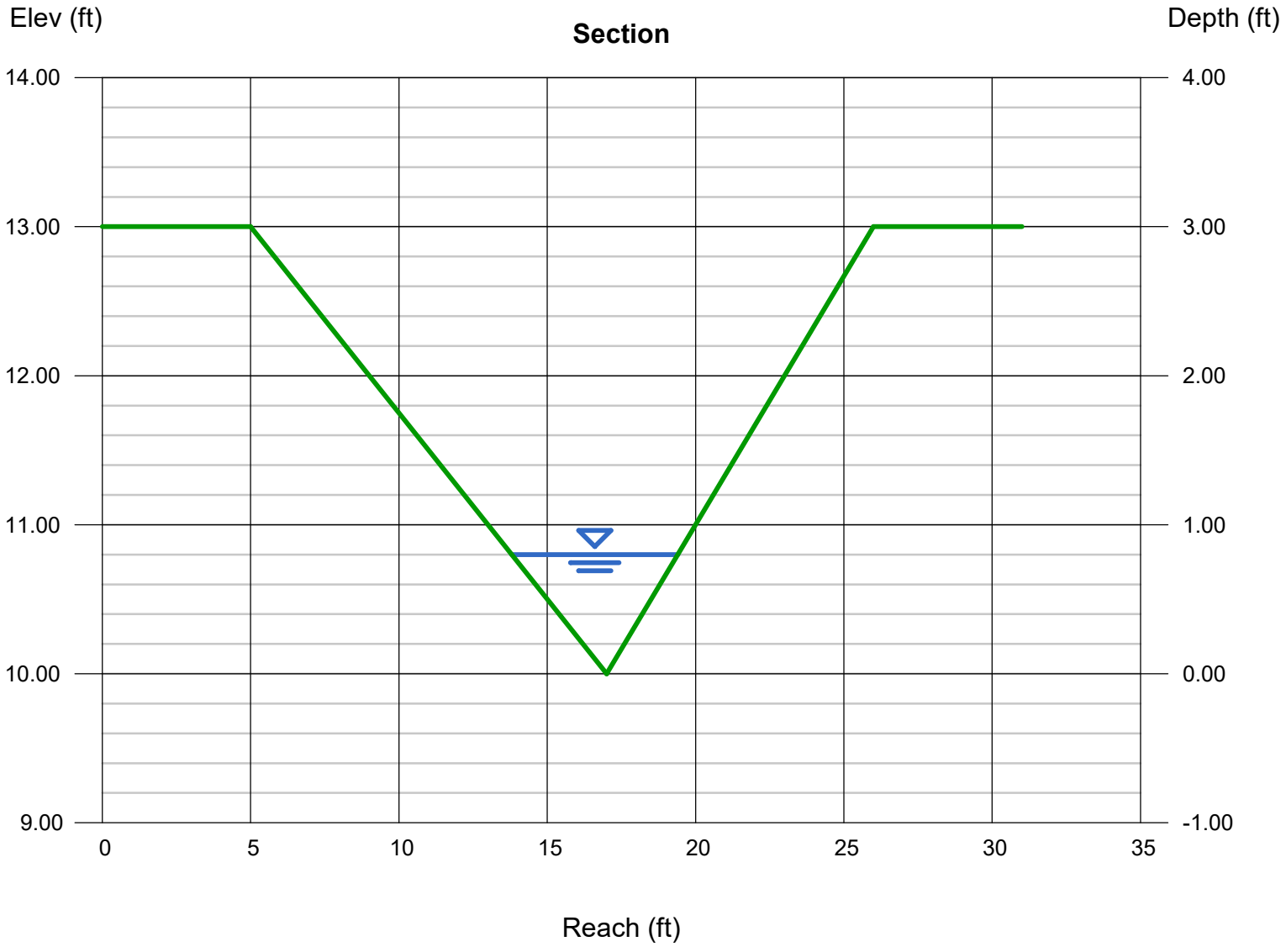
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.87
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.90

Highlighted

Depth (ft)	= 0.80
Q (cfs)	= 7.900
Area (sqft)	= 2.24
Velocity (ft/s)	= 3.53
Wetted Perim (ft)	= 5.83
Crit Depth, Yc (ft)	= 0.80
Top Width (ft)	= 5.60
EGL (ft)	= 0.99



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.5 Swale (5-Year) (FR: 0.59)

Triangular

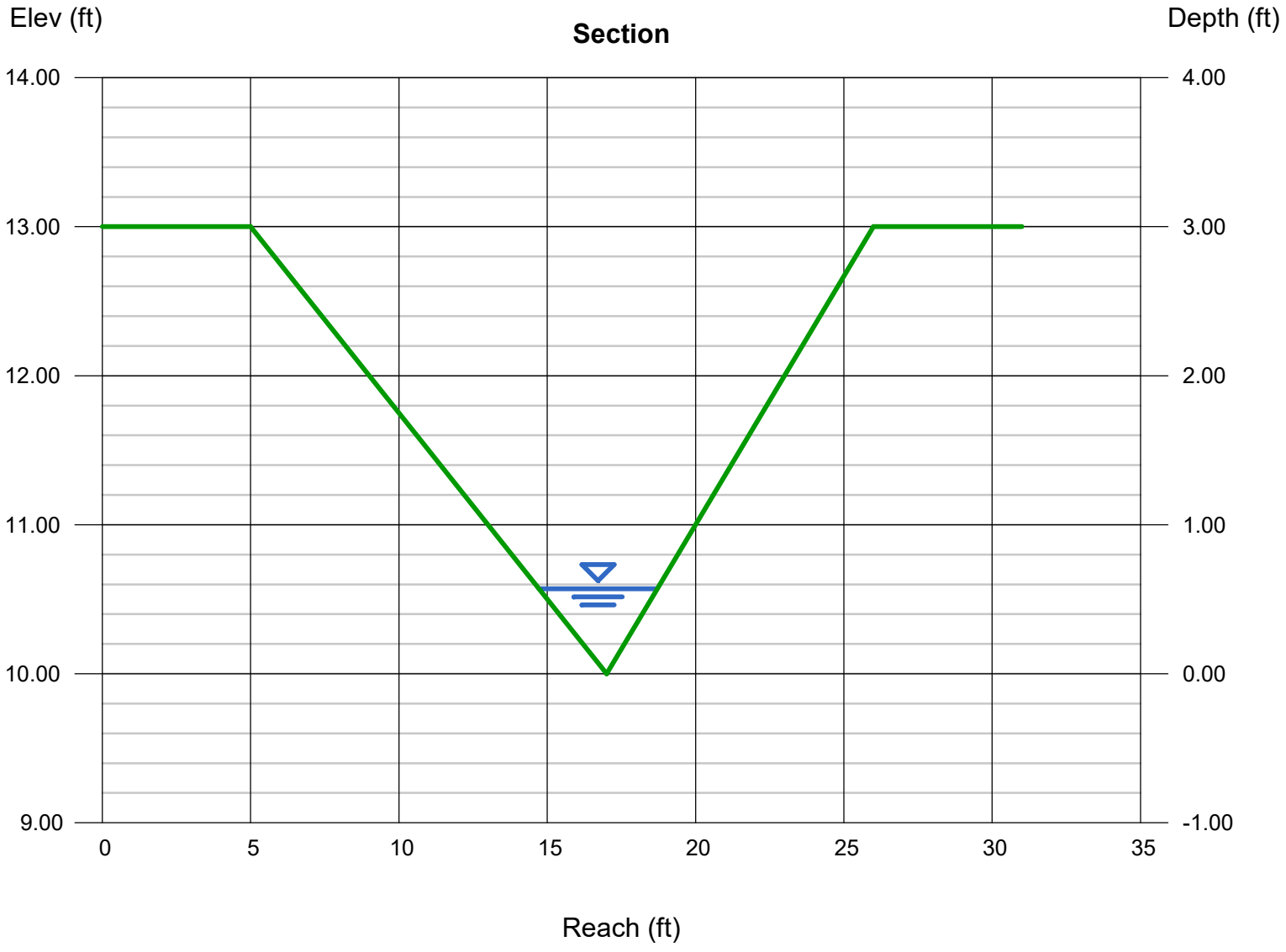
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.80

Highlighted

Depth (ft)	= 0.57
Q (cfs)	= 2.800
Area (sqft)	= 1.14
Velocity (ft/s)	= 2.46
Wetted Perim (ft)	= 4.15
Crit Depth, Yc (ft)	= 0.53
Top Width (ft)	= 3.99
EGL (ft)	= 0.66



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 1.5 Swale (100-Year) (FR: 0.63)

Triangular

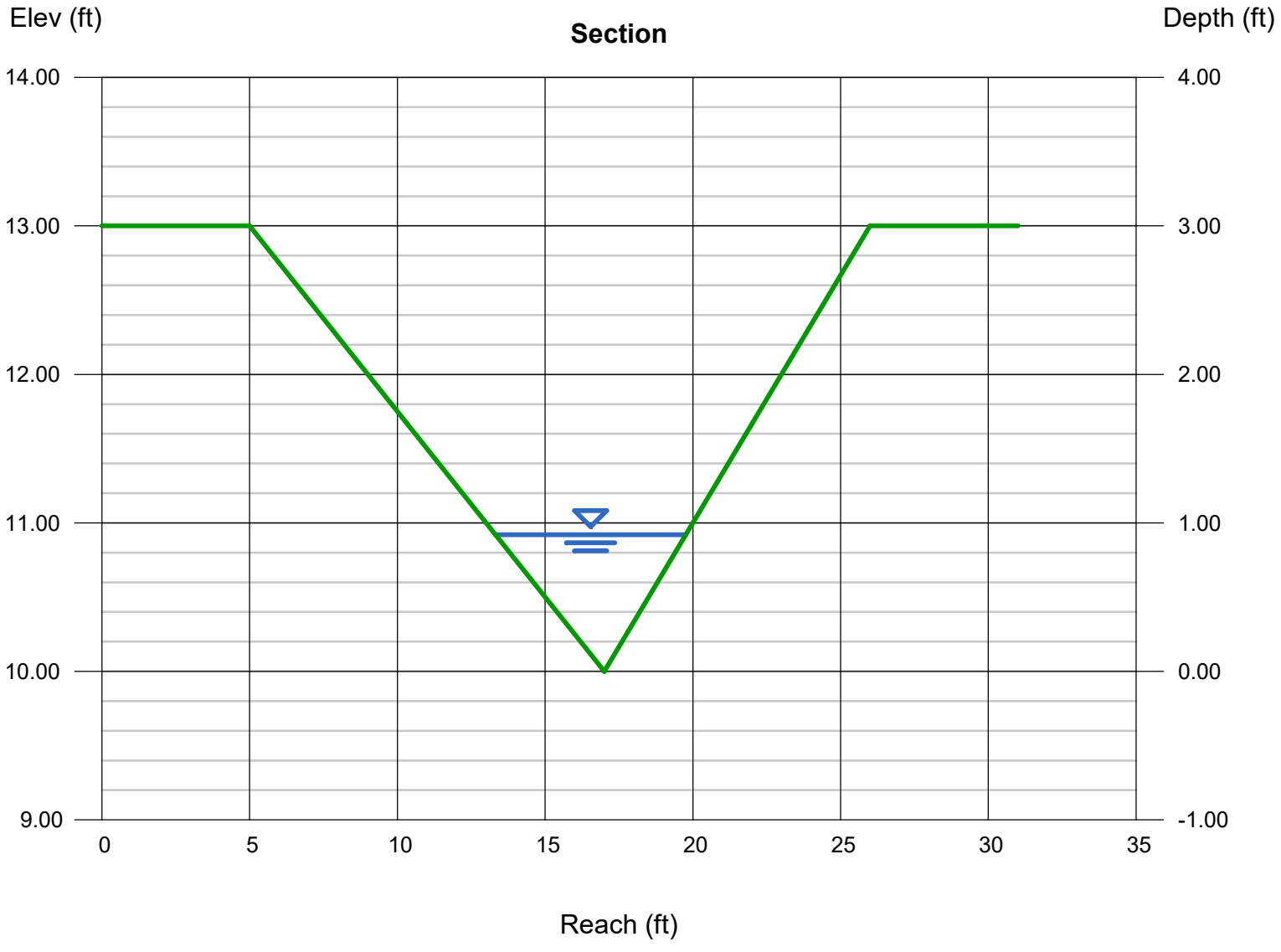
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.40
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 9.90

Highlighted

Depth (ft)	= 0.92
Q (cfs)	= 9.900
Area (sqft)	= 2.96
Velocity (ft/s)	= 3.34
Wetted Perim (ft)	= 6.70
Crit Depth, Yc (ft)	= 0.87
Top Width (ft)	= 6.44
EGL (ft)	= 1.09



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 8 Swale (5-Year) (FR: 0.55)

Triangular

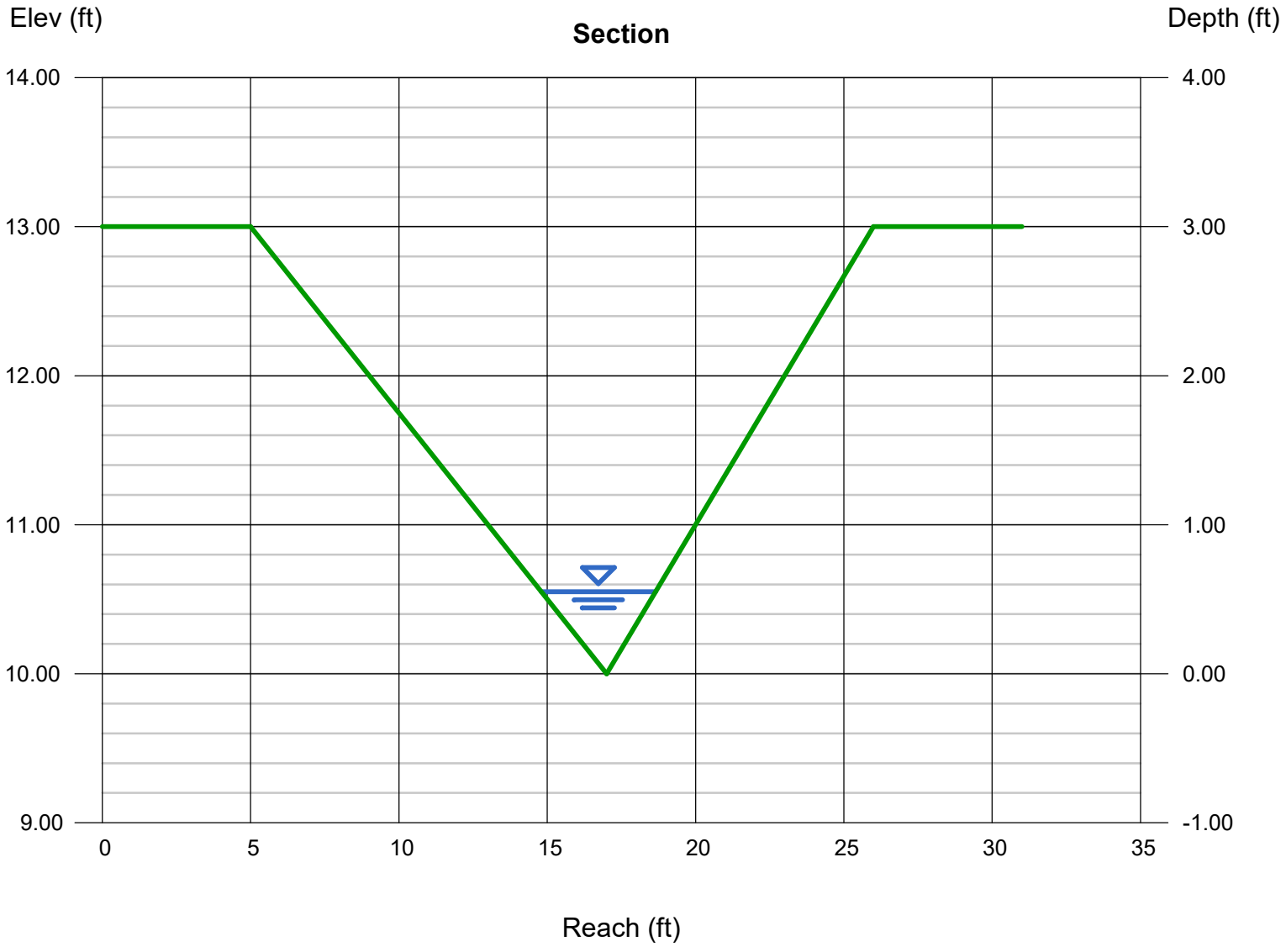
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.22
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.55
Q (cfs)	= 2.300
Area (sqft)	= 1.06
Velocity (ft/s)	= 2.17
Wetted Perim (ft)	= 4.01
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 3.85
EGL (ft)	= 0.62



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 8 Swale (100-Year) (FR: 0.59)

Triangular

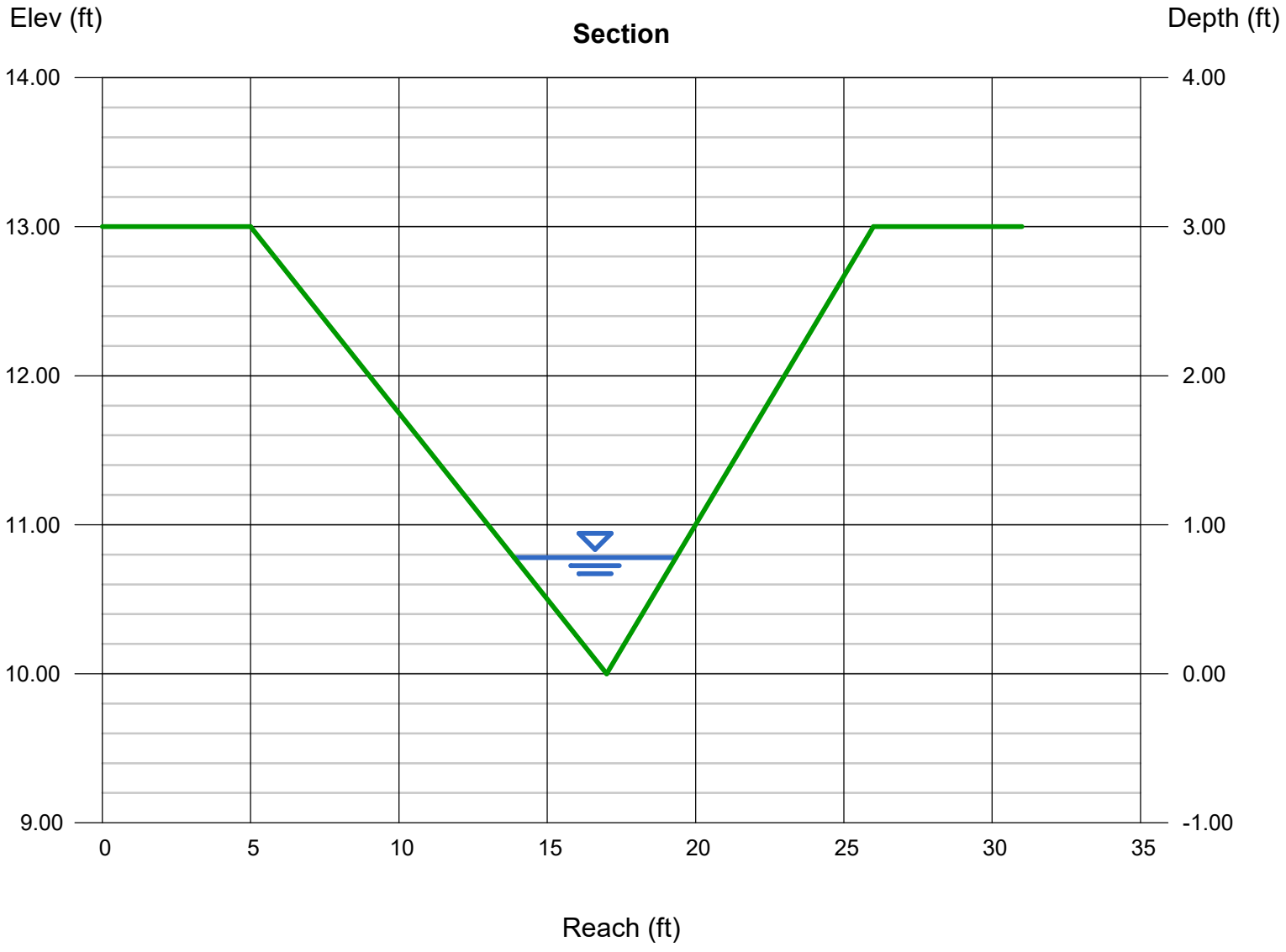
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.22
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.00

Highlighted

Depth (ft)	= 0.78
Q (cfs)	= 6.000
Area (sqft)	= 2.13
Velocity (ft/s)	= 2.82
Wetted Perim (ft)	= 5.68
Crit Depth, Yc (ft)	= 0.72
Top Width (ft)	= 5.46
EGL (ft)	= 0.90



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Dec 14 2021

DP 9 Swale (5-Year) (FR: 0.54)

Triangular

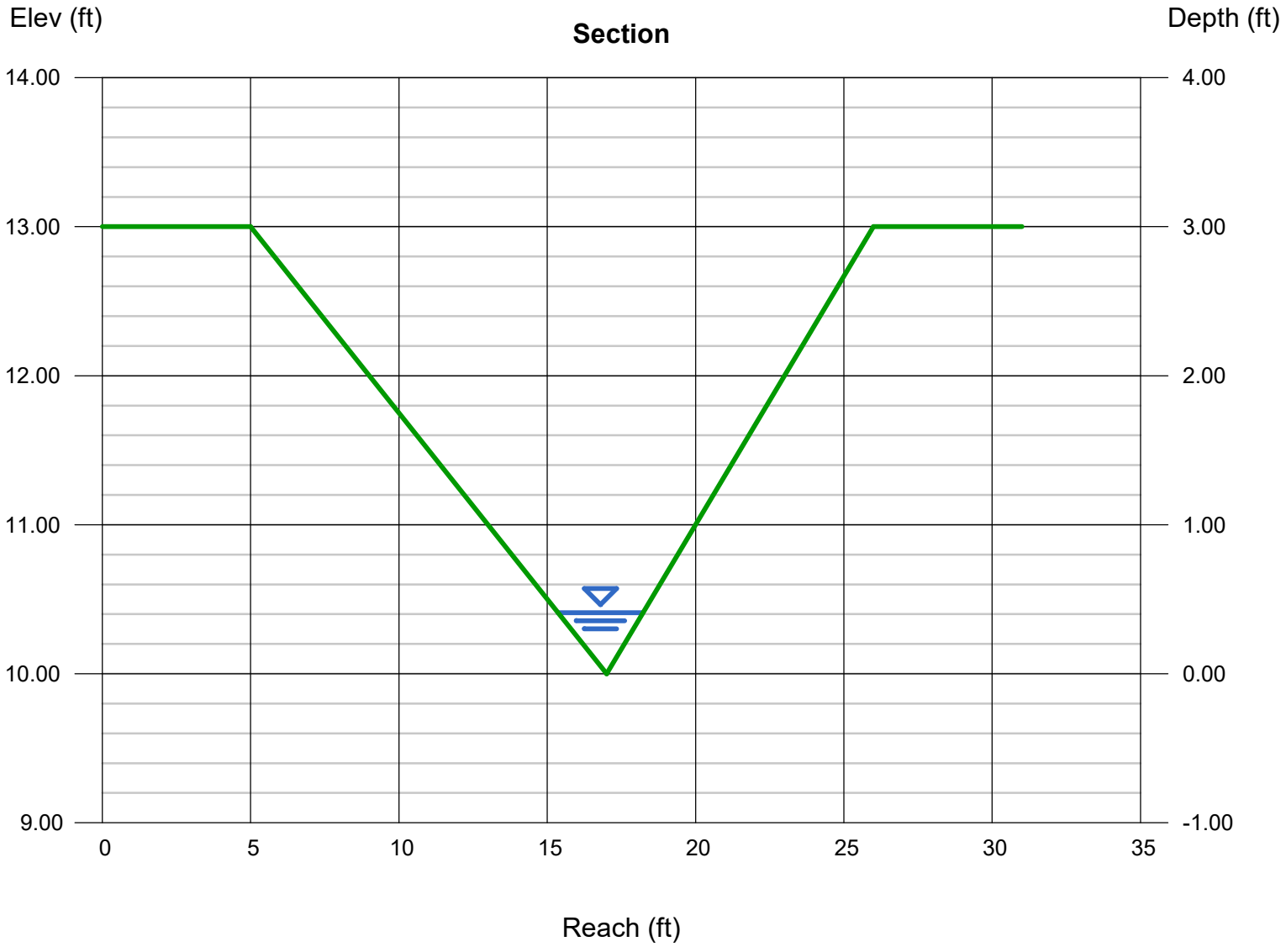
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.30
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.10

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 1.100
Area (sqft)	= 0.59
Velocity (ft/s)	= 1.87
Wetted Perim (ft)	= 2.99
Crit Depth, Yc (ft)	= 0.37
Top Width (ft)	= 2.87
EGL (ft)	= 0.46



Channel Report

DP 9 Swale (100-Year) (FR: 0.57)

Triangular

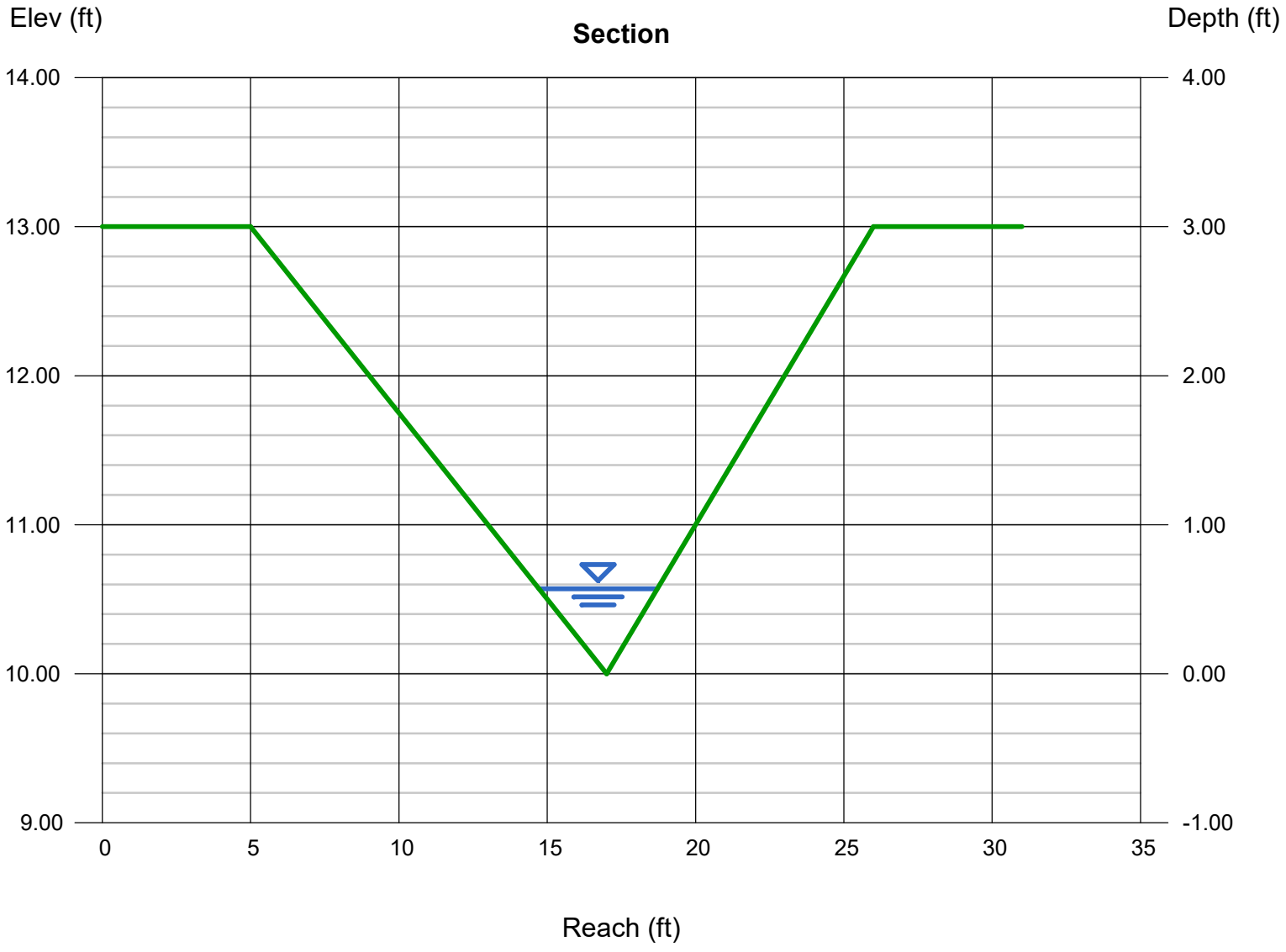
Side Slopes (z:1)	= 4.00, 3.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 10.00
Slope (%)	= 1.30
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.60

Highlighted

Depth (ft)	= 0.57
Q (cfs)	= 2.600
Area (sqft)	= 1.14
Velocity (ft/s)	= 2.29
Wetted Perim (ft)	= 4.15
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 3.99
EGL (ft)	= 0.65



APPENDIX D

WATER QUALITY AND DETENTION CALCULATIONS

Replace WQ/Detention calculation with the Temporary Sediment Basin calculation.

Table SB-1 & SB-2 of the Grading and Erosion control plan is limited to 2 ac-ft of volume. Update the narrative section to discuss this limitation in sizing the temporary sediment basin and explain how you proceeded to design the TSB.

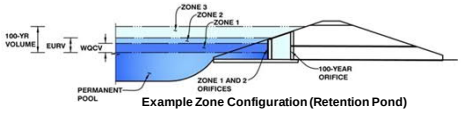
JR: Noted, temporary sediment basin design calculations have been added

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: Saddlehorn Filing 2

Basin ID: Pond F



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	95.54	acres
Watershed Length =	5,707	ft
Watershed Length to Centroid =	2,118	ft
Watershed Slope =	0.014	ft/ft
Watershed Imperviousness =	13.50%	percent
Percentage Hydrologic Soil Group A =	89.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	11.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.684	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.038	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.647	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.984	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.358	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	3.366	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	4.729	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	6.859	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	11.388	acre-feet		inches
Approximate 2-yr Detention Volume =	0.656	acre-feet		
Approximate 5-yr Detention Volume =	0.969	acre-feet		
Approximate 10-yr Detention Volume =	1.252	acre-feet		
Approximate 25-yr Detention Volume =	1.625	acre-feet		
Approximate 50-yr Detention Volume =	1.996	acre-feet		
Approximate 100-yr Detention Volume =	2.911	acre-feet		

Define Zones and Basin Geometry

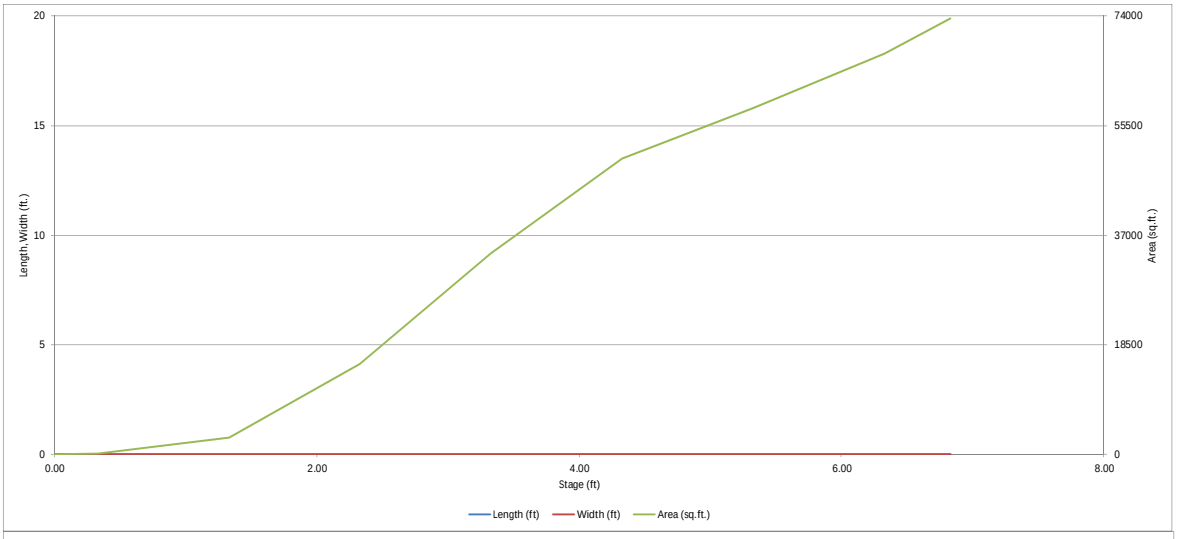
Zone 1 Volume (WQCV) =	0.684	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.355	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.873	acre-feet
Total Detention Basin Volume =	2.911	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio (R_{LW}) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

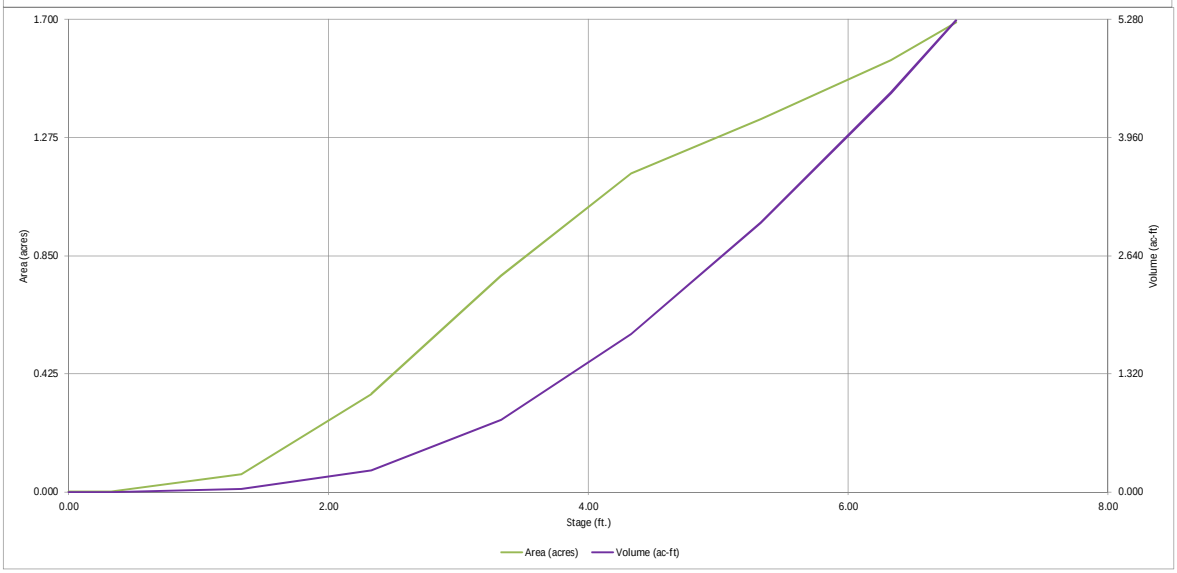
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	36	0.001		
6681	--	0.33	--	--	--	50	0.001	14	0.000
6682	--	1.33	--	--	--	2,789	0.064	1,434	0.033
6683	--	2.33	--	--	--	15,282	0.351	10,469	0.240
6684	--	3.33	--	--	--	33,913	0.779	35,066	0.805
6685	--	4.33	--	--	--	49,906	1.146	76,976	1.767
6686	--	5.33	--	--	--	58,427	1.341	131,142	3.011
6687	--	6.33	--	--	--	67,707	1.554	194,209	4.458
6687.5	--	6.83	--	--	--	73,617	1.690	229,540	5.270

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)





Update. GEC identifies this as Sed Basin 1.

OUTLET STRUCTURE DESIGN

MHFD-Detention, Versio

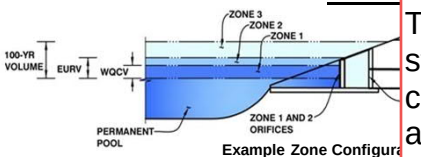
Project: Saddleho

Basin ID: Pond F

JR: Noted. Temproary outlet structure design calculations have been added for sediment basin 1

Update the outlet structure design for the temporary sediment basin being constructed with this early grading application.

The permanent structure design will be reviewed on the subsequent FDR for the final plat application.



Example Zone Configura

User Input: Orifice at Underdrain Outlet (typically used to d

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media su	Underdrain Orifice Centroid =	N/A	feet
Underdrain Orifice Diameter =	N/A	inches			

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Calculated Parameters for Plate

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.413E-02	ft^2
Depth at top of Zone using Orifice Plate =	3.17	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	12.70	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	2.03	sq. inches (diameter = 1-5/8 inches)	Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.06	2.11					
Orifice Area (sq. inches)	2.03	2.03	2.03					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

Calculated Parameters for Vertical Orifice

	Zone 2 Circular	Not Selected			Zone 2 Circular	Not Selected	
Invert of Vertical Orifice =	3.17	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.00	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	3.62	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.02	N/A	feet
Vertical Orifice Diameter =	0.38	N/A	inches				

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.03	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.03	N/A	feet
Overflow Weir Front Edge Length =	6.00	N/A	feet	Overflow Weir Slope Length =	5.00	N/A	feet
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	4.96	N/A	
Horiz. Length of Weir Sides =	5.00	N/A	feet	Overflow Grate Open Area w/o Debris =	20.88	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	20.88	N/A	ft^2
Debris Clogging % =	0%	N/A	%				

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	4.21	N/A	ft^2
Outlet Pipe Diameter =	30.00	N/A	inches	Outlet Orifice Centroid =	1.09	N/A	feet
Restrictor Plate Height Above Pipe Invert =	24.00		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.21	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage=	5.38	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.45	feet
Spillway Crest Length =	55.00	feet	Stage at Top of Freeboard =	6.83	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.69	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	5.27	acre-ft

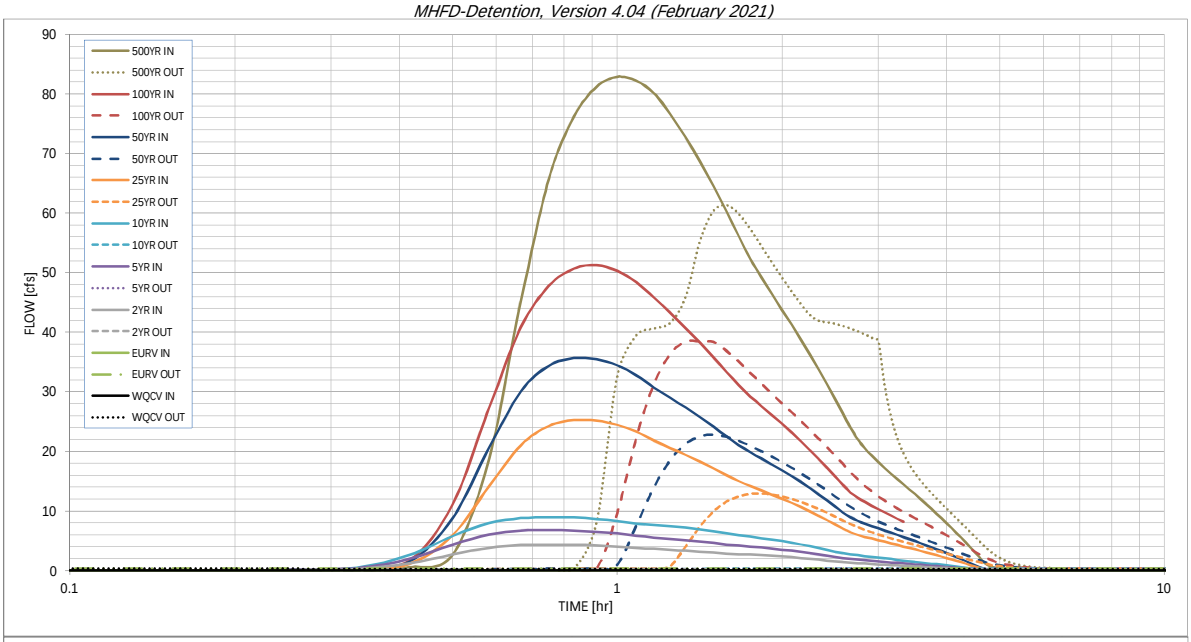
Routed Hydrograph Results

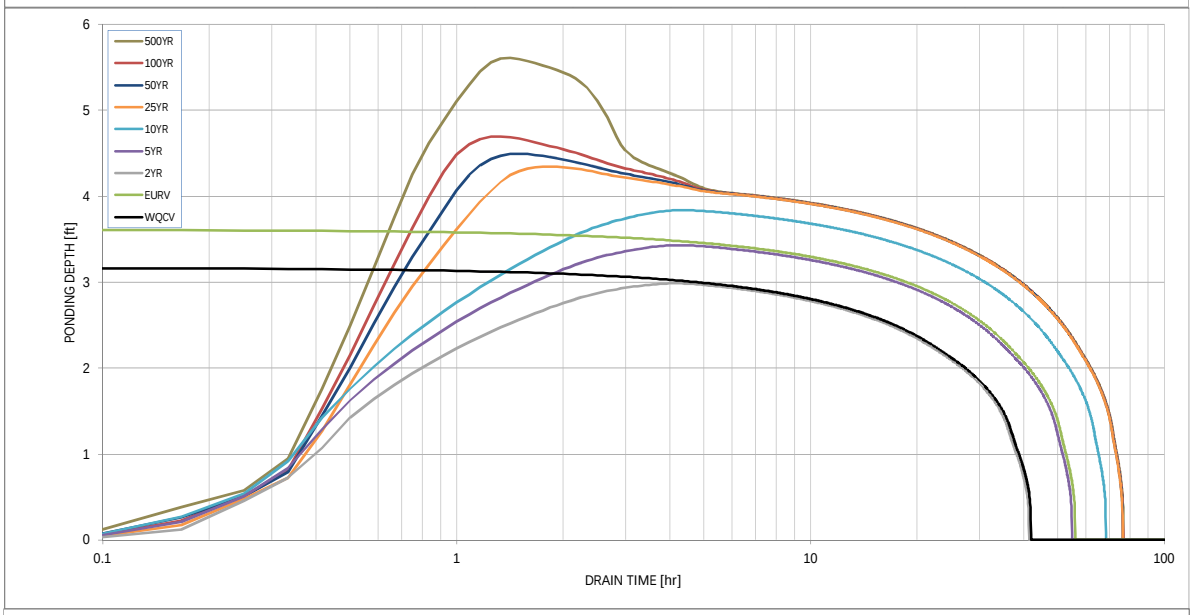
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

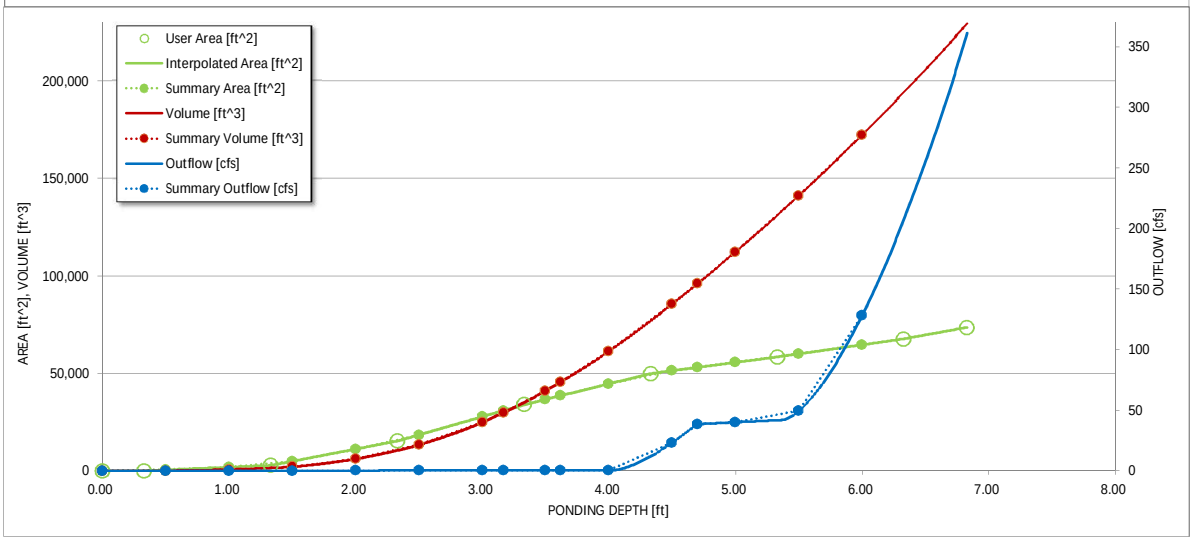
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.14
CUHP Runoff Volume (acre-ft) =	0.684	1.038	0.647	0.984	1.358	3.366	4.729	6.859	11.388
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.647	0.984	1.358	3.366	4.729	6.859	11.388
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.5	0.9	1.2	16.1	25.9	40.7	71.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.01	0.17	0.27	0.43	0.75
Peak Inflow Q (cfs) =	N/A	N/A	4.4	6.8	9.0	25.2	35.6	51.3	82.9
Peak Outflow Q (cfs) =	0.3	0.3	0.3	0.3	0.3	12.9	22.8	38.5	61.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.4	0.3	0.8	0.9	0.9	0.9
Structure Controlling Flow =	Plate	Vertical Orifice 1	Plate	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.6	1.1	1.8	2.0
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	51	38	50	62	65	62	57	50
Time to Drain 99% of Inflow Volume (hours) =	40	54	40	53	66	71	69	68	64
Maximum Ponding Depth (ft) =	3.17	3.62	2.99	3.43	3.84	4.35	4.49	4.70	5.61
Area at Maximum Ponding Depth (acres) =	0.71	0.89	0.63	0.82	0.96	1.15	1.18	1.22	1.40
Maximum Volume Stored (acre-ft) =	0.686	1.046	0.559	0.885	1.240	1.779	1.953	2.192	3.381

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02
	0:15:00	0.00	0.00	0.05	0.09	0.11	0.08	0.10	0.09	0.16
	0:20:00	0.00	0.00	0.27	0.39	0.46	0.30	0.37	0.37	0.53
	0:25:00	0.00	0.00	1.18	1.91	2.58	1.10	1.47	1.68	2.65
	0:30:00	0.00	0.00	2.67	4.32	5.78	5.92	8.77	11.06	18.84
	0:35:00	0.00	0.00	3.83	6.06	7.99	14.15	20.62	27.30	45.14
	0:40:00	0.00	0.00	4.28	6.69	8.78	21.04	30.08	40.81	65.73
	0:45:00	0.00	0.00	4.36	6.79	8.98	24.27	34.38	47.75	76.17
	0:50:00	0.00	0.00	4.33	6.71	8.92	25.23	35.65	50.68	81.19
	0:55:00	0.00	0.00	4.21	6.51	8.67	25.15	35.49	51.26	82.88
	1:00:00	0.00	0.00	4.02	6.20	8.29	24.46	34.47	50.28	82.22
	1:05:00	0.00	0.00	3.80	5.83	7.87	23.30	32.79	48.42	80.15
	1:10:00	0.00	0.00	3.62	5.55	7.62	21.85	30.72	45.82	76.61
	1:15:00	0.00	0.00	3.47	5.32	7.44	20.56	28.95	43.22	72.76
	1:20:00	0.00	0.00	3.32	5.08	7.22	19.41	27.33	40.71	68.67
	1:25:00	0.00	0.00	3.16	4.84	6.91	18.30	25.75	38.22	64.49
	1:30:00	0.00	0.00	3.01	4.59	6.55	17.17	24.13	35.76	60.30
	1:35:00	0.00	0.00	2.87	4.37	6.21	16.05	22.53	33.34	56.16
	1:40:00	0.00	0.00	2.76	4.19	5.93	15.01	21.06	31.10	52.36
	1:45:00	0.00	0.00	2.67	4.02	5.68	14.16	19.86	29.24	49.20
	1:50:00	0.00	0.00	2.58	3.85	5.43	13.43	18.81	27.62	46.42
	1:55:00	0.00	0.00	2.48	3.68	5.19	12.74	17.81	26.10	43.78
	2:00:00	0.00	0.00	2.37	3.51	4.94	12.06	16.84	24.63	41.24
	2:05:00	0.00	0.00	2.24	3.32	4.67	11.36	15.85	23.16	38.73
	2:10:00	0.00	0.00	2.10	3.11	4.37	10.64	14.83	21.67	36.22
	2:15:00	0.00	0.00	1.95	2.89	4.06	9.91	13.81	20.19	33.74
	2:20:00	0.00	0.00	1.80	2.67	3.75	9.19	12.79	18.71	31.29
	2:25:00	0.00	0.00	1.66	2.45	3.44	8.46	11.77	17.25	28.85
	2:30:00	0.00	0.00	1.52	2.24	3.15	7.74	10.76	15.78	26.42
	2:35:00	0.00	0.00	1.39	2.05	2.89	7.04	9.77	14.35	24.04
	2:40:00	0.00	0.00	1.29	1.91	2.71	6.42	8.93	13.11	22.02
	2:45:00	0.00	0.00	1.22	1.81	2.56	5.99	8.34	12.20	20.52
	2:50:00	0.00	0.00	1.16	1.71	2.42	5.65	7.87	11.49	19.29
	2:55:00	0.00	0.00	1.09	1.62	2.28	5.36	7.46	10.86	18.20
	3:00:00	0.00	0.00	1.03	1.53	2.15	5.08	7.07	10.29	17.19
	3:05:00	0.00	0.00	0.97	1.44	2.02	4.81	6.70	9.73	16.24
	3:10:00	0.00	0.00	0.92	1.36	1.90	4.55	6.33	9.20	15.33
	3:15:00	0.00	0.00	0.86	1.28	1.78	4.29	5.97	8.69	14.47
	3:20:00	0.00	0.00	0.81	1.20	1.67	4.04	5.62	8.19	13.64
	3:25:00	0.00	0.00	0.75	1.12	1.56	3.79	5.28	7.69	12.82
	3:30:00	0.00	0.00	0.70	1.04	1.45	3.54	4.93	7.20	12.00
	3:35:00	0.00	0.00	0.65	0.96	1.35	3.30	4.59	6.70	11.18
	3:40:00	0.00	0.00	0.60	0.89	1.25	3.06	4.25	6.21	10.36
	3:45:00	0.00	0.00	0.55	0.82	1.14	2.81	3.91	5.72	9.54
	3:50:00	0.00	0.00	0.50	0.74	1.04	2.57	3.57	5.23	8.73
	3:55:00	0.00	0.00	0.46	0.67	0.94	2.33	3.23	4.74	7.92
	4:00:00	0.00	0.00	0.41	0.60	0.85	2.09	2.90	4.26	7.11
	4:05:00	0.00	0.00	0.36	0.53	0.75	1.85	2.56	3.77	6.30
	4:10:00	0.00	0.00	0.32	0.46	0.65	1.62	2.23	3.28	5.49
	4:15:00	0.00	0.00	0.27	0.39	0.56	1.38	1.89	2.80	4.68
	4:20:00	0.00	0.00	0.23	0.32	0.46	1.14	1.56	2.32	3.88
	4:25:00	0.00	0.00	0.18	0.26	0.37	0.91	1.23	1.83	3.07
	4:30:00	0.00	0.00	0.14	0.19	0.28	0.68	0.90	1.35	2.27
	4:35:00	0.00	0.00	0.10	0.13	0.20	0.45	0.58	0.89	1.50
	4:40:00	0.00	0.00	0.08	0.10	0.16	0.26	0.34	0.53	0.93
	4:45:00	0.00	0.00	0.07	0.09	0.14	0.17	0.21	0.33	0.62
	4:50:00	0.00	0.00	0.06	0.08	0.12	0.12	0.15	0.22	0.42
	4:55:00	0.00	0.00	0.05	0.07	0.10	0.09	0.12	0.15	0.28
	5:00:00	0.00	0.00	0.04	0.06	0.08	0.07	0.09	0.11	0.19
	5:05:00	0.00	0.00	0.04	0.05	0.07	0.06	0.07	0.08	0.12
	5:10:00	0.00	0.00	0.03	0.04	0.05	0.05	0.05	0.05	0.07
	5:15:00	0.00	0.00	0.03	0.03	0.04	0.04	0.04	0.04	0.05
	5:20:00	0.00	0.00	0.02	0.03	0.03	0.03	0.03	0.03	0.04
	5:25:00	0.00	0.00	0.02	0.02	0.03	0.02	0.03	0.02	0.03
	5:30:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.02
	5:35:00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.02
	5:40:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	5:45:00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.
The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]
	0.00	36	0.001	0	0.000	0.00
	0.50	516	0.012	62	0.001	0.05
	1.00	1,885	0.043	662	0.015	0.07
	1.50	4,913	0.113	2,088	0.048	0.13
	2.00	11,159	0.256	6,106	0.140	0.16
	2.50	18,449	0.424	13,336	0.306	0.23
	3.00	27,765	0.637	24,890	0.571	0.28
WCQV	3.17	30,932	0.710	29,879	0.686	0.29
	3.50	36,632	0.841	41,063	0.943	0.32
EURV	3.62	38,551	0.885	45,574	1.046	0.32
	4.00	44,628	1.025	61,378	1.409	0.35
	4.50	51,355	1.179	85,583	1.965	23.22
100-YR	4.70	53,059	1.218	96,024	2.204	38.50
	5.00	55,615	1.277	112,326	2.579	40.07
	5.50	60,005	1.378	141,209	3.242	49.47
	6.00	64,645	1.484	172,371	3.957	128.37

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

To be reviewed on resubmittal once construction plans are submitted and narrative updated to provide information for the construction/design intent.

JR: Noted

PIPE OUTFALL RI

Subdivision: Saddlehorn Ranch — dlehorn Ranch
Location: El Paso County — 42.04
M
Date: 6/4/21

	STORM DRAIN SYSTEM			
	DESIGN POINT	**DESIGN POINT**	**DESIGN POINT**	**Notes**
Q_{100} (cfs):	45.0			Flows are the greater of proposed vs. future
Conduit	Pipe			
D_c, Pipe Diameter (in):	42			
W, Box Width (ft):	N/A			
H, Box Height (ft):	N/A			
Y_t, Tailwater Depth (ft):	1.00			If unknown, use Y_t/D_c (or H)=0.4
Y_t/Dc or Y_t/H	0.29			
$Q/D^{2.5}$ or $Q/(WH^{3/2})$	1.96			
Supercritical?	No			
Y_n, Normal Depth (ft) [Supercritical]:	1.00			
D_a, H_a (in) [Supercritical]:	N/A			$D_a=(D_c+Y_n)/2$
Riprap d_{50} (in) [Supercritical]:	N/A			
Riprap d_{50} (in) [Subcritical]:	8.53			
Required Riprap Size:	**L**			**Fig. 9-38 or Fig. 9-36**
d_{50} (in):	**9**			
Expansion Factor, $1/(2\tan\theta)$:	6.00			Read from Fig. 9-35 or 9-36
θ:	0.08			
Erosive Soils?	No			
Area of Flow, A_t (ft^2):	6.43			$A_t=Q/V$
Length of Protection, L_p (ft):	17.6			L=(1/(2 tan θ))(At/Yt - D)
Min Length (ft)	10.5			Min L=3D or 3H
Max Length (ft)	35.0			Max L=10D or 10H
Min Bottom Width, T (ft):	6.4			$T=2*(L_p*\tan\theta)+W$
Design Length (ft)	**18.0**			
Design Width (ft)	**6.4**			
Riprap Depth (in)	**18**			Depth=2(d_{50})
Type II Bedding Depth (in)*	6			*Not used if Soil Riprap
Cutoff Wall	Yes			
Cutoff Wall Depth (ft)	24.0			Depth of Riprap and Base
Cutoff Wall Width (ft)	8.3			

Note: No Type II Base to be used if Soil Riprap is specified within the plans

* For use when the flow in the culvert is supercritical (and less than full).

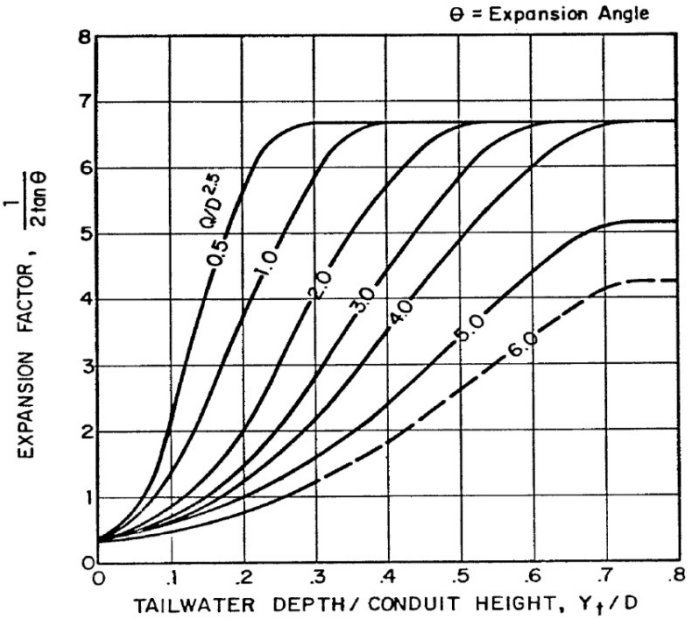


Figure 9-35. Expansion factor for circular conduits

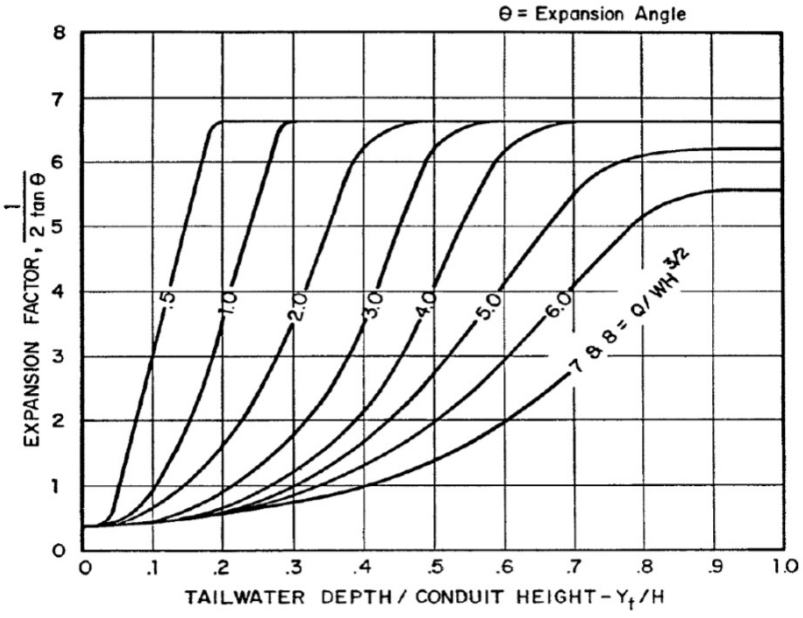


Figure 9-36. Expansion factor for rectangular conduits

FOREBAY VOLUME REQUIREMENTS

To be reviewed on resubmittal once construction plans are submitted and narrative updated to provide information for the construction/design intent.

If forebay is not constructed at this time with the early grading then remove the calculations.

JR: Noted

Equation 3-1 $WQCV = a(0.91I^3 - 1.19I^2 + 0.781I)$

a=1 (40 hour drain time)

Forebay 1 *I=.135* *WQCV=* 0.085851

Equation 3-3 V=(WQCV/12)A

Forebay 1 A= 95.54 Acres V= 0.684

3% OF WQCV

FOREBAY TOTAL VOLUME= .03(V)

VOLUME REQUIRED FOR FOREBAY 1 = 0.021 AC-FT 893 CF

VOLUME PROVIDED FOR FOREBAY 1 = 0.037 AC-FT 1596 CF

Q_{100} Discharges 2% OF Q_{100}

Q_{100} Forebay 1= .02*51.3 CFS= 1.03 CFS

Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 25 2021

Pond F Forebay Weir

V-Notch Weir

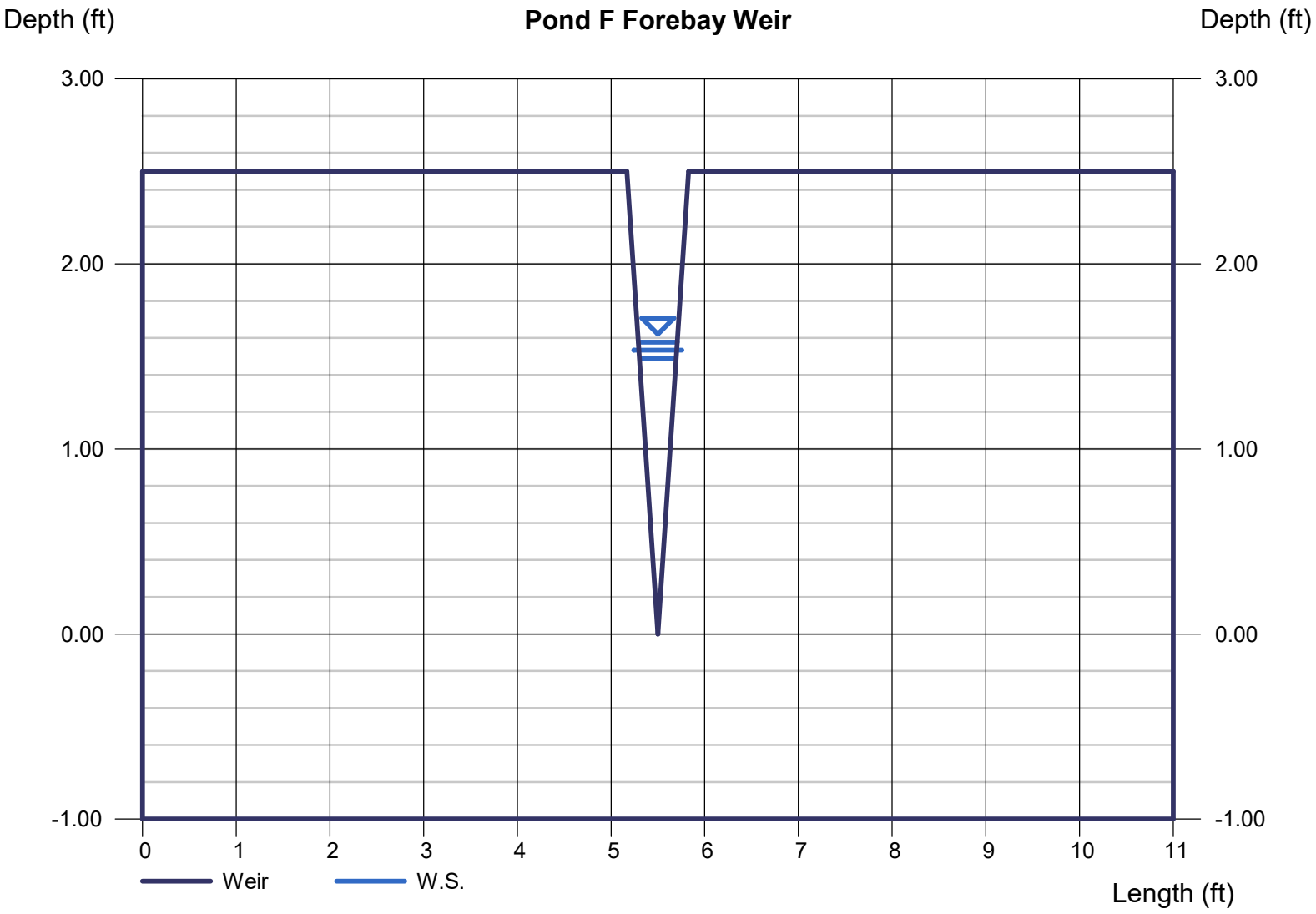
Crest	= Sharp
Angle (Deg)	= 15
Total Depth (ft)	= 2.50

Calculations

Weir Coeff. Cw	= 0.33
Compute by:	Known Q
Known Q (cfs)	= 1.03

Highlighted

Depth (ft)	= 1.58
Q (cfs)	= 1.030
Area (sqft)	= 0.33
Velocity (ft/s)	= 3.15
Top Width (ft)	= 0.42



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, May 20 2021

Pond F Trickle Channel

Rectangular

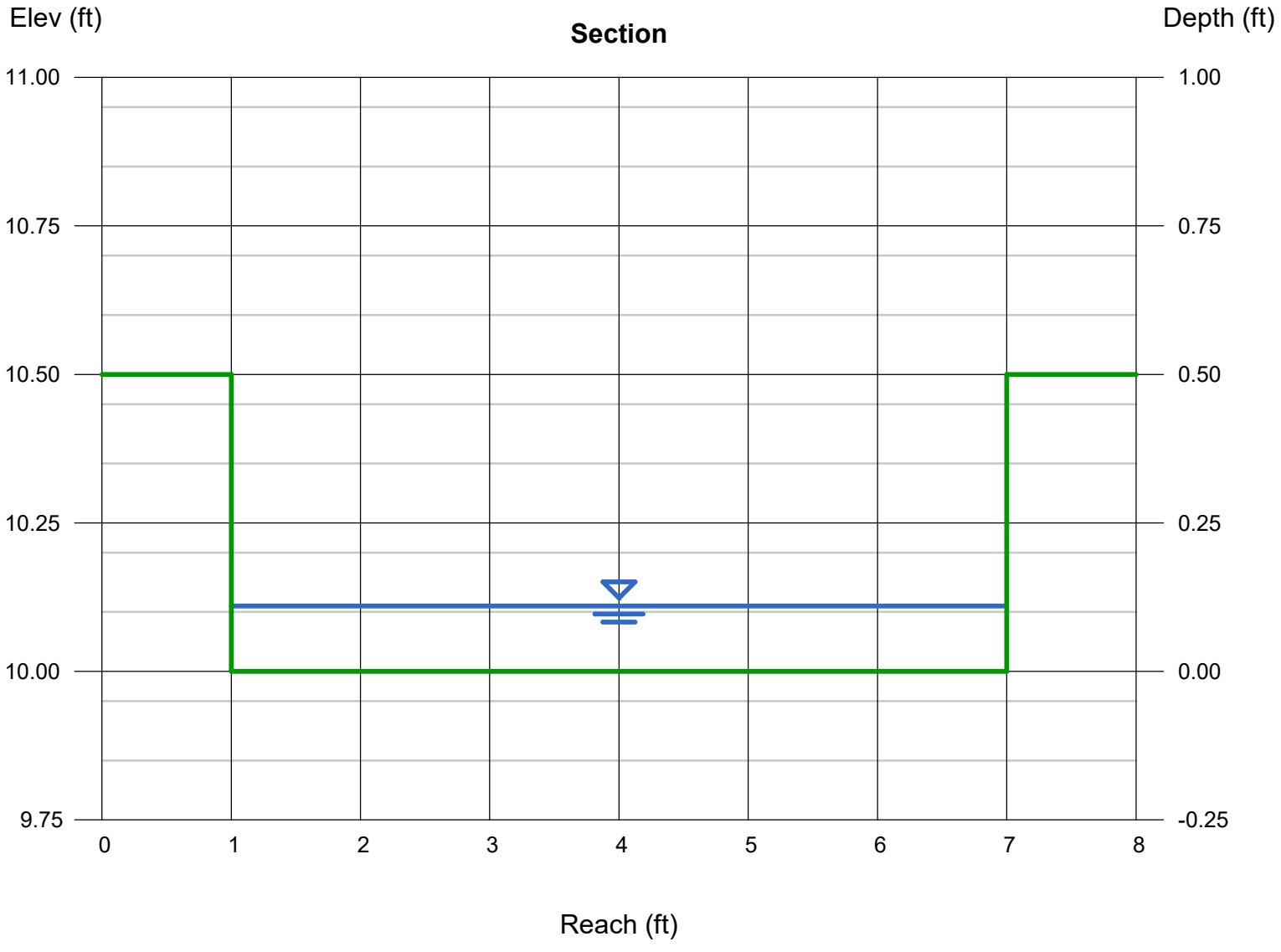
Bottom Width (ft)	= 6.00
Total Depth (ft)	= 0.50
Invert Elev (ft)	= 10.00
Slope (%)	= 0.50
N-Value	= 0.013

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.03

Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 1.030
Area (sqft)	= 0.66
Velocity (ft/s)	= 1.56
Wetted Perim (ft)	= 6.22
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 6.00
EGL (ft)	= 0.15



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, May 20 2021

Pond F Spillway

Trapezoidal Weir

Crest	= Sharp
Bottom Length (ft)	= 55.00
Total Depth (ft)	= 1.45
Side Slope (z:1)	= 4.00

Calculations

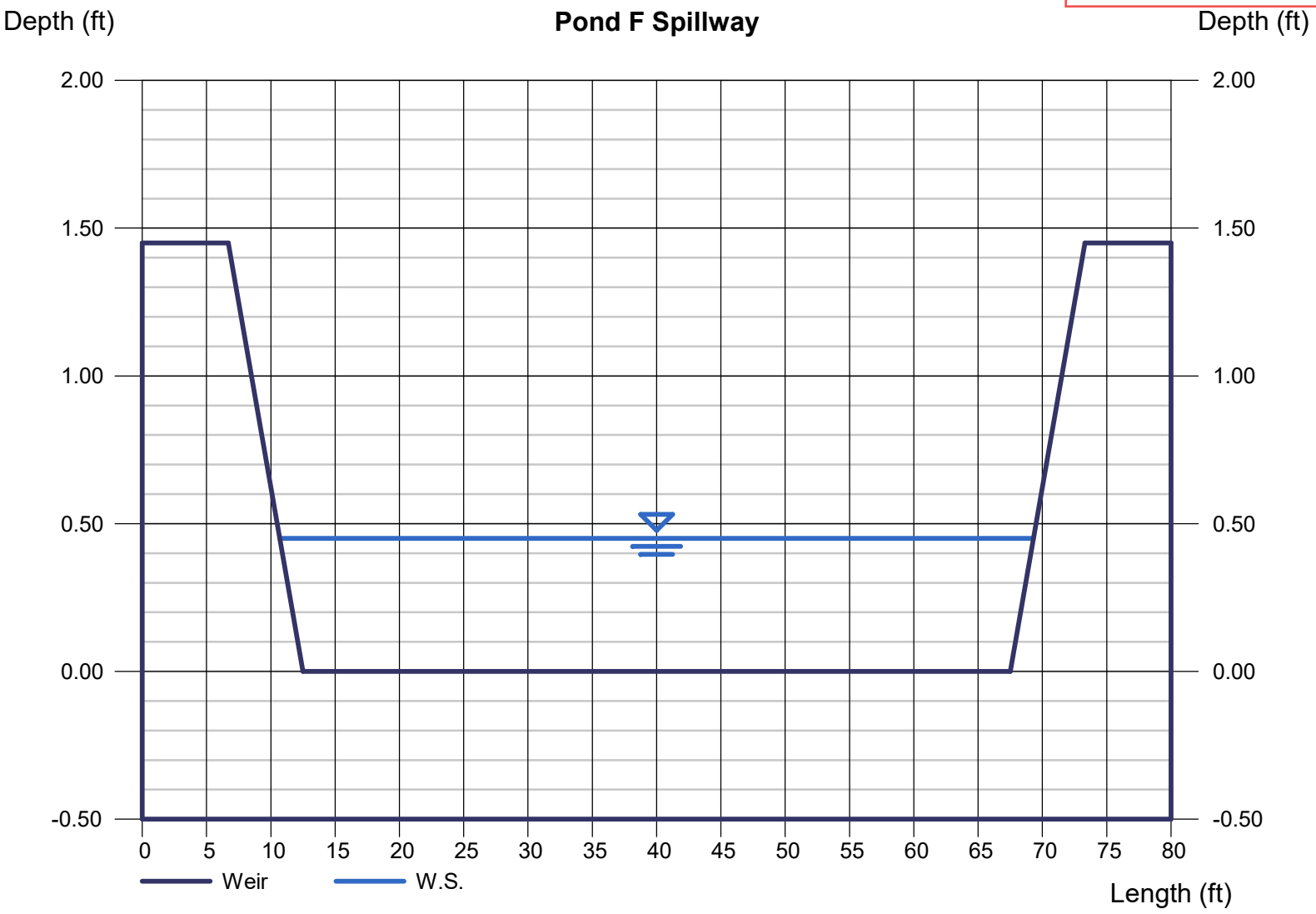
Weir Coeff. Cw	= 3.10
Compute by:	Known Q
Known Q (cfs)	= 51.30

Highlighted

Depth (ft)	= 0.45
Q (cfs)	= 51.30
Area (sqft)	= 25.56
Velocit	
Top W	

To be reviewed on resubmittal once construction plans are submitted and narrative updated to provide information for the construction/design intent.

JR: Noted



Remove the SDI worksheet from the FDR.

JR: For reference only

Stormwater Detention and Infiltration Design Data Sheet

Workbook Protected Worksheet Protected

Stormwater Facility Name: SADDLEHORN RANCH - FILING 2 - POND F

Facility Location & Jurisdiction: EL PASO COUNTY - SADDLEHORN RANCH METROPOLITAN DISTRICT

User Input: Watershed Characteristics

Watershed Slope =	0.014	ft/ft
Watershed Length =	5707	ft
Watershed Area =	95.54	acres
Watershed Imperviousness =	13.5%	percent
Percentage Hydrologic Soil Group A =	89.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	11.0%	percent

Location for 1-hr Rainfall Depths (use dropdown): User Input

WQCV Treatment Method = Extended Detention

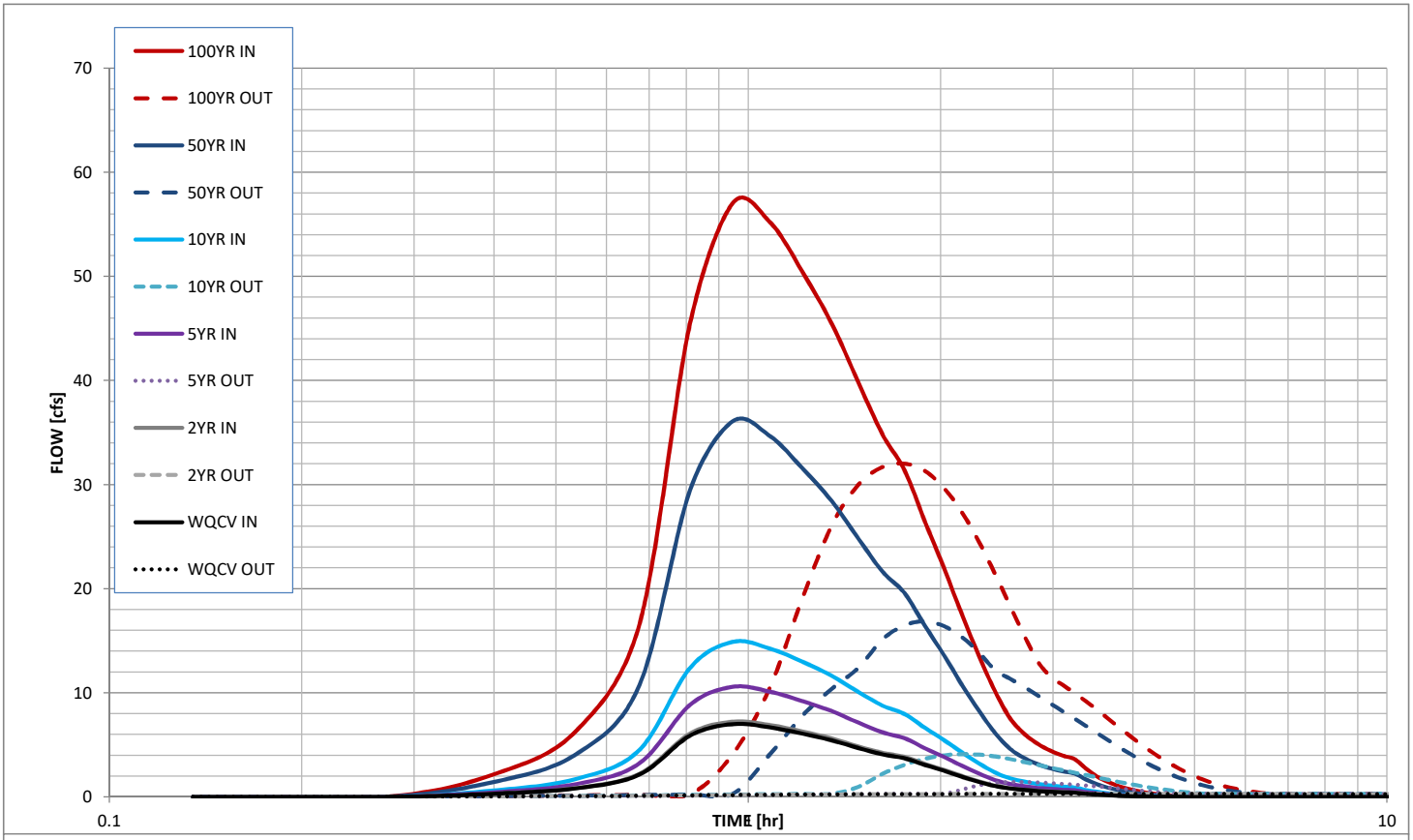
User Defined Stage [ft]	User Defined Area [ft^2]	User Defined Stage [ft]	User Defined Discharge [cfs]
0.00	36	0.00	0.00
0.33	50	0.33	0.04
1.33	2,789	1.33	0.11
2.33	15,282	2.33	0.21
3.33	33,913	3.33	0.30
4.33	49,906	4.33	12.02
5.33	58,427	5.33	41.73
6.33	67,707	6.33	207.62
6.83	73,617	6.83	360.96

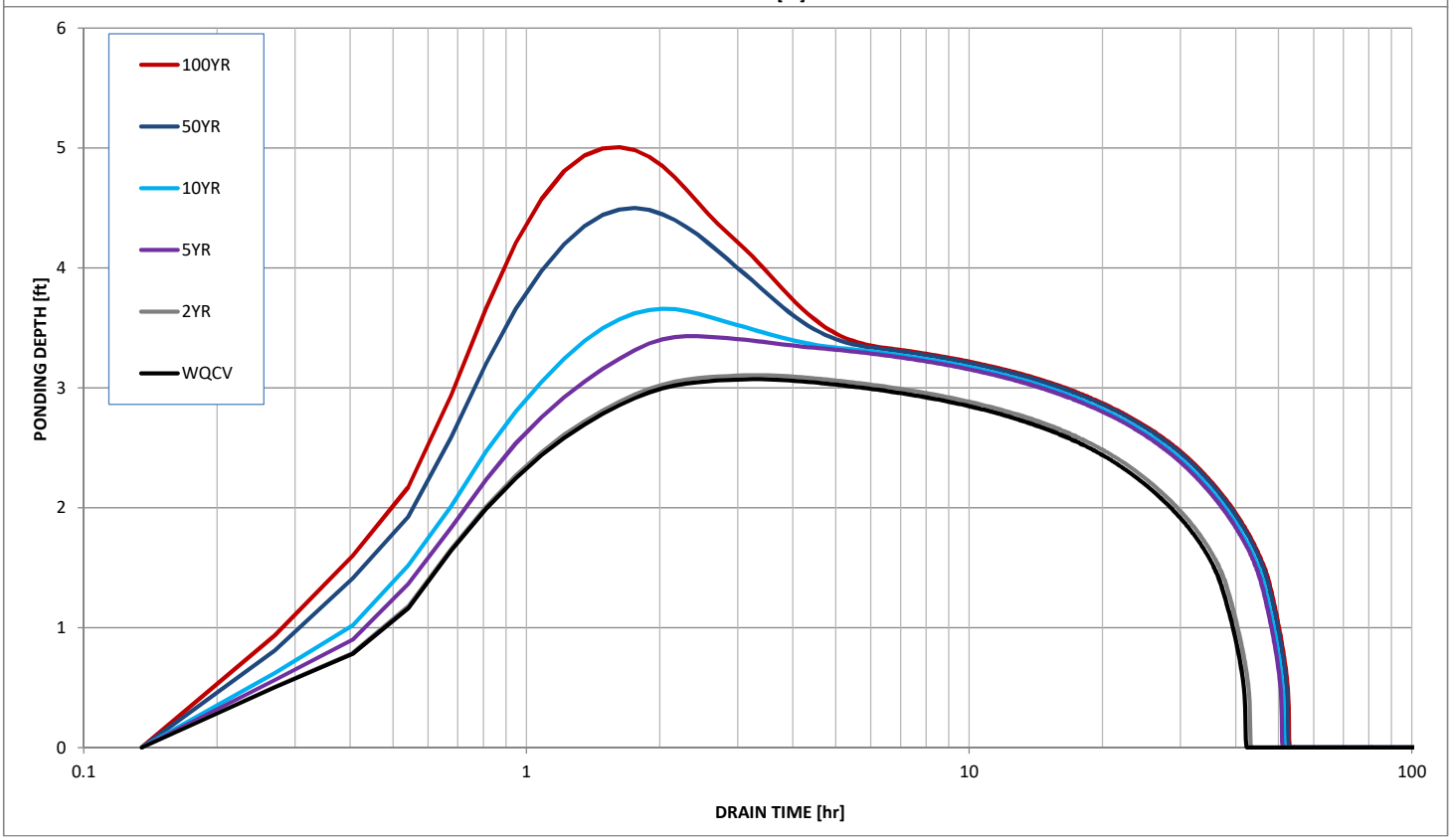
After completing and printing this worksheet to a pdf, go to:
https://maperture.digitaldataservices.com/gvh/?viewer=cswdif
create a new stormwater facility, and
attach the pdf of this worksheet to that record.

Routed Hydrograph Results

Design Storm Return Period =	WQCV	2 Year	5 Year	10 Year	50 Year	100 Year	
One-Hour Rainfall Depth =	0.53	1.19	1.50	1.75	2.25	2.52	in
Calculated Runoff Volume =	0.684	0.707	1.039	1.468	3.604	5.758	acre-ft
OPTIONAL Override Runoff Volume =							acre-ft
Inflow Hydrograph Volume =	0.683	0.706	1.038	1.468	3.604	5.752	acre-ft
Time to Drain 97% of Inflow Volume =	38.8	39.7	**46.2**	45.4	41.1	37.0	hours
Time to Drain 99% of Inflow Volume =	40.8	41.8	48.9	48.8	47.3	**45.6**	hours
Maximum Ponding Depth =	3.07	3.10	3.43	3.66	4.50	5.01	ft
Maximum Ponded Area =	0.67	0.68	0.81	0.90	1.18	**1.28**	acres
Maximum Volume Stored =	0.616	0.636	0.880	1.074	1.953	2.582	acre-ft

Stormwater Detention and Infiltration Design Data Sheet





APPENDIX E

REFERENCE MATERIALS

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER
Name: *El Paso County News*
Dates: 11/10/2004 11/17/2004

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD) EFFECTIVE	BFE (FEET NGVD) REVISED	MAP PANEL NUMBER(S)
Haegler Ranch Tributary 2	Approximately 310 feet upstream of confluence with Geick Ranch West Tributary	None	6,735	08041C0575 F
	Approximately 3,140 feet upstream of confluence with Geick Ranch West Tributary	None	6,779	08041C0575 F
Haegler Ranch Tributary 3	Approximately 8,100 feet downstream of Curtis Road	None	6,672	08041C0575 F
	Approximately 300 feet upstream of Curtis Road	None	6,769	08041C0575 F
Haegler Ranch Tributary 4	Approximately 4,000 feet downstream of Curtis Road	None	6,688	08041C0575 F
	Approximately 300 feet upstream of Curtis Road	None	6,758	08041C0575 F

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Kevin C Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

102929 101104080587 102IAC

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE UNINCORPORATED AREAS OF EL PASO COUNTY, COLORADO, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On March 17, 1997, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the unincorporated areas of El Paso County, Colorado, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate new hydrologic, hydraulic, and topographic data for Haegler Ranch Tributary 2 from approximately 310 feet upstream to approximately 3,140 feet upstream of the confluence with Geick Ranch West Tributary; for Haegler Ranch Tributary 3 from approximately 8,100 feet downstream to approximately 400 feet upstream of Curtis Road; and for Haegler Ranch Tributary 4 from approximately 4,100 feet downstream to approximately 400 feet upstream of Curtis Road. This has resulted in increases and decreases in SFHA width and increased BFEs for the above-mentioned tributaries. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Haegler Ranch Tributary 2:		
Approximately 310 feet upstream of confluence with Geick Ranch West Tributary	None	6,735
Approximately 3,140 feet upstream of confluence with Geick Ranch West Tributary	None	6,779
Haegler Ranch Tributary 3:		
Approximately 8,100 feet downstream of Curtis Road	None	6,672
Approximately 300 feet upstream of Curtis Road	None	6,769
Haegler Ranch Tributary 4:		
Approximately 4,000 feet downstream of Curtis Road	None	6,688
Approximately 300 feet upstream of Curtis Road	None	6,758

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

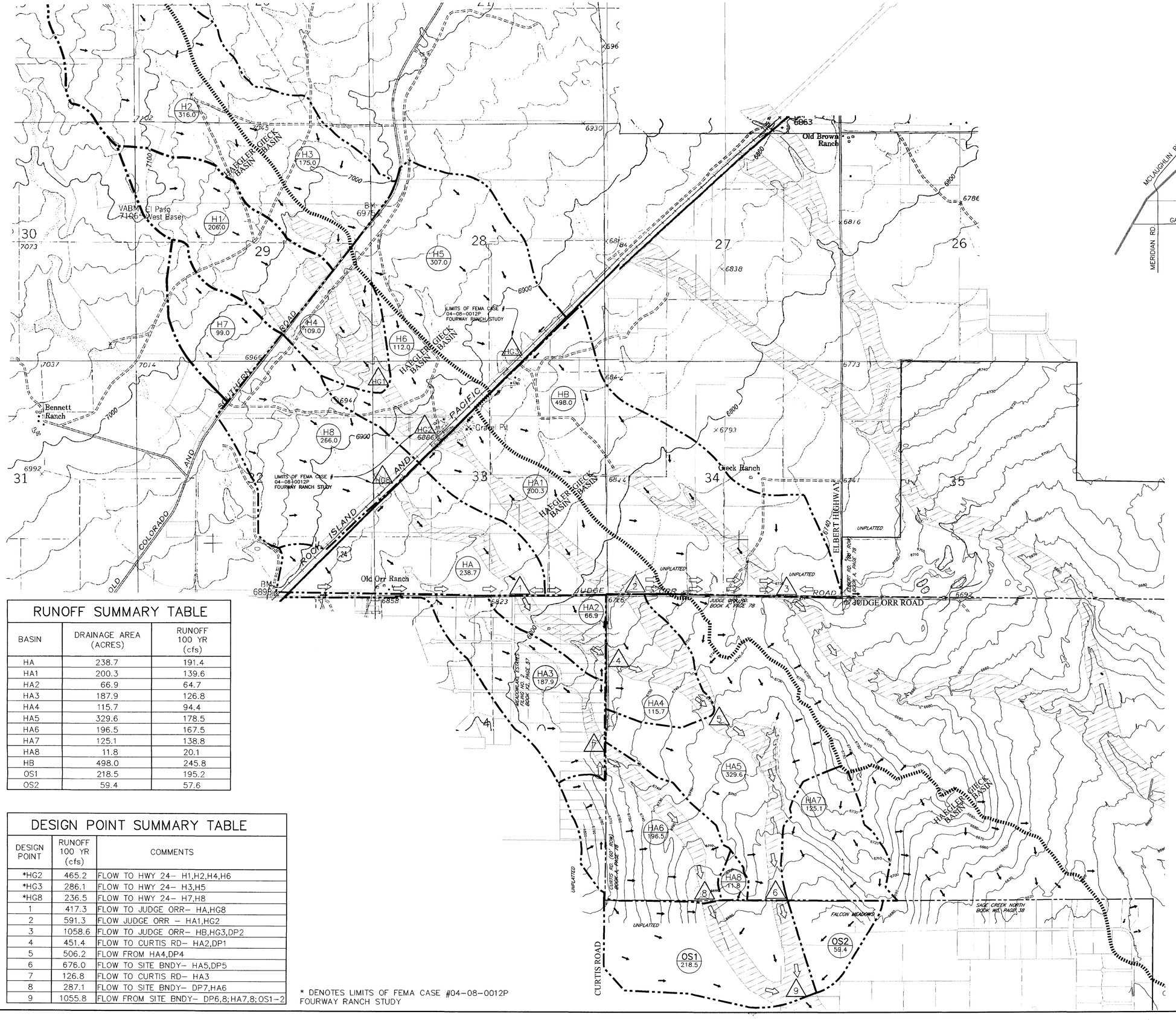
The Honorable Chuck Brown
Chairman, El Paso County
Board of Commissioners
27 Vermijo Avenue
Colorado Springs, CO 80903-2208

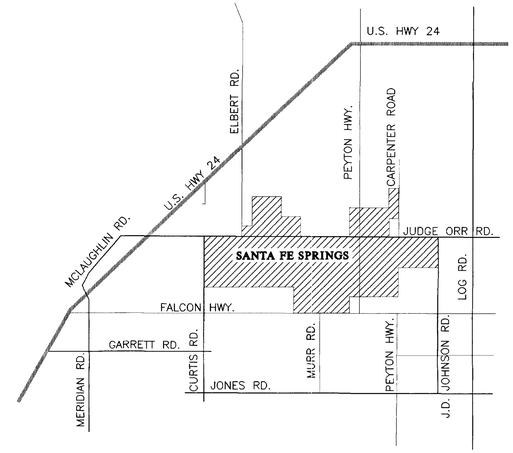
Table 3. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Year	50-Year	100-Year	500-Year
Haegler Ranch Tributary 2 At the confluence with Geick Ranch West Tributary	1.47	__1	__1	592	__1
Haegler Ranch Tributary 3 At approximately 2,300 feet upstream of the confluence with Haegler Ranch Tributary 4	1.09	__1	__1	505	__1
Haegler Ranch Tributary 4 At approximately 3,700 feet upstream of the confluence with Haegler Ranch Tributary 3	0.60	__1	__1	130	__1

1 Data Not Available

REVISED TO
REFLECT LOMR
DATED FEB 16 2005





VICINTY MAP

1"=5000'

LEGEND

- EX. MAJOR CONTOUR 6420
- DRAINAGE BASIN BOUNDARY .....
- OVERLAND FLOW DIRECTION .....
- CHANNELIZED FLOW DIRECTION .....
- HAEGLER/GIECK BASIN BOUNDARY .....
- DESIGN POINT 1
- 100-YEAR FLOODPLAIN PER FIRM MAPS .....
- BASIN I.D. / BASIN AREA (Acres) — HA3 / 187.9

RUNOFF SUMMARY TABLE

BASIN	DRAINAGE AREA (ACRES)	RUNOFF 100 YR (cfs)
HA	238.7	191.4
HA1	200.3	139.6
HA2	66.9	64.7
HA3	187.9	126.8
HA4	115.7	94.4
HA5	329.6	178.5
HA6	196.5	167.5
HA7	125.1	138.8
HA8	11.8	20.1
HB	498.0	245.8
OS1	218.5	195.2
OS2	59.4	57.6

DESIGN POINT SUMMARY TABLE

DESIGN POINT	RUNOFF 100 YR (cfs)	COMMENTS
*HG2	465.2	FLOW TO HWY 24- H1,H2,H4,H6
*HG3	286.1	FLOW TO HWY 24- H3,H5
*HG8	236.5	FLOW TO HWY 24- H7,H8
1	417.3	FLOW TO JUDGE ORR- HA,HG8
2	591.3	FLOW JUDGE ORR - HA1,HG2
3	1058.6	FLOW TO JUDGE ORR- HB,HG3,DP2
4	451.4	FLOW TO CURTIS RD- HA2,DP1
5	506.2	FLOW FROM HA4,DP4
6	676.0	FLOW TO SITE BNDY- HA5,DP5
7	126.8	FLOW TO CURTIS RD- HA3
8	287.1	FLOW TO SITE BNDY- DP7,HA6
9	1055.8	FLOW FROM SITE BNDY- DP6,8;HA7,8;OS1-2

* DENOTES LIMITS OF FEMA CASE #04-08-0012P FOURWAY RANCH STUDY

GRAPHIC SCALE
1000 0 500 1000
1 inch = 1000 ft.

NO.	DESCRIPTION	REV BY	CKD BY	DATE
	REVISION			

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193

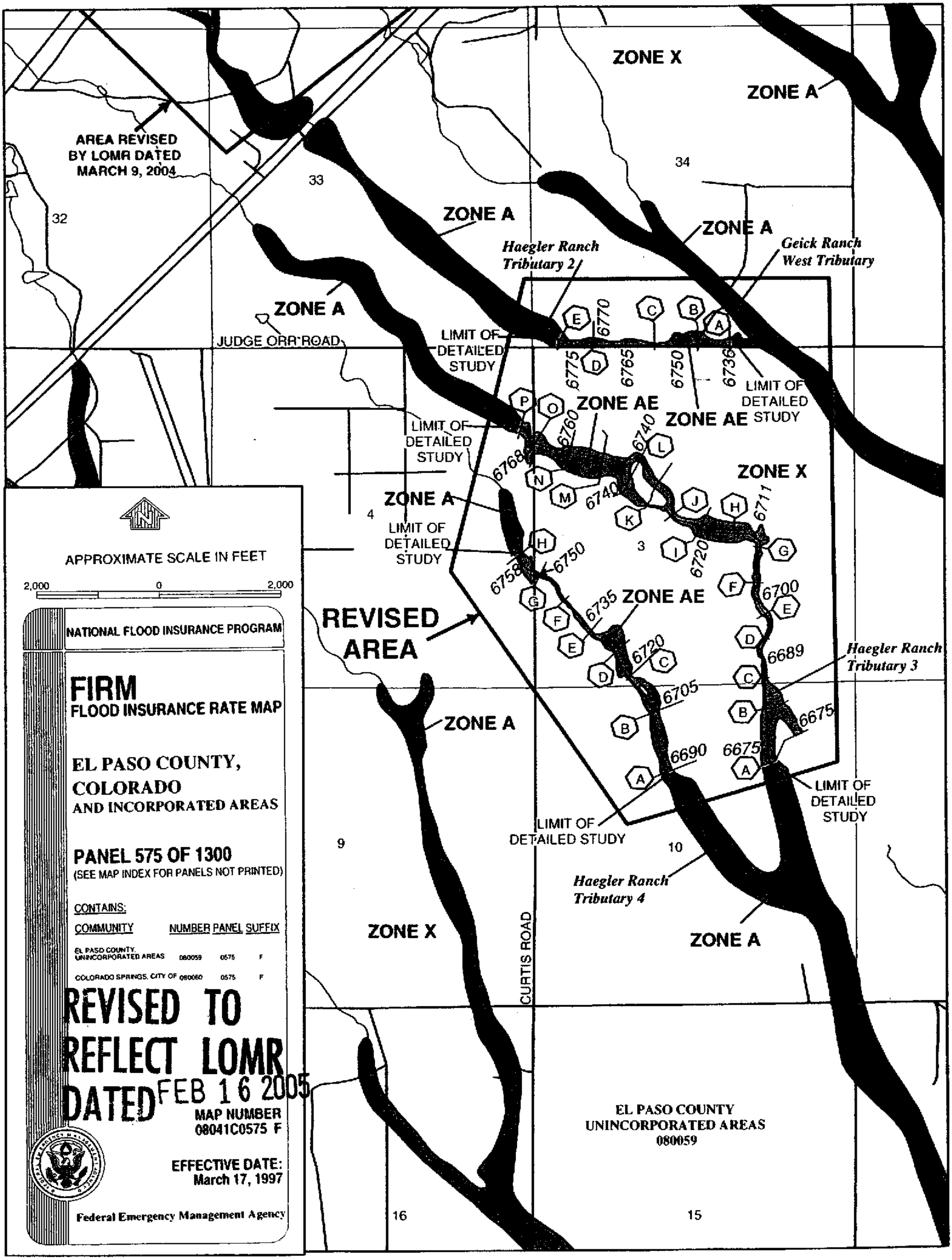
SCALE (H): 1"=1000'
SCALE (V): N/A
DRAWN BY: DMM
DESIGNED BY: RLS
CHECKED BY: RLS
DATE: 05/21/04

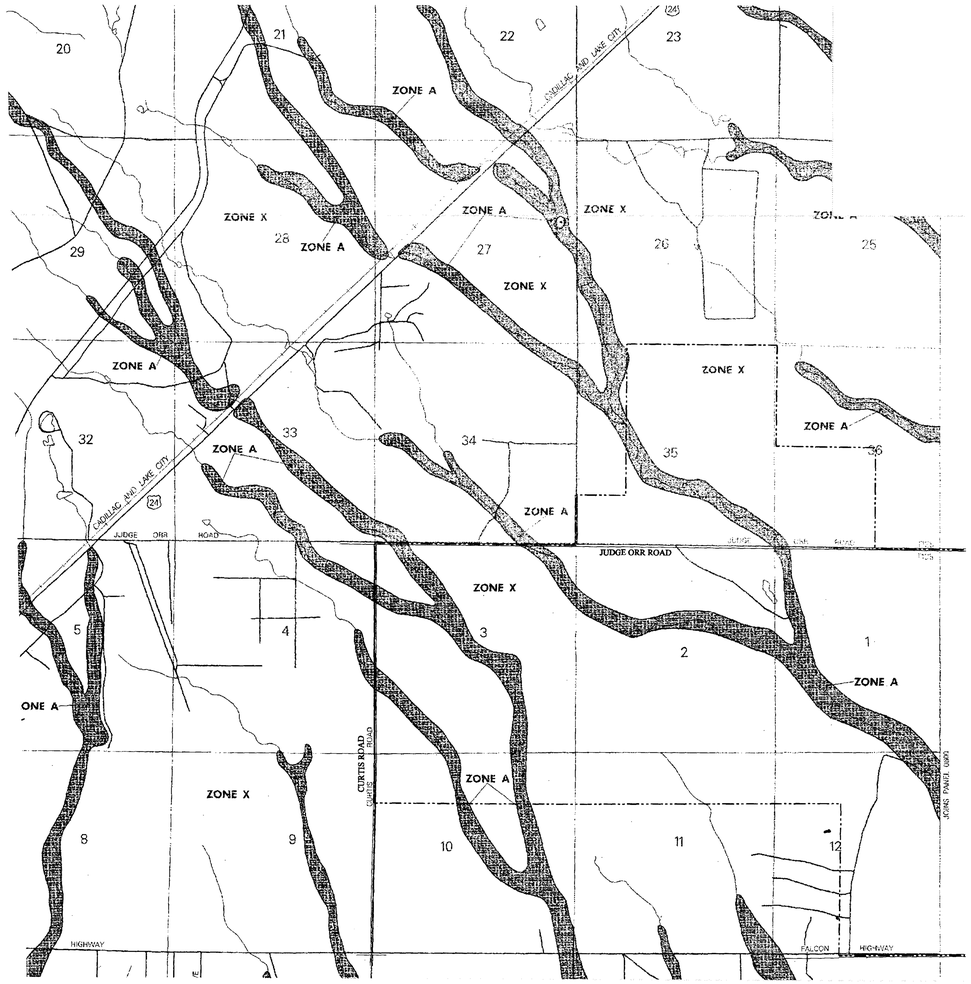
SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO, COUNTY

REALTY DEVELOPMENT SERVICES
25 NORTH TEJON
SUITE 300

EXHIBIT 1
HYDROLOGIC SUBBASIN MAP

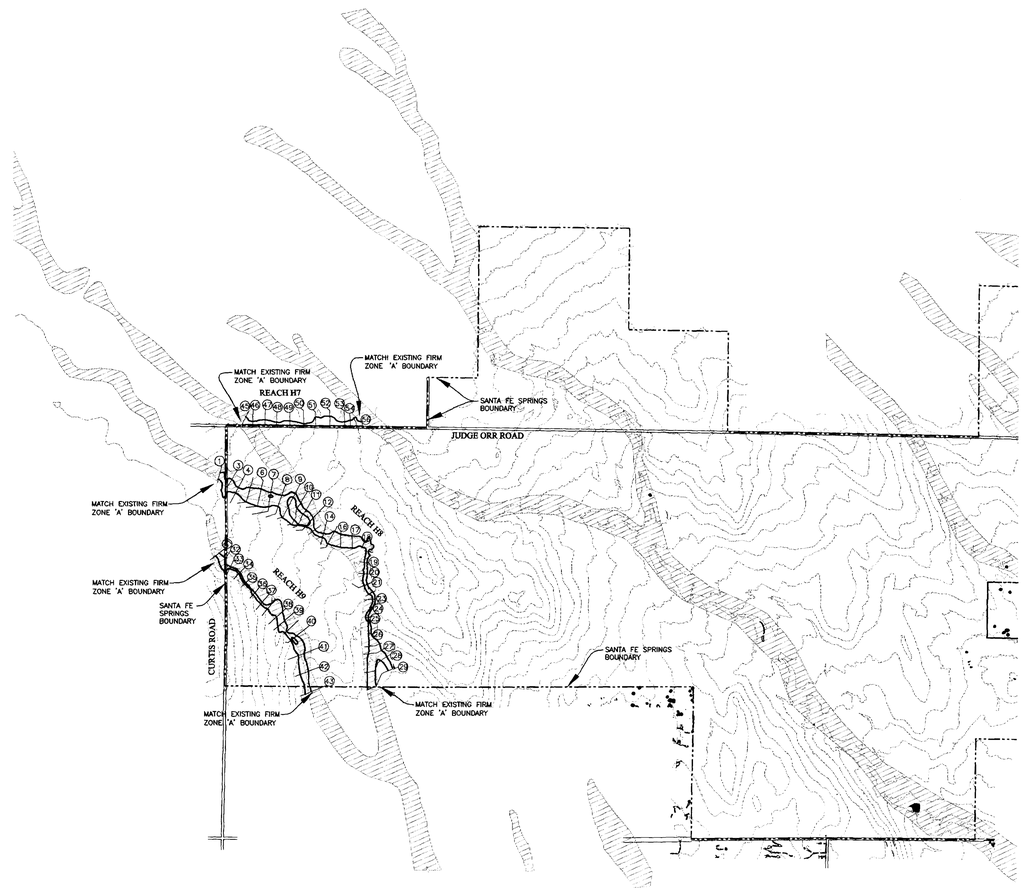
PROJECT NO. 6005-0001
FILENAME 01DR_HIST.DWG
DRAWING NO. EXH. 1


ZONE X
ZONE A
AREA REVISED
BY LOMR DATED
MARCH 9, 2004
33
34
32
ZONE A
ZONE A
Haegler Ranch
Tributary 2
Geick Ranch
West Tributary
ZONE A
JUDGE ORR ROAD
LIMIT OF
DETAILED
STUDY
6770
6775
6765
6750
6736
LIMIT OF
DETAILED STUDY
ZONE AE
ZONE AE
LIMIT OF
DETAILED
STUDY
6760
6740
6768
ZONE X
ZONE A
4
LIMIT OF
DETAILED
STUDY
6740
6711
3
6720
6758
6750
6735
ZONE AE
6700
REVISED
AREA
6720
6689
Haegler Ranch
Tributary 3
ZONE A
6705
6675
6690
6675
LIMIT OF
DETAILED STUDY
9
10
Haegler Ranch
Tributary 4
ZONE X
ZONE A
CURTIS ROAD
16
15
EL PASO COUNTY
UNINCORPORATED AREAS
080059
APPROXIMATE SCALE IN FEET
2,000
0
2,000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY,
COLORADO
AND INCORPORATED AREAS
PANEL 575 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS
080059
0575
F
COLORADO SPRINGS, CITY OF
080060
0575
F
REVISED TO
REFLECT LOMR
DATED FEB 16 2005
MAP NUMBER
08041C0575 F
EFFECTIVE DATE:
March 17, 1997
Federal Emergency Management Agency



EFFECTIVE CONDITION

MAP PANEL NO. 0575F



REVISED EFFECTIVE CONDITION

APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 575 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0575	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0575	F

MAP NUMBER
08041C0575 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

GRAPHIC SCALE
2000 0 1000 2000
1 inch = 2000 ft

REVISION NO.	DESCRIPTION	REV BY	CKD BY	DATE

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193

SCALE (H): 1"=2000'
SCALE (V): N/A

DRAWN BY: DMM
DESIGNED BY: RLS
CHECKED BY: RLS

DATE: 05/21/04

SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO, COUNTY

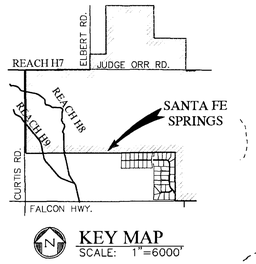
REALTY DEVELOPMENT SERVICES
25 NORTH TEJON
SUITE 300

EXHIBIT 2
REVISED FLOOD INSURANCE RATE MAP

PROJECT NO.
6005-0001

FILENAME
RATE_MAP_LOMR.DWG

DRAWING NO.
EXH. 2



KEY MAP
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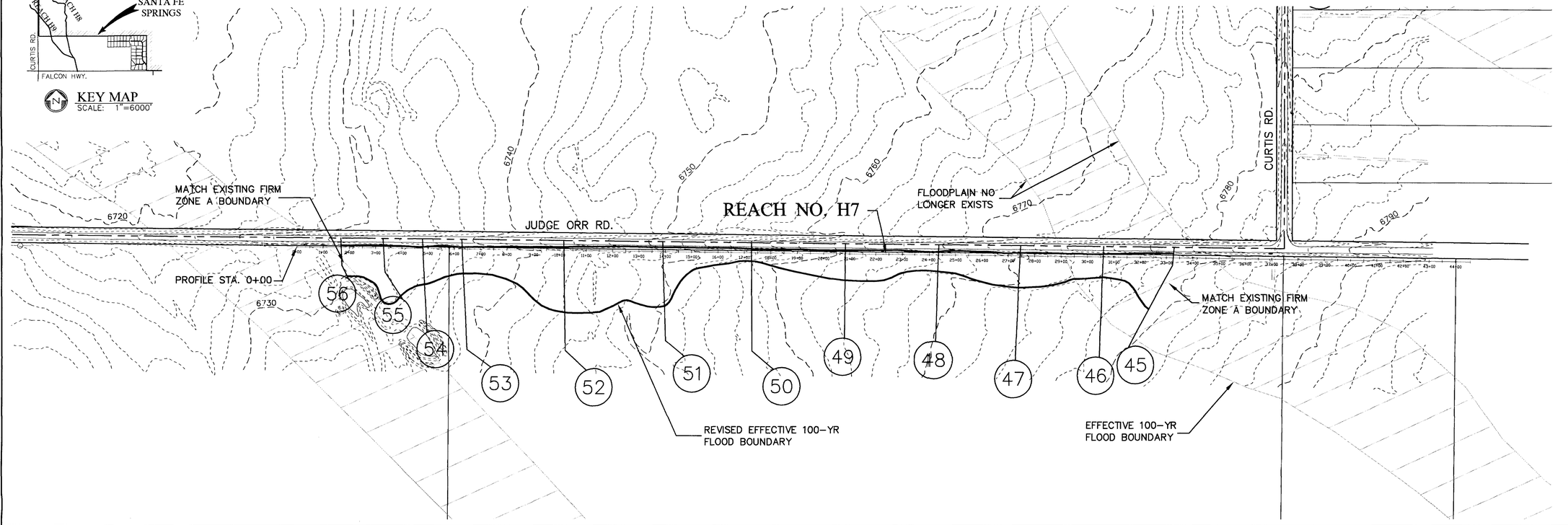

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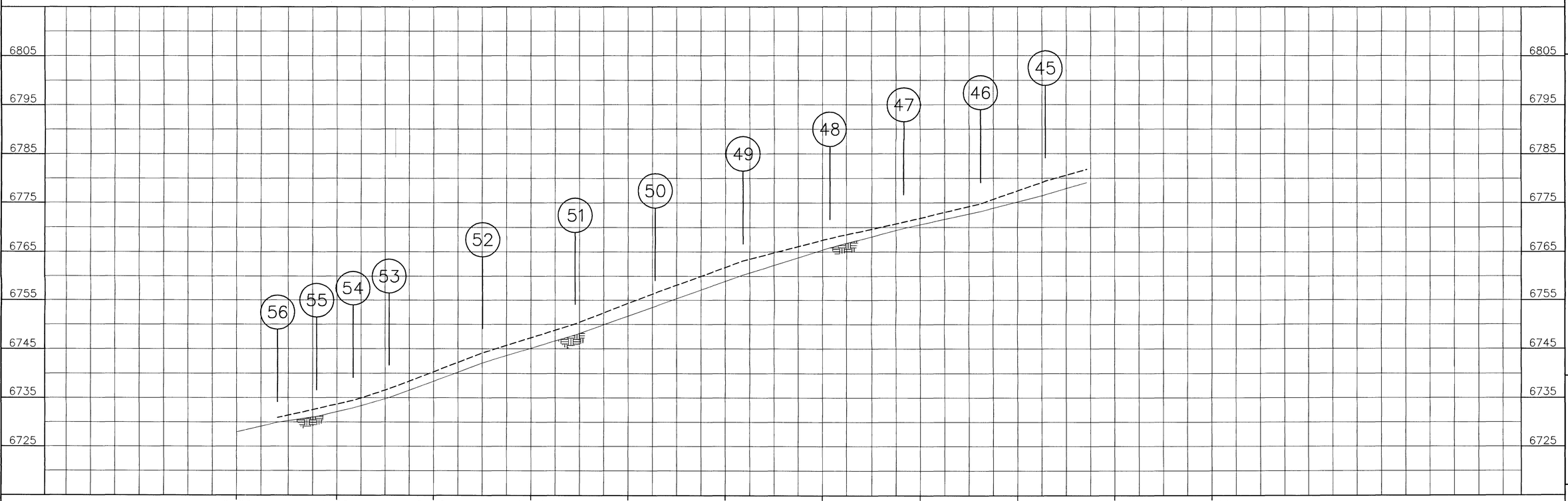

NO.	DESCRIPTION	REV BY	CKD BY	DATE
	REVISION			

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193

SCALE (H): 1"=200'
SCALE (V): 1"=10'
DRAWN BY: KMV
DESIGNED BY: RLS
CHECKED BY: RLS
DATE: 06/04/04

SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO COUNTY

REALTY DEVELOPMENT SERVICES
25 NORTH TEJON, SUITE 300
COLORADO SPRINGS, CO 80903

EXHIBIT 3 100-YEAR FLOODPLAIN BOUNDARY & PROFILE WORKMAP

PROJECT NO.
6005.0001
FILENAME
PP-LOMR.DWG
DRAWING NO.
EXH. 3

KEY MAP
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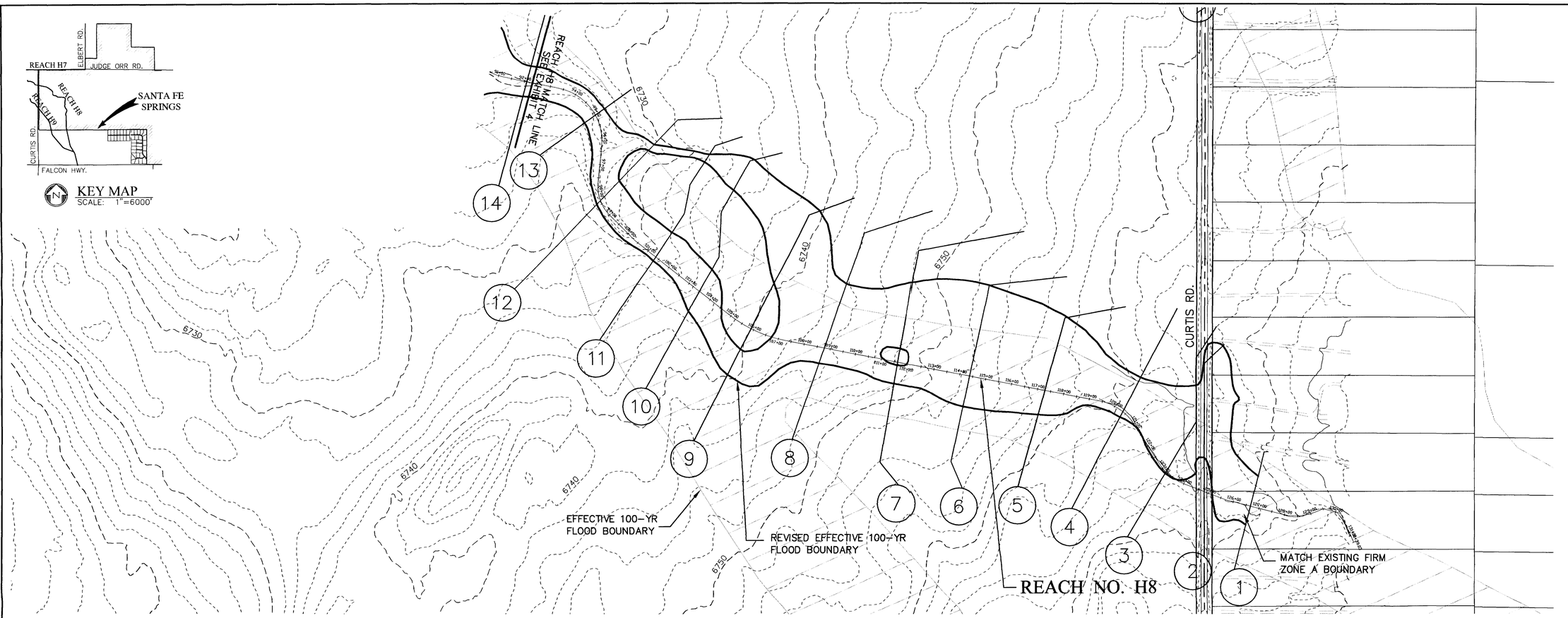

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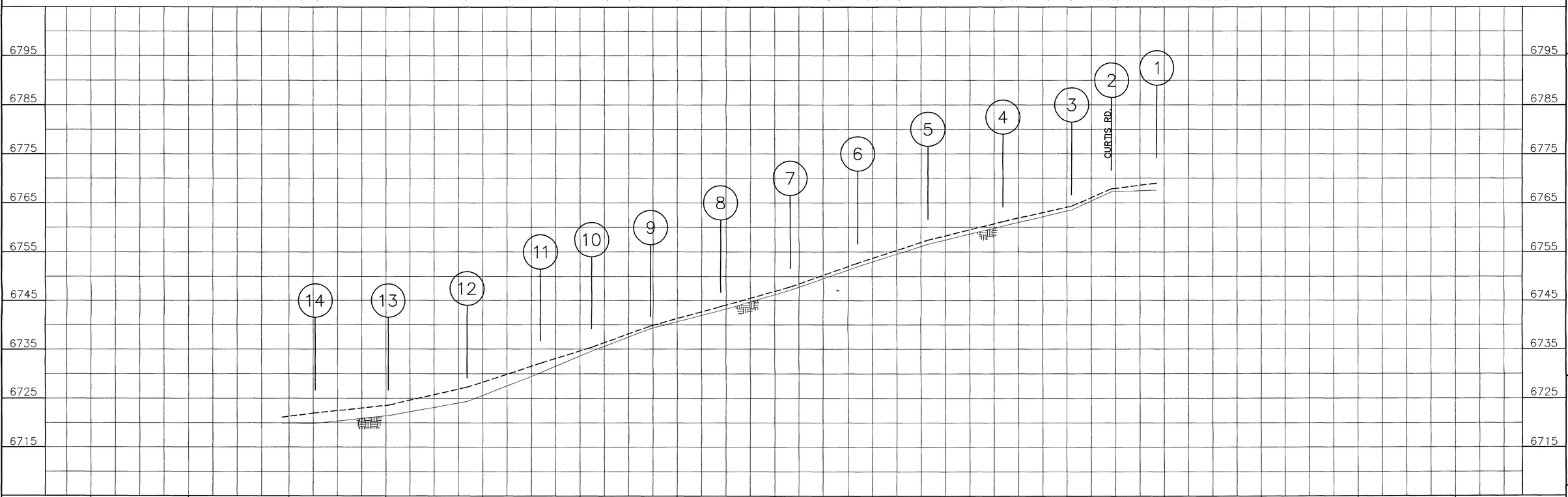
1 inch = 200 ft.

REVISION				
NO.	DESCRIPTION	REV BY	CKD BY	DATE

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193



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SCALE (V): 1"=10'
DRAWN BY: KMV
DESIGNED BY: RLS
CHECKED BY: RLS
DATE: 06/04/04

SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO COUNTY

REALTY DEVELOPMENT SERVICES
25 NORTH TEJON, SUITE 300
COLORADO SPRINGS, CO 80903

EXHIBIT 4 100-YEAR FLOODPLAIN BOUNDARY & PROFILE WORKMAP

PROJECT NO.
6005.0001
FILENAME
PP-LOMR.DWG
DRAWING NO.
EXH. 4

KEY MAP
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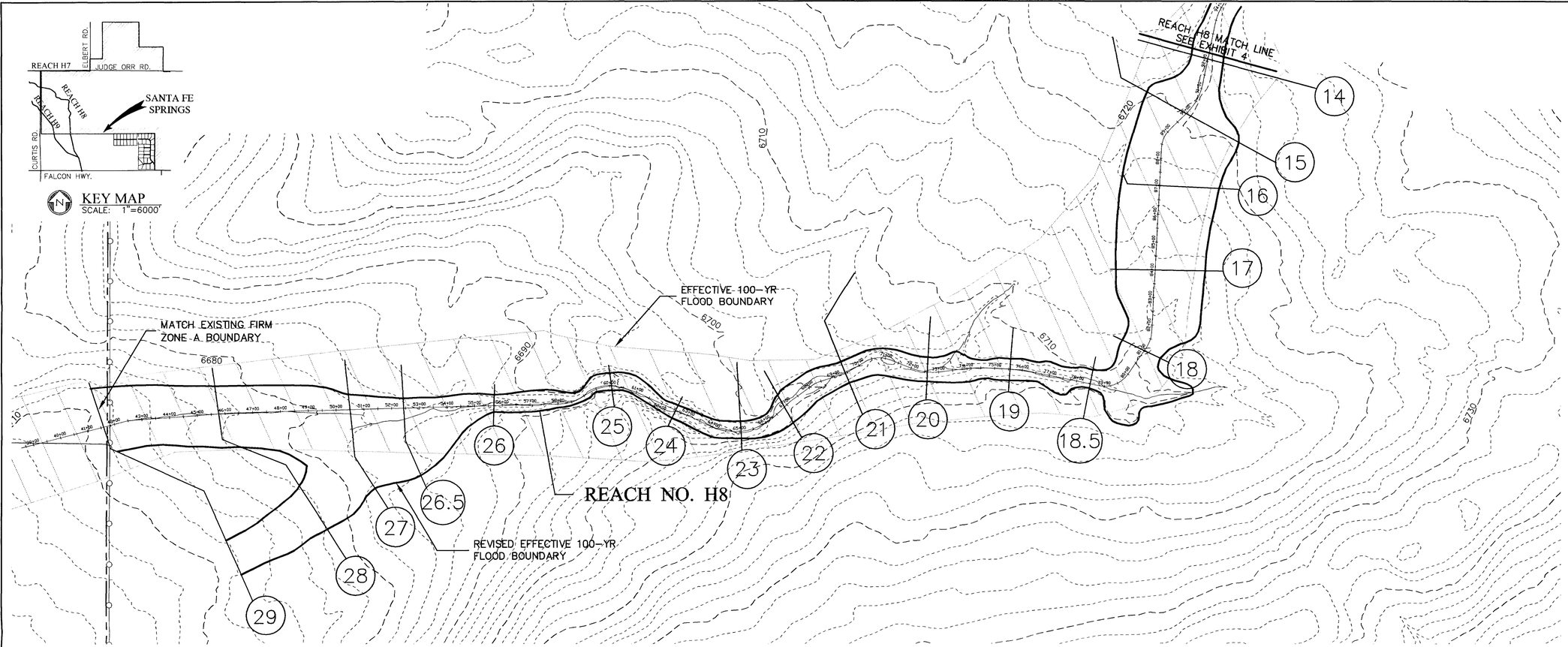

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GRAPHIC SCALE
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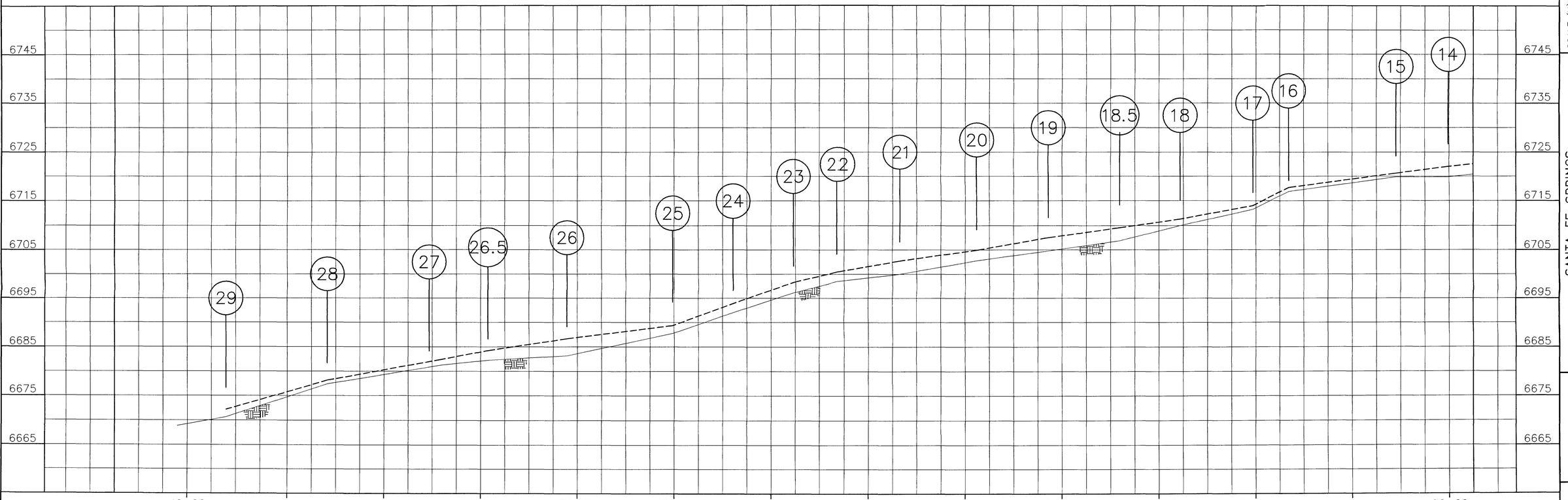


NO.	DESCRIPTION	REVISION BY	CKD BY	DATE

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193

SCALE (H): 1"=200'
SCALE (V): 1"=10'
DRAWN BY: KMV
DESIGNED BY: RLS
CHECKED BY: RLS
DATE: 06/04/04

SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO COUNTY

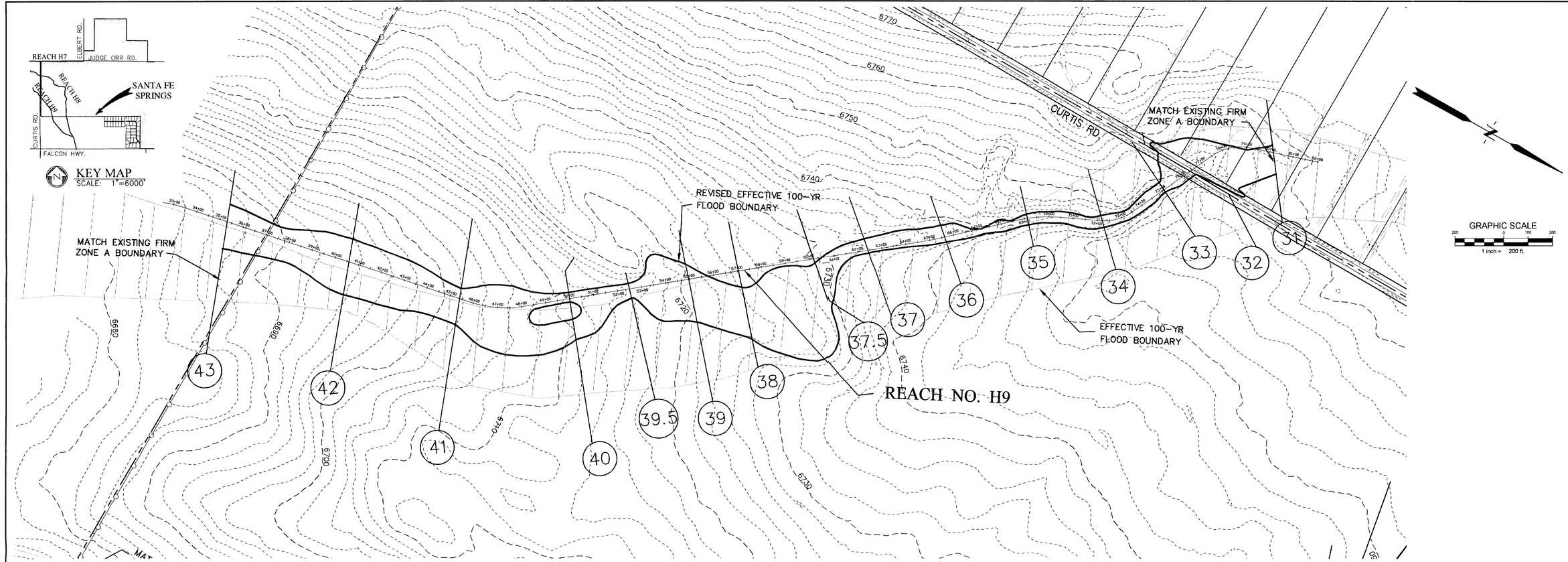
REALTY DEVELOPMENT SERVICES
25 NORTH TEJON, SUITE 300
COLORADO SPRINGS, CO 80903

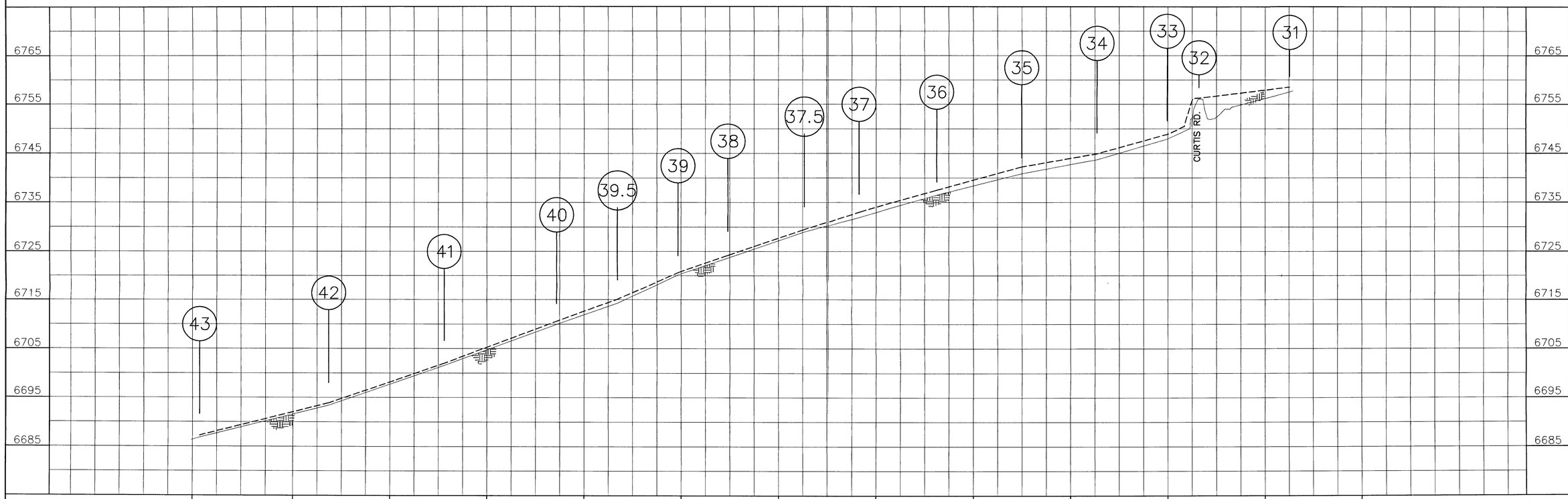
EXHIBIT 5 100-YEAR FLOODPLAIN BOUNDARY & PROFILE WORKMAP

PROJECT NO.
6005.0001

PP-LOMR.DWG

DRAWING NO.
EXH. 5





NO.	DESCRIPTION	REV BY	CKD BY	DATE
	REVISION			

TRI-CORE ENGINEERING
5526 N. ACADEMY BLVD., SUITE 204
COLORADO SPRINGS, CO 80918
PHONE (719) 264-1560
FAX (719) 264-1193

SCALE (H): 1"=200'
SCALE (V): 1"=10'

DRAWN BY: KMV
DESIGNED BY: RLS
CHECKED BY: RLS

DATE: 06/04/04

SANTA FE SPRINGS
HAEGLER RANCH DRAINAGE BASIN LOMR
EL PASO COUNTY

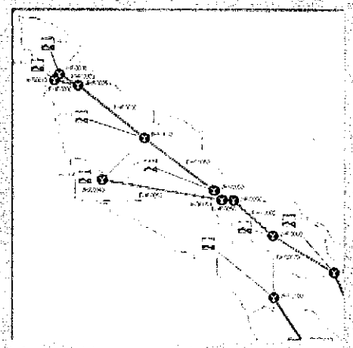
REALTY DEVELOPMENT SERVICES
25 NORTH TEJON, SUITE 300
COLORADO SPRINGS, CO 80903

EXHIBIT 6 100-YEAR FLOODPLAIN BOUNDARY & PROFILE WORKMAP

PROJECT NO.
6005.0001

PP-LOMR.DWG

DRAWING NO.
EXH. 6



Fountain Creek Basin

Drainage Basin Planning Study

May 2009

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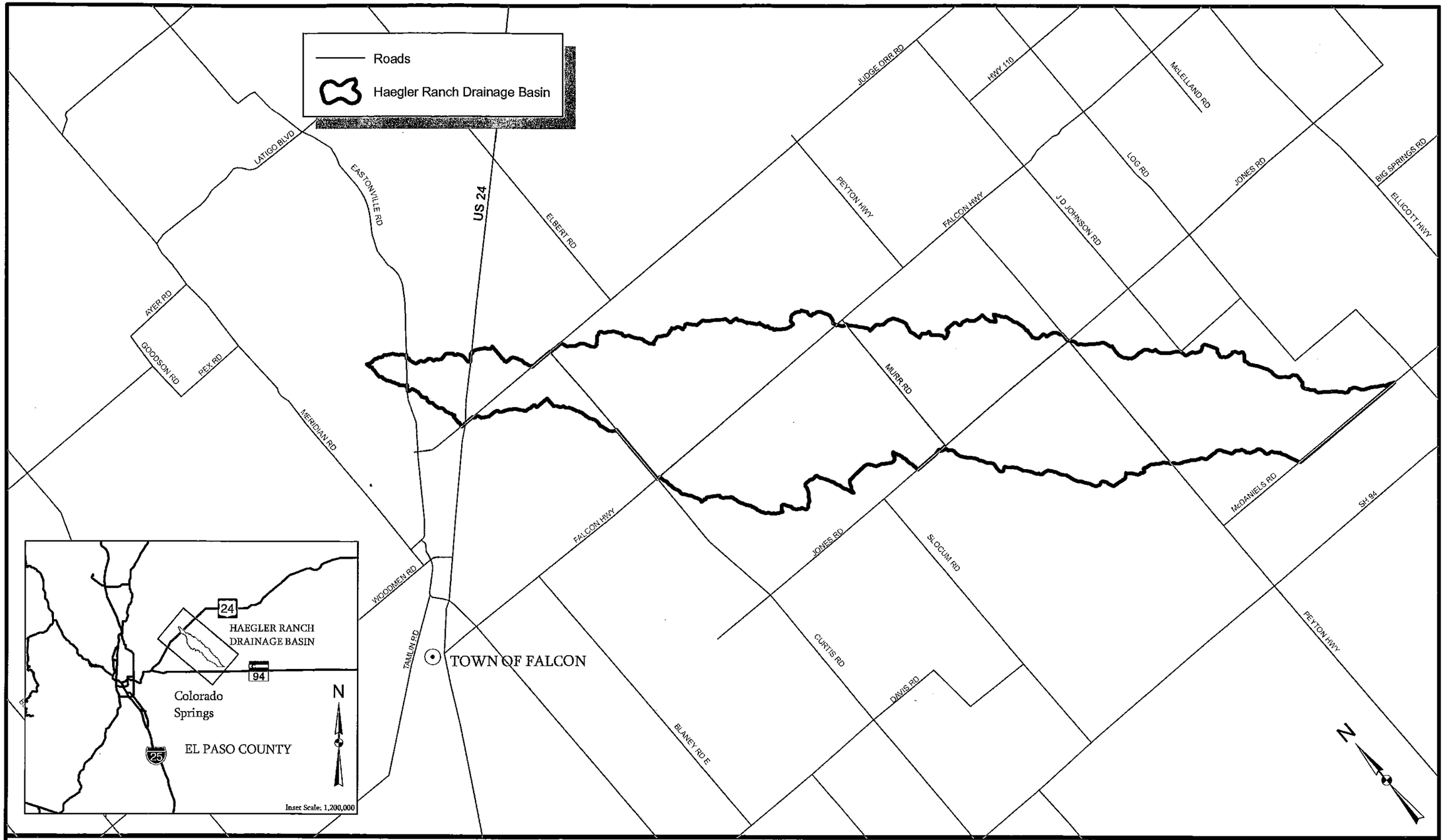

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6,000 3,000 0 6,000 Feet

1" = 6,000'

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HAEGLER RANCH DRAINAGE BASIN

VICINITY MAP
FIGURE 1-1

URS NO. 21711039

Haegler Ranch Drainage Basin Boundary
Subbasin Boundaries
Diverted to Geick
Stream Reach
Roads

LATIGO BLVD
EASTONVILLE RD
US 24
ELBERT RD
MERIDIAN RD
WOODMEN RD
TAMLIN RD
FALCON HWY
BLANEY RD E
JUDGE ORR RD
HWY 110
PEYTON HWY
McLELLAND RD
LOG RD
J D JOHNSON RD
JONES RD
ELLICOTT HWY
BIG SPRINGS RD
SLOCUM RD
CURTIS RD
DAVIS RD
SH 94

HR0010 HR0020 HR0030 HR0040 HR0050 HR0060 HR0070 HR0080 HR0090 HR0100 HR0110 HR0120 HR0130 HR0140 HR0150 HR0160 HR0170 HR0180 HR0190 HR0200 HR0210 HR0220 HR0230 HR0240 HR0250 HR0260 HR0270 HR0280 HR0290 HR0300 HR0310 HR0320 HR0330 HR0340 HR0350 HR0360 HR0370 HR0380 HR0390 HR0400 HR0410 HR0420 HR0430 HR0440 HR0450 HR0460 HR0470 HR0480 HR0490 HR0500 HR0510 HR0520 HR0530 HR0540 HR0550 HR0560 HR0570 HR0580 HR0590 HR0600 HR0610 HR0620 HR0630 HR0640 HR0650 HR0660 HR0670 HR0680

T1 T2 T3 - 01 T3 - 02 T4 T5 T6 T7

MS - 01 MS - 02 MS - 03 MS - 04 MS - 05 MS - 06 MS - 07

N

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5,000 2,500 0 5,000 Feet
1" = 5,000'

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HAEGLER RANCH DRAINAGE BASIN
SUBBASIN DELINEATION
FIGURE 4-1

URS NO. 21711039

Table 5-3 Existing Hydraulic Deficiencies

Facility Number	Road Crossing	Channel	Existing Size	Existing 100-yr Flow (cfs)	Deficiency
633	Sagecreek Road	N/A	24" CMP	N/A	N/A
634	Sagecreek Road	N/A	24" CMP	N/A	N/A
701	Curtis Road	N/A	18" CMP	N/A	N/A
702	Curtis Road	Tributary 6 (T6)	36" CMP	120	Overtops
703	Curtis Road	Main Stem (MS-06)	24" CMP	590	Overtops
704	Judge Orr Road	Main Stem (MS-06)	Blocked Culvert	540	Overtops
705	Judge Orr Road	N/A	18" CMP	N/A	N/A
706	US 24	N/A	20" Steel Pipe	N/A	N/A
707	US 24	N/A	24" CMP	N/A	N/A
801	Pedestrain Bridge	Main Stem (MS-06)	Bridge	350	Meets Capacity
802	US24	Main Stem (MS-06)	2-66" CMPs	350	Meets Capacity
803	Eastonville Road	Main Stem (MS-07)	27"X21" CMP	25	Overtops
804	Eastonville Road	Tributary 7 (T7)	18" CMP	99	Overtops

Note. 69 Structures were cataloged and located. N/A indicates that the structure was not analyzed because it was not on one of the main channels.

5.14. Results

Hydraulic conditions from the hydraulic model results are summarized in Table 5-4. This includes channel velocity, flow depth, and top width for existing conditions at key locations. Water surface profiles for Haegler Ranch Drainage Basin for the 100-year recurrence interval flood for the existing conditions are presented in Figure 5-4 the HEC-RAS model for Haegler Ranch Drainage Basin for the existing conditions is provided in Appendix B.

The approximate 100-year floodplain as seen in Figure 5-4 varies from a contained floodplain with in a defined channel to a wide floodplain with shallow flooding. Three areas were designated as flooding: 1) the approximate 100-year floodplain as delineated by HEC-RAS, 2) split flow flooding that was estimated from HEC-RAS elevation upstream and contours, and 3) shallow areas connected to the floodplain with less than 1 foot of flooding.

Table 5-4 Existing Conditions HEC-RAS Model

Key Location	Reach and Station	HEC-RAS Result	Recurrence Intervals			
			2-yr	5-yr	10-yr	100-yr
Main stem at US 24	MS-06 72276	Channel velocity (ft/sec)	1.1	1.63	1.98	2.92
		Water surface depth in channel (ft)	1.36	2.44	3.24	6.49
		Top width (ft)	18.23	24.85	29.7	255.62
Main stem at Judge Orr Road	MS-06 67666	Channel velocity (ft/sec)	3.33	4.09	1.76	3.48
		Water surface depth in channel (ft)	0.52	1.04	1.05	1.35
		Top width (ft)	174.53	534.34	535.52	569.34
Main stem at Falcon Highway	MS-05 52353	Channel velocity (ft/sec)	1.05	1.6	2.04	3.59
		Water surface depth in channel (ft)	1.79	3.69	4.96	5.74
		Top width (ft)	31.42	83.76	556.41	592.33
Main stem at Jones Road	MS-03 33189	Channel velocity (ft/sec)	2.45	3.7	1.27	2.51
		Water surface depth in channel (ft)	3.2	5.83	9.25	10.46
		Top width (ft)	47.98	105.51	580.28	667.17
Main stem at Peyton Highway	MS-02 18474	Channel velocity (ft/sec)	0.16	0.4	0.59	1.43
		Water surface depth in channel (ft)	4.14	4.35	4.51	5.15
		Top width (ft)	813.21	871.68	882.22	925.27
Southeast Tributary at Jones Road	T1 22297	Channel velocity (ft/sec)	0.62	1.02	1.47	3.2
		Water surface depth in channel (ft)	2.45	3.52	3.59	3.82
		Top width (ft)	197.35	345.68	351.74	372.17
Southeast Tributary at Peyton Highway	T1 16611	Channel velocity (ft/sec)	1.67	2.25	2.65	4.05
		Water surface depth in channel (ft)	0.08	0.17	0.24	0.51
		Top width (ft)	239.82	241.36	242.51	247.41
Southeast Tributary at Confluence with Main stem	T1 410	Channel velocity (ft/sec)	3.44	0.11	0.18	0.67
		Water surface depth in channel (ft)	1.69	2.01	2.01	2.01
		Top width (ft)	31.89	1169.3	1169.3	1169.3
At Confluence with Geick Basin	MS-01 82	Channel velocity (ft/sec)	2.68	3.85	19.89	17.33
		Water surface depth in channel (ft)	1.45	2.17	1.11	2.36
		Top width (ft)	75.88	255.32	60.67	262.84

Grass channels are designed for depths and velocities to be within the limits of allowable shear stress. Grass lined channels are limited to 1.0 psf shear stress. If calculated shear stress is above this, drop structures must be added to flatten the natural slope of the channel.

Using these criteria, several channel sections were developed to accommodate a range of future flow rates from 100 cfs to 3500 cfs, as shown in Table 6-2. The approximate channel sections were used in the alternatives to accommodate future flows as necessary,

Table 6-2 Channel Dimensions based on Flow Rates

Q (cfs)	Grass		
	Sideslope (h:v)	Bottom (ft)	Depth (ft)
300	4	6	5
500	4	8	5
600	4	15	5
800	4	20	5
900	4	25	5
1000	4	30	5
1500	4	50	5
2000	4	80	5
3000	4	120	5
3500	4	140	5

6.2.2. Culvert Design

Culvert sizes for use in alternative evaluation were estimated based on full flow capacity of reinforced concrete pipe with a minimum slope of 0.50% and concrete end sections. For flows up to 300 cfs single RC pipe culverts with a maximum of 72" diameter were used. For greater flows, multiple RC pipes or 6-foot by 6-foot concrete box culverts with headwalls and flared wingwalls were used. Proposed culverts sizes based on existing flow rates are listed in Table 6-3.

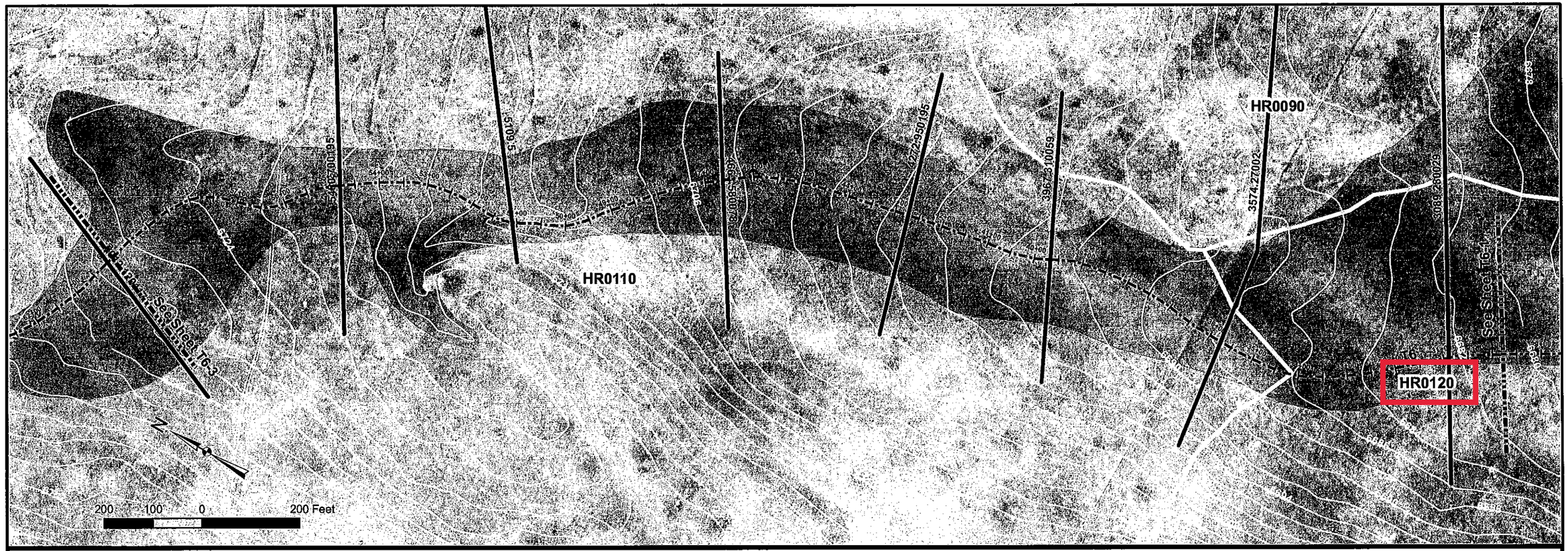
Table 6-3 Existing Conditions Culvert Design

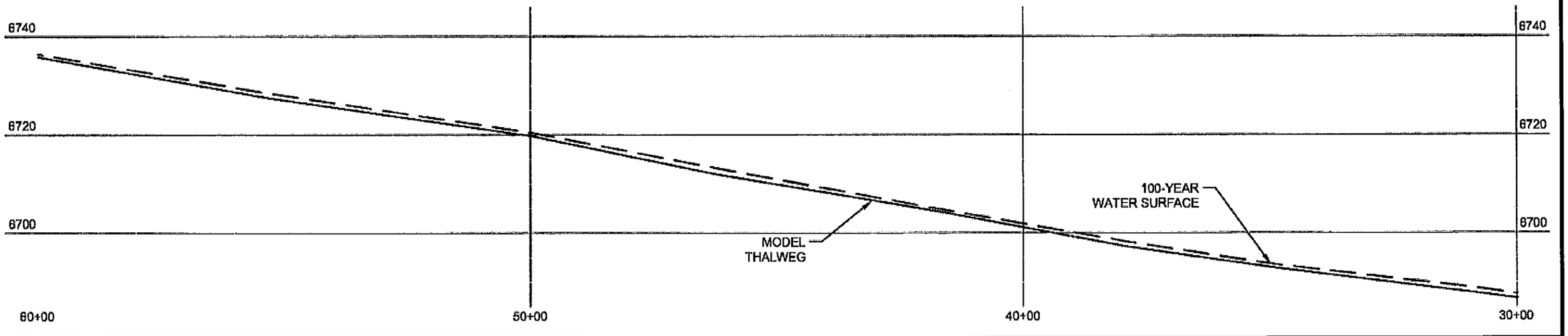
Facility Number	Road Crossing	Channel	Existing Size	Existing 100-yr Flow (cfs)	Deficiency	Necessary Facility
N/A	Peyton Highway	Tributary 1 (T1)	No Culvert	500	Overtops	2-72" RCPs
N/A	Falcon Highway	Tributary 1 (T1)	No Culvert	33	Overtops	36" RCP
301	Peyton Highway	Main Stem (MS-02)	2-33"X48" CMPs	2,500	Overtops	7-6'X6' RCBs
401	Jones Road	Tributary 1 (T1)	2-24" CMPs	370	Overtops	6'X6' RCB
403	Jones Road	Main Stem (MS-03)	3-60" CMPs	2,300	Overtops	6-6'X6' RCBs
405	Murr Road	Main Stem (MS-04)	66" RCP	1,700	Overtops	5-6'X6' RCBs
407	Murr Road	Tributary 3 (T3-01)	66" RCP	670	Overtops	2-6'X6' RCBs
507	Peerless Farms Road	Tributary 3 (T3-01)	60" CMP	600	Overtops	2-6'X6' RCBs
509	Murr Road	Tributary 1 (T1)	2-15" RCPs	220	Overtops	66" RCP
601	Whiting Way	Tributary 1 (T1)	24" CMP	220	Overtops	66" RCP
604	Max Road	Tributary 1 (T1)	18" CMP	220	Overtops	66" RCP
609	Falcon Highway	Tributary 3 (T3-02)	18" CMP	180	Overtops	66" RCP
610	Falcon Highway	Tributary 4 (T4)	24" CMP	200	Overtops	66" RCP
612	Falcon Highway	Tributary 5 (T5)	24" CMP	150	Overtops	60" RCP
628	Falcon Highway	Main Stem (MS-05)	2-60" CMPs	1,000	Overtops	3-6'X6' RCBs
702	Curtis Road	Tributary 6 (T6)	36" CMP	120	Overtops	54" RCP
703	Curtis Road	Main Stem (MS-06)	24" CMP	590	Overtops	2-6'X6' RCBs
704	Judge Orr Road	Main Stem (MS-06)	Blocked Culvert	540	Overtops	2-72" RCPs
801	Pedestrain Bridge	Main Stem (MS-06)	Bridge	350	Meets Capacity	Existing Bridge
802	US24	Main Stem (MS-06)	2-66" CMPs	350	Meets Capacity	Existing Culvert
803	Eastonville Road	Main Stem (MS-07)	27"X21" CMP	25	Overtops	30" RCP
804	Eastonville Road	Tributary 7 (T7)	18" CMP	99	Overtops	48" RCP

6.2.3. Detention Design

All detention pond design is based on Chapter 10, Storage, of the UDFCD SDCM. All ponds were assumed to be "full spectrum" per the SDCM. For final design to be performed later, some of the ponds may be separated into a water quality pond and an off-line major detention pond.

For the Regional Detention Alternative, either the simplified full spectrum sizing method or the hydrograph method was used to size the facility. If the contributing area is less than 160 acres and no





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Subbasin Boundaries
Approximate 100-Year Floodplain
Thalweg
Cross Sections
2' Contours

DATE: 05/08

HAEGLER RANCH DRAINAGE BASIN

APPROXIMATE 100-YEAR FLOOD LIMITS

SHEET T6-2

FIGURE 5-4

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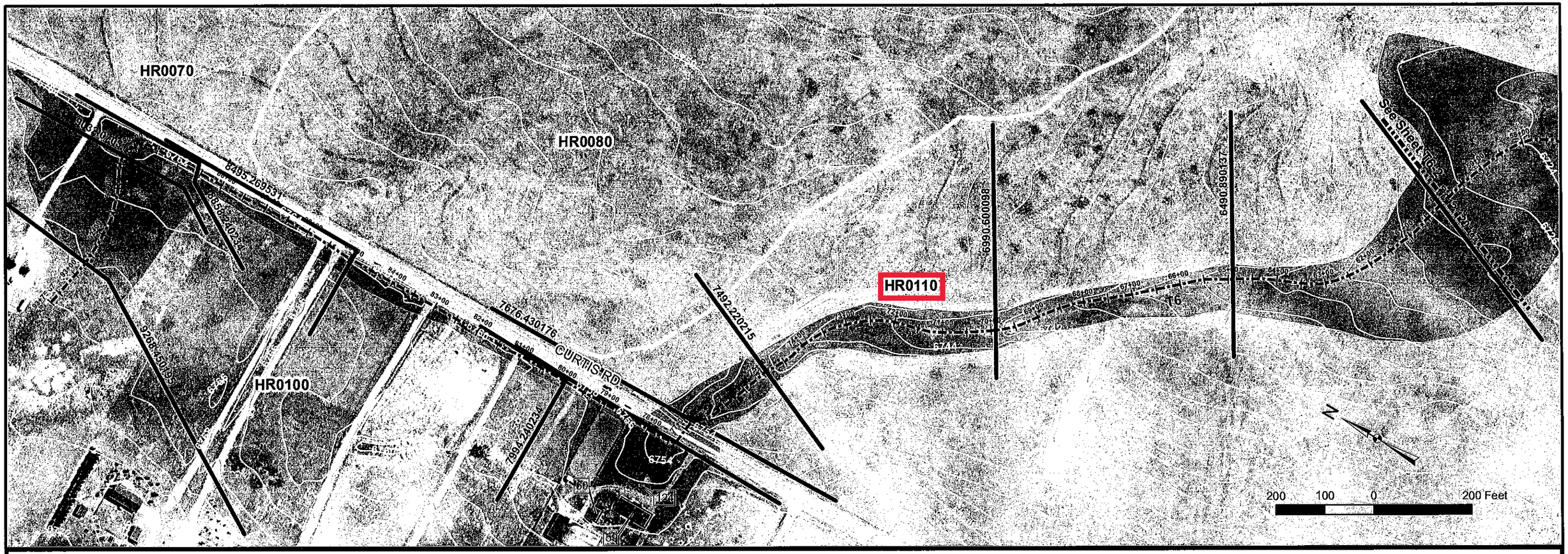

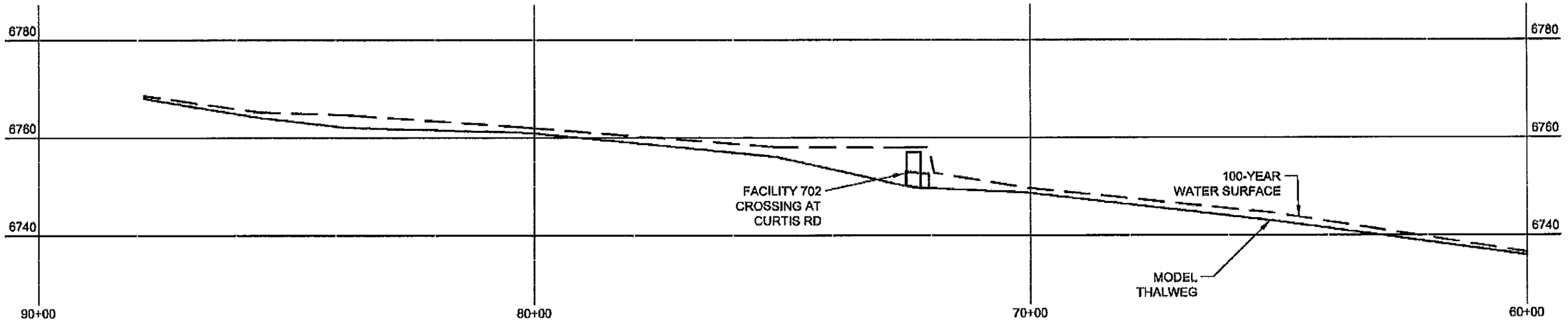

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Subbasin Boundaries
Approximate 100-Year Floodplain
Thalweg
Cross Sections
2' Contours

HAEGLER RANCH DRAINAGE BASIN

APPROXIMATE 100-YEAR FLOOD LIMITS
SHEET T6-3
FIGURE 5-4

DATE: 09/08

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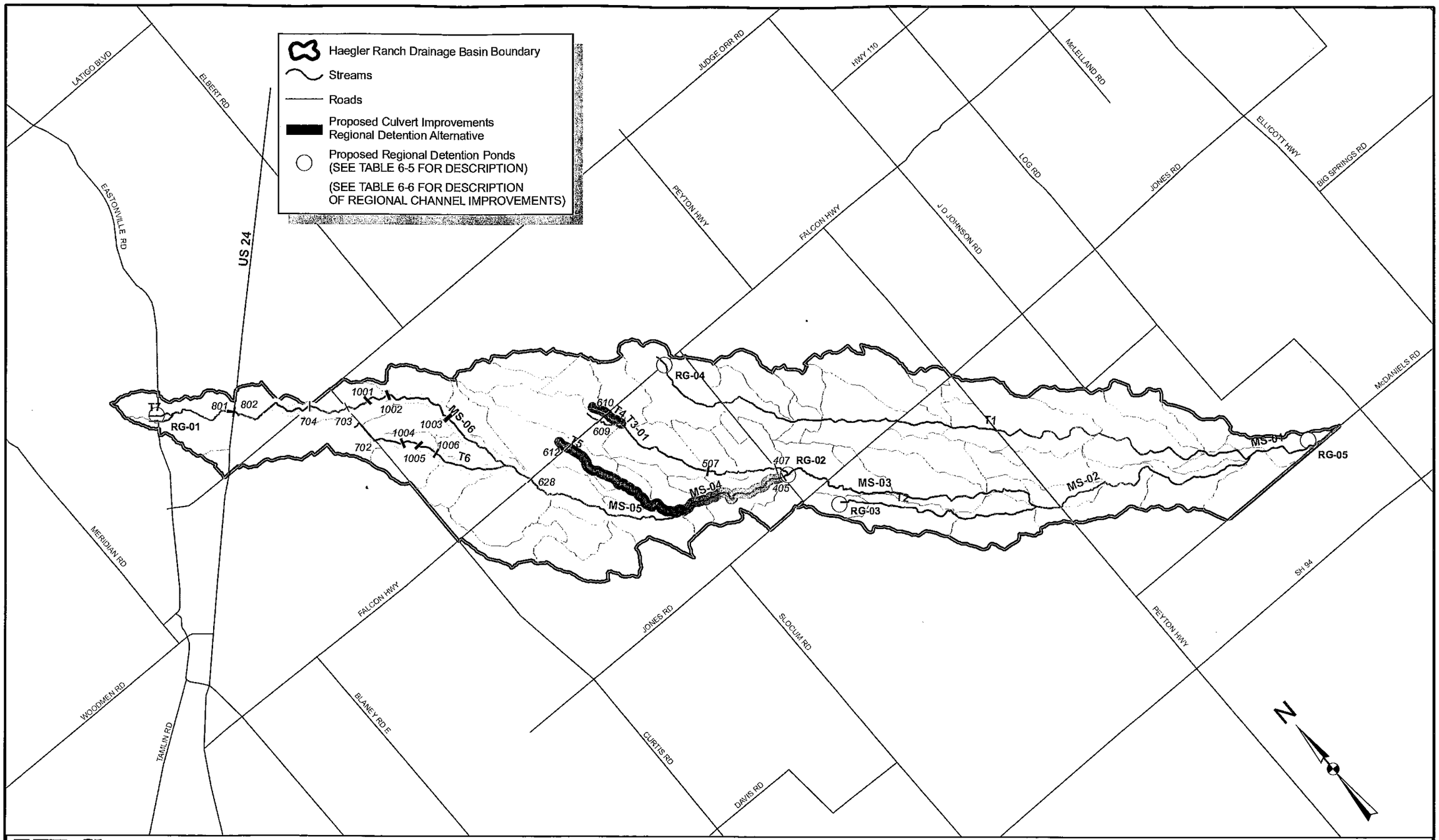

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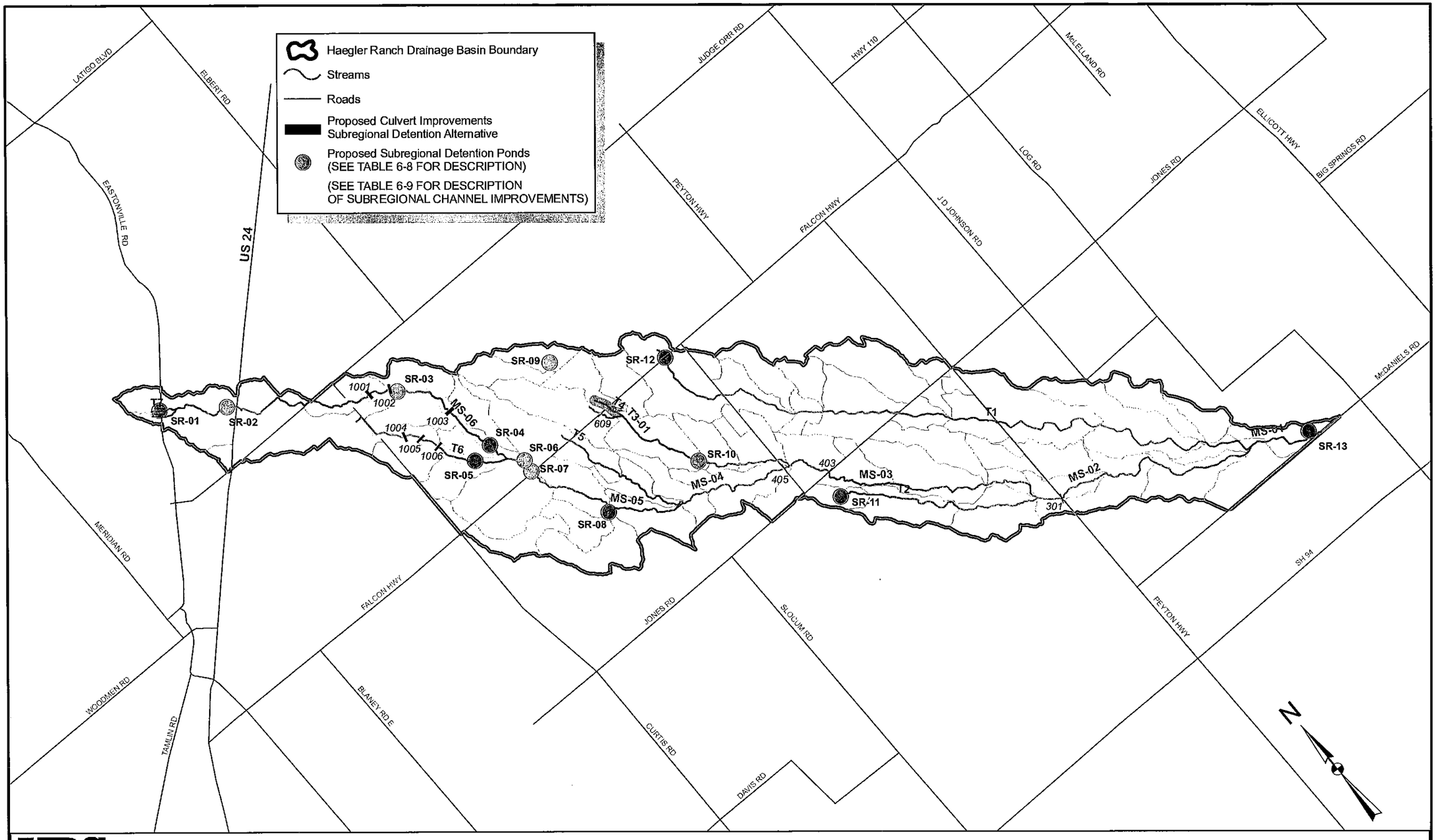
5,000 2,500 0 5,000 Feet

1" = 5,000'

DATE: 05/08

HAEGLER RANCH DRAINAGE BASIN
REGIONAL DETENTION
ALTERNATIVES
FIGURE 6-1

URS NO. 21711039



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5,000 2,500 0 5,000 Feet

1" = 5,000'

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HAEGLER RANCH DRAINAGE BASIN
SUBREGIONAL DETENTION ALTERNATIVES
FIGURE 6-2

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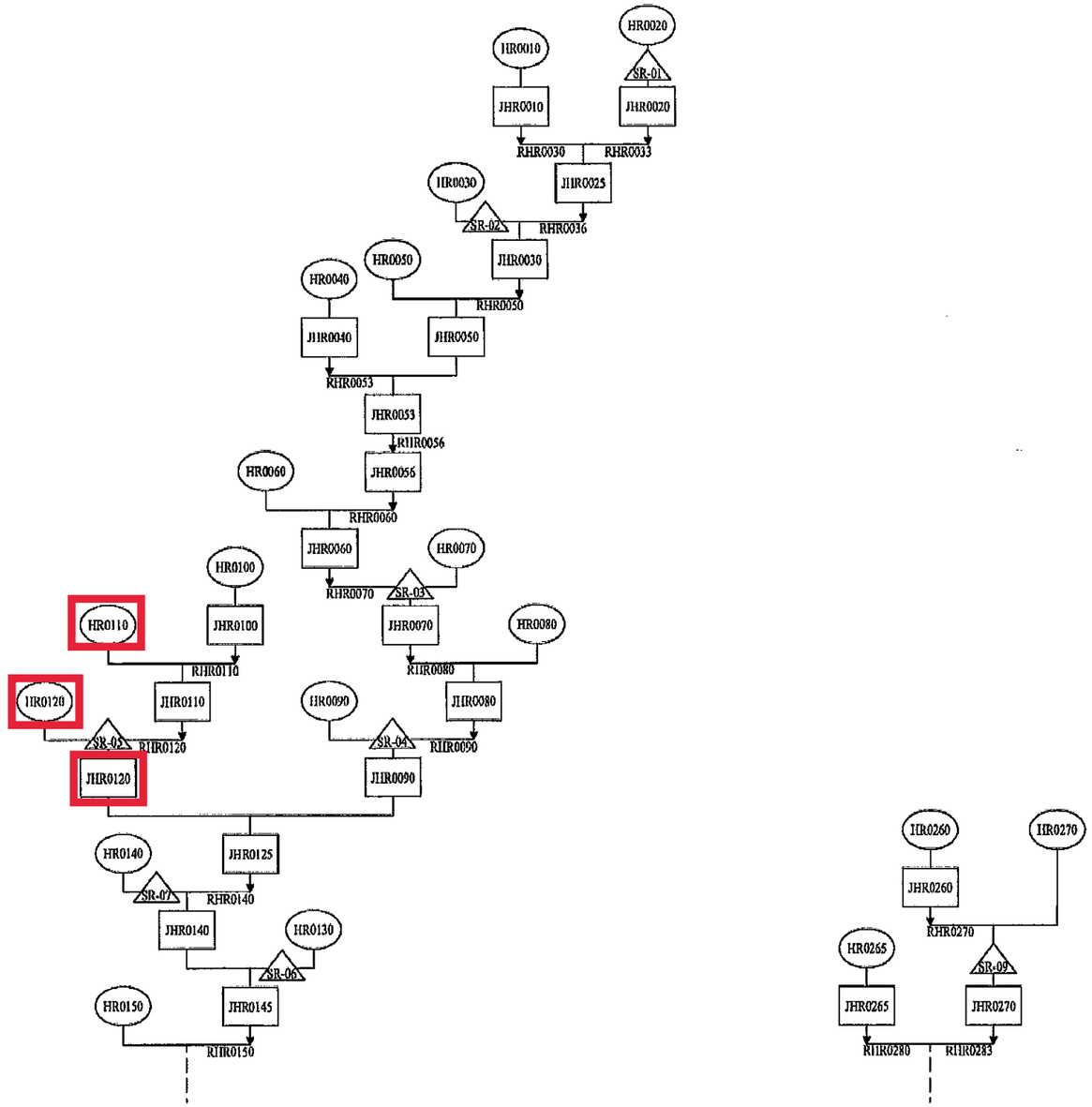

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HAEGLER RANCH DRAINAGE BASIN

SUBREGIONAL DETENTION ALTERNATIVE

SHEET 1

FIGURE 6-3

6.4.1. Channel & Culvert Costs

Channel costs for each alternative are based on cubic yards of excavation, plus the cost of the channel lining and drop structures. These costs are presented in Table 6-13 and Table 6-14.

Table 6-13 Regional Detention Alternative Channel Cost Estimates

Channel	Design Flow (cfs)	Channel Length (ft)	Total Cost	Drop Structure Cost
Main Stem (MS-04)	3,500	7,140	$1,626,000	none
Main Stem (MS-05)	3,000	11,100	$2,216,000	$2,539,000
Main Stem (MS-06)	900	7,330	$482,000	$589,000
Main Stem (MS-06)	1,000	3,170	$231,000	$268,000
Main Stem (MS-06)	1,500	4,450	$450,000	$548,000
Main Stem (MS-06)	2,000	3,330	$477,000	$636,000
Tributary 3 (T3-01)	1,500	6,710	$1,082,000	$1,302,000
Tributary 4 (T4)	600	1,840	$96,000	$127,000
Tributary 5 (T5)	300	930	$37,000	$36,000
Tributary 5 (T5)	500	7,770	$325,000	$370,000
Tributary 6 (T6)	500	4,270	$179,000	$222,000
Tributary 6 (T6)	600	3,940	$204,000	$253,000
Sub-Total			$7,405,000	$6,888,000
30% Construction Contingency			$2,222,000	$2,066,000
15% Engineering Contingency			$1,110,000	$1,033,000
Total			$10,737,000	$9,988,000

(See Tables C6 and C7 in Appendix C for details)

Table 6-14 Sub-Regional Detention Alternative Channel Cost Estimates

Channel	Design Flow (cfs)	Channel Length (ft)	Total Cost	Drop Structure Cost
Main Stem (MS-05)	2,000	1,560	$224,000	$367,000
Main Stem (MS-06)	600	3,120	$162,000	$295,000
Main Stem (MS-06)	1,000	4,535	$331,000	$375,000
Main Stem (MS-06)	800	3,190	$188,000	$368,000
Tributary 3 (T3-01)	600	5,000	$259,000	$422,000
Tributary 3 (T3-02)	500	420	$18,000	$37,000
Tributary 4 (T4)	500	940	$40,000	$74,000
Tributary 6 (T6)	500	4,280	$179,000	$333,000
Tributary 6 (T6)	300	1,400	$55,000	$107,000
Sub-Total			$1,456,000	$2,374,000
30% Construction Contingency			$430,000	$712,000
15% Engineering Contingency			$218,000	$356,000
Total			$2,111,000	$3,442,000

(See Tables C6 and C8 in Appendix C for details)

Culverts costs are based on a per linear foot of pipe with two flared end sections or two wing walls, as appropriate, complete-in-place. Culvert costs for each alternative are presented in Table 6-15 and Table 6-16.

Table 6-15 Regional Detention Alternative Roadway Crossing Cost Estimate Sumary

Facility Number	Road Crossing	Channel	Existing Size	Proposed 100-yr Flow (cfs)	Necessary Facility for Proposed 100-year Flow	Estimated Cost
405	Murr Road	Main Stem (MS-04)	66" RCP	3,400	9-6'X6' RCBs	$256,000
507	Peerless Farms Road	Tributary 3 (T3-01)	60" CMP	1200	4-6'X6' RCBs	$139,000
609	Falcon Highway	Tributary 3 (T3-02)	18" CMP	460	2-66" RCPs	$51,600
610	Falcon Highway	Tributary 4 (T4)	24" CMP	570	2-72" RCPs	$51,000
612	Falcon Highway	Tributary 5 (T5)	24" CMP	240	72" RCP	$26,000
628	Falcon Highway	Main Stem (MS-05)	2-60" CMPs	2,200	6-6'X6' RCBs	$243,000
702	Curtis Road	Tributary 6 (T6)	36" CMP	140	60" RCP	$29,000
703	Curtis Road	Main Stem (MS-06)	24" CMP	890	3-6'X6' RCBs	$142,000
704	Judge Orr Road	Main Stem (MS-06)	Blocked Culvert	830	3-6'X6' RCBs	$185,000
1001	Future Pastura Street	Main Stem (MS-06)	N/A	930	3-6'X6' RCBs	$99,000
1002	Future Arroyo Hondo Blvd. N.	Main Stem (MS-06)	N/A	930	3-6'X6' RCBs	$99,000
1003	Future Arroyo Hondo Blvd. N	Main Stem (MS-06)	N/A	1500	4-6'X6' RCBs	$143,000
1004	Future Pastura Strect	Tributary 6 (T6)	N/A	440	2-66" RCPs	$43,000
1005	Future El Vado Road	Tributary 6 (T6)	N/A	440	2-66" RCPs	$43,000
1006	Future Socorro Trail	Tributary 6 (T6)	N/A	440	2-66" RCPs	$43,000
Sub-Total						$1,591,000
30% Construction Contingency						$477,000
15% Engineering Contingency						$239,000
Total						$2,307,000

(See Table C4 in Appendix C for details)

Table 6-16 Sub-Regional Detention Roadway Crossing Cost Estimate Summary

Facility Number	Road Crossing	Channel	Proposed 100-yr Flow (cfs)	Necessary Facility for Proposed 100-year Flow	Estimated Cost
301	Peyton Highway	Main Stem (MS-02)	3,370	9-6'X6' RCBs	$402,000
403	Jones Road	Main Stem (MS-03)	2,970	8-6'X6' RCBs	$358,000
405	Murr Road	Main Stem (MS-04)	2,870	8-6'X6' RCBs	$283,000
609	Falcon Highway	Tributary 3 (T3-02)	460	2-6'X6' RCBs	$106,000
N/A	Falcon Highway	Tributary 1 (T1)	110	2 - 36" RCP	$20,000
1001	Future Pastura Street	Main Stem (MS-06)	610	2-6'X6' RCBs	$107,000
1002	Future Arroyo Hondo Blvd. N.	Main Stem (MS-06)	610	2-6'X6' RCBs	$87,000
1003	Future Arroyo Hondo Blvd. N.	Main Stem (MS-06)	530	2-6'X6' RCBs	$87,000
1004	Future Pastura Street	Tributary 6 (T6)	440	2-66" RCPs	$43,000
1005	Future El Vado Road	Tributary 6 (T6)	440	2-66" RCPs	$43,000
1006	Future Socorro Trail	Tributary 6 (T6)	440	2-66" RCPs	$43,000
Sub-Total					$1,582,000
30% Construction Contingency					$475,000
15% Engineering Contingency					$237,000
Total					$2,294,000

(See Tables C5 in Appendix C for details)

6.4.2. Detention Pond Costs

The cost of detention ponds, both regional and subregional, is based on the cubic yards of excavation, an estimated outlet structure, and the cost of the land required for the facility. These costs are presented in Table 6-17 and Table 6-18.

Table 6-17 Regional Detention Pond Cost Summary

Facility	Storage (AF)	Total Cost Including Construction and Engineering Contingencies
RG-01 9.02	9.02	$542,000
RG-02 64.52	64.52	$4,053,000
RG-03 0.04	0.04	$146,000
RG-04 1.07	1.07	$160,000
RG-05 0.03	0.03	$146,000
Total		$5,048,000

(See Tables C1 in Appendix C for details)

Table 6-18 Sub-Regional Detention Pond Cost Summary

Facility	Storage (AF)	Total Cost Including Construction and Engineering Contingencies
SR-01	10	$899,000
SR-02	5	$640,000
SR-03	16	$868,000
SR-04	25	$1,453,000
SR-05	24	$1,557,000
SR-06	9	$547,000
SR-07	5	$524,000
SR-08	5	$326,000
SR-09	20	$861,000
SR-10	23	$1,069,000
SR-11	2	$182,000
SR-12	9	$477,000
SR-13	3	$376,000
Total		$9,780,000

(See Table C1 in Appendix C for details)

6.4.3. Other Costs

Design Engineering costs are also included as 15% of the construction costs. Construction contingencies (30%) include such items as utility relocations, mobilization, temporary erosion control, and construction engineering.

6.4.4. Conceptual Alternative Costs

The total estimated capital costs for each alternative are based on the sum of the cost of the proposed facilities, plus costs for engineering and construction contingencies. These costs are listed in Table 6-19.

Table 6-19 Conceptual Alternative Costs

	Regional Alternative	Subregional Alternative
Detention Ponds	$5,048,000	$9,780,000
Channel Improvements	$10,737,000	$2,110,000
Drop Structures	$9,988,000	$3,442,000
Roadway Crossing Culverts	$2,307,000	$2,294,000
Total	$28,080,000	$17,627,000

impacted by site development, utility, roadway and landscape construction activities have in some cases negatively affected downstream areas.

El Paso County has enacted an erosion control ordinance to address these problems. In general, it is the responsibility of the entity conducting any land disturbance activity to properly control surface runoff, erosion and sedimentation during and after the activity. Technical criteria identifying measures which help mitigate the impacts of erosion and sedimentation are available and being used throughout the region. Minimum requirements must be developed to properly control erosion.

Erosion control is necessary to prevent environmental degradation caused by wind or water-borne soil. The following minimum criteria and standards are intended to prevent excessive erosion. El Paso County as well as other affected agencies will enforce the Clean Water Act standards if the planned erosion control measures fail to perform satisfactorily. Proper installation and maintenance is necessary to achieve the desired function of erosion control measures. By paying attention to quality, reinstallation can be avoided. General requirements for erosion control are as follows:

1. Any land disturbing activity shall be conducted so as to effectively reduce unacceptable erosion and resulting sedimentation.

2. All land disturbing activities shall be designed, constructed, and completed in such a manner that the exposure time of disturbed land shall be limited to the shortest possible period of time.

3. Sediment caused by accelerated soil erosion and runoff shall be intercepted by erosion control measures such as hay bales, silt fences and / or sediment ponds, and contained within the site.

4. Any facility designed and constructed to convey storm runoff shall be designed to be non-erosive.

5. Erosion control measures will be used prior to and during construction.

Temporary erosion control measures are required during construction, and permanent erosion control measures are required for all developments. Maintenance of erosion control measures is the responsibility of the property owner.

Various structures have been proposed in this plan to help control localized erosion and sedimentation problems. It is important that the erosion control plan for any land disturbing activity be strictly adhered to and maintained so that the above minimum criteria can be achieved in the Haegler Ranch Basin.

7.4. Operations and Maintenance

Maintenance of drainage way facilities is essential in preventing long term degradation of the creek and overbank areas. Along the drainageway, clearing of debris and dead vegetation should be considered within the low flow area of the creek and its tributaries. On the overbanks, limited maintenance of the existing vegetative cover is recommended. Semi-annual clearing of trash and debris at roadway crossings is also recommended to increase the effectiveness of the crossings. Sediments cleared from the channel or culvert should not be left on the overbank. This disturbs the native vegetation, creates a potential water quality concern if the dredgings are subsequently washed into the drainageway by natural erosion, and reduces the capacity of the overbank. In those reaches designated to be selectively lined and the floodplain preserved, maintenance activities should be carried out with the least disturbances to native vegetation that is practical.

Similar practices should be employed when removing sediment from detention basins. Although some channels degrade and others agrade, all detention basins will collect sediment and agrade. The use of an easily accessible concrete lined forebay in the final design of a detention facility can make the cleaning of the larger debris and trash more easily accomplished with motorized equipment. If forebays are provided, they will need clearing semi-annually and after major storm events. More frequent routine maintenance may be required depending on the type of development upstream and the access provided to the public. Plan for annual removal of sediment and debris from the detention area of a facility with a forebay.

Deposition in drainage facilities of wind-blown trash and debris, should be expected in this region. This means that regular maintenance, even without rainfall events, should be performed.

7.5. Drainage and Bridge Fee Calculations

The cost estimates and basin fee calculation for the major drainageways, tributary drainageways, roadway culverts, regional detention basins, and related improvements for the Sub-Regional Detention Facilities are presented in Table 7-2. The sub-regional detention capital construction cost estimates include the cost for the construction of the embankment, water quality, and outlet structures. Bridges in the Sub-Regional Detention Alternative are presented in Table 7-3. The cost estimates include engineering and construction costs for the entire Haegler Ranch Basin as presented on the Conceptual Design Drawings in Appendix D. These estimates do not include costs for local or initial systems, and therefore no costs attributable to local or minor drainage systems have been computed in the estimation of the drainage basin fee. These systems are expected to be provided with proposed development. Costs associated with utility relocations have not been estimated but would be included in construction contingencies. A review of utility maps indicates that the majority of the potential relocations occur at the roadway crossings. Land acquisition costs for the detention facilities were not included for calculation of fees per Appendix L of the El Paso County Criteria Manual.

Unplatted acreage within Haegler Ranch was obtained from El Paso County, and is shown in Figure 7-I. A total of 8,953 acres is estimated to be currently unplatted and subject to future development. This unplatted land is projected to have an average imperviousness of approximately 15%, corresponding to approximately 1,343 unplatted impervious acres. All drainage and bridge fees are calculated per *impervious* acre. (See Appendix D for an unplatted area breakdown by subbasin and average imperviousness calculations.)

Reimbursable costs calculated for the Haegler Ranch Basin are listed in Table 7-4. These costs are based on improvements required under existing conditions. The term "reimbursable costs" used on Table 7-4 means those costs that have been used in estimation of drainage basin fees. Costs considered "non-reimbursable" are costs for the replacement of existing, undersized culverts, or costs to rehabilitate or maintain an existing lined segment of drainageway. For the most part, all of the drainageway costs for Haegler Ranch Basin are considered reimbursable.

The calculated drainage basin fee presented in Table 7-2 is $ 7,633 per impervious acre, and the bridge fee is $1,126 per impervious acre, as shown in Table 7-3.

Table 7-2 Drainage Basin Fee Calculations

Channel Improvements					
Channel	**Basins**	**Channel Construction Cost**	**Drop Structure Construction Cost**	**Contingency Cost**	**Total Cost**
Main Stem (MS-05)	HR0200	$224,000	$363,600	$264,420	$852,020
Main Stem (MS-06)	HR0070	$162,000	$295,400	$205,830	$633,230
Main Stem (MS-06)	HR0080	$331,000	$374,500	$317,475	$1,022,975
Main Stem (MS-06)	HR0090	$188,000	$368,000	$250,200	$806,200
Tributary 3 (T3-01)	HR0330	$259,000	$422,000	$306,450	$987,450
Tributary 3 (T3-02)	HR0300	$18,000	$37,000	$24,750	$79,750
Tributary 4 (T4)	HR0300	$40,000	$74,000	$51,300	$165,300
Tributary 6 (T6)	HR0110	$179,000	$333,000	$230,400	$742,400
Tributary 6 (T6)	HR0120	$55,000	$106,500	$72,675	$234,175
Subtotal Channel Costs					$5,553,500

Culvert Improvements					
Culvert	**Road Crossing**	**Channel**	**Culvert Construction Cost**	**Contingency Cost**	**Total Cost**
609	Falcon Highway	Tributary 3 (T3-02)	$106,301	$47,836	$154,137
N/A	Falcon Highway	Tributary 1 (T1)	$19,500	$8,775	$28,275
1001	Future Pastura Street	Main Stem (MS-06)	$106,301	$47,836	$154,137
1002	Future Arroyo Hondo Blvd. N.	Main Stem (MS-06)	$87,301	$39,286	$126,587
1003	Future Arroyo Hondo Blvd. N.	Main Stem (MS-06)	$87,301	$39,286	$126,587
1004	Future Pasture Street	Tributary 6 (T6)	$51,000	$22,950	$73,950
1005	Future El Vado Road	Tributary 6 (T6)	$19,500	$8,775	$28,275
1006	Future Socorro Trail	Tributary 6 (T6)	$42,800	$19,260	$62,060
Subtotal Culvert Costs					$754,007

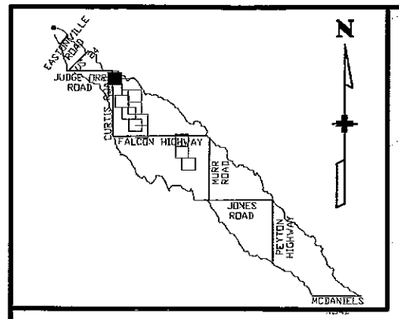
Detention Improvements					
Facility	**Storage (AF)**	**Construction Cost**		**Contingency Cost**	**Total Cost**
SR-01	10	$296,701		$133,516	$430,217
SR-02	5	$207,949		$93,577	$301,525
SR-03	16	$186,252		$83,814	$270,066
SR-04	25	$390,182		$175,582	$565,764
SR-05	24	$455,235		$204,856	$660,091
SR-06	9	$140,670		$63,301	$203,971
SR-07	5	$162,046		$72,921	$234,967
SR-08	5	$87,489		$39,370	$126,860
SR-09	20	$188,250		$84,713	$272,963
SR-10	23	$331,635		$149,236	$480,871
SR-11	2	$56,880		$25,596	$82,476
SR-12	9	$108,987		$49,044	$158,031
SR-13	3	$107,812		$48,515	$156,327
Subtotal Detention Costs					$3,944,129
Total Cost					**$10,251,636**
Total Unplatted Impervious Acres					**1,343**
Fee Per Impervious Acre					**$7,633**

Table 7-3 Bridge Fee Calculation

301	Peyton Highway	Main Stem (MS-02)	401,710	$180,770	$582,480
403	Jones Road	Main Stem (MS-03)	358,123	$161,155	$519,278
405	Murr Road	Main Stem (MS-04)	282,941	$127,323	$410,264
Subtotal Bridge Costs					$1,512,022
Total Cost					**$1,512,022**
Total Unplatted Impervious Acres					**1,343**
Bridge Fee Per Impervious Acre					**$1,126**

Table 7-4 Reimbursable Costs

Reimbursable Culvert Improvements					
Culvert	**Road Crossing**	**Channel**	**Culvert Construction Cost**	**Contingency Cost**	**Total Cost**
N/A	Peyton Highway	Tributary 1 (T1)	$51,000	$22,950	$73,950
N/A	Falcon Highway	Tributary 1 (T1)	$9,7580	$4,388	$14,138
301	Peyton Highway	Main Stem (MS-02)	$314,535	$141,541	$456,076
401	Jones Road	Tributary 1 (T1)	$53,111	$23,900	$77,011
403	Jones Road	Main Stem (MS-03)	$270,947	$121,926	$392,874
405	Murr Road	Main Stem (MS-04)	$180,371	$81,167	$261,538
407	Murr Road	Tributary 3 (T3-01)	$77,801	$35,011	$112,812
507	Peerless Farms Road	Tributary 3 (T3-01)	$115,801	$52,111	$167,912
509	Murr Road	Tributary 1 (T1)	$19,300	$8,685	$27,985
601	Whiting Way	Tributary 1 (T1)	$23,500	$10,575	$34,075
604	Max Road	Tributary 1 (T1)	$19,300	$8,685	$27,985
609	Falcon Highway	Tributary 3 (T3-02)	$25,600	$11,520	$37,120
610	Falcon Highway	Tributary 4 (T4)	$23,500	$10,575	$34,075
612	Falcon Highway	Tributary 5 (T5)	$21,200	$9,540	$30,740
628	Falcon Highway	Main Stem (MS-05)	$154,741	$69,633	$224,375
702	Curtis Road	Tributary 6 (T6)	$23,150	$10,418	$33,568
703	Curtis Road	Main Stem (MS-06)	$125,301	$56,386	$181,687
704	Judge Orr Road	Main Stem (MS-06)	$83,200	$37,440	$120,640
803	Eastonville Road	Main Stem (MS-07)	$9,680	$4,356	$14,036
804	Eastonville Road	Tributary 7 (T7)	$14,980	$6,741	$21,721
Subtotal Channel Costs					$2,344,315
Reimbursable Detention Improvements					
Facility	**Storage (AF)**	**Construction Cost**		**Contingency Cost**	**Total Cost**
SR-01	10	$296,701		$133,516	$430,217
SR-02	5	$207,949		$93,577	$301,525
SR-03	16	$186,252		$83,814	$270,066
SR-04	25	$390,182		$175,582	$565,764
SR-05	24	$455,235		$204,856	$660,091
SR-06	9	$140,670		$63,301	$203,971
SR-07	5	$162,046		$72,921	$234,967
SR-08	5	$87,489		$39,370	$126,860
SR-09	20	$188,250		$84,713	$272,963
SR-10	23	$331,635		$149,236	$480,871
SR-11	2	$56,880		$25,596	$82,476
SR-12	9	$108,987		$49,044	$158,031
SR-13	3	$107,812		$48,515	$156,327
Subtotal Detention Costs					$3,944,129
Total Reimbursable Cost					**$6,288,444**



HR0060

HR0070

HR0100

HR0070

CURTIS ROAD

BEGIN PROPOSED IMPROVEMENTS

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(SEE PROFILE MS-06)

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MATCHLINE MS-06 PG 2

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	CONTOURS – MINOR ELEVATION
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	BASIN BOUNDARY
	ROADS
20+00	RIVER AND ALIGNMENT

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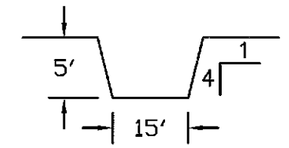

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Structure Numbers

HAEGLER RANCH SUB-REGIONAL DETENTION
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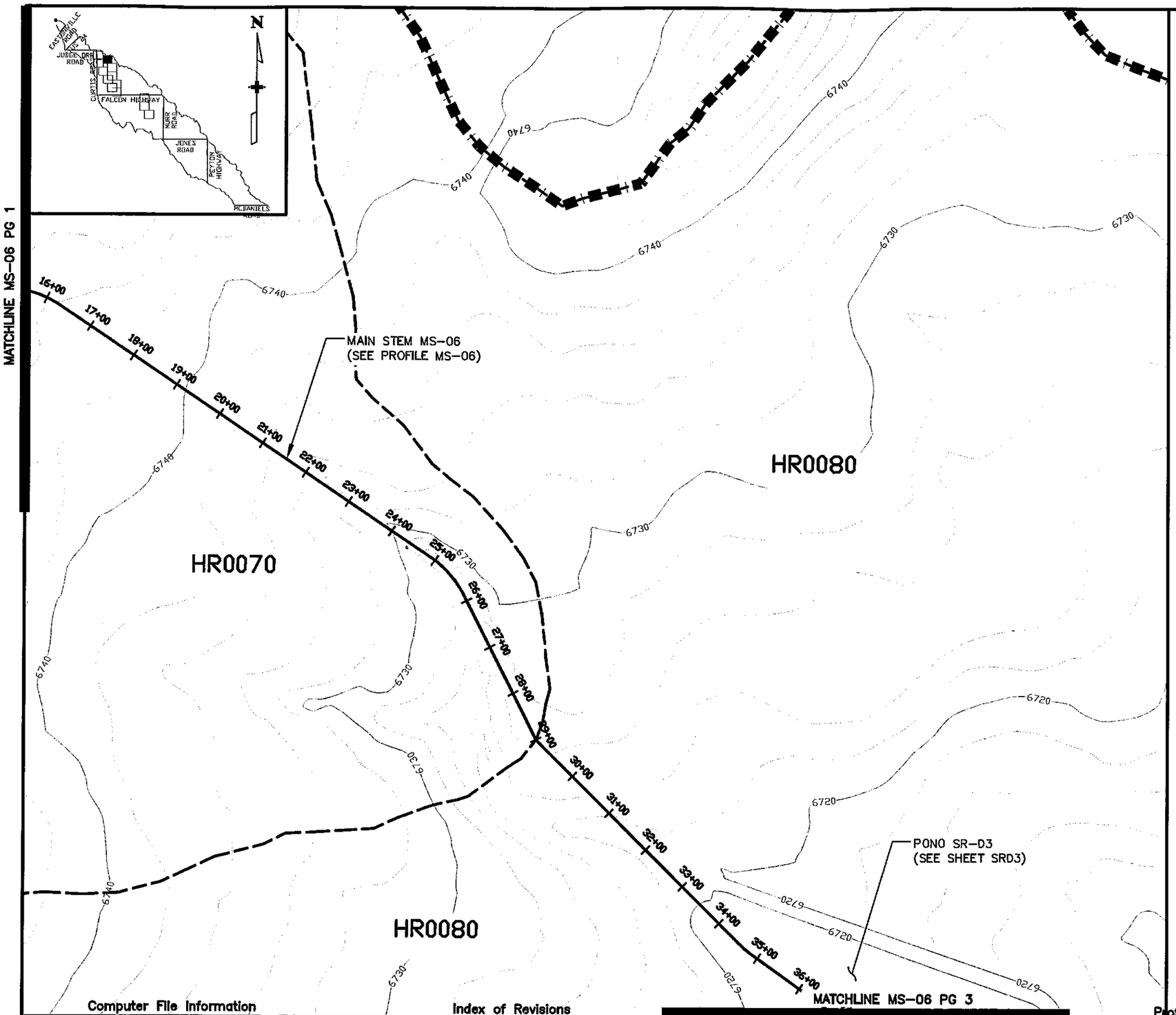

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- CONTOURS – MINOR ELEVATION
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- BASIN BOUNDARY
- ROADS
- 20+00 RIVER AND ALIGNMENT

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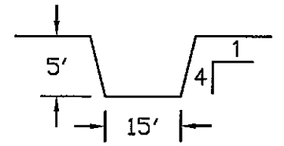

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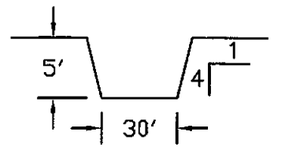

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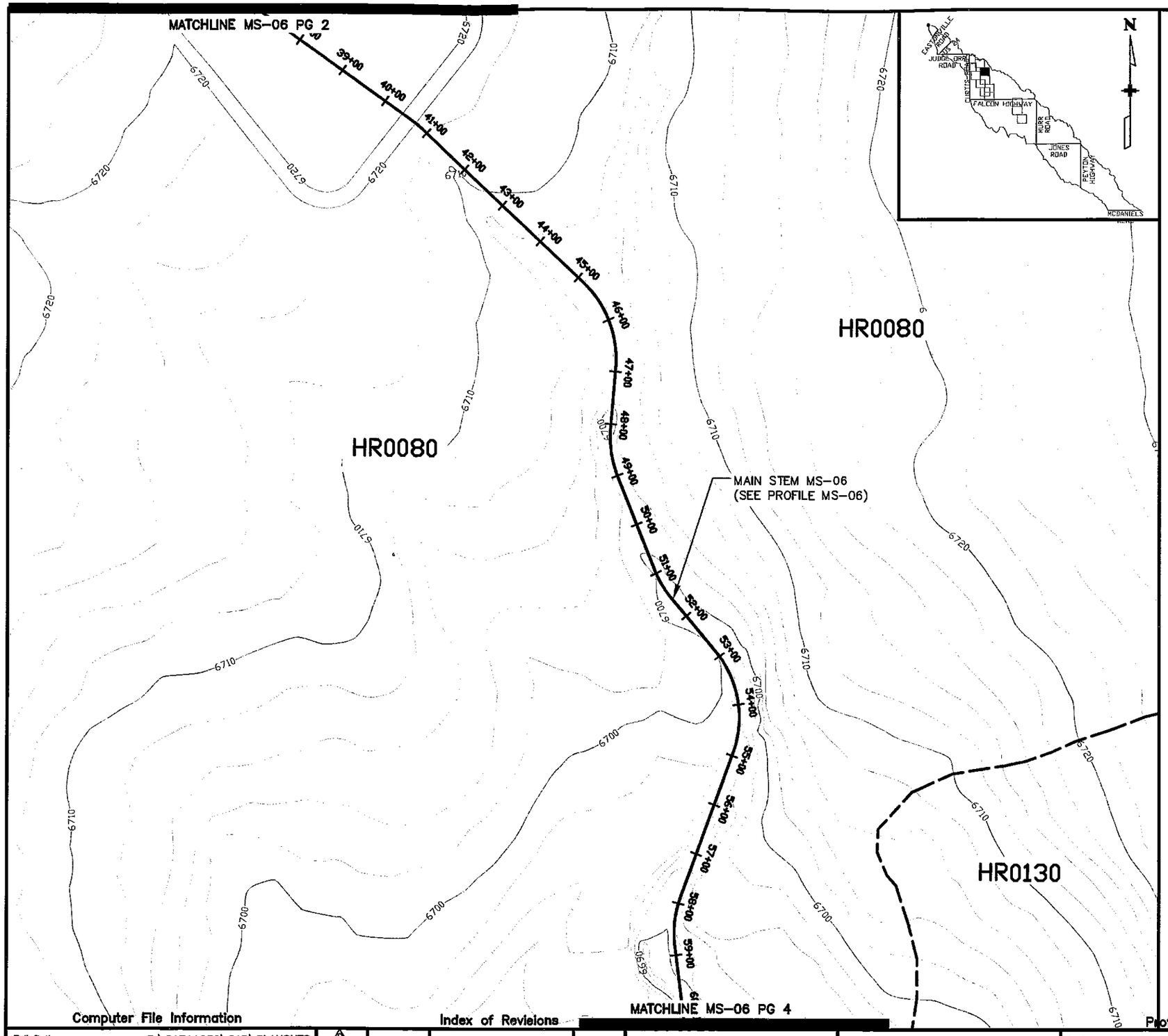

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	ROADS
20+00	RIVER AND ALIGNMENT

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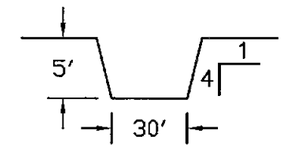

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Sheet Number MAIN STEM PG 3

MATCHLINE MS-06 PG 3

HR0110

HR0080

HR0130

HR0090

HR0090

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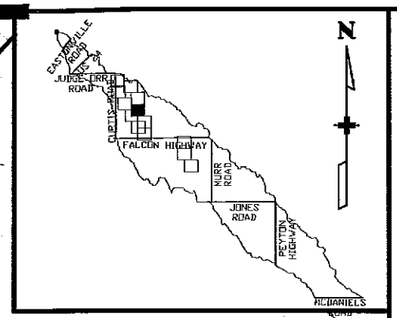
MATCHLINE MS-06 PG 5



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	ROADS
20+00	RIVER AND ALIGNMENT

1"=200'

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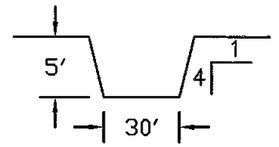

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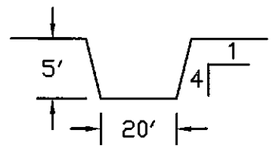

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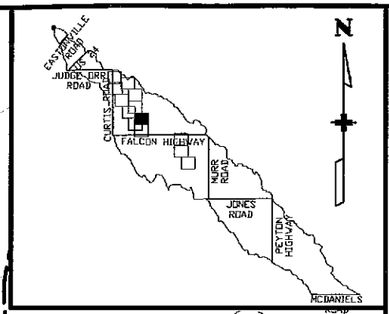
Sheet Number MAIN STEM PG 4

MATCHLINE MS-06 PG 4



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HR0090

HR0130

HR0210

HR0140

POND SR-05
(SEE SHEET SR05)

POND SR-04
(SEE SHEET SR04)

MAIN STEM MS-06
(SEE MAINSTEM PAGE 5)

TRIBUTARY 6 (T6)
(SEE PROFILE TRIBUTARY 6)

MATCHLINE MS-06 PG 6

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Profiles

LEGEND

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	ROADS
20+00	RIVER AND ALIGNMENT

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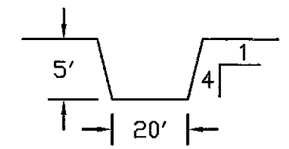

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HAEGLER RANCH SUB-REGIONAL DETENTION
ALTERNATIVE CONCEPTUAL CHANNELS

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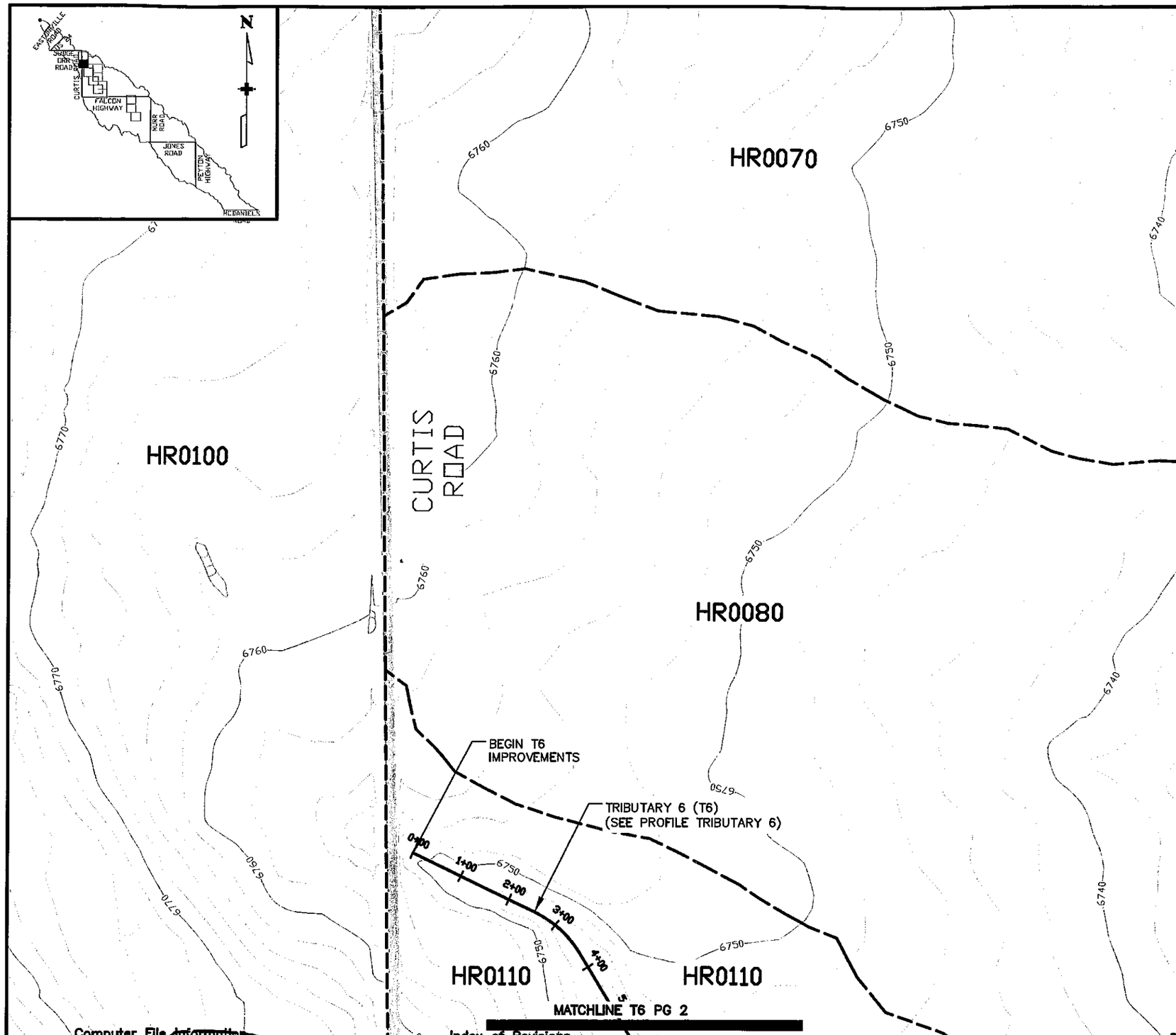

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20+00	RIVER AND ALIGNMENT

1"=200'

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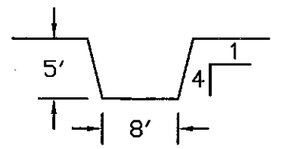

STA: 0+00 TO STA: 41+73

Q: 500 CFS

Computer File Information

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Full Path:	P:\21711039\CAO\PLANSHTS	R				Designed by: KAP	Structure Numbers
Drawing File Name:	CHANNEL.DWG	△				Detailed by: DRM	
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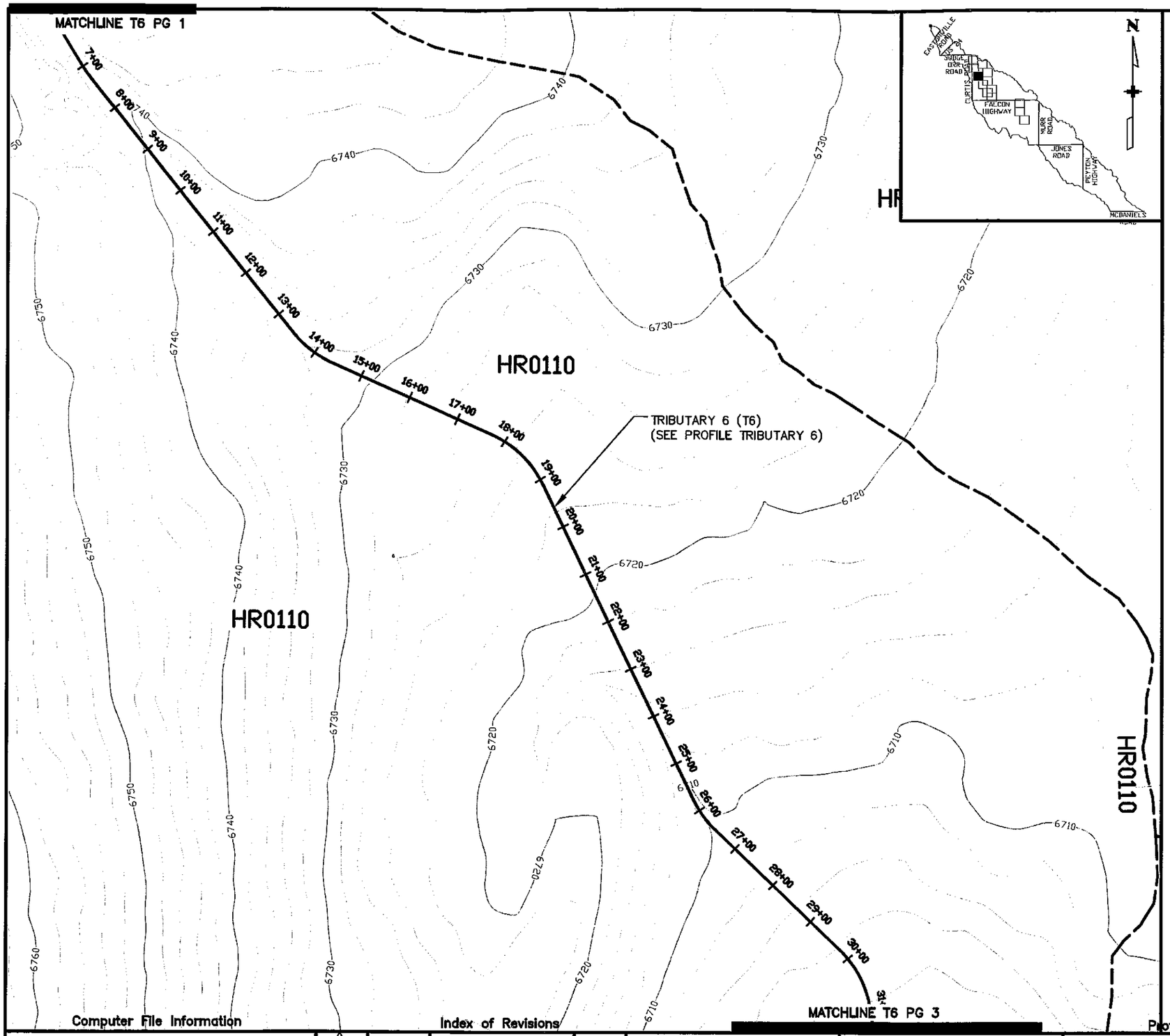
HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL CHANNELS

Sheet Number TRIBUTARY 6 PG 1



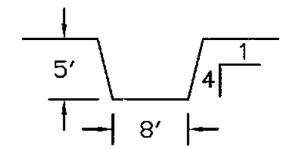
LEGEND

6630	CONTOURS – MAJOR ELEVATION
	CONTOURS – MINOR ELEVATION
	WATERSHED BOUNDARY
	BASIN BOUNDARY
	ROADS
20+00	RIVER AND ALIGNMENT

1"=200'

200 0 200 400

CHANNEL: TRIBUTARY 6 (T6)
BASIN: HR0110



STA: 0+00 TO STA: 41+73

Q: 500 CFS

Computer File Information

Full Path:	P:\21711039\CAD\PLANSHTS
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Acad. Ver. 2006	Scale: 1"=200' Units: Feet

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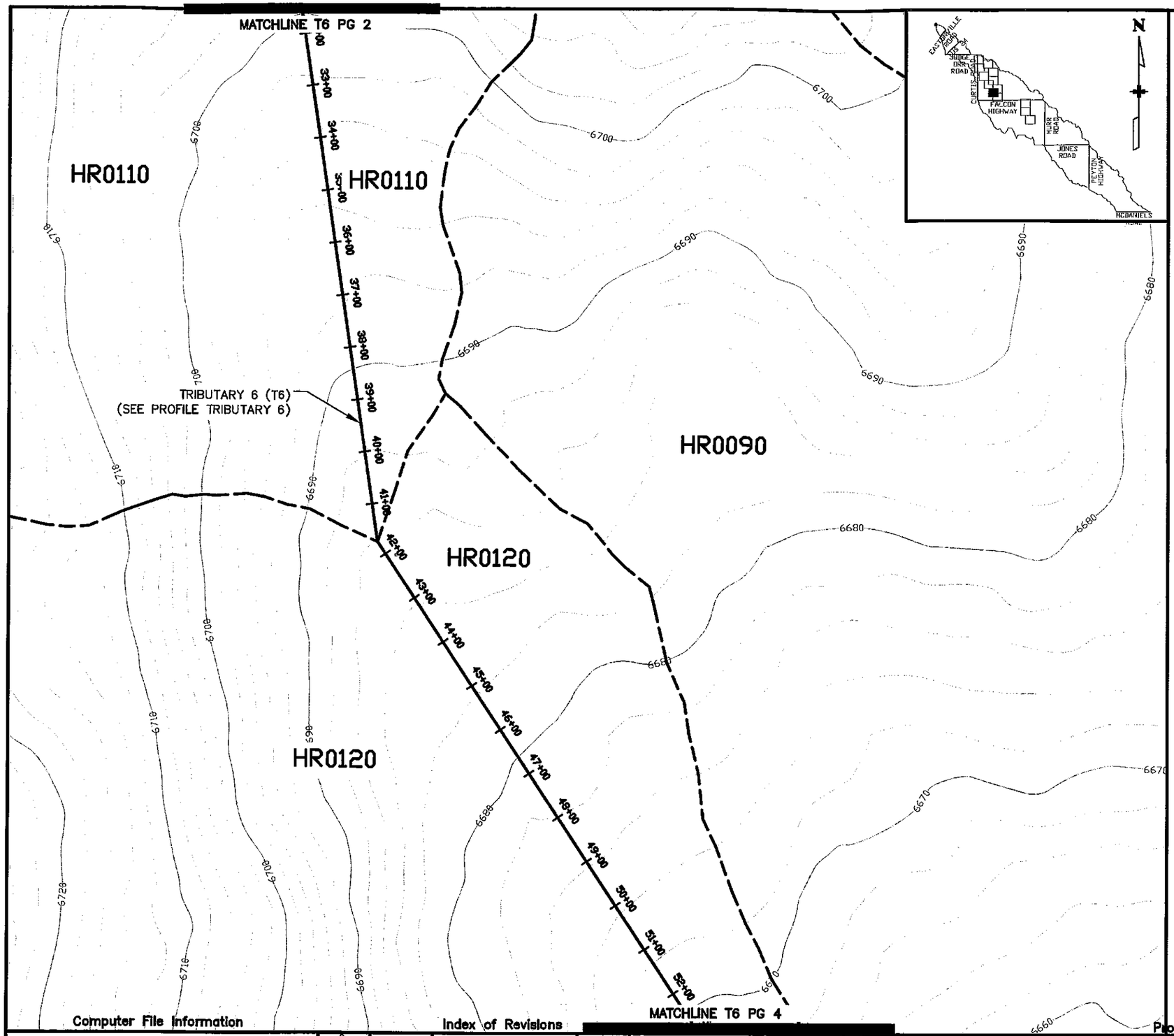
HAEGLER RANCH SUB-REGIONAL DETENTION
ALTERNATIVE CONCEPTUAL CHANNELS

Sheet Number TRIBUTARY 6 PG 2



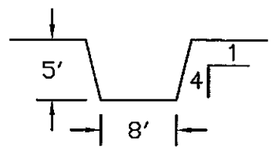
LEGEND

6630	CONTOURS – MAJOR ELEVATION
	CONTOURS – MINOR ELEVATION
	WATERSHED BOUNDARY
	BASIN BOUNDARY
	ROADS
20+00	RIVER AND ALIGNMENT

1"=200'

200 0 200 400

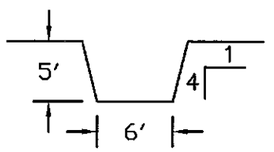
CHANNEL: TRIBUTARY 6 (T6)
BASIN: HR0110



STA: 0+00 TO STA: 41+73

Q: 500 CFS

CHANNEL: TRIBUTARY 6 (T6)
BASIN: HR0120



STA: 41+73 TO STA: 75+50

Q: 300 CFS

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS
Drawing File Name: CHANNEL.DWG
Acad. Ver. 2006 Scale: 1"=200' Units: Feet

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Structure Numbers

HAEGLER RANCH SUB-REGIONAL DETENTION
ALTERNATIVE CONCEPTUAL CHANNELS

Sheet Number TRIBUTARY 6 PG 3

MATCHLINE MS-06 PG 2

TRIBUTARY 6 (T6)
(SEE PROFILE TRIBUTARY 6)

HR0120

POND SR-05
(SEE SHEET SR05)

POND SR-04
(SEE SHEET SR04)

HR0090

MAIN STEM MS-06
(SEE MAINSTEM PAGE 5)

HR0120

TRIBUTARY 6 (T6)
(SEE PROFILE TRIBUTARY 6)

MATCHLINE MS-06 PG 6

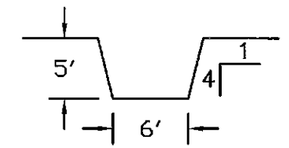
LEGEND

- 6630 — CONTOURS – MAJOR ELEVATION
- CONTOURS – MINOR ELEVATION
- WATERSHED BOUNDARY
- BASIN BOUNDARY
- ROADS
- 20+00 — RIVER AND ALIGNMENT

1"=200'

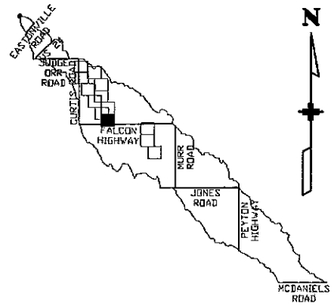
200 0 200 400

CHANNEL: TRIBUTARY 6 (T6)
BASIN: HR0120



STA: 41+73 TO STA: 75+50

Q: 300 CFS



Computer File Information

Full Path:	P:\21711039\CAD\PLANSHTS
Drawing File Name:	CHANNEL.DWG
Acad. Ver. 2006	Scale: 1"=200' Units: Feet

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Structure Numbers

HAEGLER RANCH SUB-REGIONAL DETENTION
ALTERNATIVE CONCEPTUAL CHANNELS

Sheet Number TRIBUTARY 6 PG 4

PROFILE MAIN STEM (MS-06 & MS-05)

MS-06 HR0070

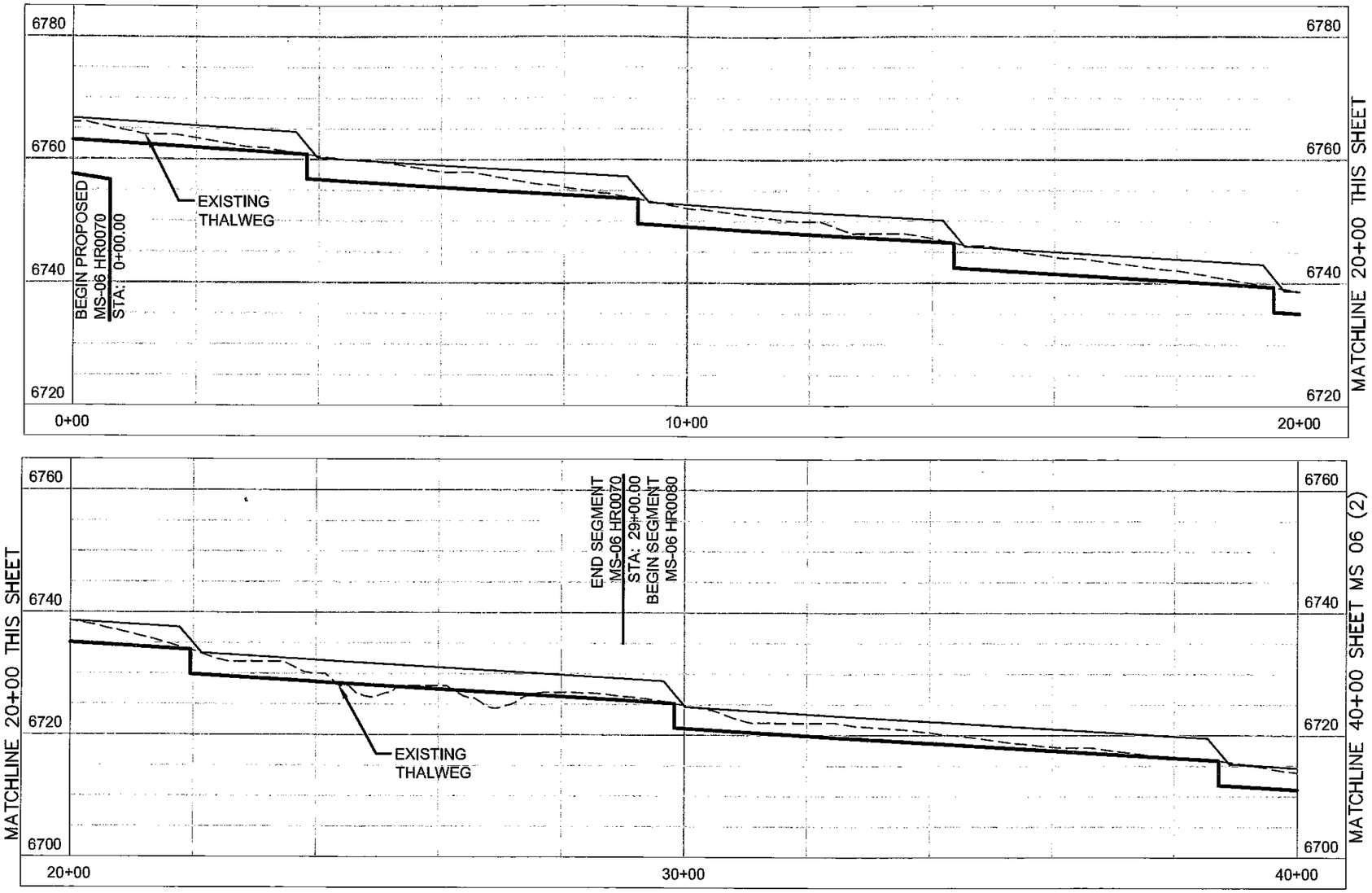
SLOPE = 0.60%

(7) 4' DROPS

MS-06 HR0080

SLOPE = 0.60%

(7) 4' DROPS



LEGEND

- PROPOSED DROP STRUCTURE
- EXISTING THALWEG
- HYDRAULIC GRADE LINE

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS

Drawing File Name: MAINSTEM PROFILES_PRDPOSED.DWG

Acad. Ver. 2006 Scale: 1"=2D' Units: Feet

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Structure Numbers

HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL PROFILES

Sheet Number MS 06

MS–06 HR0080

SLOPE = 0.60%

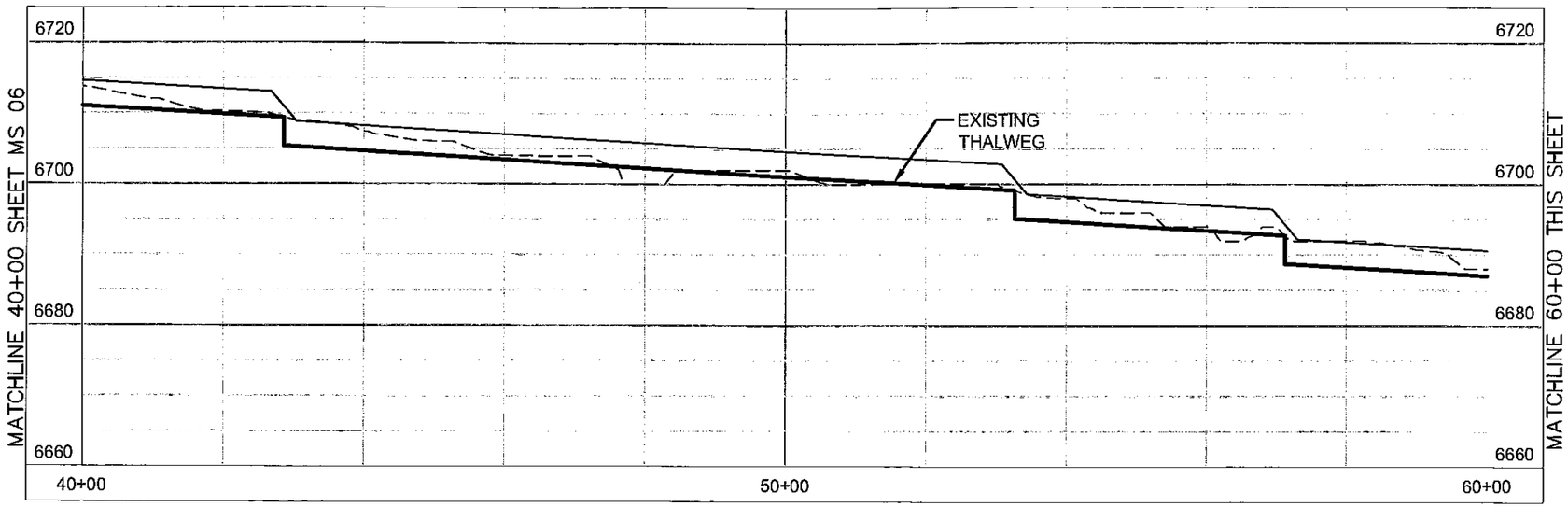
(7) 4' DROPS

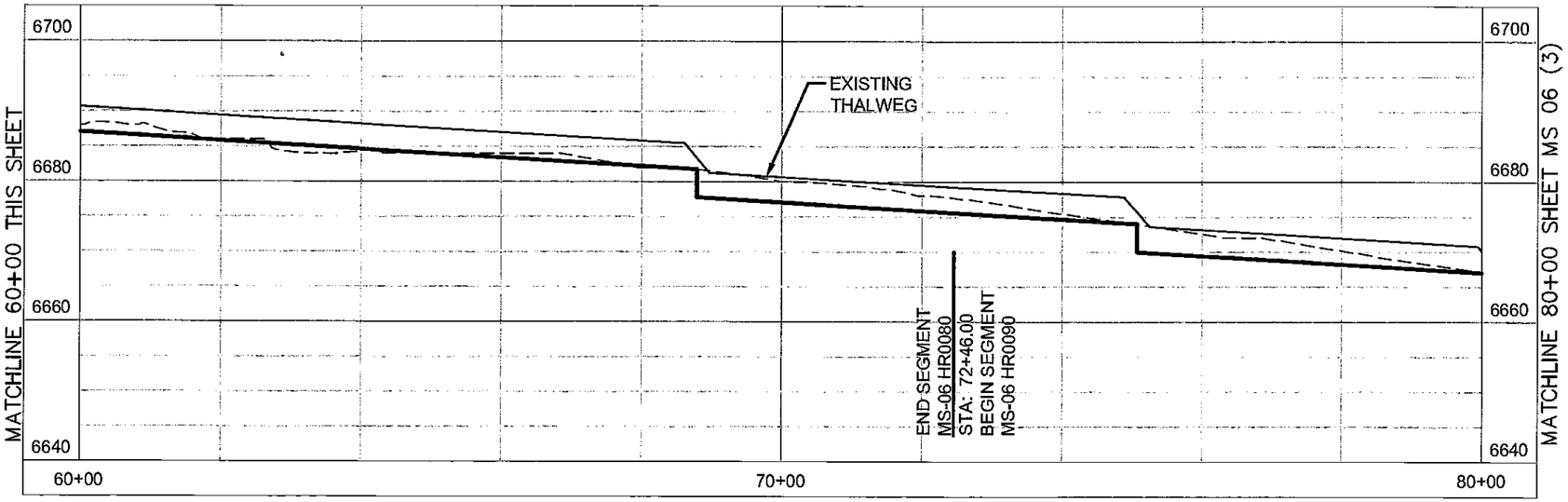
MS–06 HR0090

SLOPE = 0.60%

(8) 4' DROPS

PROFILE MAIN STEM (MS–06 & MS–05)





LEGEND

- PROPOSED DROP STRUCTURE
- EXISTING THALWEG
- HYDRAULIC GRADE LINE

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS

Drawing File Name: MAINSTEM PROFILES_PROPOSED.DWG

Acad. Ver. 2006 Scale: 1"=20' Units: Feet

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Profiles

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Detailed by: DRM

Checked by:

Structure Numbers

HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL PROFILES

Sheet Number MS06 (2)

MS–06 HR0090

SLOPE = 0.60%

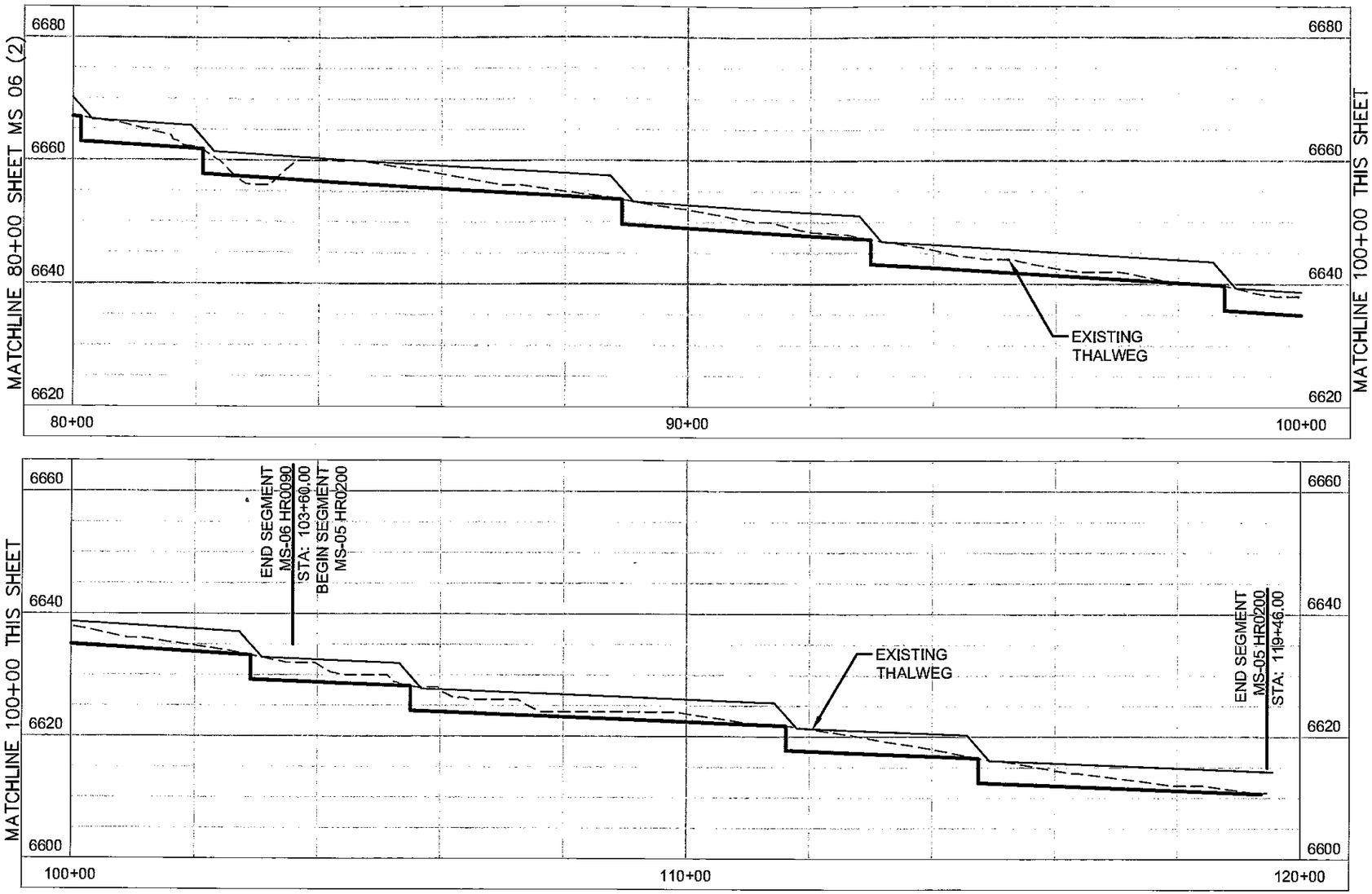
(8) 4' DROPS

MS–05 HR0200

SLOPE = 0.40%

(4) 4' DROPS

PROFILE MAIN STEM (MS–06 & MS–05)



LEGEND

- PROPOSED DROP STRUCTURE
- EXISTING THALWEG
- HYDRAULIC GRADE LINE

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS

Drawing File Name: MAINSTEM PROFILES_PROPOSED.DWG

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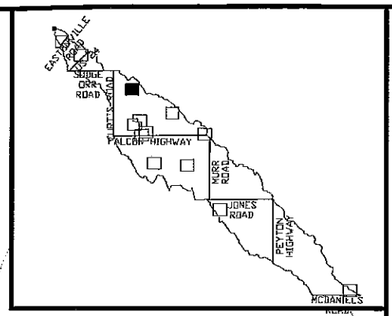
HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL PROFILES

Sheet Number MS06 & MS05 (3)

POND SR-03



MAIN STEM MS-06
(SEE MAINSTEM PG 2 & 3)
(SEE PROFILE MS-06)

TOP OF BERM
6724'

100 YEAR
WS 6721'

LOW POINT

6730 6720 6710

LEGEND

6630	PROPOSED CONTOURS – MAJOR ELEVATION
	PROPOSED CONTOURS – MINOR ELEVATION
6630	EXISTING CONTOURS – MAJOR ELEVATION
	EXISTING CONTOURS – MINOR ELEVATION
	WATERSHED BOUNDARY
	ROADS
	RIVER
	100 YEAR WATER SURFACE ELEVATION
⊠	OUTLET

POND SR-03
DISCHARGE

Q100	530 CFS
Q2	29 CFS
POND VOLUME AC FT	16
BERM WIDTH	10'
SIDESLOPES	8:1

N

1"=200'

200 0 200 400

Computer File Information

Full Path:	P:\21711039\CAD\PLANSHTS
Drawing File Name:	PONDS.DWG
Acad. Ver. 2006	Scale: 1"=20D' Units: Feet

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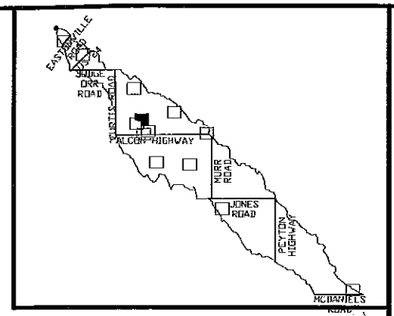
Structure Numbers

HAEGLER RANCH DRAINAGE BASIN

Sheet Number SR03

POND SR-04



MAIN STEM MS-06
(SEE MAINSTEM PG 5)
(SEE PROFILE MS-06)

100 YEAR
WS 6653.25'

TOP OF BERM
6656.25'

LOW POINT

MAIN STEM MS-06
(SEE MAINSTEM PG 5)
(SEE PROFILE MS-06)

6670 6660 6650 6640

LEGEND

- 6630 — PROPOSED CONTOURS - MAJOR ELEVATION
- PROPOSED CONTOURS - MINOR ELEVATION
- 6630 — EXISTING CONTOURS - MAJOR ELEVATION
- EXISTING CONTOURS - MINOR ELEVATION
- WATERSHED BOUNDARY
- ROADS
- RIVER
- 100 YEAR WATER SURFACE ELEVATION
- ⊠ OUTLET

POND SR-04
DISCHARGE

Q100	740 CFS
Q2	33 CFS
POND VOLUME AC FT	25
BERM WIDTH	10'
SIDESLOPES	8:1

N

1"=200'

200 0 200 400

Computer File Information

Full Path:	P:\21711039\CAD\PLANSHTS
Drawing File Name:	PONDS.DWG
Acad. Ver. 2006	Scale: 1"=200' Units: Feet

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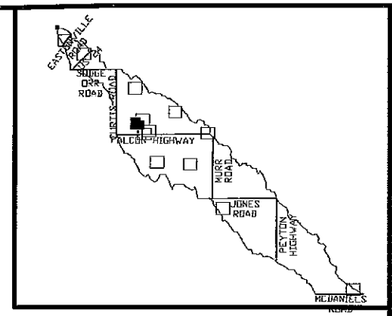
Detailed by:	DRM
Checked by:	JAJ

Structure Numbers

HAEGLER RANCH DRAINAGE BASIN

Sheet Number SR04

POND SR-05



TRIBUTARY 6 (T6)
(SEE TRIBUTARY 6 PG 4)
(SEE PROFILE TRIBUTARY 6)

LOW POINT

100 YEAR
WS 6655.50'

TOP OF BERM
6658.50'

TRIBUTARY 6 (T6)
(SEE TRIBUTARY 6 PG 4)
(SEE PROFILE TRIBUTARY 6)

LEGEND

6630	PROPOSED CONTOURS – MAJOR ELEVATION
	PROPOSED CONTOURS – MINOR ELEVATION
6630	EXISTING CONTOURS – MAJOR ELEVATION
	EXISTING CONTOURS – MINOR ELEVATION
	WATERSHED BOUNDARY
	ROADS
	RIVER
	100 YEAR WATER SURFACE ELEVATION
⊠	OUTLET

POND SR-05
DISCHARGE

Q100	250 CFS
Q2	9 CFS
POND VOLUME AC FT	24
BERM WIDTH	10'
SIDESLOPES	8:1

N

1"=200'

200 0 200 400

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS
Drawing File Name: PONDS.DWG
Acad. Ver. 20D6 Scale: 1"=200' Units: Feet

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Structure Numbers

HAEGLER RANCH DRAINAGE BASIN

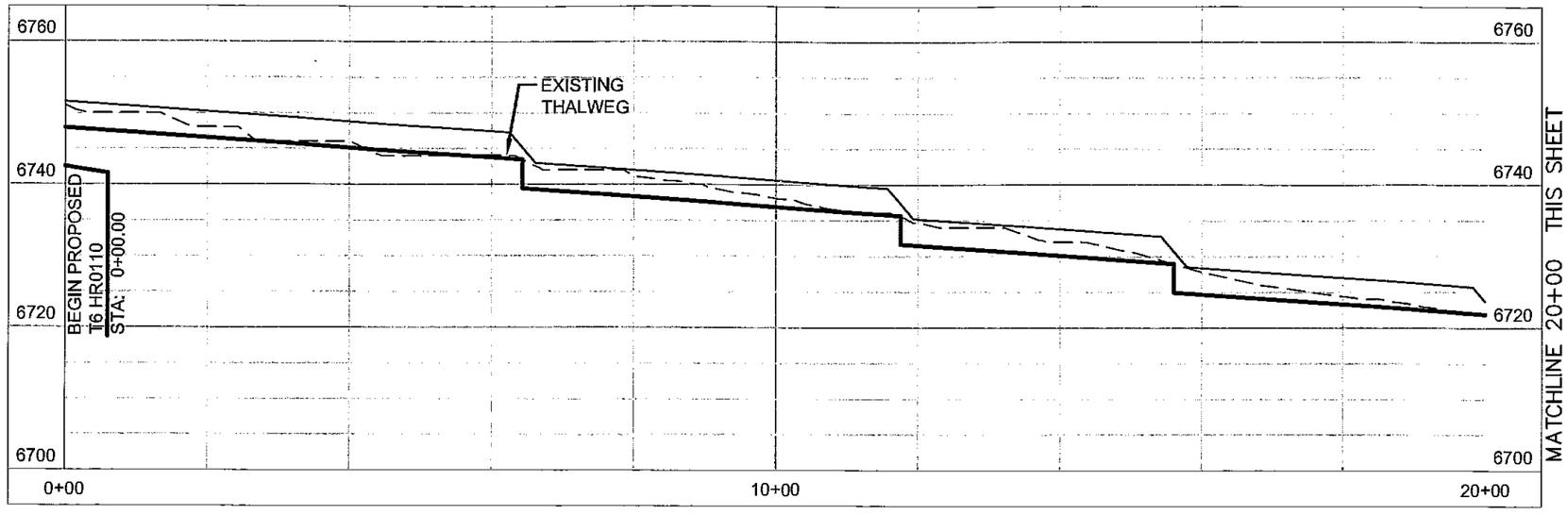
Sheet Number SR05

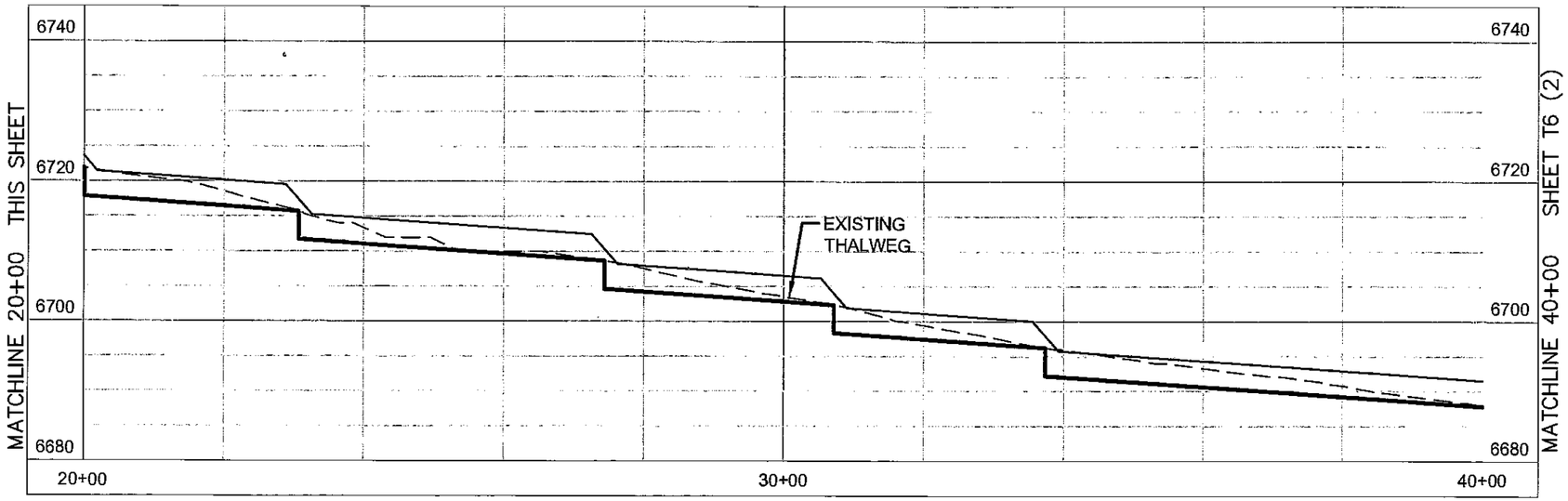
T6 HR0110

SLOPE = 0.70%

(9) 4' DROPS

PROFILE TRIBUTARY 6 (T6)





LEGEND

- PROPOSED DROP STRUCTURE
- EXISTING THALWEG
- HYDRAULIC GRADE LINE

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS

Drawing File Name: T_PROFILE_SHEETS 6_PROPOSED.DWG

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Designed by: KAP

Detailed by: DRM

Checked by:

Structure Numbers:

HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL PROFILES

Sheet Number T6

T6 HR0110

SLOPE = 0.70%

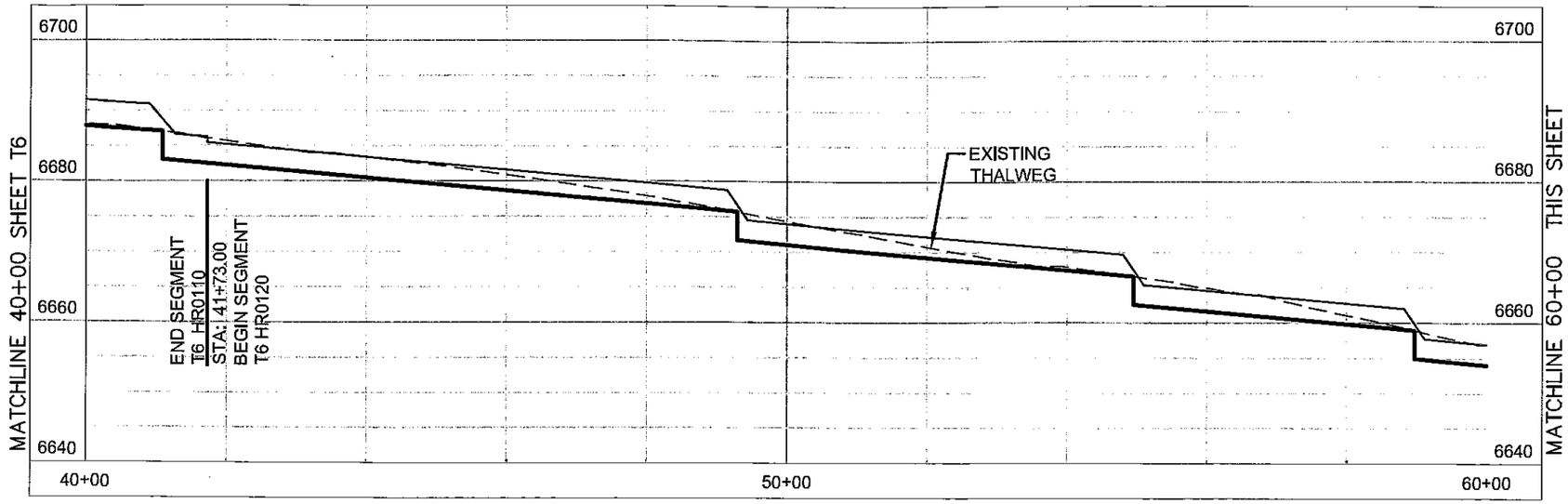
(9) 4' DROPS

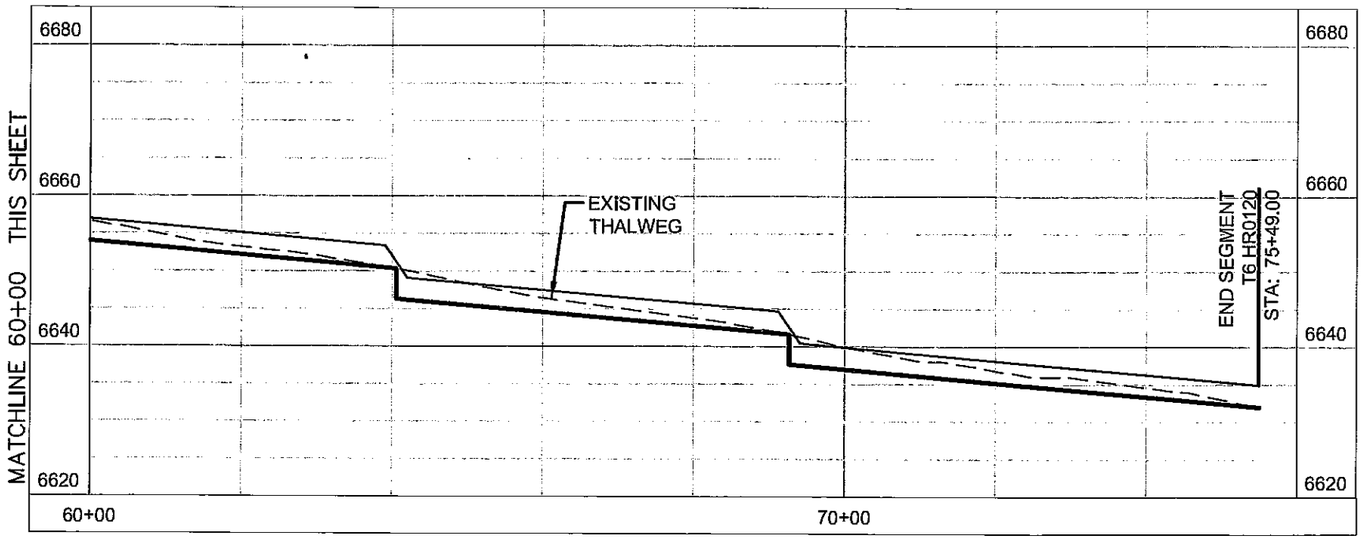
T6 HR0120

SLOPE = 0.90%

(6) 4' DROPS

PROFILE TRIBUTARY 6 (T6)





LEGEND

- PROPOSED DROP STRUCTURE
- EXISTING THALWEG
- HYDRAULIC GRADE LINE

Computer File Information

Full Path: P:\21711039\CAD\PLANSHTS

Drawing File Name: T PROFILE SHEETS 6_PROPOSED.DWG

Acad. Ver. 2006 Scale: 1"=20' Units: Feet

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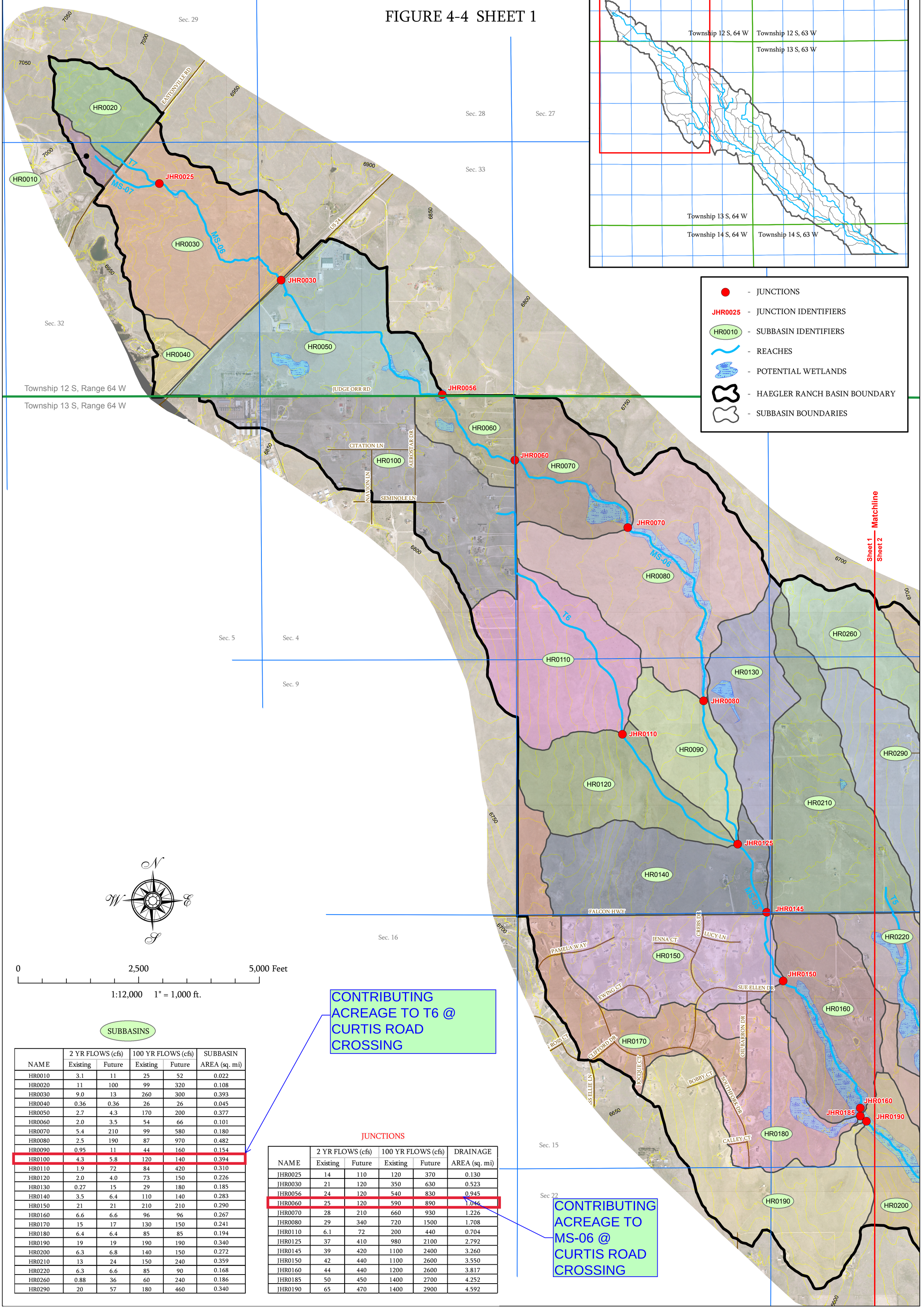
HAEGLER RANCH SUB-REGIONAL DETENTION ALTERNATIVE CONCEPTUAL PROFILES

Sheet Number T6 (2)

FIGURE 4-4 SHEET 1



0 2,500 5,000 Feet

1:12,000 1" = 1,000 ft.

SUBBASINS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	SUBBASIN AREA (sq. mi)
HR0010	3.1	11	25	52	0.022
HR0020	11	100	99	320	0.108
HR0030	9.0	13	260	300	0.393
HR0040	0.36	0.36	26	26	0.045
HR0050	2.7	4.3	170	200	0.377
HR0060	2.0	3.5	54	66	0.101
HR0070	5.4	210	99	580	0.180
HR0080	2.5	190	87	970	0.482
HR0090	0.95	11	44	160	0.154
HR0100	4.3	5.8	120	140	0.394
HR0110	1.9	72	84	420	0.310
HR0120	2.0	4.0	73	150	0.226
HR0130	0.27	15	29	180	0.185
HR0140	3.5	6.4	110	140	0.283
HR0150	21	21	210	210	0.290
HR0160	6.6	6.6	96	96	0.267
HR0170	15	17	130	150	0.241
HR0180	6.4	6.4	85	85	0.194
HR0190	19	19	190	190	0.340
HR0200	6.3	6.8	140	150	0.272
HR0210	13	24	150	240	0.359
HR0220	6.3	6.6	85	90	0.168
HR0260	0.88	36	60	240	0.186
HR0290	20	57	180	460	0.340

CONTRIBUTING ACREAGE TO T6 @ CURTIS ROAD CROSSING

JUNCTIONS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	DRAINAGE AREA (sq. mi)
JHR0025	14	110	120	370	0.130
JHR0030	21	120	350	630	0.523
JHR0056	24	120	540	830	0.945
JHR0060	25	120	590	890	1.046
JHR0070	28	210	660	930	1.226
JHR0080	29	340	720	1500	1.708
JHR0110	6.1	72	200	440	0.704
JHR0125	37	410	980	2100	2.792
JHR0145	39	420	1100	2400	3.260
JHR0150	42	440	1100	2600	3.550
JHR0160	44	440	1200	2600	3.817
JHR0185	50	450	1400	2700	4.252
JHR0190	65	470	1400	2900	4.592

CONTRIBUTING ACREAGE TO MS-06 @ CURTIS ROAD CROSSING

URS

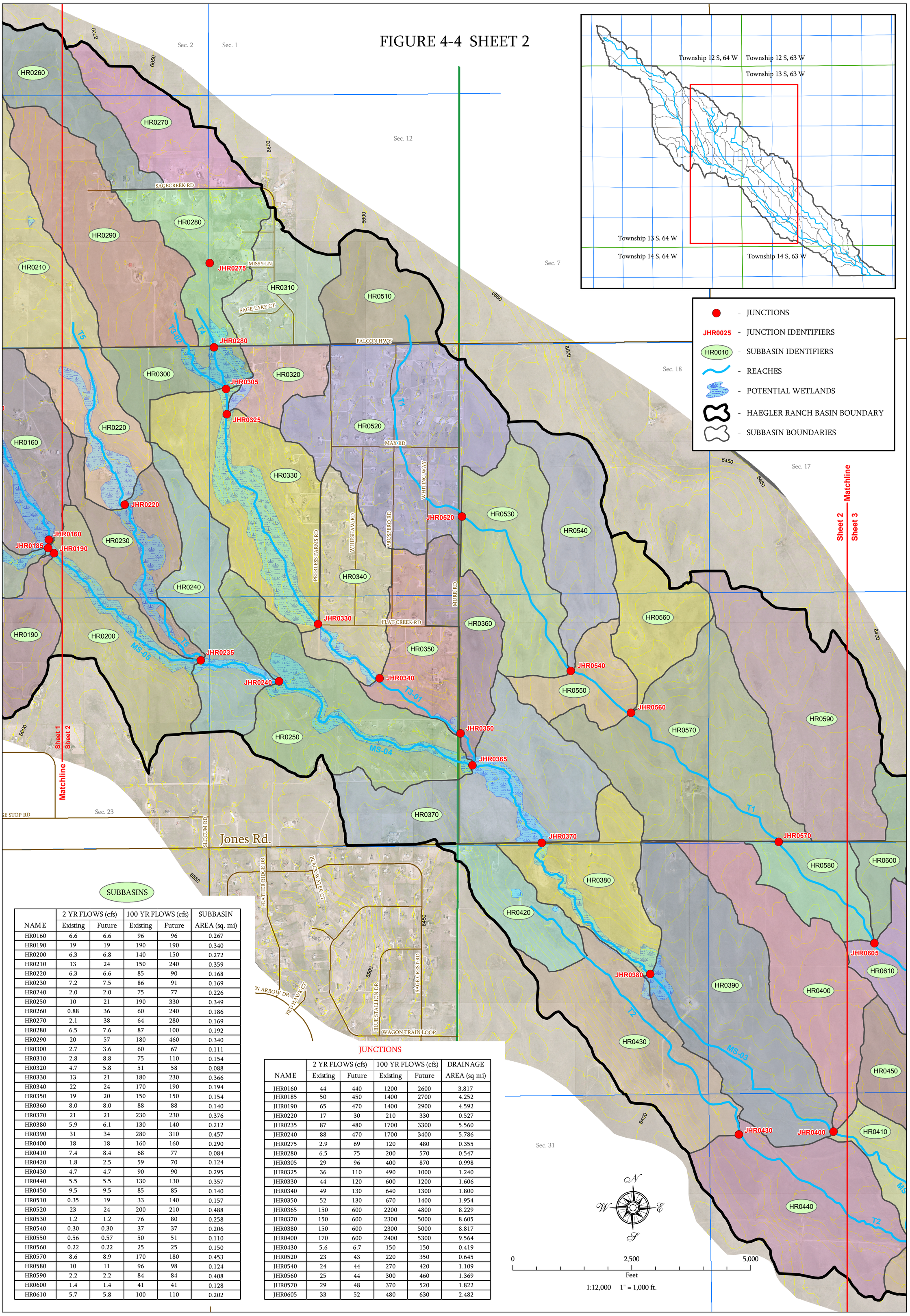
HAEGLER RANCH DRAINAGE BASIN

EXISTING AND FUTURE CONDITIONS HYDROLOGIC MODEL

URS NO. 21711039

DATE: 09/08

FIGURE 4-4 SHEET 2



SUBBASINS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	SUBBASIN AREA (sq. mi)
HR0160	6.6	6.6	96	96	0.267
HR0190	19	19	190	190	0.340
HR0200	6.3	6.8	140	150	0.272
HR0210	13	24	150	240	0.359
HR0220	6.3	6.6	85	90	0.168
HR0230	7.2	7.5	86	91	0.169
HR0240	2.0	2.0	75	77	0.226
HR0250	10	21	190	330	0.349
HR0260	0.88	36	60	240	0.186
HR0270	2.1	38	64	280	0.169
HR0280	6.5	7.6	87	100	0.192
HR0290	20	57	180	460	0.340
HR0300	2.7	3.6	60	67	0.111
HR0310	2.8	8.8	75	110	0.154
HR0320	4.7	5.8	51	58	0.088
HR0330	13	21	180	230	0.366
HR0340	22	24	170	190	0.194
HR0350	19	20	150	150	0.154
HR0360	8.0	8.0	88	88	0.140
HR0370	21	21	230	230	0.376
HR0380	5.9	6.1	130	140	0.212
HR0390	31	34	280	310	0.457
HR0400	18	18	160	160	0.290
HR0410	7.4	8.4	68	77	0.084
HR0420	1.8	2.5	59	70	0.124
HR0430	4.7	4.7	90	90	0.295
HR0440	5.5	5.5	130	130	0.357
HR0450	9.5	9.5	85	85	0.140
HR0510	0.35	19	33	140	0.157
HR0520	23	24	200	210	0.488
HR0530	1.2	1.2	76	80	0.258
HR0540	0.30	0.30	37	37	0.206
HR0550	0.56	0.57	50	51	0.110
HR0560	0.22	0.22	25	25	0.150
HR0570	8.6	8.9	170	180	0.453
HR0580	10	11	96	98	0.124
HR0590	2.2	2.2	84	84	0.408
HR0600	1.4	1.4	41	41	0.128
HR0610	5.7	5.8	100	110	0.202

JUNCTIONS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	DRAINAGE AREA (sq mi)
JHR0160	44	440	1200	2600	3.817
JHR0185	50	450	1400	2700	4.252
JHR0190	65	470	1400	2900	4.592
JHR0220	17	30	210	330	0.527
JHR0235	87	480	1700	3300	5.560
JHR0240	88	470	1700	3400	5.786
JHR0275	2.9	69	120	480	0.355
JHR0280	6.5	75	200	570	0.547
JHR0305	29	96	400	870	0.998
JHR0325	36	110	490	1000	1.240
JHR0330	44	120	600	1200	1.606
JHR0340	49	130	640	1300	1.800
JHR0350	52	130	670	1400	1.954
JHR0365	150	600	2200	4800	8.229
JHR0370	150	600	2300	5000	8.605
JHR0380	150	600	2300	5000	8.817
JHR0400	170	600	2400	5300	9.564
JHR0430	5.6	6.7	150	150	0.419
JHR0520	23	43	220	350	0.645
JHR0540	24	44	270	420	1.109
JHR0560	25	44	300	460	1.369
JHR0570	29	48	370	520	1.822
JHR0605	33	52	480	630	2.482

URS

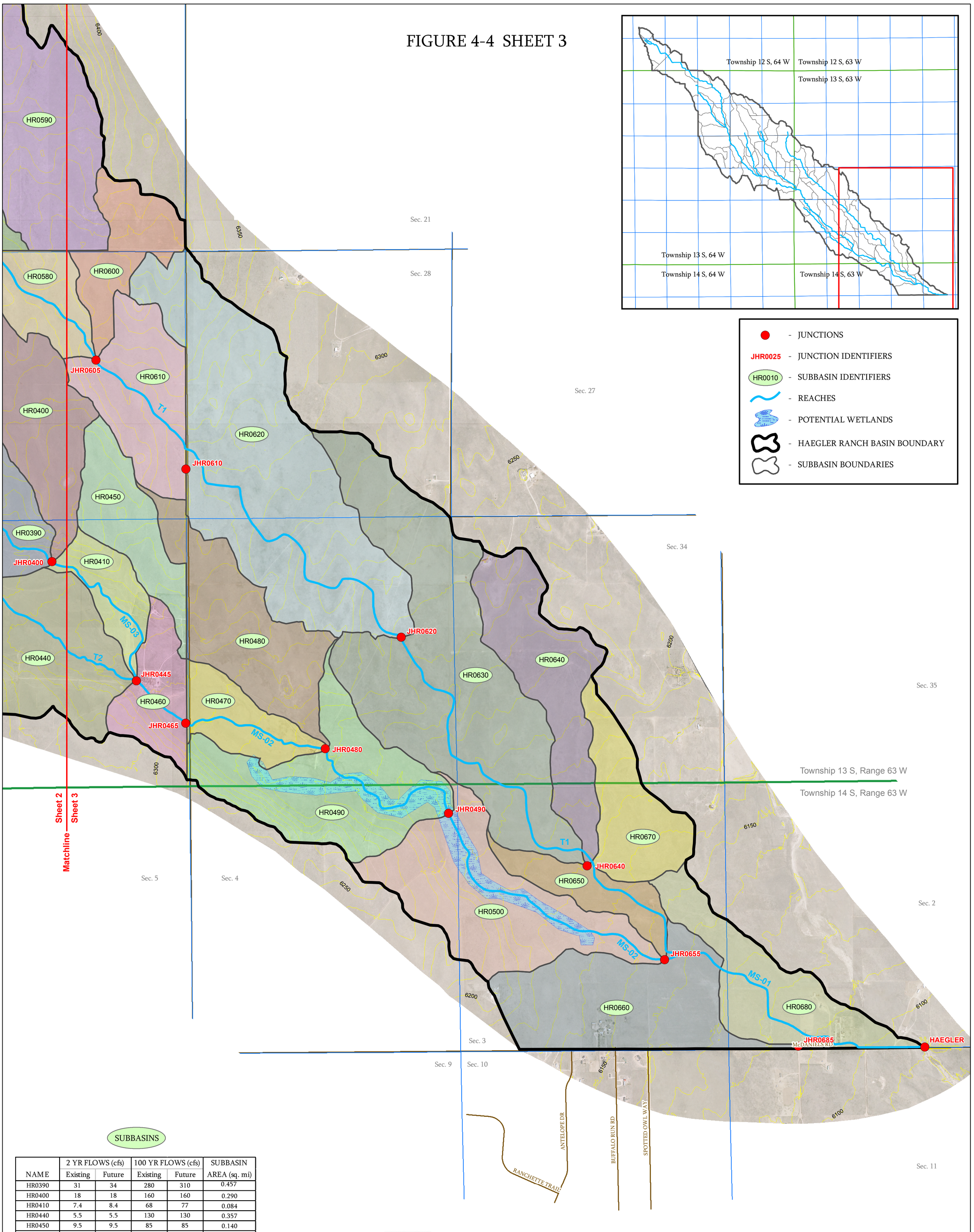
HAEGLER RANCH DRAINAGE BASIN

EXISTING AND FUTURE CONDITIONS HYDROLOGIC MODEL

URS NO. 21711039

DATE: 09/08

FIGURE 4-4 SHEET 3



SUBBASINS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	SUBBASIN AREA (sq. mi)
HR0390	31	34	280	310	0.457
HR0400	18	18	160	160	0.290
HR0410	7.4	8.4	68	77	0.084
HR0440	5.5	5.5	130	130	0.357
HR0450	9.5	9.5	85	85	0.140
HR0460	4.0	4.0	76	76	0.109
HR0470	7.3	7.6	73	77	0.102
HR0480	0.86	0.86	34	34	0.244
HR0490	9.2	9.8	210	220	0.312
HR0500	3.3	3.4	140	150	0.326
HR0580	10	11	96	98	0.124
HR0590	2.2	2.2	84	84	0.408
HR0600	1.4	1.4	41	41	0.128
HR0610	5.7	5.8	100	110	0.202
HR0620	1.9	1.9	110	120	0.647
HR0630	2.2	2.2	86	86	0.616
HR0640	0.88	0.88	37	37	0.237
HR0650	4.2	4.3	45	46	0.092
HR0660	0.87	0.87	52	52	0.296
HR0670	0.63	0.63	31	31	0.153
HR0680	11	12	110	120	0.206

JUNCTIONS

NAME	2 YR FLOWS (cfs) Existing	2 YR FLOWS (cfs) Future	100 YR FLOWS (cfs) Existing	100 YR FLOWS (cfs) Future	DRAINAGE AREA (sq. mi)
JHR0400	170	600	2400	5300	9.564
JHR0445	180	590	2500	5400	10.424
JHR0465	180	570	2600	5400	10.673
JHR0480	180	570	2600	5400	11.019
JHR0490	180	570	2600	5500	11.331
JHR0605	33	52	480	630	2.482
JHR0610	34	52	500	650	2.684
JHR0620	35	53	560	700	3.331
JHR0640	38	54	670	780	4.184
JHR0655	190	570	3200	5600	15.933
JHR0685	190	550	3200	5600	16.588
HAEGLER	190	550	3200	5600	16.588

N W E S

0 2,500 5,000
Feet

1:12,000 1" = 1,000 ft.

URS

HAEGLER RANCH DRAINAGE BASIN

EXISTING AND FUTURE CONDITIONS HYDROLOGIC MODEL

URS NO. 21711039

DATE: 09/08

MASTER DEVELOPMENT DRAINAGE PLAN
and PRELIMINARY DRAINAGE REPORT
FOR
SADDLEHORN RANCH

Remove the MDDP/Prelim drainage report and only include snippets of information pertinent to the design.

Prepared For:
ROI Property Group, LLC
2495 Rigdon Street
Napa, CA 94558
(707) 365-6891

May 8, 2020
Project No. 25142.00

Prepared By:
JR Engineering, LLC
5475 Tech Center Drive
Colorado Springs, CO 80919
719-593-2593

El Paso County PCD File No.
SP-19-006

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 El Paso County for drainage reports and said report is in conformity with the 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.

Mike Bramlett, Colorado P.E. # 32314 Date
For and On Behalf of JR Engineering, LLC

DEVELOPER'S STATEMENT:
I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: ROI Property Group, LLC

By:

Title:
Address: 2495 Rigdon Street
Napa, CA 94558

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

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

Conditions:

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PURPOSE

This document is the Master Development Drainage Plan (MDDP)/Preliminary Drainage Report (PDR) for the proposed Saddlehorn Ranch. The purpose of this report is to:

1. Identify on-site and off-site drainage patterns.
2. Recommend preliminary storm water facilities to collect and convey storm runoff from the proposed development to appropriate discharge and/or detention locations.
3. Recommend preliminary water quality and detention facilities to control discharge release rates to below historic.
4. Demonstrate compliance with surrounding major drainage basin planning studies, master plan and flood insurance studies.

GENERAL LOCATION AND DESCRIPTION

Location

The proposed Saddlehorn Ranch, known as "the site" from herein, is a parcel of land located in Section 3 and 10, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The proposed 824 acre, rural, single family-development is bound by Judge Orr Road to the North and Curtis Road to the West. To the East, the site is bound by undeveloped land owned by Brent Houser Enterprises, LLC. To the south, the site is bound by undeveloped properties owned by 7120 Sudiev, LLC and Faye Reyonlds. A vicinity map and property owner map is presented in Appendix A.

Currently, there are three major drainageways that run through the site: Haegler Ranch Main Stem 6 (MS-06), Haegler Ranch Tributary 6 (T-6), and Gieck Ranch West Fork – Reach 7A (WF-R7A). These drainageways were analyzed, both hydrologically and hydraulically, in the following reports:

1. Geick Ranch Drainage Basin Planning Study (DBPS), October 2007
2. Haegler Ranch Basin DBPS, May 2009
3. Sante Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision (LOMR), October 2004

The impact of these drainageways and planning studies on the proposed development will be discussed later in the report.

Description of Property

The proposed development contains approximately 824 acres and will be comprised of 227 rural 2.5 – 5 acre lots. The site is currently unoccupied and undeveloped. The existing ground cover is sparse vegetation and open space, typical of a Colorado rolling range land condition. In general, the site slopes from northwest to southeast and the existing drainageways follow this topography.

Per a NRCS web soil survey of the area, the site is made up of Type A, B and D soils. Type A soils cover roughly 80% of the site while Type B soils cover 3% and Type D cover the remaining 17% of the site. Group A soils have a high infiltration rate when thoroughly wet. Type B soils have a moderate infiltration when thoroughly wet. Type D soils have a very slow infiltration rate when thoroughly wet and have a high shrink-swell potential. A NRCS soil survey map has been presented in Appendix A.

Two existing wells are located in the southwest corner of the site. A 12" Cherokee Metropolitan District waterline runs through the site just south of the northern property line. Approximately a mile south of the Curtis Road and Judge Orr Road intersection, a two lane dirt road proceeds from Curtis Road east towards approximate center of the site. A water tank, pond and windmill are located within Major Drainageway MS-06 at the end of the dirt road.

Floodplain Statement

Based on the FEMA FIRM Map number 08041C0558G, dated December 7, 2018, the site lies within Zone A, Zone AE, and Zone X. Zone A is defined as areas subject to inundation by the 1-percent-annual-chance flood determined using approximate methodologies because BFEs have not been established. Zone AE is defined as area subject to inundation by the 1-percent-annual-chance flood event. Zone X is defined as area outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. All proposed development within the site will occur in Zone X.

In the northeast corner of the site, proposed development borders the Zone A boundary of the Geick Ranch West Tributary (WF-R7). At time of Final Drainage Report for this future phase of the development, a LOMR will be presented to establish base flood elevations (BFEs) for all lots that border the current Zone A boundary. The current FIRM Map has been presented in Appendix A.

DRAINAGE BASINS AND SUBBASINS

Major Basin Descriptions

The site lies within two major drainage basins: the Gieck Ranch Drainage Basin based on the "*Gieck Ranch Drainage Basin Planning Study*" (DBPS) prepared by Drexel, Barrell & Co. in October, 2007 and revised in February 2010 and the Haegler Ranch Drainage Basin based on the "*Haegler Ranch Drainage Basin Planning Study*" prepared by URS Corporation in May 2009.

The Gieck Ranch Drainage Basin covers approximately 22 square miles and begins approximately five miles northeast of the Town of Falcon and travels approximately 15 miles to the southeast. The Gieck Ranch Drainage Basin is tributary to Black Squirrel Creek which drains south to the Arkansas River near the city of Pueblo, Colorado. The majority of the area within the basin is undeveloped and is characterized as rolling range land typically associated with Colorado's semi-arid climates.

Anticipated land use for the basin includes residential, industrial, agricultural and commercial development. Residential developments will range from 0.125 – 5 acre lots with a mix of low, medium and high density developments.

The Haegler Ranch Drainage Basin covers approximately 16.6 square miles in unincorporated El Paso County, CO. The Haegler Ranch Drainage Basin is tributary to Black Squirrel Creek. In its existing condition, the basin is comprised of rolling rangeland with poor vegetative cover associated with Colorado's semi-arid climate. The natural drainageways within the basin are typically shallow and wide with poorly defined flow paths in most areas. Anticipated land use for the basin includes residential and commercial development. Residential developments will range from 0.125 – 5 acre lots with a mix of low, medium and high density developments.

As part of its drainage research, JR Engineering reviewed the following drainage studies, reports and LOMRs:

- Gieck Ranch Drainage Basin Planning Study prepared by Drexel, Barrell & Co. in October, 2007 and revised in February 2010. (Not adopted by El Paso County as of July 2019)
- Haegler Ranch Drainage Basin Planning Study prepared by URS Corporation in May 2009
- Santa Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision prepared by Tri-Core Engineering in June 2004.

Existing Gieck Ranch Drainage Basin

The "*Gieck Ranch Drainage Basin Planning Study"* evaluated existing and future drainage conditions, identified future improvements, and established basin and bridge fees for the Gieck Ranch Drainage Basin. It should be noted that as of today the "*Gieck Ranch Drainage Basin Planning Study"* has not yet been approved and adopted by the County. All referenced information from the aforementioned report is presented for information purposes only.

Based upon provided drainage maps and analysis, Gieck Ranch discharges a total of 1,017 cfs onto the site within Major Drainageway Gieck Ranch West Fork Reach 7A (WF-R7A). An existing 66" CMP and 36" CMP convey the offsite flow across Judge Orr Road onto the site. The existing culverts at Judge Orr Road are undersized for existing and future flows resulting in localized overtopping. The DBPS recommends the culvert be upsized to four –12' x 5' box culverts. The culvert will not be upsized within the context of this report and development. The culvert is owned by El Paso County and timing of the recommended improvements will be controlled by the County. The overtopping at the intersection of WF-R7A is not contained within the 100-year floodplain. Therefore, at time of Final Drainage Report, berming will be provided that will protect proposed lots from overtopping flows. An overtopping analysis is presented in Appendix D and the limits of overtopping are presented on the existing and proposed drainage maps in Appendix F.

Based on existing channel analysis, the *Gieck Ranch DBPS* recommends WF-R7A channel improvements approximately 200' upstream and 300' downstream of the culvert crossing at Judge Orr Road (50' bottom width, 10:1 side slopes and vegetative augmentation). The recommended

channel improvements result from upsizing the culvert at Judge Orr Road, requiring the channel to be lowered. The channel improvements were not recommended due to existing channel instability. Existing velocities in the channel were found to be 2.19 ft/s, as presented in Appendix E. Per the MS4 permit requirements, the onsite reach of WF-R7A will be analyzed for channel stability with the corresponding Final Drainage Report for that phase of the development. At the time of Final Drainage Report, any necessary improvements to WF-R7A to satisfy the MS4 permit will be evaluated. It should be noted that the onsite reach of WF-R7A, where the aforementioned channel improvements were recommended, is comprised of jurisdictional wetlands which will limit the allowable improvements. Coordination with the Army Corps of Engineers will be required to grant permission to disturb the jurisdictional wetlands. Recommended channel improvements from the *Gieck Ranch DBPS* are presented in Appendix E.

Existing Haegler Ranch Drainage Basin

The "*Haegler Ranch Drainage Basin Planning Study*" was used to establish a stormwater management plan for the existing and future stormwater infrastructure needs within the Haegler Ranch Drainage Basin. Based on provided drainage maps and analysis, in the existing condition Haegler Ranch contributes a total of 710 cfs onto the site. Of the 710 cfs, 590 cfs crosses Curtis Road in an existing 24" CMP onto the site. Major Drainageway MS-06 conveys the stormwater through the site and to its off-site confluence with Major Drainageway MS-05. The remaining 210 cfs crosses Curtis Road in an existing 36" CMP onto the site. Major Drainageway T-6 conveys the stormwater through the site and to its off-site confluence with Major Drainageway MS-05. Both Curtis Road culverts are undersized for existing and future flows and overtopping occurs locally near the culvert crossings. Overtopping at the intersection of Curtis Road and T-6 is contained within the 100-year floodplain and will not affect proposed lots. The overtopping at the intersection of MS-06 and Curtis Road is not contained within the 100-year floodplain limits. Therefore, at time of Final Drainage Report, berming will be provided that will protect proposed lots from overtopping flows. An overtopping analysis is presented in Appendix D and the limits of overtopping are presented on the existing and proposed drainage maps in Appendix F.

The culverts are not proposed to be upsized within the context of this report and development. The culverts are owned by El Paso County and timing of the recommended improvements will be controlled by the County.

Furthermore, the *Haegler Ranch DBPS* recommends channel improvements within drainageways MS-06 and T-6. Per the *Haegler Ranch DBPS*, all recommended channel sections are trapezoidal with side slopes of 4:1 and a maximum depth of five feet. Within the limits of the site, three (3) channel bottom widths are recommended for MS-06. The first reach, from station 0+00 – 31+34, is proposed with a 15' bottom width, the second reach from 31+34 to 74+61, MS-06 is proposed with a 30' bottom width, and the last reach from station 74+61 - 103+62 is proposed with a 20' channel bottom. The *Haegler Ranch DBPS* recommends Major Drainageway T-6 be improved to a trapezoidal channel with an 8' bottom width, 4:1 side slopes and depth of 5'. Drop structures have

also been recommended within MS-06 and T-6. These improvements will not occur within the context of this report or development. However, due to the addition of culvert crossings within MS-06 and T-6, channel improvements are anticipated up and downstream of the proposed culverts. The extent of these channel improvements will be addressed with corresponding Final Drainage Reports for those phases of the development. At that time, channel stability will be evaluated and any necessary improvements will be proposed. Recommended channel improvements from the *Haegler Ranch DBPS* are presented in Appendix E.

Based on flood impacts, stream stability and cost effectiveness, this study recommended a sub-regional detention approach. This allows future development anywhere in the basin with the construction of an associated sub-regional pond. Within the boundary of Saddlehorn Ranch, the DBPS recommended a total of three (3) sub-regional ponds. Based on discussion with El Paso County, the site will utilize full spectrum water quality and detention ponds instead. These full spectrum detention ponds will limit developed discharge into the drainageways to less than historic rates. Future, upstream development will also require full spectrum detention in accordance with current El Paso County criteria, which is an effective alternative to the sub-regional pond approach.

The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR was executed on Haegler Ranch Tributary 2, 3, and 4. The LOMR revised the onsite effective flood zones from Zone A to Zone AE for the three drainageways. Upstream stretches of Tributary 3 and 4 are classified Zone A but those channel reaches are off site. All stretches of Tributary 3 and 4 onsite are Zone AE. See FIRM Map Panel 080059-0575G for limits of LOMR study and revised flood zones, presented in Appendix E.

Existing Sub-basin Drainage

On-site, existing drainage patterns are generally from northwest to southeast by way of existing, natural drainageways (MS-06, T-6, WF-R7A). On-site areas flow directly into these drainageways which also bypass off-site flows through the site. Offsite flows within the major drainageways that pass through the site will influence the on-site culvert designs and any channel improvements.

On-site, existing drainage basins were established based upon existing topography and the limits of 100-year floodplain. The site was divided into eleven existing sub-basins. See Table 1 below for summary of existing drainage sub-basins and corresponding peak flows. An existing drainage map is provided in Appendix F.

Table 1: Existing Drainage Basin Summary

EXISTING BASIN SUMMARY TABLE				
Tributary Sub-Basin	Area (acres)	Percent Impervious	Q_5 (cfs)	Q_{100} (cfs)
G1	10.1	2.0%	0.00	0.1
G2	87.6	2.0%	1.5	76.4
H1	166.5	2.0%	0.1	81.0
H2	111.1	2.0%	0.2	91.1
H3	118.9	2.0%	0.9	64.1
H4	63.3	2.0%	1.4	73.2
H5	53.2	2.0%	0.3	28.2
H6	87.6	2.0%	0.2	110.1
CH1	23.9	2.0%	5.4	21.0
CH2	84.2	2.0%	2.6	33.7
CH3	19.1	2.0%	0.1	6.5
Total	825.4	N/A	12.7	585.4

The existing condition of the three major drainageways are discussed below;

Existing Geick Ranch West Fork Reach 7A (WF-R7A)

The first major drainageway is the Gieck Ranch West Fork Reach 7A (WF-R7A), per the *Gieck Ranch DBPS*. WF-R7A crosses onto the site along Judge Orr Road, approximately ¼ mile west of the intersection with Elbert Road. Discharge from the developed site into this drainageway will be limited to historic rates via a full spectrum detention pond prior to discharge. This drainageway includes jurisdictional wetlands and the entire drainageway onsite is classified Zone A. Access to the drainage way will be provided from internal roadways and along an equestrian trail will be constructed adjacent to the drainageway. The equestrian train can be utilized for maintenance equipment as well.

Existing Haegler Ranch Main Stem (MS-06)

The second drainageway is the Haegler Ranch Main Stem (MS-06), per the *Haegler Ranch DBPS*, which crosses onto the site along Curtis Road, approximately 1,600' south of the intersection with Judge Orr Road. MS-06 flows south towards its offsite confluence with Black Squirrel Creek. MS-06 exits the site along the southern property line. Discharge from the developed site into this drainageway will be limited to historic rates via a full spectrum detention pond prior to discharge. This drainageway includes non-jurisdiction wetlands and the entire drainageway is classified Zone AE. Access to the channel will be provided at the culvert crossing of MS-06 and San Isidro Trail via

a 15' wide maintenance and access road that will proceed from San Isidro trail to the channel bottom. From here, access through the channel is achievable with existing grades within the channel. Furthermore, an equestrian trail will be constructed adjacent to the drainageway that can be utilized for maintenance equipment as well. The road alignments are displayed on the proposed drainage map presented in Appendix F.

Existing Haegler Ranch Tributary 6 (T-6)

The third drainageway is the Haegler Ranch Tributary 6 (T-6), per the *Haegler Ranch DBPS*, which crosses onto the site along Curtis Road, approximately ¾ mile south of the intersection with Judge Orr Road. T-6 conveys flows south through the site and towards its off-site confluence with Black Squirrel Creek. Discharge from the developed site into this drainageway will be limited to historic rates via a full spectrum detention pond prior to discharge. This drainageway is absent of any on-site wetlands and the entire drainageway is classified Zone AE. Access to the channel will be provided at the culvert crossing of T-6 and Del Cerro Trail via a 15' wide maintenance and access road that will proceed from Del Cerro Trail to the channel bottom. From here, access through the channel is achievable with existing grades within the channel. Furthermore, an equestrian trail will be constructed adjacent to the drainageway that can be utilized for maintenance equipment as well. The road alignments are displayed on the proposed drainage map presented in Appendix F.

The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR was executed on three Haegler Ranch basin drainageways. Two of the drainageways that were evaluated pass through the proposed development. These drainageways are the: Haegler Ranch Tributary 3 & 4. Within the boundary of the proposed development, Haegler Ranch Tributary 3 and 4 are synonymous with Main Stem 6 and Tributary 6 from the *Haegler Ranch DBPS*. The purpose of the LOMR was to revise the flood hazard depicted in the current Flood Insurance Study. Additionally, the LOMR provided existing, 100-year velocities within the drainageways that will be utilized in the design of any potential channel improvements. A FIRM panel with the limits of the detailed study as well as BFEs has been presented in Appendix E.

See Table 2 for comparison of drainageway identification and the naming convention used within the context of this report. See Table 3 for a comparison of 100-year flows as calculated in the aforementioned DBPS' and LOMR. An existing conditions drainage map is presented in Appendix F.

Table 2: Major Drainageways

Major Drainageway Naming Conventions			
Saddlehorn Ranch MDDP/PDR:	Per Haegler Ranch DBPS:	Per Geick Ranch DBPS:	Per Sante Fe Springs LOMR:
WF-R7A	N/A*	West Fork (Middle)/WF-R7A	N/A*
MS-06	Main Stem (MS-06)	N/A*	Haegler Ranch Tributary 3
T-6	Tributary 6 (T-6)	N/A*	Haegler Ranch Tributary 4

Table 3: Major Drainageways – Ex. 100-Year Flow Comparison

Major Drainageways: 100-Year Flow Comparison				
Drainageway Name	Contributing Area (sq. mi.)	Q_{100} Per Haegler Ranch DBPS:	Q_{100} Per Geick Ranch DBPS:	Q_{100} Per Sante Fe Springs LOMR:
WF-R7A @ Judge Orr Road	1.50	N/A*	1,017 cfs	N/A*
MS-06 @ Curtis Road	1.05	451 cfs	N/A*	505 cfs
T-6 @ Curtis Road	0.39	120 cfs	N/A*	130 cfs

*N/A: Flow regime outside limits of study.

Proposed Sub-basin Drainage

The proposed basin delineation is as follows;

Basin A is approximately 9.2 acres and in its existing condition is rolling rangeland. Runoff generally flows southeast away from Drainageway MS-06. In the proposed condition, Basin A will be rural 2.5 acre lots and roadway. Runoff from this basin will be collected in road side swales and conveyed south along Barrosito Drive to Pond A. Pond A, while considered temporary in this MDDP, will need to meet Full Spectrum Detention Criteria unless deviations are approved in the Final Drainage Report for this future filing. It is anticipated that Barrosito Drive will be extended south as part of the development of the adjacent parcel to the south. The most logical place for a permanent Full Spectrum pond is located approximately 1,000 feet south at the future road crossing with MS-06. When that pond is constructed, the Saddlehorn Metropolitan District No. 1 will remove Pond A. The peak flow rate for Basin A in the 5 and 100-year storm are 9.5 cfs and 20.7 cfs, respectively. However, Pond A will discharge at less than historic rates.

Basin B is approximately 60.4 acres and in its existing condition is rolling rangeland. Runoff generally flows southwest across the basin towards Drainageway MS-06. In the proposed condition, Basin B will be rural 2.5 acre lots, paved roadway and will include Pond B. Runoff from this basin will be collected in road side swales and conveyed south along Barrosito Drive to Pond B. The peak flow rate for Basin B in the 5 and 100-year storm are 9.9 cfs and 46.3 cfs, respectively. However, Pond B will discharge at less than historic rates. A portion of Basin B is inundated by the existing 100-year floodplain, however; at time of final platting berming will be constructed to reduce the floodplain limits within the drainageway tract and a corresponding LOMR will be executed on this stretch of channel to establish the revised floodplain.

Basin C is approximately 102.5 acres and in its existing condition is rolling rangeland. Runoff generally flows southwest across the basin towards Drainageway MS-06. In the proposed condition, Basin C will be rural 2.5 acre lots, paved roadway and will include Pond C. Runoff from this basin will be collected in road side swales and conveyed south along Barrosito Drive and Del Cambre Drive to Pond C. The peak flow rate for Basin C in the 5 and 100-year storm are 15.8 cfs and 69.4 cfs, respectively. However, Pond C will discharge at less than historic rates.

Basin D is approximately 99.2 acres and in its existing condition is rolling rangeland. Runoff generally flows east across the basin towards Drainageway WF-R7A. In the proposed condition, Basin D will be rural 2.5 acre lots, paved roadway and will include Pond D. Runoff from this basin will be collected in road side swales and conveyed east along Barrosito drive to Pond D. The peak flow rate for Basin D in the 5 and 100-year storm are 29.4 cfs and 95.4 cfs, respectively. However, Pond D will discharge at less than historic rates. A portion of Basin D is inundated by the existing 100-year floodplain, however; at time of final platting berming will be constructed to reduce the floodplain limits within the drainageway tract and a corresponding LOMR will be executed on this stretch of channel to establish the base flood elevations.

Basin E is approximately 11.6 acres and in its existing condition is rolling rangeland. Runoff generally flows east across the basin towards Drainageway MS-06. In the proposed condition, Basin E will be rural 2.5 acre lots, paved roadway and will include Pond E. Runoff from this basin will be collected in road side swales and conveyed southwest along San Isidro Trail to Pond E. The peak flow rate for Basin E in the 5 and 100-year storm are 2.0 cfs and 9.9 cfs, respectively. However, Pond E will discharge at less than historic rates.

Basin F is approximately 117.4 acres and in its existing condition is rolling rangeland. Runoff generally flows southeast across the basin towards Drainageway MS-06. In the proposed condition, Basin F will be rural 2.5 acre lots, paved roadway and will include Pond F. Runoff from this basin will be collected in road side swales and conveyed southwest along Benito Wells Trail to Pond F. The peak flow rate for Basin F in the 5 and 100-year storm are 17.0 cfs and 69.9 cfs, respectively. However, Pond F will discharge at less than historic rates.

Basin G is approximately 39.9 acres and in its existing condition is rolling rangeland. Runoff generally flows south across the basin towards Drainageway T-6. In the proposed condition, Basin G will be rural 2.5 acre lots, paved roadway and will include Pond G. Runoff from this basin will be collected in road side swales and conveyed southwest along El Raiceno Trail to Pond G. The peak flow rate for Basin G in the 5 and 100-year storm are 6.1 cfs and 25.3, respectively. However, Pond G will discharge at less than historic rates.

Basin H is approximately 30.7 acres and in its existing condition is rolling rangeland. Runoff generally flows east across the basin towards Drainageway T-6. In the proposed condition, Basin H will be rural 2.5 acre lots, paved roadway and will include Pond H. Runoff from this basin will be collected in road side swales and conveyed north along Rosalia Place to Pond H. The peak flow rate for Basin H in the 5 and 100-year storm are 3.7 cfs and 17.9 cfs, respectively. However, Pond H will discharge at less than historic rates.

Basin I is approximately 46.6 acres and in its existing condition is rolling rangeland. Runoff generally flows east across the basin towards Drainageway T-6. In the proposed condition, Basin I will be rural 2.5 acre lots, paved roadway and will include Pond I. Runoff from this basin will be collected in road side swales and conveyed south down Carrizo Springs Trail and east down Zaragoza Trail to Pond I. The peak flow rate for Basin I in the 5 and 100-year storm are 15.9 cfs and 63.1 cfs, respectively. However, Pond I will discharge at less than historic rates.

Basin J is approximately 10.1 acres and in its existing condition is rolling rangeland. This basin will not be developed and will remain in its existing condition, per Section I.7.1.B.5 of the ECM Stormwater Quality Policy and Procedures this basin will not be detained in a full spectrum water quality and detention pond. Runoff generally flows east across the basin towards Drainageway T-6. In the proposed condition, Basin J will be an undeveloped tract. Undeveloped runoff from this basin will follow existing drainage patterns and sheet flow into Drainageway WF-R7A. The peak flow rate for Basin J in the 5 and 100-year storm are 3.0 cfs and 10.5 cfs, respectively.

Basins CH1, CH2 and CH3 are existing drainageway basins that will remain undeveloped in the proposed condition. There will be no development within Basin CH1-CH3, however; Basin CH2 & CH3 will require channel grading to accommodate proposed culverts. The scope of this grading will leave the channels in an undeveloped condition per Section I.7.1.B.7 and therefore will be excluded from permanent stormwater management. Basin CH1 contains jurisdictional wetlands. Basin CH2 contains non-jurisdictional wetlands. There are no wetlands located in Basin CH3. Peak flow rates for proposed undeveloped basins are presented in Appendix B.

Basins UD1-UD11 acre comprised of rural 2.5+ acre residential lots and will follow existing drainage patterns in the proposed condition. Development in these basins will be limited to a maximum of 10% impervious development via a plat covenant. Therefore, these basins can be excluded from permanent stormwater detention per Section I.7.1.B.5 of the ECM Stormwater Quality Policy and Procedures (2.5+ acre lots with imperviousness less than 10% can be excluded from

permanent stormwater management practices). Therefore, Basins UD1-UD11 will not be included in the developments permanent stormwater management facilities. A Permanent BMP applicability form is presented in Appendix D to justify these exclusions. A map detailing each development site and any exclusion is presented in Appendix F. Basin UD1 flows directly into Major Drainageway WF-R7A. Basins UD2, UD2.1, UD2.2, UD3, UD4, UD5 and UD8 flow directly into Major Drainageway MS-06. Basins UD6, UD7, UD9, and UD9.1 flow directly into Major Drainageway T-6. Basins UD8.1, UD10, and UD11 follow existing drainage patterns as well but flow directly off-site prior to being captured in major drainageways. A portion of Basin UD2.2 is inundated by the existing 100-yr floodplain. However, at time of final drainage report, lot lines will be adjusted outside floodplain limits. Furthermore, a portion of Basin UD10 is inundated by the existing 100-year floodplain, however; at time of final platting berming will be constructed to reduce the floodplain limits within the drainageway tract and a corresponding LOMR will be executed on this stretch of channel to establish the revised floodplain.

In addition to undeveloped lot areas, a small portion of Del Cerro Trail (portion of Basins UD9 & UD9.1) and San Isidro Trail (a portion of Basin UD5) will be allowed to directly discharge into Drainageway T-6 and MS-06, respectively, and excluded from the developments permanent stormwater management facilities. Per Section I.7.1.C.1, the County may exclude up to 20 percent, not to exceed 1 acre, of the applicable development site area from permanent stormwater management. Approximately, 16,240 ft^2 of Del Cerro Drive and 14,000 ft^2 square feet of San Isidro Trail, totaling 0.08% of the total development area, will be excluded from stormwater management, which is significantly less than the 20% limit.

A summary of all basin parameters has been presented in Appendix B.

Developed basin's runoff will be captured in roadside ditches and conveyed to a full spectrum water quality and detention pond per El Paso County DCM Volume 1. Each full spectrum pond will release treated flows at less than historic rates to minimize adverse impacts downstream. Pond D will discharge into Major Drainageway WF-7A, Pond B, C, E, and F will discharge into Major Drainageway MS-06 and Ponds G, H, and I will discharge into Major Drainageway T-6. Due to existing topography, Pond A will discharge into open space south of the site. Based on existing topography in the area, this flow will eventually be captured off-site by Major Drainageway MS-06.

See Table 4 for comparison of proposed pond parameters including a comparison of proposed basin discharge versus existing discharge.

Table 4: Pond Summary

POND SUMMARY TABLE							
Tributary Sub-Basin	Pond Name	Tributary Acres	WQ Volume (ac-ft)	100-Year Volume (ac-ft)	Provided Volume (ac-ft)	100-Year Peak Discharge (cfs)	Ex. 100-Year Peak Discharge (cfs)
A	POND A	9.2	0.20	1.14	1.14	2.5	2.8
B	POND B	60.4	0.35	1.46	2.17	18.9	21.0
C	POND C	102.5	0.64	2.69	2.77	26.0	28.9
D	POND D	99.2	0.59	2.86	2.97	47.7	53.0
E	POND E	11.6	0.05	0.23	0.39	4.7	5.2
F	POND F	117.4	0.65	3.20	3.35	50.7	56.3
G	POND G	39.9	0.34	1.36	1.62	10.1	11.2
H	POND H	30.7	0.16	0.70	1.18	10.5	11.7
I	POND I	46.6	0.25	1.09	1.41	26.8	29.8

DRAINAGE DESIGN CRITERIA

Development Criteria Reference

Storm drainage analysis and design criteria for the project were taken from the "*City of Colorado Spring/El Paso County Drainage Criteria Manual*" Volumes 1 and 2 (EPCDCM), dated October 12, 1994, the "*Urban Storm Drainage Criteria Manual"* Volumes 1 - 3 (USDCM) and Chapter 6 and Section 3.2.1 of Chapter 13 of the "Colorado Springs Drainage Criteria Manual (CCSDCM), dated May 2014, as adopted by El Paso County, as well as the July 2019 El Paso County Engineering Criteria Manual update.

Hydrologic Criteria

All hydrologic data was obtained from the "El Paso Drainage Criteria Manual" Volumes 1 and 2, and the "Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual" Volumes 1, 2, and 3. Onsite drainage improvements were designed based on the 5 year (minor) storm event and the 100-year (major) storm event. Runoff was calculated using CUHP Version 2.0.0, developed by Urban Drainage and Flood Control District. The model utilizes the raingage classified as "a design storm by temporal distribution of one-hour rain depths with area correction factors". The following Colorado Springs rainfall depths were utilized in the model: 2.52 inches for 1-hour 100-year depth and 3.5 inches for 6-hour 100-year depth. EPA SWMM 5.1 was utilized to route runoff flow rates for the sizing of stormwater storage facilities. The CUHP calculations and SWMM model are presented in Appendix B.

Urban Drainage and Flood Control District's UD-Detention, Version 3.07 workbook was used for preliminary pond sizing. Required detention volumes and allowable release rates were designed per USDCM and CCS/EPCDCM. Pond sizing spreadsheets are presented in Appendix D.

Hydraulic Criteria

The Federal Highway Administration's HY-8 program (Volume 7.50) was used to analyze the proposed box culvert within Major Drainageways MS-06 and T-6. Per Section 14.3.2 of the CCS/EPCDCM, a maximum headwater-to-rise ratio of 1.5 was used for the sizing of box culverts. Furthermore, box culverts will be designed in conjunction with channel improvements to maintain the current floodplain and base flood elevations. Culvert sizing and corresponding channel improvements will be revised as roadway geometry becomes better defined. Preliminary culvert design sheets are presented in Appendix C.

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) was used for preliminary roadside ditch design. For the purposes of this PDR/MDDP, the maximum roadside ditch size was determined based on peak 100-year flows and minimum roadway slopes within each basin. Swales were checked for velocity and Froude number per the EPC DCM Chapter 10, Section 10-7 and Table 10-4. Swale cross sections with a 100-year velocity greater than 5 ft/s or a Froude number greater than 0.9 will be lined with erosion control blanket and native grasses, or another approved method of stabilization, to limit erosive potential. Final swale designs and cross section details will be included with the Final Drainage Report. Preliminary swale design sheets are presented in Appendix C.

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) will be used for final local road crossing culvert design with in the Final Drainage Report. All onsite, local road crossing culverts are assumed to be 18" or 24" CMP based on preliminary calculations. Culvert size was determined based on 100-year flows and hydraulic criteria from EPCDCM Chapter 9 –Culvert Design. The Final Drainage Report will provide final local road crossing culvert designs.

DRAINAGE FACILITY DESIGN

General Concept

The proposed stormwater conveyance system was designed to convey the developed Saddlehorn Ranch flows to full spectrum water quality and detention ponds. Water quality and detention ponds will be designed to release at less than historic rates to minimize adverse impacts downstream. All full spectrum water quality and detention ponds have been sized such that State Engineer review or approval is not required. Undeveloped basins are allowed to follow existing drainage patterns and discharge directly into major drainageways or off-site.

The undeveloped portion of developed lots will be allowed to discharge directly into Drainageways MS-06, T-6 and WF-R7A. Per the "Jurisdictional Determination Request for the 824 Acres Curtis Road subdivision Project" completed by Ecosystem System Services in October 2018, MS-06 and T-

6 are not waters of the state and WF-R7A is a water of the state however, any direct discharge into this drainageway will be historic, undeveloped flows. The direct discharge into drainageway situation occurs anywhere a lot naturally drains toward a drainageway rather than the street. It was determined for these lots that all development (i.e. house and driveway) will occur in the first 200' of the lot, measured from the street into the lot. The 200' developed region of the lot will drain towards the road and be conveyed to a full spectrum water quality pond, however; the remainder of the lot (undeveloped) will be allowed to follow historic drainage patterns and flow directly into the drainageways. Furthermore, at time of platting, a covenant will be established for the development that will limit imperviousness to 10% for areas draining directly to the drainageways in order to satisfy Section I.7.1.B.5 of the ECM Stormwater Quality Policy and Procedures.

A box culvert will be proposed within Major Drainageway MS-06 and T-6 to convey existing, off site and developed, on-site flows underneath proposed roadways and through the site, in accordance with the *Haegler Ranch DBPS*. Culverts will not be required in Major Drainageway WF-R7A to maintain the drainage patterns established in the *Gieck Ranch DBPS.*

Channel improvements will be proposed immediately up and downstream of culvert improvements in order to maintain the current floodplain. Further channel improvements may be required within the major drainageways and the need for these potential improvements will be evaluated in the Final Drainage Report for each Filing. Access roads will be provided from local roadways down into the drainageways to provide culvert and drainageway maintenance access. A proposed drainage map is presented in Appendix F showing locations of culvert improvements, approximate channel improvements and access roads.

Specific Details

Four Step Process to Minimize Adverse Impacts of Urbanization

In accordance with the El Paso County Drainage Criteria Manual, Volume 2 this site has implemented the four step process to minimize adverse impacts of urbanization. The four step process includes reducing runoff volumes; stabilizing drainageways, treating the water quality capture volume (WQCV), and consider the need for Industrial Commercial BMP's.

Step 1, Reducing Runoff Volumes: The development of the project site is proposed as single family residential (2.5 ac. min.) with open spaces and lawn areas interspersed within the development which helps disconnect impervious areas and reduce runoff volumes. Roadways will utilize roadside ditches further disconnecting impervious areas. These practices will also allow for increased infiltration and reduce runoff volume.

Step 2, Stabilize Drainageways: This site will utilize roadside ditches with culvert crossings throughout the site. These roadside ditches will then direct the on-site development flows to the multiple detention ponds within the project that will be designed to release at or below historic rates in the natural channels. The natural channels will be stabilized in reaches with high velocity by the

use of drop structures incorporated at each roadway culvert crossing and isolated grade control structures where warranted. Based upon the proposed reduction in released flows compared to the pre-developed flows, no impact to downstream drainageways is anticipated.

Step 3, Provide WQCV: Runoff from this development will be treated through capture and slow release of the WQCV in multiple permanent detention basins that will be designed per current El Paso County drainage criteria.

Step 4 Consider the need for Industrial and Commercial BMP's: No industrial or commercial uses are proposed within this development. However, a site specific storm water quality and erosion control plan and narrative will be prepared for each future Filing. Site specific temporary source control BMPs as well as permanent BMP's will be detailed in this plan and narrative to protect receiving waters.

Water Quality

In accordance with Section 13.3.2.1 of the CCS/EPCDCM, full spectrum water quality and detention will be provided for all of the development site not meeting exclusions present in the ECM - Stormwater Quality Policy and Procedures Section I.7.1.B and C. Any areas of the development site not being included in the site's permeant stormwater management are presented on the MS4 Development Site Map with their specific exclusion, presented in Appendix F. Outlet structure release rates will be limited to less than historic rates to minimize adverse impacts to downstream stormwater facilities. Complete pond and outlet structure designs will be provided with the Final Drainage Report. Preliminary pond design parameters are presented in Appendix D.

Erosion Control Plan

The El Paso County Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate must be submitted with each Final Drainage Report. We respectfully request that the Erosion Control Plan and Cost Estimate be submitted in conjunction with the grading and erosion control plans and construction assurances posted prior to obtaining a grading permit.

Operation & Maintenance

In order to ensure the function and effectiveness of the stormwater infrastructure, maintenance activities such as inspection, routine maintenance, restorative maintenance, rehabilitation and repair, are required. All proposed drainage structures within the any platted County ROW (roadside ditches and local road culverts) will be owned and maintained by El Paso County. All proposed drainage structures within easements or tracts (full spectrum water quality ponds, drainageway culverts and drainageway improvements) will be owned and maintained by the Saddlehorn Ranch Metropolitan District No.1. Inspection access for El Paso County will be provided through a maintenance easement.

Drainage and Bridge Fees

An estimate of total basin fees for the proposed development within Haegler Ranch Drainage Basin is provided in Table 6. A portion of Saddlehorn Ranch (Basin J and CH1) is not within an approved

drainage basin, therefore; no drainage or bridge fees will be required for this area. Drainage and Bridge fees are for informational purposes only and do not include reductions for rural lots, permanent water quality facilities or reimbursable channel improvements. Final drainage reports for each phase of development will establish official drainage and bridge fees to be paid at time of platting.

Table 5: Site Composite Percent Imperviousness

Total Site Composite % Impervious for Basin Fees			
Basin	Area (ac)	% Imperviousness	(Area) * (% Imp.)
A	9.2	67%	6.13
B	60.4	10%	6.28
C	102.5	11%	11.69
D	99.2	11%	10.71
E	11.6	12%	1.35
F	117.4	10%	11.62
G	39.9	17%	6.70
H	30.7	9%	2.89
I	46.6	9%	4.38
J	10.1	9%	0.89
UD1	12.4	2%	0.25
UD2	12.8	2%	0.26
UD2.1	14.8	2%	0.30
UD2.2	7.2	2%	0.14
UD3	13.4	2%	0.27
UD4	4.8	2%	0.10
UD5	36.4	2%	0.73
UD6	22.1	2%	0.44
UD7	9.3	2%	0.19
UD8	4.6	2%	0.09
UD8.1	5.3	2%	0.11
UD9	4.8	2%	0.10
UD9.1	6.4	2%	0.13
UD10	10.4	2%	0.21
UD11	6.0	2%	0.12
CH1	23.9	2%	0.48
CH2	84.2	2%	1.68
CH3	19.0	2%	0.38
Total	825.4	-	68.59
Comp. % Imp. = 68.59%*ac/825.4 ac = 8.31%			

Table 6: Drainage Basin Fees

El Paso County - Haegler Ranch Drainage Basin Fees						
Area (acre)	Composite % Impervious	Total Impervious Acreage	2019 Drainage Fee (per Impervious Acre)	2019 Bridge Fee (per Impervious Acre)	Saddlehorn Ranch Drainage Fee	Saddlehorn Ranch Bridge Fee
825.4	8.31%	68.59	$10,324	$1,524	$708,123	$104,531

Construction Cost Opinion

(For Information Only / Non-Reimbursable)
Cost opinion to be provided with Final Drainage Report.

SUMMARY

The proposed development remains consistent with pre-development drainage conditions with the construction of the recommended drainage improvements, including ditches, culverts, detention ponds and drainage channel improvements. The proposed development will not adversely affect the offsite major drainageways or surrounding development. This report meets the latest El Paso County Drainage Criteria requirements for this site.

REFERENCES:

1. City of Colorado Springs Drainage Criteria Manual Volume 1, City of Colorado Springs, CO, May 2014.

2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Revision.

3. Gieck Ranch Drainage Basin Planning Study, Drexel, Barrell & Co., October 2007 and revised in February 2010.

4. Haegler Ranch Drainage Basin Planning Study, URS Corporation, May 2009.

5. The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR, Federal Emergency Management Agency, October 20, 2004.

APPENDIX A

FIGURES AND EXHIBITS

APPENDIX B

HYDROLOGIC CALCULATIONS

APPENDIX C

HYDRAULIC CALCULATIONS

APPENDIX D

WATER QUALITY AND DETENTION CALCULATIONS

APPENDIX E

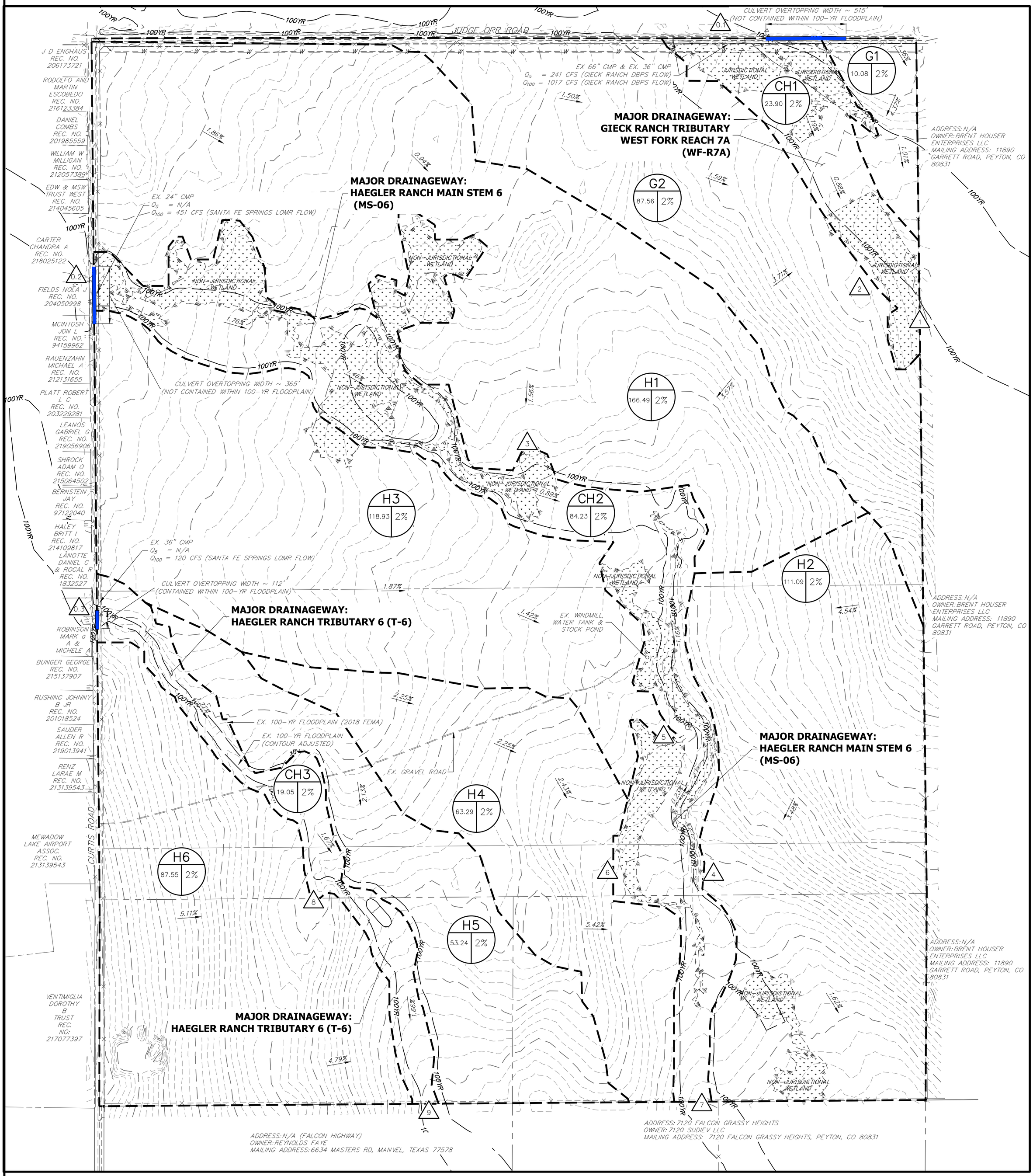
REFERENCE MATERIALS

APPENDIX F

DRAINAGE MAPS

824 ACRE CURTIS ROAD SUBDIVISION

EX. CONDITIONS DRAINAGE MAP



LEGEND

- I.D. (A | B): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: % IMPERVIOUS
- X: DESIGN POINT
- BASIN DELINEATION
- --6100-- EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION

BASIN SUMMARY TABLE

Tributary Sub-Basin	Area (acres)	Percent Impervious	Q_5 (cfs)	Q_{100} (cfs)
G1	10.1	2.0%	0.00	0.1
G2	87.6	2.0%	1.5	76.4
H1	166.5	2.0%	0.1	81.0
H2	111.1	2.0%	0.2	91.1
H3	118.9	2.0%	0.9	64.1
H4	63.3	2.0%	1.4	73.2
H5	53.2	2.0%	0.3	28.2
H6	87.6	2.0%	0.2	110.1
CH1	23.9	2.0%	5.4	21.0
CH2	84.2	2.0%	2.6	33.7
CH3	19.1	2.0%	0.1	6.5
Total	825.4	N/A	12.7	585.4

DESIGN POINT SUMMARY TABLE

Tributary Sub-	Q_5 (cfs)	Q_{100} (cfs)
0.1	241.00	1017.0
0.2	-	451.0
0.3	-	120.0
1	6.9	1114.0
2	1.5	76.4
3	0.1	80.9
4	0.1	91.1
5	0.9	64.1
6	1.4	73.2
7	4.1	704.9
8	0.2	110.1
9	0.4	248.1

300 150 0 300 600

ORIGINAL SCALE: 1" = 300'

EX. DRAINAGE MAP
824 CURTIS ROAD
25142.00
5/8/20
SHEET 1 OF 1

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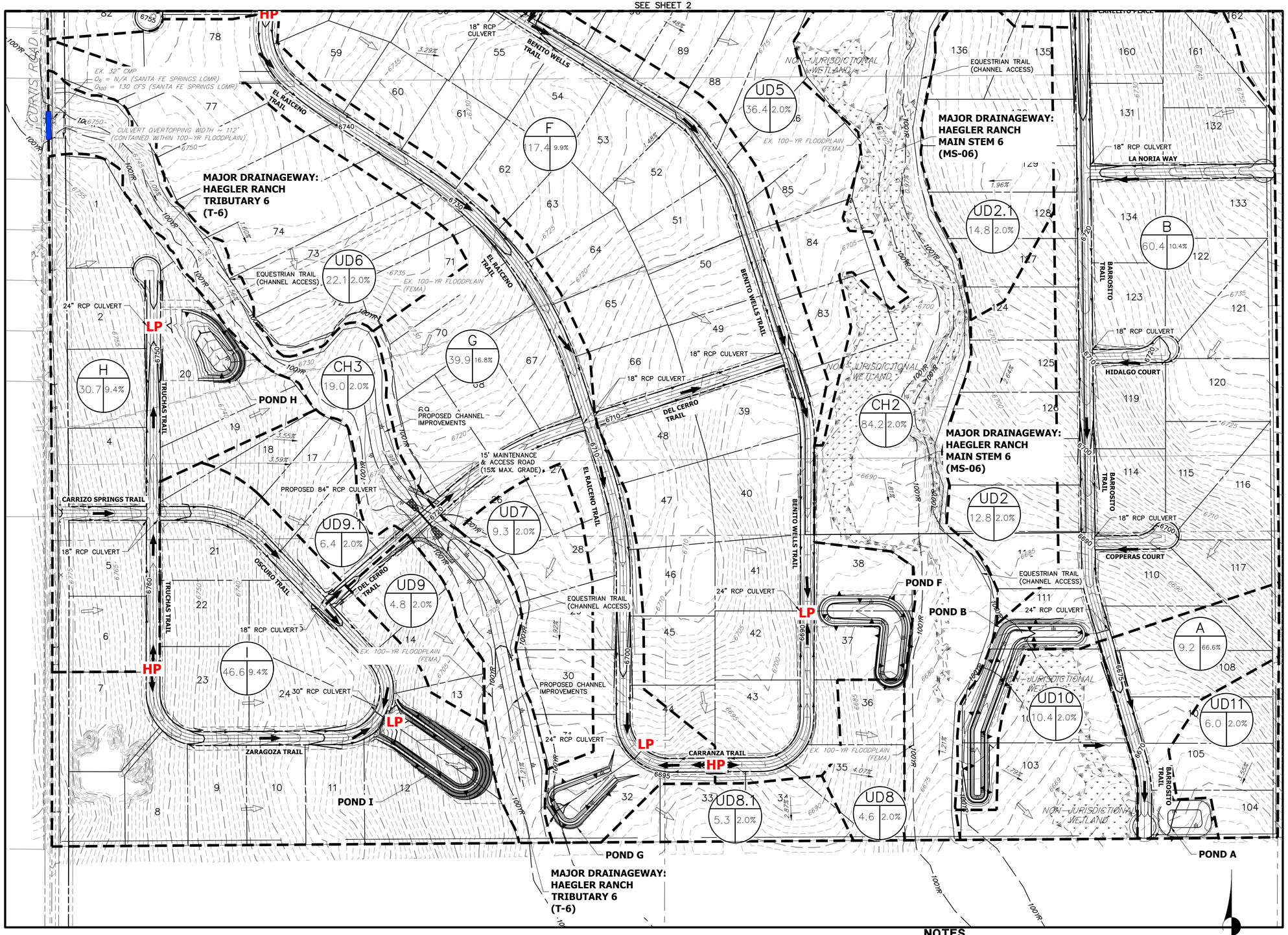
SADDLEHORN RANCH SUBDIVISION

PROPOSED DRAINAGE MAP

SEE SHEET 2



BASIN SUMMARY TABLE

Tributary Sub-Basin	Area (acres)	Composite Percent Impervious	Q_5 (cfs)	Q_{100} (cfs)
A	9.2	66.6%	9.5	20.7
B	60.4	10.4%	9.9	46.3
C	102.5	11.4%	15.8	69.4
D	99.2	10.8%	29.4	95.4
E	11.6	11.6%	2.0	9.9
F	117.4	9.9%	17.0	69.9
G	39.9	16.8%	6.1	25.3
H	30.7	9.4%	3.7	17.9
I	46.6	9.4%	15.9	63.1
J	10.1	2.0%	3.0	10.5
UD1	12.4	2.0%	0.3	13.9
UD2	12.8	2.0%	0.1	7.7
UD2.1	14.8	2.0%	0.1	14.7
UD2.2	7.2	2.0%	0.1	5.5
UD3	13.4	2.0%	0.2	13.1
UD4	4.8	2.0%	0.03	3.4
UD5	36.4	2.0%	4.1	27.4
UD6	22.1	2.0%	0.1	12.4
UD7	9.3	2.0%	0.7	7.4
UD8	4.6	2.0%	0.03	3.3
UD8.1	5.3	2.0%	0.1	5.6
UD9	4.8	2.0%	0.1	4.2
UD9.1	6.4	2.0%	0.2	8.1
UD10	10.4	2.0%	0.1	6.7
UD11	6	2.0%	0.02	4.3
CH1	23.9	2.0%	5.4	21.0
CH2	84.2	2.0%	2.6	33.7
CH3	19.0	2.0%	0.1	6.5
Total	825.4	N/A	126.7	627.3

POND SUMMARY TABLE

Tributary Sub-Basin	Pond Name	Tributary Acres	WQ Volume (ac-ft)	100-Year Volume (ac-ft)	Provided Volume (ac-ft)	100-Year Peak Discharge (cfs)	Ex. 100-Year Peak Discharge (cfs)
A	POND A	9.2	0.20	1.14	1.14	2.5	2.8
B	POND B	60.4	0.35	1.46	2.17	18.9	21.0
C	POND C	102.5	0.64	2.69	2.77	26.0	28.9
D	POND D	99.2	0.59	2.86	2.97	47.7	53.0
E	POND E	11.6	0.05	0.23	0.39	4.7	5.2
F	POND F	117.4	0.65	3.20	3.35	50.7	56.3
G	POND G	39.9	0.34	1.36	1.62	10.1	11.2
H	POND H	30.7	0.16	0.70	1.18	10.5	11.7
I	POND I	46.6	0.25	1.09	1.41	26.8	29.8

LEGEND

- I.D. / A / B — BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: COMP. % IMPERVIOUS
- X — DESIGN POINT
- BASIN DELINEATION
- 6100 — EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100 — PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP — PROPOSED HIGH POINT
- LP — PROPOSED LOW POINT

SADDLEHORN RANCH
SUBDIVISION
MDDP DRAINAGE MAP
25142.00
12/18/19
SHEET 1 OF 3

NOTES

1. ALL CULVERT SIZES ARE PRELIMINARY AND SUBJECT TO CHANGE WITH FINAL DRAINAGE REPORTS.

200 100 0 200 400

ORIGINAL SCALE: 1" = 200'

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Fort Collins 970-491-9888 • www.jrengineering.com

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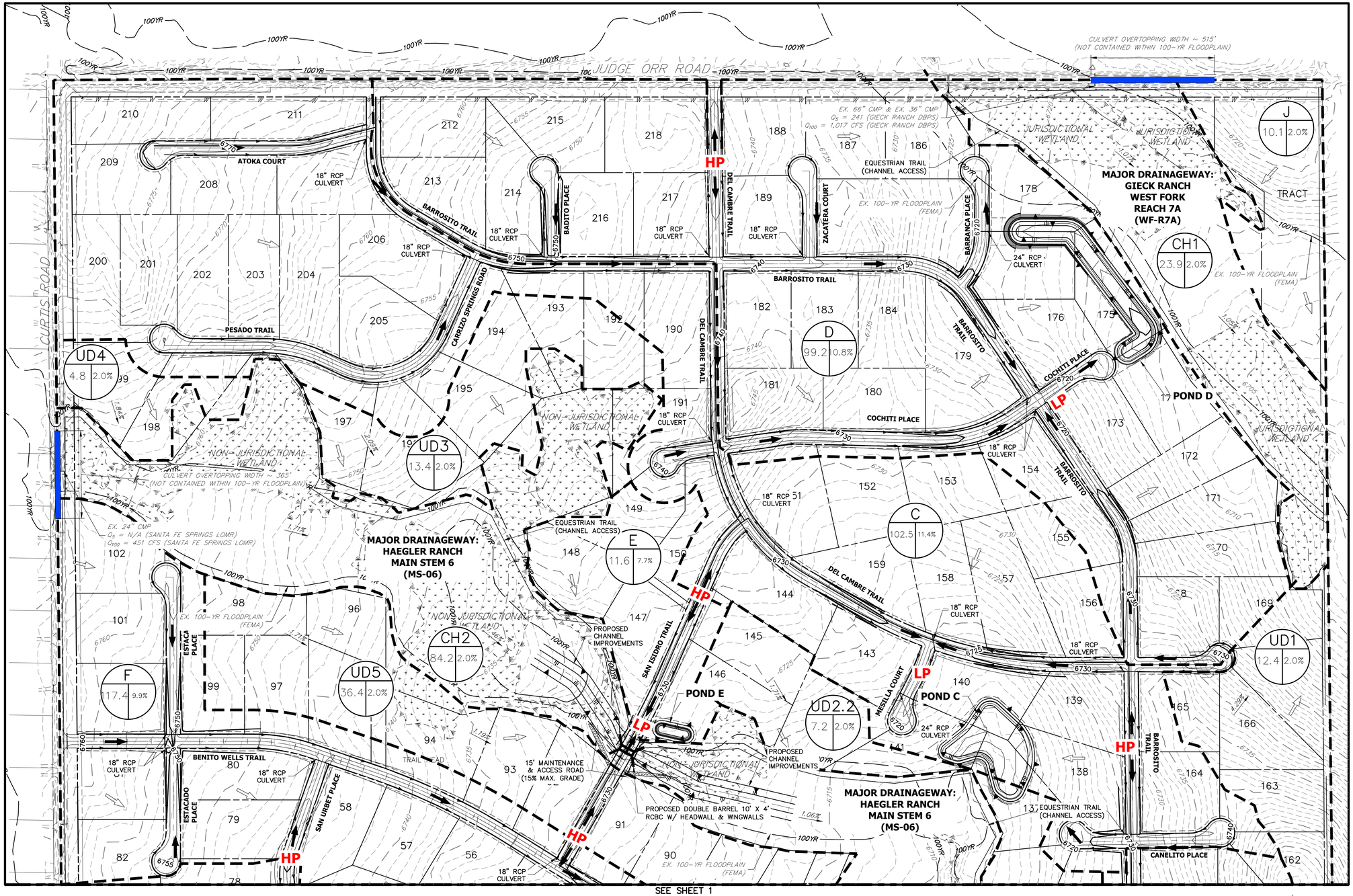
SADDLEHORN RANCH SUBDIVISION
PROPOSED DRAINAGE MAP



BASIN SUMMARY TABLE				
Tributary Sub-Basin	Area (acres)	Composite Percent Impervious	Q_5 (cfs)	Q_{100} (cfs)
A	9.2	66.6%	9.5	20.7
B	60.4	10.4%	9.9	46.3
C	102.5	11.4%	15.8	69.4
D	99.2	10.8%	29.4	95.4
E	11.6	11.6%	2.0	9.9
F	117.4	9.9%	17.0	69.9
G	39.9	16.8%	6.1	25.3
H	30.7	9.4%	3.7	17.9
I	46.6	9.4%	15.9	63.1
J	10.1	2.0%	3.0	10.5
UD1	12.4	2.0%	0.3	13.9
UD2	12.8	2.0%	0.1	7.7
UD2.1	14.8	2.0%	0.1	14.7
UD2.2	7.2	2.0%	0.1	5.5
UD3	13.4	2.0%	0.2	13.1
UD4	4.8	2.0%	0.03	3.4
UD5	36.4	2.0%	4.1	27.4
UD6	22.1	2.0%	0.1	12.4
UD7	9.3	2.0%	0.7	7.4
UD8	4.6	2.0%	0.03	3.3
UD8.1	5.3	2.0%	0.1	5.6
UD9	4.8	2.0%	0.1	4.2
UD9.1	6.4	2.0%	0.2	8.1
UD10	10.4	2.0%	0.1	6.7
UD11	6	2.0%	0.02	4.3
CH1	23.9	2.0%	5.4	21.0
CH2	84.2	2.0%	2.6	33.7
CH3	19.0	2.0%	0.1	6.5
Total	825.4	N/A	126.7	627.3

POND SUMMARY TABLE							
Tributary Sub-Basin	Pond Name	Tributary Acres	WQ Volume (ac-ft)	100-Year Volume (ac-ft)	Provided Volume (ac-ft)	100-Year Peak Discharge (cfs)	Ex. 100-Year Peak Discharge (cfs)
A	POND A	9.2	0.20	1.14	1.14	2.5	2.8
B	POND B	60.4	0.35	1.46	2.17	18.9	21.0
C	POND C	102.5	0.64	2.69	2.77	26.0	28.9
D	POND D	99.2	0.59	2.86	2.97	47.7	53.0
E	POND E	11.6	0.05	0.23	0.39	4.7	5.2
F	POND F	117.4	0.65	3.20	3.35	50.7	56.3
G	POND G	39.9	0.34	1.36	1.62	10.1	11.2
H	POND H	30.7	0.16	0.70	1.18	10.5	11.7
I	POND I	46.6	0.25	1.09	1.41	26.8	29.8

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- —6100— PROPOSED INDEX CONTOURS
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NOTES

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SADDLEHORN RANCH
MDDP DRAINAGE MAP
25142.00
12/18/19
SHEET 2 OF 3

200 100 0 200 400
ORIGINAL SCALE: 1" = 200'

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FINAL DRAINAGE REPORT
FOR
SADDLEHORN RANCH – FILING 1

Prepared For:
ROI Property Group, LLC
2495 Rigdon Street
Napa, CA 94558
(707) 365-6891

Remove the MDDP/Prelim drainage report and only include snippets of information pertinent to the design.

May 7, 2020
Project No. 25142.02

Prepared By:
JR Engineering, LLC
5475 Tech Center Drive
Colorado Springs, CO 80919
719-593-2593

El Paso County PCD File No.:
SF-19-012

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 El Paso County for drainage reports and said report is in conformity with the 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.

Mike Bramlett, Colorado P.E. # 32314 Date
For and On Behalf of JR Engineering, LLC

DEVELOPER'S STATEMENT:

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

Business Name: ROI Property Group, LLC

By: _____

Title: _____
Address: 2495 Rigdon Street
Napa, CA 94558

El Paso County:

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

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

Conditions:

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PURPOSE

This document is the Final Drainage report for Filing 1 of Saddlehorn Ranch. The purpose of this report is to:

1. Identify on-site and off-site drainage patterns.
2. Recommend storm water facilities to collect and convey storm runoff from the proposed development to appropriate discharge and/or detention locations.
3. Recommend water quality and detention facilities to control discharge release rates to below historic.
4. Demonstrate compliance with surrounding major drainage basin planning studies, master development drainage plans and flood insurance studies.

GENERAL LOCATION AND DESCRIPTION

Location

The proposed Saddlehorn Ranch Filing 1, known as "Filing 1" from herein, is a parcel of land located in Section 3 and 10, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. Saddlehorn Ranch is an 824 acre, rural, single family-development. Filing 1 is 174 acres and is comprised of 55 lots of the overall Saddlehorn Ranch development. Saddlehorn Ranch is bound by Judge Orr Road to the North and Curtis Road to the West. To the East, Saddlehorn Ranch is bound by undeveloped land owned by Brent Houser Enterprises, LLC. To the south, Saddlehorn Ranch is bound by undeveloped properties owned by Carolyn Gudzunas and Faye Reyonlds. Filing 1 is bound by future filings to the North and East while it is bound by Curtis Road to the West and to the South by undeveloped properties owned by Carolyn Gudzunas and Faye Reyonlds. A vicinity map is presented in Appendix A.

Currently, is one major Drainageway that bisects Filing 1: Haegler Ranch Tributary 6 (T-6). This Drainageway was analyzed, both hydrologically and hydraulically, in the following reports:

- Haegler Ranch Basin Drainage Basin Planning Study (DBPS), May 2009.
- Santa Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision, June 2004.
- Preliminary Drainage Report/Master Development Drainage Plan for Saddlehorn Ranch, April 2019.

The impact of this Drainageway and planning studies on the proposed development will be discussed later in the report.

Description of Property

Filing 1 is currently unoccupied and undeveloped. The existing ground cover is sparse vegetation and open space, typical of a Colorado rolling range land condition. In general, Filing 1 slopes from northwest to southeast and the existing Drainageway follows this topography.

Per a NRCS web soil survey of the area, Filing 1 is made up of Type A and B soils. Type A soils cover roughly 91% of Filing 1 while Type B soils cover 9% of Filing 1. Group A soils have a high infiltration rate when thoroughly wet. Type B soils have a moderate infiltration when thoroughly wet. A NRCS soil survey map has been presented in Appendix A.

There are two existing wells in the south west corner of Filing 1.

Floodplain Statement

Based on the FEMA FIRM Map number 08041C0558G, dated December 7, 2018, Filing 1 lies within Zone AE and Zone X. Zone AE is defined as area subject to inundation by the 1-percent-annual-chance flood event. Zone X is defined as area outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (or 500-year) flood. All proposed residential development within Filing 1 will occur in Zone X. The FIRM Map has been presented in Appendix A.

DRAINAGE BASINS AND SUBBASINS

Existing Major Basin Descriptions

Filing 1 lies within Haegler Ranch Drainage Basin based on the "*Haegler Ranch Drainage Basin Planning Study*" prepared by URS Corporation in May 2009.

The Haegler Ranch Drainage Basin covers approximately 16.6 square miles in unincorporated El Paso County, CO. The Haegler Ranch Drainage Basin is tributary to Black Squirrel Creek. In its existing condition, the basin is comprised of rolling rangeland with poor vegetative cover associated with Colorado's semi-arid climate. The natural Drainageways within the basin are typically shallow and wide with poorly defined flow paths in most areas. Anticipated land use for the basin includes residential and commercial development. Residential developments will range from 0.125 – 5 acre lots with a mix of low, medium and high density developments.

As part of its drainage research, JR Engineering reviewed the following drainage studies, reports and LOMRs:

- Haegler Ranch Drainage Basin Planning Study prepared by URS Corporation in May 2009
- Santa Fe Springs – Haegler Ranch Drainage Basin Letter of Map Revision prepared by Tri-Core Engineering in June 2004.
- Preliminary Drainage Report/Master Development Drainage Plan for Saddlehorn Ranch, prepared by JR Engineering, April 2019.

The *Haegler Ranch Drainage Basin Planning Study* was used to establish a stormwater management plan for the existing and future stormwater infrastructure needs within the Haegler Ranch Drainage Basin. Based on provided drainage maps and analysis, in its existing condition Haegler Ranch contributes a 100-year flow of 120 cfs onto Filing 1. The offsite drainage crosses Curtis Road in an existing 36" CMP onto

Filing 1. Major Drainageway T-6 conveys the stormwater through Filing 1 and to its off-site confluence with Major Drainageway MS-05. The existing 36" CMP culvert is undersized for existing flows.

The *Haegler Ranch DBPS* evaluated two detention alternatives for the drainage basin: region and sub regional. In the regional approach, it is recommended the existing 36" CMP be upsized to a 60" RCP. In the sub-regional approach, this culvert is recommended to be left in its existing condition.

The existing 36" CMP culvert will not be upsized within the context of this report and development. The culvert is owned by El Paso County and timing of improvements, if any, will be controlled by the County.

Furthermore, the *Haegler Ranch DBPS* recommends channel improvements within Drainageway T-6. Per the *Haegler Ranch DBPS*, Drainageway T-6 should be improved to a trapezoidal channel with an 8' bottom width, 4:1 side slopes and design depth of five feet. The DBPS also recommends a total of seven (7) four-foot drops within the on-site portion of T-6 to limit erosive velocities. The recommended drop structures will not be constructed with Saddlehorn Ranch Filing 1. Proposed channel improvements will limit erosive velocities without the use of drop structures. See recommended channel improvement sheets from the *Haegler Ranch DBPS* presented in Appendix E.

Based on flood impacts, stream stability and cost effectiveness, this study recommended a sub-regional detention approach. This allows future development anywhere in the basin with the construction of an associated sub-regional pond. However, based on the *Preliminary Drainage Report/Master Development Drainage Plan for Saddlehorn Ranch,* Filing 1 will utilize on-site full spectrum water quality and detention ponds instead. These full spectrum detention ponds will limit developed discharge into the Drainageways to less than historic rates.

The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR was executed on Haegler Ranch Tributary 2, 3, and 4. The LOMR revised the onsite effective flood zone from Zone A to Zone AE. See FIRM Map Panel 08041C0558G for limits of LOMR study and revised flood zones, presented in Appendix E.

Of the three drainageways that were evaluated in the LOMR, Haegler Ranch Tributary 4 passes through Filing 1. Within the boundary of the proposed development, Haegler Ranch Tributary 4 is synonymous with T-6 from the *Haegler Ranch DBPS*. The purpose of the LOMR was to revise the flood hazard depicted in the current Flood Insurance Study. Per the LOMR, an existing 100-year flow of 130 cfs crosses onto Filing 1 in Haegler Ranch Tributary 4. The off-site flow of 130 cfs carried within Tributary 4 was used to design the 84" RCP culvert and associated channel improvements outline in this report. Plan and profiles of the culvert and Drainageway T-6 improvements has been presented in Appendix F.

See Table 2 for comparison of Drainageway identification and the naming convention used within the context of this report. See Table 3 for a comparison of 100-year flows as calculated in the aforementioned DBPS and LOMR. An existing conditions drainage map is presented in Appendix F.

Table 1: Major Drainageway Naming Convention

Saddlehorn Ranch Filing 1 Final Drainage Report	**Per *Haegler Ranch DBPS*:**	**Per *Sante Fe Springs LOMR*:**
T-6	Tributary 6 (T-6)	Haegler Ranch Tributary 4

Table 2: Major Drainageway – Ex. 100-Year Flow Comparison

Drainageway Name	**Q_{100} Per *Haegler Ranch DBPS*:**	**Q_{100} Per Sante Fe Springs LOMR:**
T-6	120 cfs	130 cfs

The *Preliminary Drainage Report/Master Development Drainage Plan for Saddlehorn Ranch* proposed the overall drainage facility design for Saddlehorn Ranch. Within the context of this report, onsite drainage basins and associated full spectrum water quality ponds were established. As it pertains to Filing 1, three full spectrum water quality ponds are recommended. Roadside ditches and local street culverts will be utilized to capture and convey Filing 1's runoff to the water quality ponds. Water quality ponds will discharge into Drainageway T-6 at less than historic rates.

In order to maintain the function of Drainageway T-6, the PDR/MDDP recommends an 84" reinforced concrete pipe (RCP) culvert at the crossing of Del Cerro Trail and Drainageway T-6 in addition to channel improvements up and downstream of the culvert. This culvert and channel improvements are designed to ensure a no-rise scenario in the floodplain.

Existing Sub-basin Drainage

On-site, existing sub-basin drainage patterns are generally from northwest to southeast by way of Drainageway T-6. On-site areas flow directly into this drainageway, which also bypasses off-site flow through Filing 1.

Proposed Sub-basin Drainage

The proposed Filing 1 basin delineation is as follows;

Filing 1 contains a 14.0 acre portion of Basin F which is comprised of Sub-basins F1-F4. The remaining area of Basin F is within the boundary of future Filings 2 and 3. In its existing condition, Basin F is rolling rangeland and runoff generally flows southeast towards Drainageway MS-06. In the Filing 1 proposed condition of Basin F, only four 2.5 acre lots will be developed and the remaining area will be undeveloped. During Filing 1, runoff from this basin will be captured in roadside ditches and conveyed to one of two temporary sediment basins. Per Section I.7.1.B.5 of the ECM – Stormwater Quality Policy and Procedures a single-family residential lots, greater than or equal to 2.5 acres, and having a total lot imperviousness no greater than 10% can be excluded from permanent stormwater quality. Sub-basins F1

and F2, Imperviousness (I) =7.0% and I=2.0% respectively, are comprised of 2.5 acre residential lots and undeveloped area, therefore; they are routed to Sediment Basin F1. In future filings of Saddlehorn Ranch, when all of Basin F will develop, a permanent, full spectrum water quality and detention pond (Pond F) will be constructed to detain and treat the developed flows from Sub-basin F1 and F2.

Per Section I.7.1.C.1 of the ECM – Stormwater Quality Policy and Procedures, the County may exclude up to 20%, not to exceed 1 acre, of the applicable development site, from the WQCV standard. Sub-basin F3 and F4 total 2.86 acres, of which 0.17 ac is asphalt roadway and 0.20 acre is gravel cul-de-sac. The combined developed area in F3 and F4 totals 0.37 acres which is approximately 0.2% of the development site. The remaining 2.49 acres are 2.5 acre residential lots with I=6.2%. Per Section I.7.1.C.1 and I.7.1.B.5, Sub-basin F3 and F4 will be excluded from permanent stormwater quality in Filing 1 and instead will be routed to Sediment Basin F2. In future filings of Saddlehorn Ranch, when all of Basin F will develop, a permanent, full spectrum water quality and detention pond (Pond F) will be constructed to detain and treat the developed flows from Sub-basin F3 and F4.

Basin G consists of Sub-basins G1-G7, F-G1 & F-G2 combining for a total of 46.5 acres. In its existing condition, Basin G is rolling rangeland and runoff generally flows south and west to Drainageway T-6. In the proposed condition, Basin G will be rural 2.5 acre lots, paved roadway and will include Pond G. Basins F-G1 & F-G2 are Basin G area outside of Filing 1, however; these basins are tributary to Filing 1 and will be fully developed in future Filing 2. Therefore, F-G1 & F-G2 were analyzed as developed basins within the context of this report to adequately size ditches, culverts and water quality pond for the fully developed future condition. Runoff from this basin will be collected in road side ditches and conveyed south along El Raiceno Trail and west along Carranza Trail to Pond G. Pond G will be a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway T-6.

Basin H consists of Sub-Basins H1-H4 combining for a total of 21.2 acres. In its existing condition, Basin H is rolling rangeland and runoff generally flows southeast towards Drainageway T6. In the proposed condition, Basin H will be rural 2.5 acre lots, paved roadway and will include Pond H. Runoff from this basin will be collected in road side ditches and conveyed along Truchas Trail to Pond H. Pond H will be a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway T-6.

Basin I consists of Sub-basins I1-I7 combining for a total of 37.4 acres. In its existing condition, Basin I is rolling rangeland and runoff generally flows east across the basin towards Drainageway T-6. In the proposed condition, Basin I will be rural 2.5 acre lots, paved roadway and will include Pond I. Runoff from this Basin I1-I6 will be collected in road side ditches and conveyed south down Oscuro Trail and east down Zaragoza Trail as well as Oscuro Trail to Pond I. Pond I will be a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway T-6. Section I.7.1.B.5 of the ECM – Stormwater Quality Policy and Procedures single-family residential lots, greater than or equal to 2.5 acres, and having total lot imperviousness no greater than 10% can be excluded from permanent stormwater quality. Per Section I.7.1.B.5, Basin I7 (exclusively rural 2.5+ acre residential lots, I=6.2%) will be excluded from permanent stormwater management and due to existing topography it will not be routed to Pond I.

Basin UD1-UD6 combine for a total of 53.4 acres. In their existing condition, these basins are rolling rangeland. Runoff from Basins UD1-UD3 generally flows south and east to Drainageway T-6, while Basins UD4 & UD5 generally flow south and west to Drainageway T-6. Basin UD-6 flows directly south and off site. In the proposed condition, Basins UD1-UD6 will be rural 2.5 acre lots with an Imperviousness = 6.2% and will be excluded from permanent stormwater quality management per Section I.7.1.B.5 of the ECM – Stormwater Quality Policy and Procedures. However; Basin UD2 and UD3 contain approximately 0.30 ac of paved roadway, equal to approximately 0.20% of the total development site. Due to existing topography, these basins can't be captured and routed to a permanent, full spectrum water quality and detention pond. We respectfully request that Basin UD2 and UD3 be excluded from permanent stormwater quality management, per Section I.7.1.C.1.

Basin OS1-OS3 combine for a total of 2.06 acres of offsite area. In their existing condition, these basins are paved roadway (Curtis Road) and undeveloped area. In the proposed condition, Basin OS2 and OS3 will be improved with 1' of pavement width and the stretch of Curtis Road within basin OS1 will be improved with a deceleration lane for access to Filing 1. Basin OS1-OS2 will follow existing drainage patterns and will flow on-site prior to capture in a roadside ditch and conveyed to Pond H. Pond H will be a full spectrum water quality and detention pond and will release at less than historic rates into Drainageway T-6. Basin OS3 will not be detained in Pond H due to its location relative to Pond H as well as Section I.7.1.B.2 of the ECM – Stormwater Quality Policy and Procedures states that site's adding less than 1 acre of paved area per mile of roadway to an existing roadway can be excluded from permanent stormwater quality. The improvements along Curtis Road would add 5,280 ft^2 over the length of one mile and therefore meet the exclusion present in Section I.7.1.B.2.

A summary table of proposed basin parameters and flow rates is presented in Appendix B.

Basins G, H and I runoff will be captured in roadside ditches and conveyed to a corresponding full spectrum water quality and detention pond. Each full spectrum pond will release treated flows at less than historic rates to minimize adverse impacts downstream. Ponds G, H and I will discharge into Major Drainageway T-6. Basin F flows will be captured in roadside ditches and conveyed to two temporary sediment basins. When Filing 2 development commences, these sediment basins will be replaced with a single full spectrum water quality pond (Pond F).

See Table 5 below for comparison of proposed Filing 1 pond parameters.

Table 3: Pond Summary

Tributary Sub-Basin	Pond Name	Tributary Acres	WQ Volume (ac-ft)	Total Detention Volume (ac-ft)	Provided Volume (ac-ft)	Maximum 100-Year Discharge (cfs)
G	POND G	33.57	0.307	1.244	1.286	8.2
H	POND H	21.16	0.181	0.730	0.772	6.5
I	POND I	38.04	0.325	1.335	1.391	20.0

Proposed Channel Improvements – Haegler Ranch T-6

Haegler Ranch T-6 conveys an existing 130 cfs through the site. In order to maintain the drainage patterns in the channel, an 84" RCP culvert is proposed at the crossing with Del Cerro Trail. In order to facilitate this culvert, upstream and downstream channel improvements are required. The proposed channel section includes a 50' bottom width, an 12' wide/1' deep low flow channel and 10:1 tie backs to existing grades. The channel also includes reinforced rock berms at 150' intervals to ensure the flow remains subcritical. The entire channel will be lined with erosion control blanket and seeded with Pawnee Butte Seed Inc. – Low Grow Native Mix which includes fescue and bluegrasses. Per Table 10-4 in the EPC DCM fescue and bluegrass have a permissible velocity of 5 ft/s. Based on hydraulic analysis of the proposed channel geometry and slopes, the highest velocity present in the channel is 4.71 ft/s, therefore; the selected lining and seed mix is adequate for permanent vegetation. Channel hydraulic analysis sheets are presented in Appendix C. Channel cross section is presented on the drainage map in Appendix F.

Maintenance access to the channel will be provided on the upstream and downstream ends of the Del Cerro Culvert crossing with a 15' wide maintenance and access road. The access roads begin off the edge of pavement on Del Cerro Drive and terminate alongside the channel bottom. Existing and proposed grades within the channel are such that maintenance equipment can be operated without additional roadway. Access adjacent to the channel will be provided via equestrian trails that parallel the channel along Tract B and Tract C. Access roads are shown on the drainage map presented in Appendix F. Tract B and Tract C, which contain the existing channel and proposed channel improvements, will be owned and maintained by 824 Acre Metropolitan District No. 1.

DRAINAGE DESIGN CRITERIA

Development Criteria Reference

Storm drainage analysis and design criteria for the project were taken from the "*City of Colorado Spring/El Paso County Drainage Criteria Manual*" Volumes 1 and 2 (EPCDCM), dated October 12, 1994, the "*Urban Storm Drainage Criteria Manual"* Volumes 1 - 3 (USDCM) and Chapter 6 and Section 3.2.1 of Chapter 13 of the "Colorado Springs Drainage Criteria Manual (CCSDCM), dated May 2014, as adopted by El Paso County.

Hydrologic Criteria

All hydrologic data was obtained from the "El Paso Drainage Criteria Manual" Volumes 1 and 2, and the "Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual" Volumes 1, 2, and 3. Onsite drainage improvements were designed based on the 5 year (minor) storm event and the 100-year (major) storm event. Rational Method calculations were prepared, in accordance with Section 13.3.2.1. of the CCSDCM, for the sub-basins that directly impact the sizing of ditches and local street culverts. Rational method calculations are presented in Appendix B.

Urban Drainage and Flood Control District's UD-Detention, Version 3.07 workbook was used for pond sizing. Required detention volumes and allowable release rates were designed per USDCM and CCS/EPCDCM. Pond sizing spreadsheets are presented in Appendix D.

Hydraulic Criteria

The Federal Highway Administration's HY-8 program (Volume 7.50) was used to analyze the proposed box culvert within Drainageway T-6. Per Section 14.3.2 of the CCS/EPCDCM, a maximum headwater to rise ratio of 1.5 was used to size the 84" RCP culvert. The culvert was designed in conjunction with channel improvements to ensure a no rise scenario of the current floodplain elevations. A summary report of the 84" RCP culvert design is presented in Appendix C.

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) was used for roadside ditch design. Ditches were checked for velocity and capacity per the CCS/EPCDCM Section 12.3.2.2. In order to check capacity, a cross section analysis was performed on the roadside ditch with the basin's minimum ditch slope. In order to check velocity, a cross section analysis was performed on the roadside ditch with the basin's maximum ditch slope. Ditch cross sections have been presented in Appendix C.

Autodesk Inc.'s Hydraflow Express Extension (Volume 10.5) was used for local road crossing culvert design. Culvert size was determined based on 100-year flows and hydraulic criteria from EPCDCM Chapter 9 –Culvert Design. All local road crossing culverts are 18" or 24" RCP. Culvert design reports are presented in Appendix C.

DRAINAGE FACILITY DESIGN

General Concept

The proposed stormwater conveyance system was designed to convey the developed Filing 1 runoff to full spectrum water quality and detention ponds (Pond G, H, I) via roadside ditches and local street culverts. Pond G, H, and I were designed to release at less than historic rates to minimize adverse impacts downstream.

An 84" RCP culvert is proposed within Drainageway T-6 to convey existing, off site flows underneath Del Cerro Trail and through Filing 1, to maintain T-6 drainage patterns presented with the *Haegler Ranch DBPS*.

A trapezoidal channel section, 50' bottom width w/ 10:1 daylights to existing, is proposed 1,200 feet downstream and 650 feet upstream of the 84" RCP culvert in order to maintain water surface elevations at or below the current floodplain's base flood elevations. A proposed drainage map is presented in Appendix F showing locations of channel and culvert improvements.

Specific Details

Four Step Process to Minimize Adverse Impacts of Urbanization

In accordance with the El Paso County Drainage Criteria Manual Volume 2, this site has implemented the four step process to minimize adverse impacts of urbanization. The four step process includes reducing runoff volumes, stabilizing drainageways, treating the water quality capture volume (WQCV), and consider the need for Industrial Commercial BMP's.

Step 1, Reducing Runoff Volumes: The development of the project site is proposed single family residential lots (2.5 ac. min.) with open spaces and lawn areas interspersed within the development which helps disconnect impervious areas and reduce runoff volumes. Roadways utilize soil riprap lined roadside ditches further disconnecting impervious areas. These practices will also allow for increased infiltration and reduce runoff volume.

Step 2, Stabilize Drainageways: Filing 1 utilizes roadside ditches with culvert crossings throughout. These roadside ditches direct the on-site development flows to the multiple detention ponds within the project that release at or below historic rates into Drainageway T-6. Drainageway T-6 is stabilized upstream and downstream of the Del Cerro Trail culvert crossing. Based upon the proposed reduction in released flows compared to the pre-developed flows, no impact to downstream Drainageway T-6 is anticipated.

Step 3, Provide WQCV: Runoff from this development is treated through capture and slow release of the WQCV in multiple full spectrum water quality and detention ponds that are designed per current El Paso County drainage criteria.

Step 4 Consider the need for Industrial and Commercial BMP's: No industrial or commercial uses are proposed within this development. However, a site specific storm water quality and erosion control plan and narrative are prepared in conjunction with this report. Site specific temporary source control BMPs as well as permanent BMP's are detailed in this plan and narrative to protect receiving waters.

Water Quality

In accordance with Section 13.3.2.1 of the CCS/EPCDCM, full spectrum water quality and detention are provided for all developed basins. Outlet structure release rates are limited to less than historic rates to minimize adverse impacts to downstream stormwater facilities. Complete pond and outlet structure designs are presented in Appendix D.

Erosion Control Plan

The El Paso County Drainage Criteria Manual specifies an Erosion Control Plan and associated cost estimate must be submitted with each Final Drainage Report. The Erosion Control Plan for Filing 1 is submitted concurrently with this report.

Operation & Maintenance

In order to ensure the function and effectiveness of the stormwater infrastructure, maintenance activities such as inspection, routine maintenance, restorative maintenance, rehabilitation and repair, are required. All proposed drainage structures within the any platted County ROW will be owned and maintained by El Paso County. All proposed drainage structures within easements or tracts will be owned and maintained by the 824 Acre Metropolitan No. 1. Vegetation in the natural and improved portions of Drainageway T-6 is the responsibility of 824 Acre Metropolitan District No. 1. This includes all mowing, seeding and weed control activities. An Inspection & Maintenance Plan is submitted concurrently with this drainage report that details the required maintenance activities and intervals to ensure proper function of all stormwater infrastructure in the future.

Drainage and Bridge Fees

Drainage and Bridge Fees are due at time of final platting. An estimate of basin fees for the proposed development within Haegler Ranch drainage basin is provided below. Fee reduction for low density lots are applied to the overall basin fees in the next section. Additionally, reimbursable expenses are detailed below.

Total Filing 1 Platted Acres: 175.7 ac
Total Filing 1 Impervious Acres = 15.8 ac (175.7 ac x 9%)

Filing 1 Fee Totals (Prior to Reductions):

Bridge Fees
$ 1,524/ac x 15.8 ac = $24,079

Drainage Fees
$10,324/ac x 15.8 ac = $163,119

Filing 1 Drainage Fee Reduction: 25% Reduction for Low Density Lots: $163,119 x 25% = $40,780

Filing 1 Fee Totals (After Reductions):

Bridge Fees
$ 1,524/ac x 15.8 ac = $24,079

Drainage Fees
$163,119 - $40,780 = $122,339

Reimbursable Improvements:

The Haegler Ranch DBPS recommended channel improvements and a culvert crossing within the portions of on-site Drainageway T-6, DBPS excerpts are presented in Appendix E. Therefore, Filing 1 channel and culvert improvements within Drainageway T-6 will be considered reimbursable. See below for an analysis of the applicable DBPS cost for the proposed channel and culvert improvements.

Hagler T-6 DBPS Cost Analysis

DBPS Reference	Item	Unit	Qty.	Total Cost	30% Contin.	15% Engr.	Total	$/Unit
Table 6-13	Channel Improvement Costs	LF	4,270	179,000	53,700	26,850	259,550	61
Table 6-13	Drop Structure Costs	Ea	9	330,000	99,000	49,500	478,500	53,167
Table 6-16	Double 66" RCP Culvert Crossing	Ea	1	43,000	12,900	6,450	62,350	62,350

Drainage Basin Fee Cost Ratio

DBPS Fee	7,633
2020 Fee	10,324
Ratio	1.35

Saddlehorn Filing 1 Reimbursable Improvements (DBPS Basis)

Item	Unit	Qty.	$/Unit	Total	DBPS Ratio	Reimbursable Est.
Channel Improvement Costs	LF	1,992	61	121,083	1.35	163,770
Drop Structure Costs	Ea	0	53,167	0	1.35	0
84" RCP Culvert Crossing	Ea	1	62,350	62,350	1.35	84,331
					Total	**248,102**

Due to the reimbursable improvements, no drainage fees are required to be paid at time of final platting.

Construction Cost Opinion

(For Information Only / Non-Reimbursable)
Cost opinion has been presented in Appendix A.

SUMMARY

The proposed development remains consistent with pre-development drainage conditions with the construction of the recommended drainage improvements, including ditches, culverts, detention ponds and drainage channel improvements. The proposed development will not adversely affect the offsite major Drainageways or surrounding development. This report meets the latest El Paso County Drainage Criteria requirements for this site and is in accordance with the PDR/MDDP for Saddlehorn Ranch.

REFERENCES:

1. City of Colorado Springs Drainage Criteria Manual Volume 1, City of Colorado Springs, CO, May 2014.

2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District, Latest Revision.

3. Preliminary Drainage Report/Master Development Drainage Plan for Saddlehorn Ranch, J.R. Engineering, April 2019.

4. Haegler Ranch Drainage Basin Planning Study, URS Corporation, May 2009.

5. The Santa Fe Springs – Haegler Ranch Drainage Basin LOMR, Federal Emergency Management Agency, October 20, 2004.

CURTIS ROAD - SOUTH CULVERT - EX 32" CMP - Q_100 = 130 CFS

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 100 cfs

Design Flow: 130 cfs

Maximum Flow: 150 cfs

Table 7 - Summary of Culvert Flows at Crossing: South Curtis Road

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6755.46	100.00	44.64	55.19	10
6755.48	105.00	44.78	60.13	4
6755.50	110.00	44.90	64.80	3
6755.52	115.00	45.03	69.67	3
6755.54	120.00	45.14	74.59	3
6755.55	125.00	45.26	79.52	3
6755.57	130.00	45.37	84.44	3
6755.59	135.00	45.48	89.36	3
6755.60	140.00	45.58	94.28	3
6755.62	145.00	45.68	99.20	3
6755.63	150.00	45.78	104.12	3
6755.01	41.61	41.61	0.00	Overtopping

Rating Curve Plot for Crossing: South Curtis Road

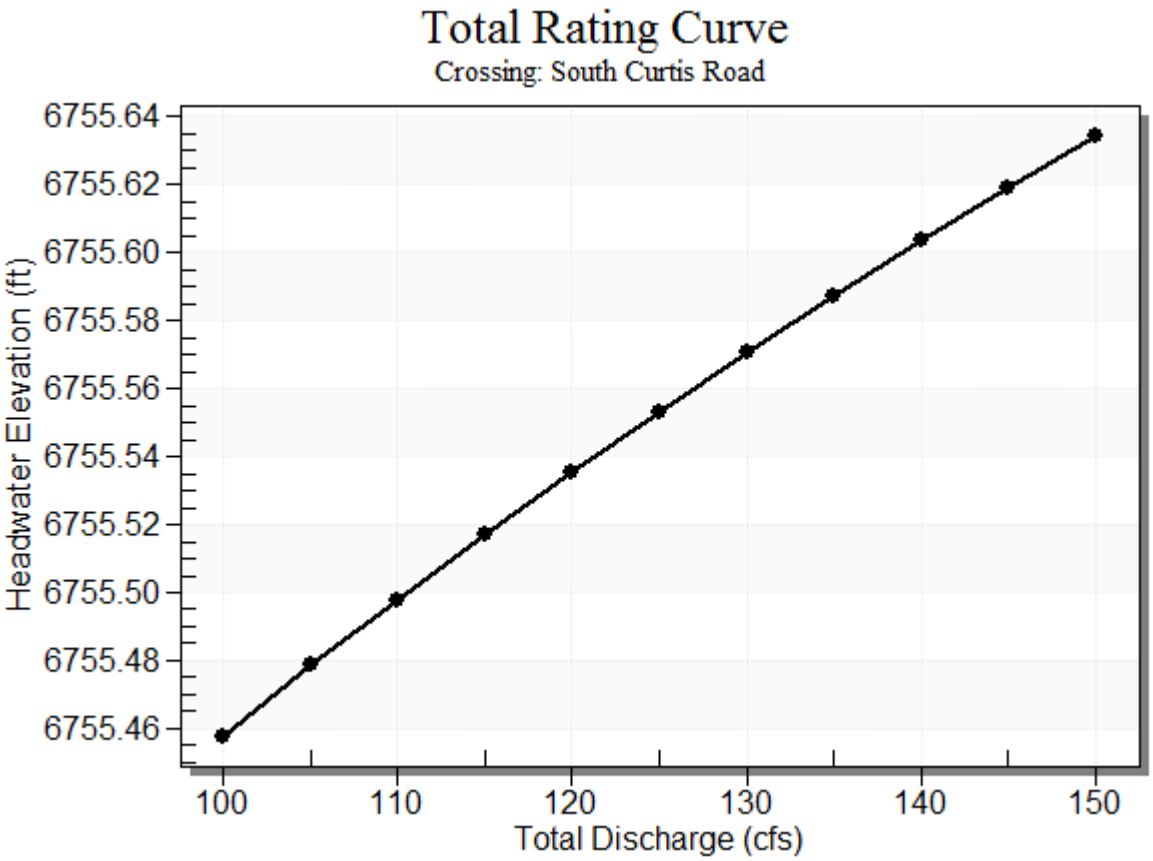


Table 8 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
100.00	44.64	6755.46	5.127	4.736	7-M2c	2.660	2.221	2.221	0.885	9.005	3.767
105.00	44.78	6755.48	5.148	4.759	7-M2c	2.660	2.224	2.224	0.912	9.022	3.838
110.00	44.90	6755.50	5.167	4.780	7-M2c	2.660	2.227	2.227	0.938	9.038	3.908
115.00	45.03	6755.52	5.186	4.801	7-M2c	2.660	2.229	2.229	0.964	9.053	3.975
120.00	45.14	6755.54	5.205	4.821	7-M2c	2.660	2.232	2.232	0.990	9.068	4.041
125.00	45.26	6755.55	5.223	4.840	7-M2c	2.660	2.234	2.234	1.015	9.082	4.105
130.00	45.37	6755.57	5.240	4.882	7-M2c	2.660	2.237	2.237	1.040	9.096	4.167
135.00	45.48	6755.59	5.257	4.898	7-M2c	2.660	2.239	2.239	1.064	9.110	4.228
140.00	45.58	6755.60	5.273	4.913	7-M2c	2.660	2.241	2.241	1.088	9.123	4.287
145.00	45.68	6755.62	5.289	4.928	7-M2c	2.660	2.243	2.243	1.112	9.136	4.346
150.00	45.78	6755.63	5.304	4.943	7-M2c	2.660	2.245	2.245	1.136	9.148	4.402

****

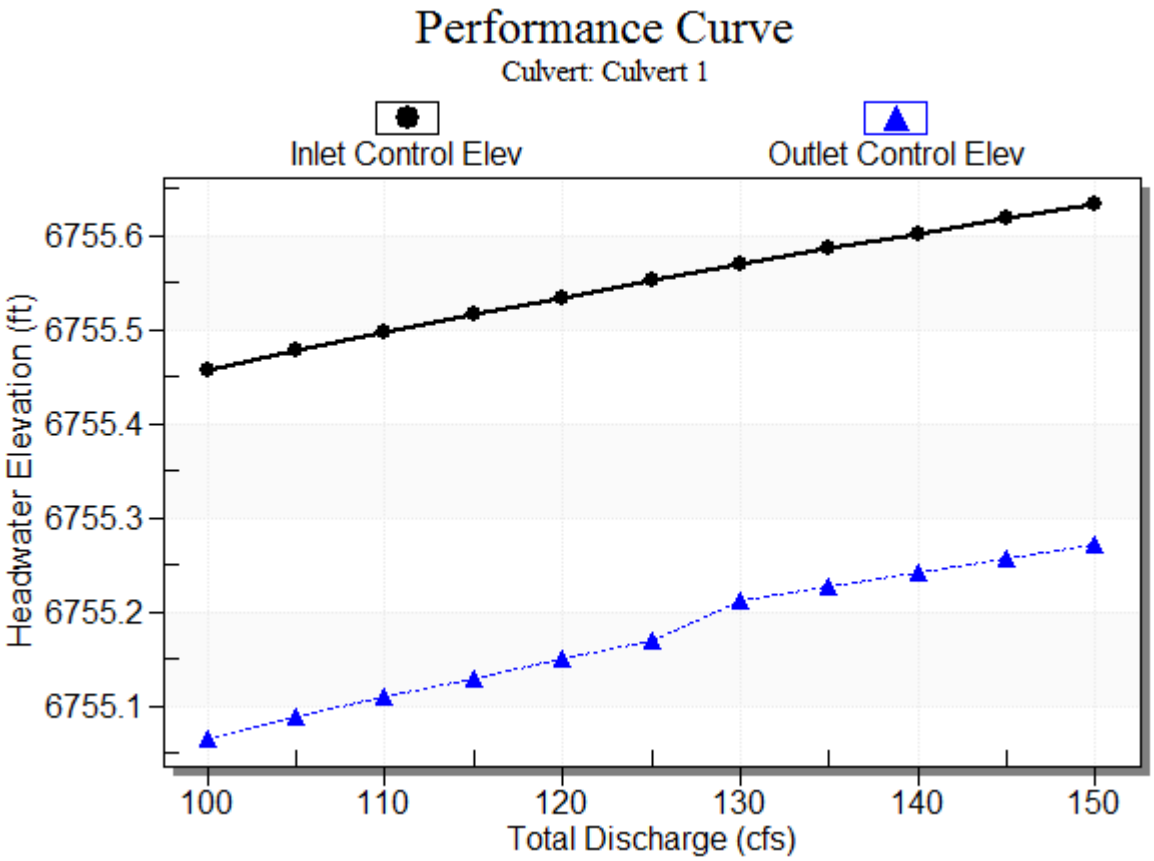
Straight Culvert

Inlet Elevation (invert): 6750.33 ft, Outlet Elevation (invert): 6749.44 ft

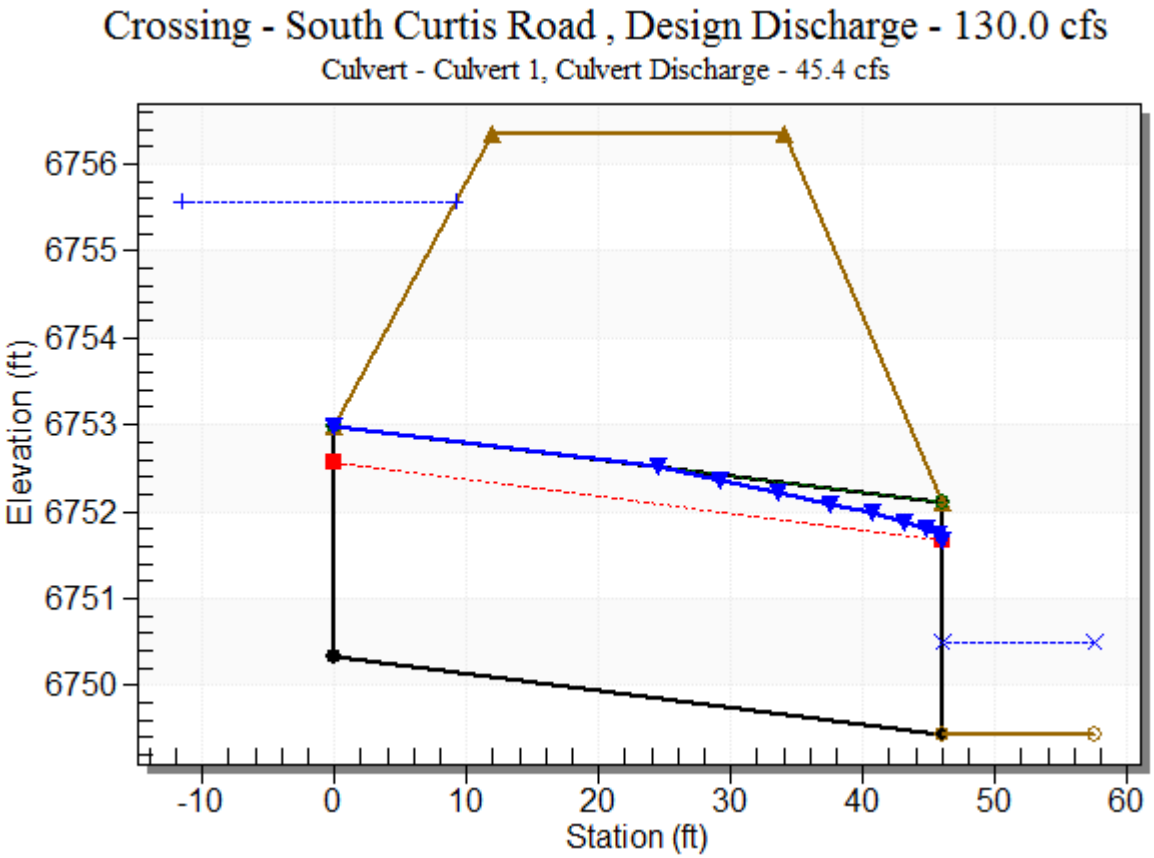
Culvert Length: 46.01 ft, Culvert Slope: 0.0193

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6750.33 ft

Outlet Station: 46.00 ft

Outlet Elevation: 6749.44 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.66 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Crossing Front View (Roadway Profile): South Curtis Road

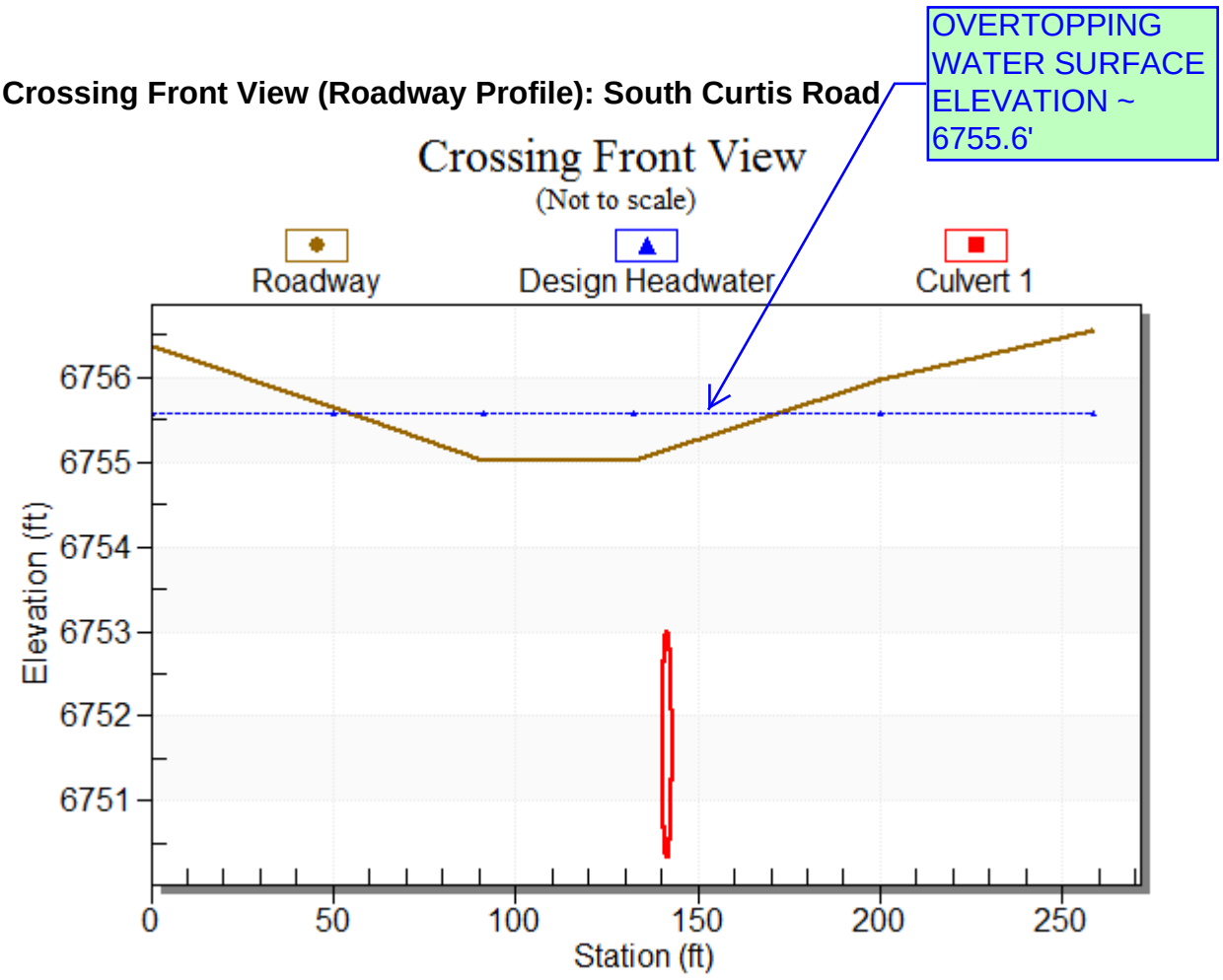


Table 9 - Downstream Channel Rating Curve (Crossing: South Curtis Road)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
100.00	6750.32	0.88	3.77	0.55	0.71
105.00	6750.35	0.91	3.84	0.57	0.71
110.00	6750.38	0.94	3.91	0.59	0.71
115.00	6750.40	0.96	3.98	0.60	0.71
120.00	6750.43	0.99	4.04	0.62	0.72
125.00	6750.46	1.02	4.11	0.63	0.72
130.00	6750.48	1.04	4.17	0.65	0.72
135.00	6750.50	1.06	4.23	0.66	0.72
140.00	6750.53	1.09	4.29	0.68	0.72
145.00	6750.55	1.11	4.35	0.69	0.73
150.00	6750.58	1.14	4.40	0.71	0.73

Tailwater Channel Data - South Curtis Road

Tailwater Channel Option: Rectangular Channel

Bottom Width: 30.00 ft

Channel Slope: 0.0100

Channel Manning's n: 0.0350

Channel Invert Elevation: 6749.44 ft

Roadway Data for Crossing: South Curtis Road

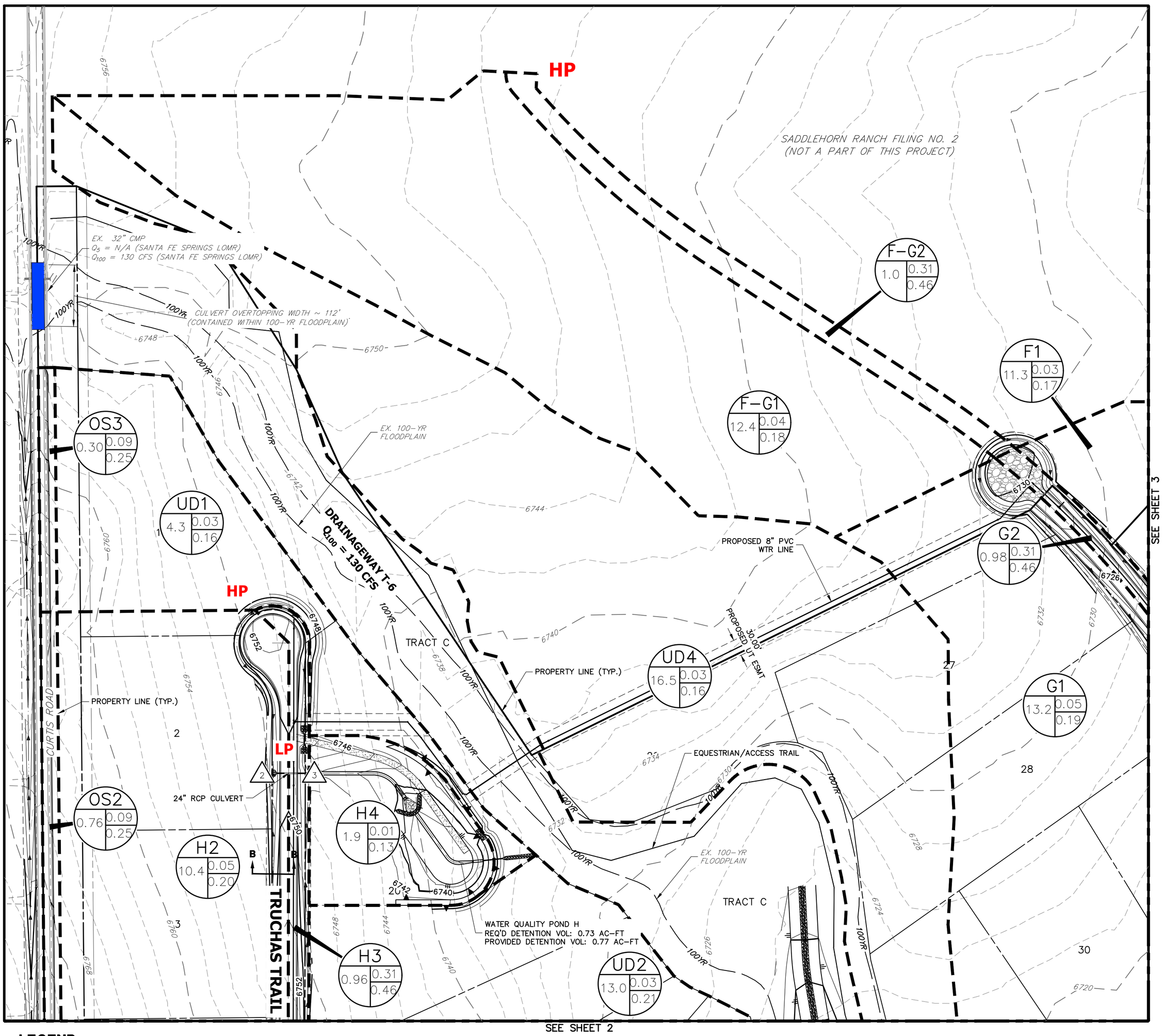
Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Roadway Surface: Paved

Roadway Top Width: 22.00 ft

SADDLEHORN RANCH - FILING 1

PROPOSED DRAINAGE MAP



LEGEND

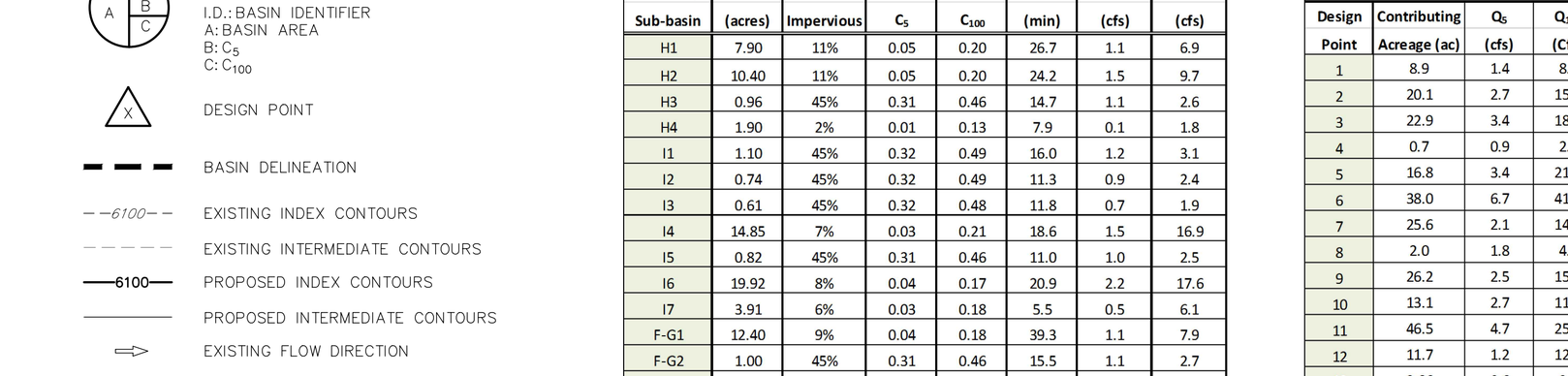
- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- 6100: EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100: PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP: PROPOSED HIGH POINT
- LP: PROPOSED LOW POINT

FILING 1 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
H1	7.90	11%	0.05	0.20	26.7	1.1	6.9
H2	10.40	11%	0.05	0.20	24.2	1.5	9.7
H3	0.96	45%	0.31	0.46	14.7	1.1	2.6
H4	1.90	2%	0.01	0.13	7.9	0.1	1.8
I1	1.10	45%	0.32	0.49	16.0	1.2	3.1
I2	0.74	45%	0.32	0.49	11.3	0.9	2.4
I3	0.61	45%	0.32	0.48	11.8	0.7	1.9
I4	14.85	7%	0.03	0.21	18.6	1.5	16.9
I5	0.82	45%	0.31	0.46	11.0	1.0	2.5
I6	19.92	8%	0.04	0.17	20.9	2.2	17.6
I7	3.91	6%	0.03	0.18	5.5	0.5	6.1
F-G1	12.40	9%	0.04	0.18	39.3	1.1	7.9
F-G2	1.00	45%	0.31	0.46	15.5	1.1	2.7
G1	13.20	11%	0.05	0.19	31.3	1.6	10.5
G2	0.98	45%	0.31	0.46	15.8	1.0	2.6
G3	0.63	45%	0.31	0.46	13.9	0.7	1.8
G4	2.50	26%	0.16	0.31	37.0	0.8	2.8
G5	11.15	11%	0.05	0.19	18.4	1.8	11.5
G6	4.36	5%	0.03	0.29	23.4	0.3	6.0
G7	0.31	45%	0.31	0.46	12.0	0.4	0.9
F1	11.30	7%	0.03	0.17	27.4	0.9	8.2
F2	0.36	2%	0.01	0.13	12.8	0.0	0.3
F3	2.39	7%	0.03	0.16	27.0	0.2	1.7
F4	0.47	45%	0.31	0.46	10.2	0.6	1.5
UD1	4.30	6%	0.03	0.16	9.1	0.5	4.9
UD2	13.00	7%	0.03	0.21	18.3	1.4	14.6
UD3	9.60	8%	0.04	0.26	14.6	1.3	14.7
UD4	16.50	6%	0.03	0.16	22.6	1.2	12.7
UD5	10.00	6%	0.03	0.27	24.9	0.9	12.7
UD6	6.80	6%	0.03	0.22	11.2	0.8	10.0
OS1	1.00	24%	0.14	0.29	27.2	0.4	1.3
OS2	0.76	18%	0.09	0.25	14.8	0.3	1.1
OS3	0.30	18%	0.09	0.25	7.9	0.1	0.6

FILING 1 - DESIGN POINT SUMMARY TABLE

Design Point	Contributing Acreage (ac)	Q_5 (cfs)	Q_{100} (Cfs)
1	8.9	1.4	8.2
2	20.1	2.7	15.7
3	22.9	3.4	18.3
4	0.7	0.9	2.4
5	16.8	3.4	21.8
6	38.0	6.7	41.5
7	25.6	2.1	14.8
8	2.0	1.8	4.4
9	26.2	2.5	15.6
10	13.1	2.7	11.7
11	46.5	4.7	25.9
12	11.7	1.2	12.0
13	2.86	0.6	2.7



T6 CHANNEL IMPROVEMENTS - TYPICAL SECTION

SCALE: 1"=10'

CHANNEL SEED MIX: EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 1
PROPOSED DRAINAGE MAP
2514202
11/27/19
SHEET 1 OF 4

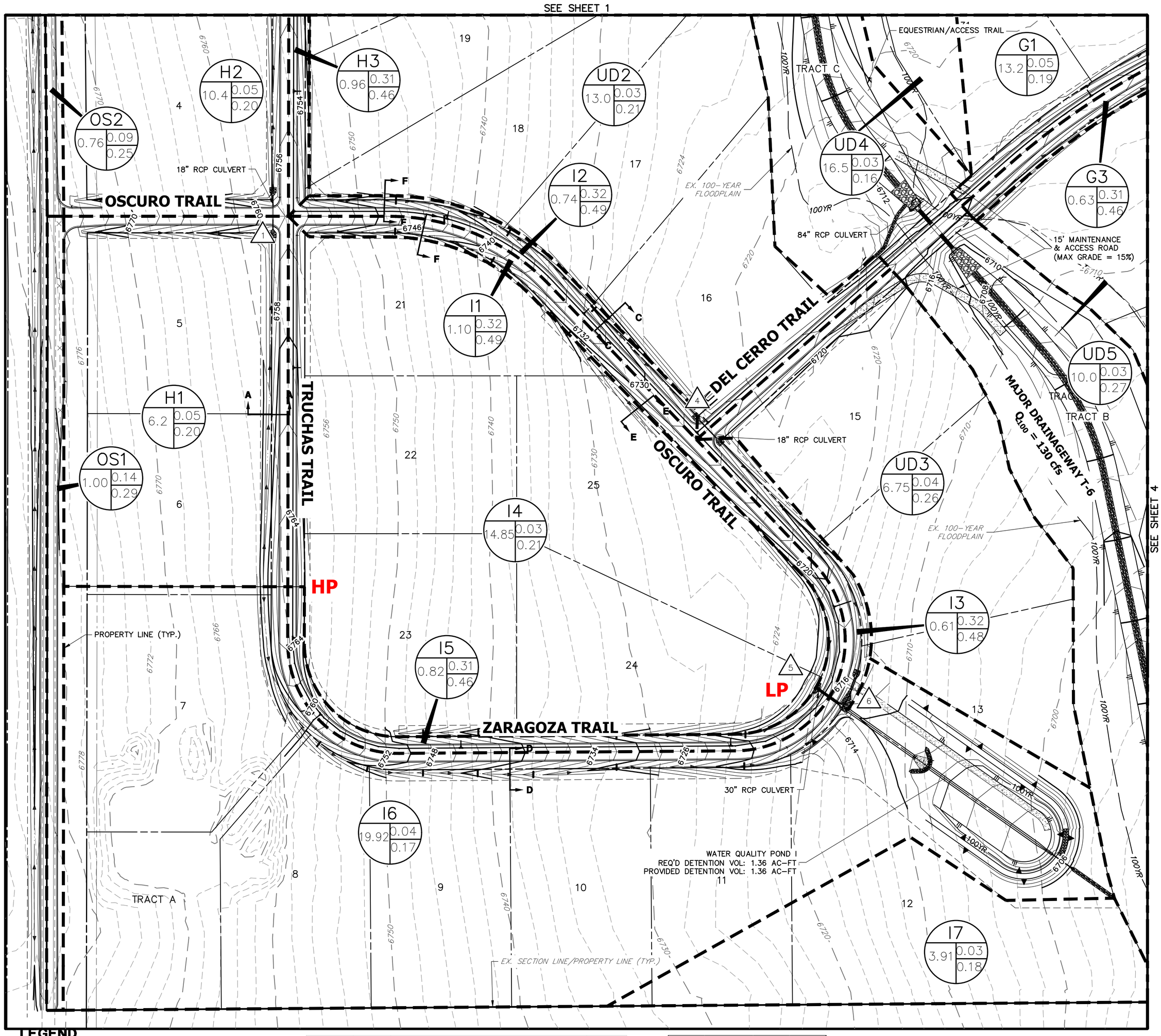
J·R ENGINEERING
A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com

X:\2510000.all\2514202\Drawings\Sheet Dwgs\Drainage\Filing 1 Drainage Map.dwg, DR01, 1/7/2020 1:34:31 PM, CS

SADDLEHORN RANCH - FILING 1

PROPOSED DRAINAGE MAP



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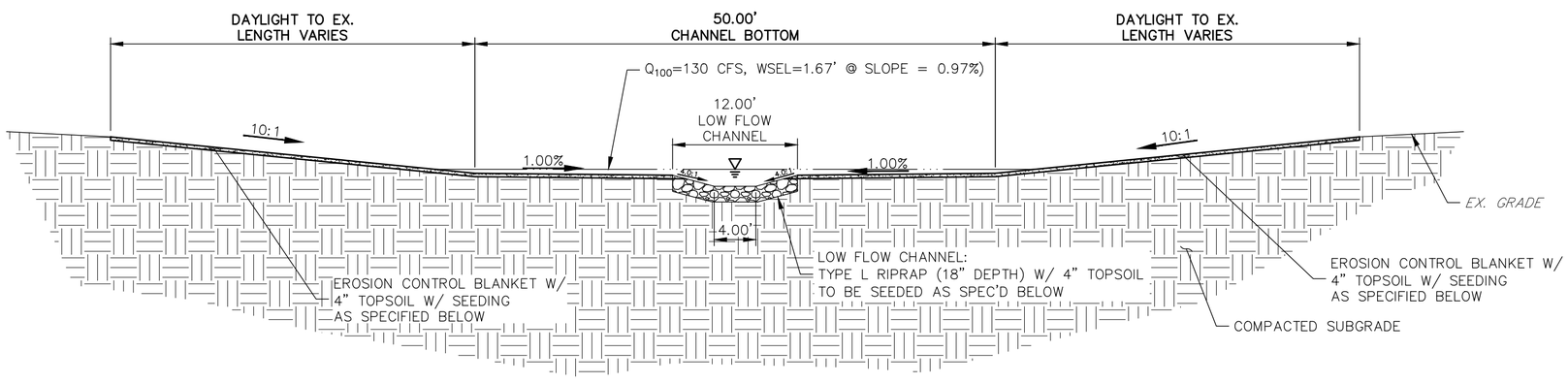
Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
H1	7.90	11%	0.05	0.20	26.7	1.1	6.9
H2	10.40	11%	0.05	0.20	24.2	1.5	9.7
H3	0.96	45%	0.31	0.46	14.7	1.1	2.6
H4	1.90	2%	0.01	0.13	7.9	0.1	1.8
I1	1.10	45%	0.32	0.49	16.0	1.2	3.1
I2	0.74	45%	0.32	0.49	11.3	0.9	2.4
I3	0.61	45%	0.32	0.48	11.8	0.7	1.9
I4	14.85	7%	0.03	0.21	18.6	1.5	16.9
I5	0.82	45%	0.31	0.46	11.0	1.0	2.5
I6	19.92	8%	0.04	0.17	20.9	2.2	17.6
I7	3.91	6%	0.03	0.18	5.5	0.5	6.1
F-G1	12.40	9%	0.04	0.18	39.3	1.1	7.9
F-G2	1.00	45%	0.31	0.46	15.5	1.1	2.7
G1	13.20	11%	0.05	0.19	31.3	1.6	10.5
G2	0.98	45%	0.31	0.46	15.8	1.0	2.6
G3	0.63	45%	0.31	0.46	13.9	0.7	1.8
G4	2.50	26%	0.16	0.31	37.0	0.8	2.8
G5	11.15	11%	0.05	0.19	18.4	1.8	11.5
G6	4.36	5%	0.03	0.29	23.4	0.3	6.0
G7	0.31	45%	0.31	0.46	12.0	0.4	0.9
F1	11.30	7%	0.03	0.17	27.4	0.9	8.2
F2	0.36	2%	0.01	0.13	12.8	0.0	0.3
F3	2.39	7%	0.03	0.16	27.0	0.2	1.7
F4	0.47	45%	0.31	0.46	10.2	0.6	1.5
UD1	4.30	6%	0.03	0.16	9.1	0.5	4.9
UD2	13.00	7%	0.03	0.21	18.3	1.4	14.6
UD3	9.60	8%	0.04	0.26	14.6	1.3	14.7
UD4	16.50	6%	0.03	0.16	22.6	1.2	12.7
UD5	10.00	6%	0.03	0.27	24.9	0.9	12.7
UD6	6.80	6%	0.03	0.22	11.2	0.8	10.0
OS1	1.00	24%	0.14	0.29	27.2	0.4	1.3
OS2	0.76	18%	0.09	0.25	14.8	0.3	1.1
OS3	0.30	18%	0.09	0.25	7.9	0.1	0.6

FILING 1 - DESIGN POINT SUMMARY TABLE

Design Point	Contributing Acreage (ac)	Q_5 (cfs)	Q_{100} (Cfs)
1	8.9	1.4	8.2
2	20.1	2.7	15.7
3	22.9	3.4	18.3
4	0.7	0.9	2.4
5	16.8	3.4	21.8
6	38.0	6.7	41.5
7	25.6	2.1	14.8
8	2.0	1.8	4.4
9	26.2	2.5	15.6
10	13.1	2.7	11.7
11	46.5	4.7	25.9
12	11.7	1.2	12.0
13	2.86	0.6	2.7



T6 CHANNEL IMPROVEMENTS - TYPICAL SECTION

SCALE: 1"=10'

CHANNEL SEED MIX: EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 1
PROPOSED DRAINAGE MAP
2514202
11/27/19
SHEET 2 OF 4

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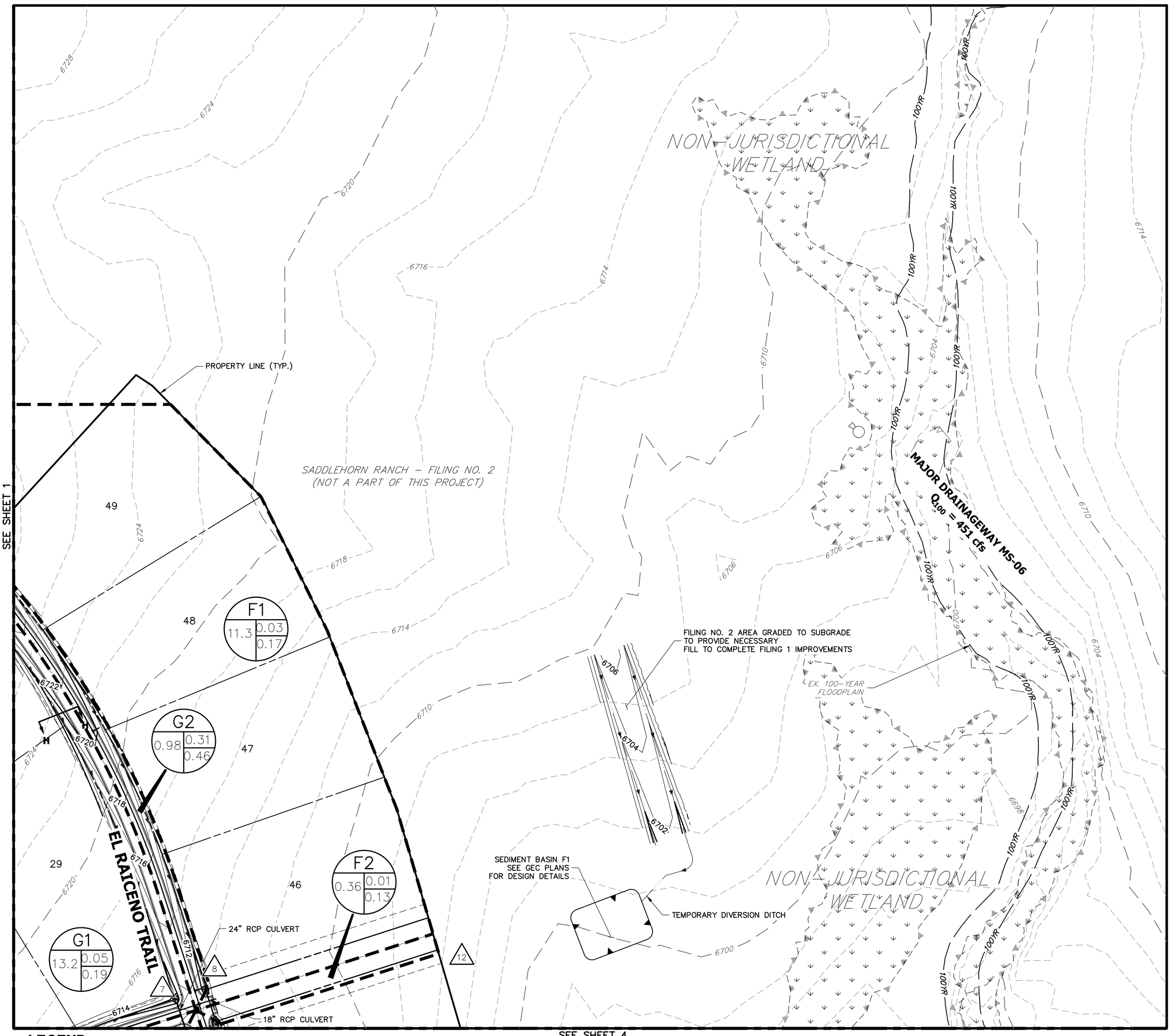
SADDLEHORN RANCH - FILING 1

PROPOSED DRAINAGE MAP



LEGEND

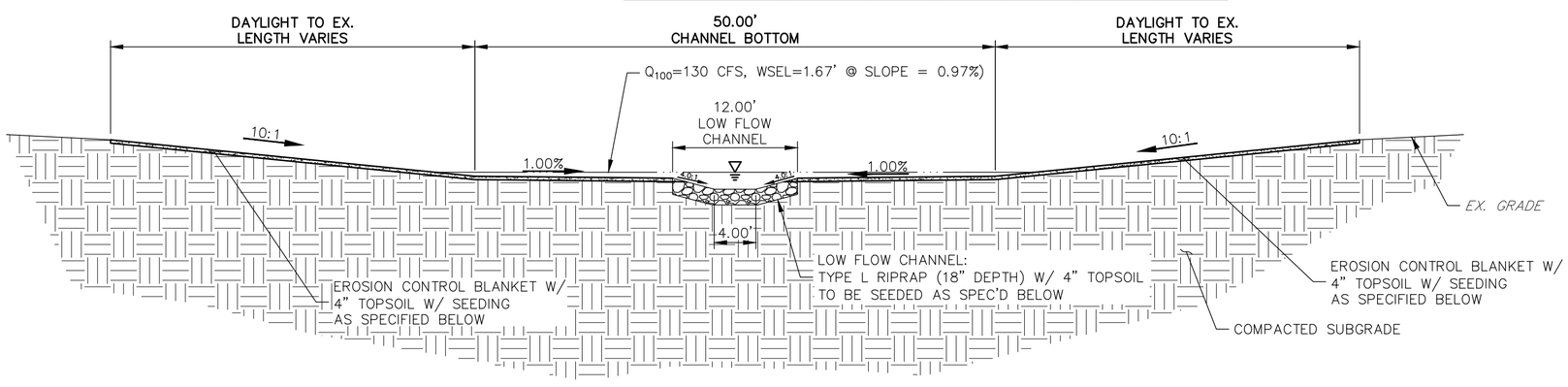
- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- --6100-- EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100 PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- **HP** PROPOSED HIGH POINT
- **LP** PROPOSED LOW POINT

FILING 1 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
H1	7.90	11%	0.05	0.20	26.7	1.1	6.9
H2	10.40	11%	0.05	0.20	24.2	1.5	9.7
H3	0.96	45%	0.31	0.46	14.7	1.1	2.6
H4	1.90	2%	0.01	0.13	7.9	0.1	1.8
I1	1.10	45%	0.32	0.49	16.0	1.2	3.1
I2	0.74	45%	0.32	0.49	11.3	0.9	2.4
I3	0.61	45%	0.32	0.48	11.8	0.7	1.9
I4	14.85	7%	0.03	0.21	18.6	1.5	16.9
I5	0.82	45%	0.31	0.46	11.0	1.0	2.5
I6	19.92	8%	0.04	0.17	20.9	2.2	17.6
I7	3.91	6%	0.03	0.18	5.5	0.5	6.1
F-G1	12.40	9%	0.04	0.18	39.3	1.1	7.9
F-G2	1.00	45%	0.31	0.46	15.5	1.1	2.7
G1	13.20	11%	0.05	0.19	31.3	1.6	10.5
G2	0.98	45%	0.31	0.46	15.8	1.0	2.6
G3	0.63	45%	0.31	0.46	13.9	0.7	1.8
G4	2.50	26%	0.16	0.31	37.0	0.8	2.8
G5	11.15	11%	0.05	0.19	18.4	1.8	11.5
G6	4.36	5%	0.03	0.29	23.4	0.3	6.0
G7	0.31	45%	0.31	0.46	12.0	0.4	0.9
F1	11.30	7%	0.03	0.17	27.4	0.9	8.2
F2	0.36	2%	0.01	0.13	12.8	0.0	0.3
F3	2.39	7%	0.03	0.16	27.0	0.2	1.7
F4	0.47	45%	0.31	0.46	10.2	0.6	1.5
UD1	4.30	6%	0.03	0.16	9.1	0.5	4.9
UD2	13.00	7%	0.03	0.21	18.3	1.4	14.6
UD3	9.60	8%	0.04	0.26	14.6	1.3	14.7
UD4	16.50	6%	0.03	0.16	22.6	1.2	12.7
UD5	10.00	6%	0.03	0.27	24.9	0.9	12.7
UD6	6.80	6%	0.03	0.22	11.2	0.8	10.0
OS1	1.00	24%	0.14	0.29	27.2	0.4	1.3
OS2	0.76	18%	0.09	0.25	14.8	0.3	1.1
OS3	0.30	18%	0.09	0.25	7.9	0.1	0.6

FILING 1 - DESIGN POINT SUMMARY TABLE

Design Point	Contributing Acreage (ac)	Q_5 (cfs)	Q_{100} (Cfs)
1	8.9	1.4	8.2
2	20.1	2.7	15.7
3	22.9	3.4	18.3
4	0.7	0.9	2.4
5	16.8	3.4	21.8
6	38.0	6.7	41.5
7	25.6	2.1	14.8
8	2.0	1.8	4.4
9	26.2	2.5	15.6
10	13.1	2.7	11.7
11	46.5	4.7	25.9
12	11.7	1.2	12.0
13	2.86	0.6	2.7



T6 CHANNEL IMPROVEMENTS - TYPICAL SECTION

SCALE: 1"=10'

CHANNEL SEED MIX: EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 1
PROPOSED DRAINAGE MAP
2514202
11/27/19
SHEET 3 OF 4

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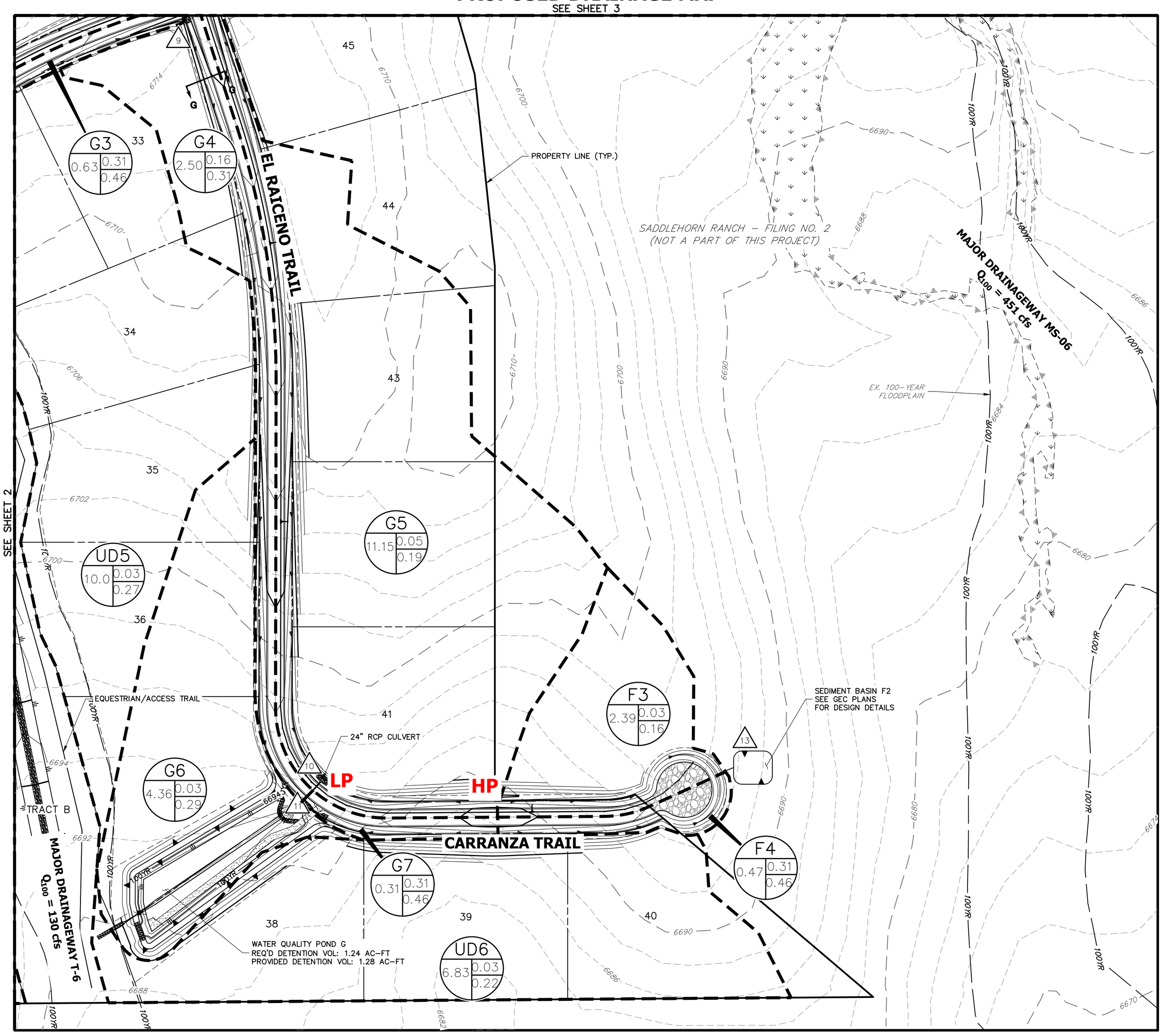
SADDLEHORN RANCH - FILING 1

PROPOSED DRAINAGE MAP



LEGEND

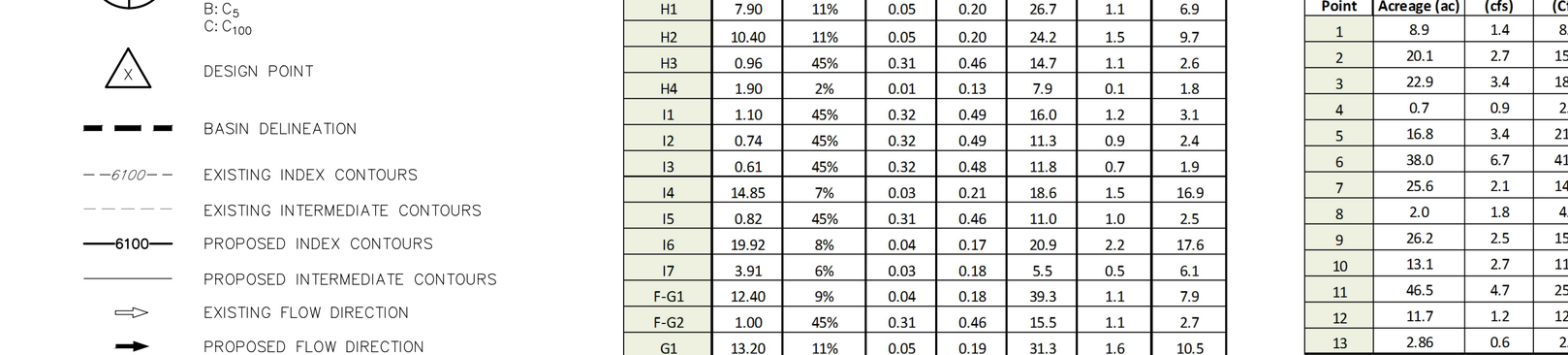
- I.D. (A: BASIN AREA, B: C_5, C: C_{100}) — BASIN DESIGNATION
- X — DESIGN POINT
- BASIN DELINEATION
- 6100 — EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100 — PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP — PROPOSED HIGH POINT
- LP — PROPOSED LOW POINT

FILING 1 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
H1	7.90	11%	0.05	0.20	26.7	1.1	6.9
H2	10.40	11%	0.05	0.20	24.2	1.5	9.7
H3	0.96	45%	0.31	0.46	14.7	1.1	2.6
H4	1.90	2%	0.01	0.13	7.9	0.1	1.8
I1	1.10	45%	0.32	0.49	16.0	1.2	3.1
I2	0.74	45%	0.32	0.49	11.3	0.9	2.4
I3	0.61	45%	0.32	0.48	11.8	0.7	1.9
I4	14.85	7%	0.03	0.21	18.6	1.5	16.9
I5	0.82	45%	0.31	0.46	11.0	1.0	2.5
I6	19.92	8%	0.04	0.17	20.9	2.2	17.6
I7	3.91	6%	0.03	0.18	5.5	0.5	6.1
F-G1	12.40	9%	0.04	0.18	39.3	1.1	7.9
F-G2	1.00	45%	0.31	0.46	15.5	1.1	2.7
G1	13.20	11%	0.05	0.19	31.3	1.6	10.5
G2	0.98	45%	0.31	0.46	15.8	1.0	2.6
G3	0.63	45%	0.31	0.46	13.9	0.7	1.8
G4	2.50	26%	0.16	0.31	37.0	0.8	2.8
G5	11.15	11%	0.05	0.19	18.4	1.8	11.5
G6	4.36	5%	0.03	0.29	23.4	0.3	6.0
G7	0.31	45%	0.31	0.46	12.0	0.4	0.9
F1	11.30	7%	0.03	0.17	27.4	0.9	8.2
F2	0.36	2%	0.01	0.13	12.8	0.0	0.3
F3	2.39	7%	0.03	0.16	27.0	0.2	1.7
F4	0.47	45%	0.31	0.46	10.2	0.6	1.5
UD1	4.30	6%	0.03	0.16	9.1	0.5	4.9
UD2	13.00	7%	0.03	0.21	18.3	1.4	14.6
UD3	9.60	8%	0.04	0.26	14.6	1.3	14.7
UD4	16.50	6%	0.03	0.16	22.6	1.2	12.7
UD5	10.00	6%	0.03	0.27	24.9	0.9	12.7
UD6	6.80	6%	0.03	0.22	11.2	0.8	10.0
OS1	1.00	24%	0.14	0.29	27.2	0.4	1.3
OS2	0.76	18%	0.09	0.25	14.8	0.3	1.1
OS3	0.30	18%	0.09	0.25	7.9	0.1	0.6

FILING 1 - DESIGN POINT SUMMARY TABLE

Design Point	Contributing Acreage (ac)	Q_5 (cfs)	Q_{100} (Cfs)
1	8.9	1.4	8.2
2	20.1	2.7	15.7
3	22.9	3.4	18.3
4	0.7	0.9	2.4
5	16.8	3.4	21.8
6	38.0	6.7	41.5
7	25.6	2.1	14.8
8	2.0	1.8	4.4
9	26.2	2.5	15.6
10	13.1	2.7	11.7
11	46.5	4.7	25.9
12	11.7	1.2	12.0
13	2.86	0.6	2.7



T6 CHANNEL IMPROVEMENTS - TYPICAL SECTION

SCALE: 1"=10'

CHANNEL SEED MIX: EROSION CONTROL BLANKET WITH PAWNEE BUTTES SEED INC. – "LOW GROW NATIVE MIX"
- –IDAHO FESCUE
- –SANDBERG BLUEGRASS
- –ROCKY MOUNTAIN FESCUE
- –BIG BLUEGRASS

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 1
PROPOSED DRAINAGE MAP
2514202
11/27/19
SHEET 4 OF 4

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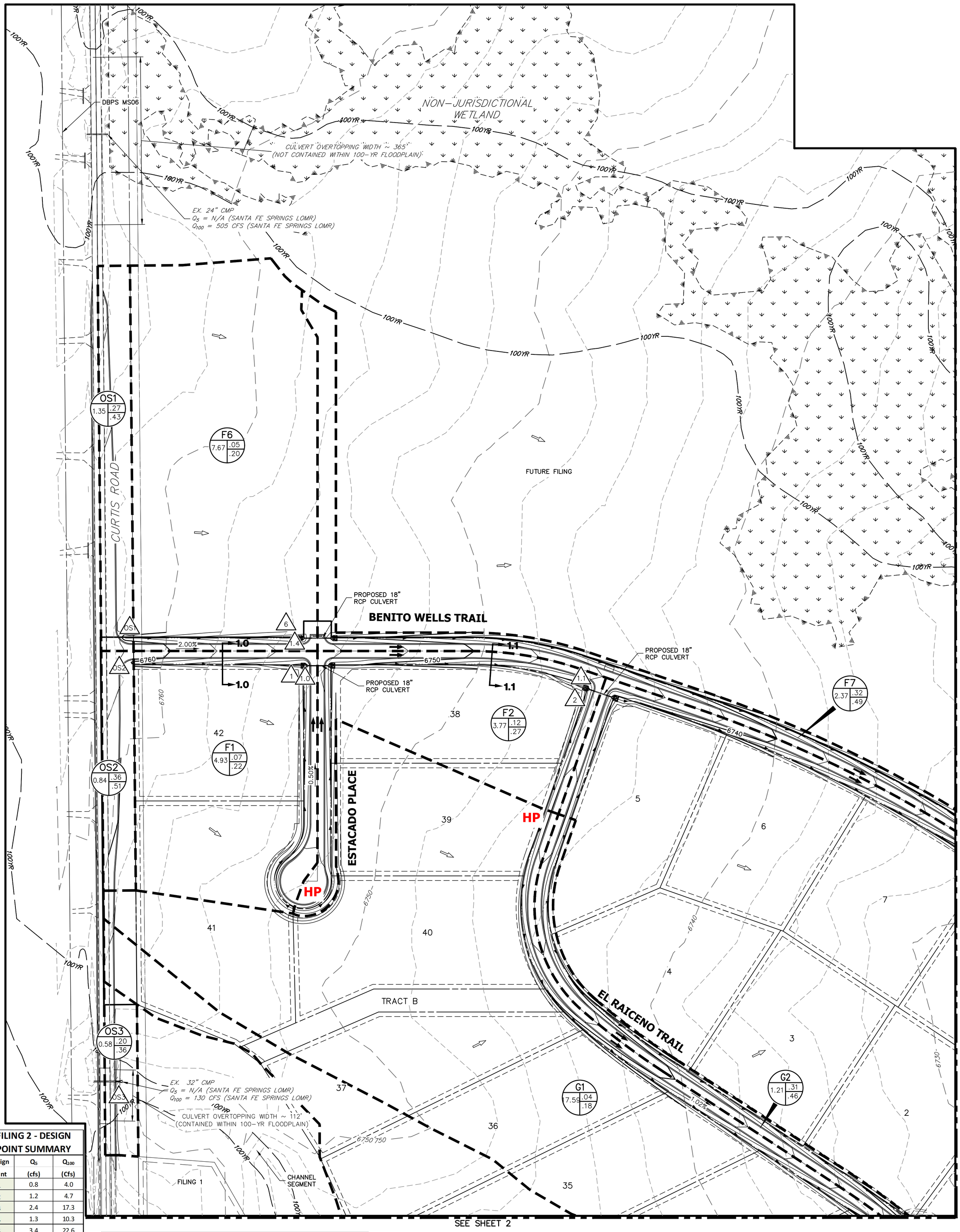
APPENDIX F

DRAINAGE MAPS & PLANS

SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
F1	4.93	14%	0.07	0.22	35.4	0.8	4.0
F2	3.77	21%	0.12	0.27	25.9	1.2	4.7
F3	33.31	10%	0.04	0.19	53.1	2.4	17.3
F4	14.38	8%	0.04	0.17	31.0	1.3	10.3
F5	19.25	12%	0.09	0.36	42.6	3.4	22.6
F6	7.67	11%	0.05	0.20	35.0	0.9	5.7
F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
G2	1.21	45%	0.31	0.46	16.4	1.3	3.2
UD1	16.50	6%	0.03	0.16	31.9	1.0	10.5
UD2	23.67	6%	0.05	0.27	28.0	2.8	28.2
UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
UD5	5.82	6%	0.03	0.16	22.6	0.4	4.5
OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
OS2	0.84	51%	0.36	0.51	14.0	1.1	2.6
OS3	0.58	32%	0.20	0.36	15.9	0.4	1.2

LEGEND

- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- 6100: EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100: PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP: PROPOSED HIGH POINT
- LP: PROPOSED LOW POINT

N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 1 OF 4

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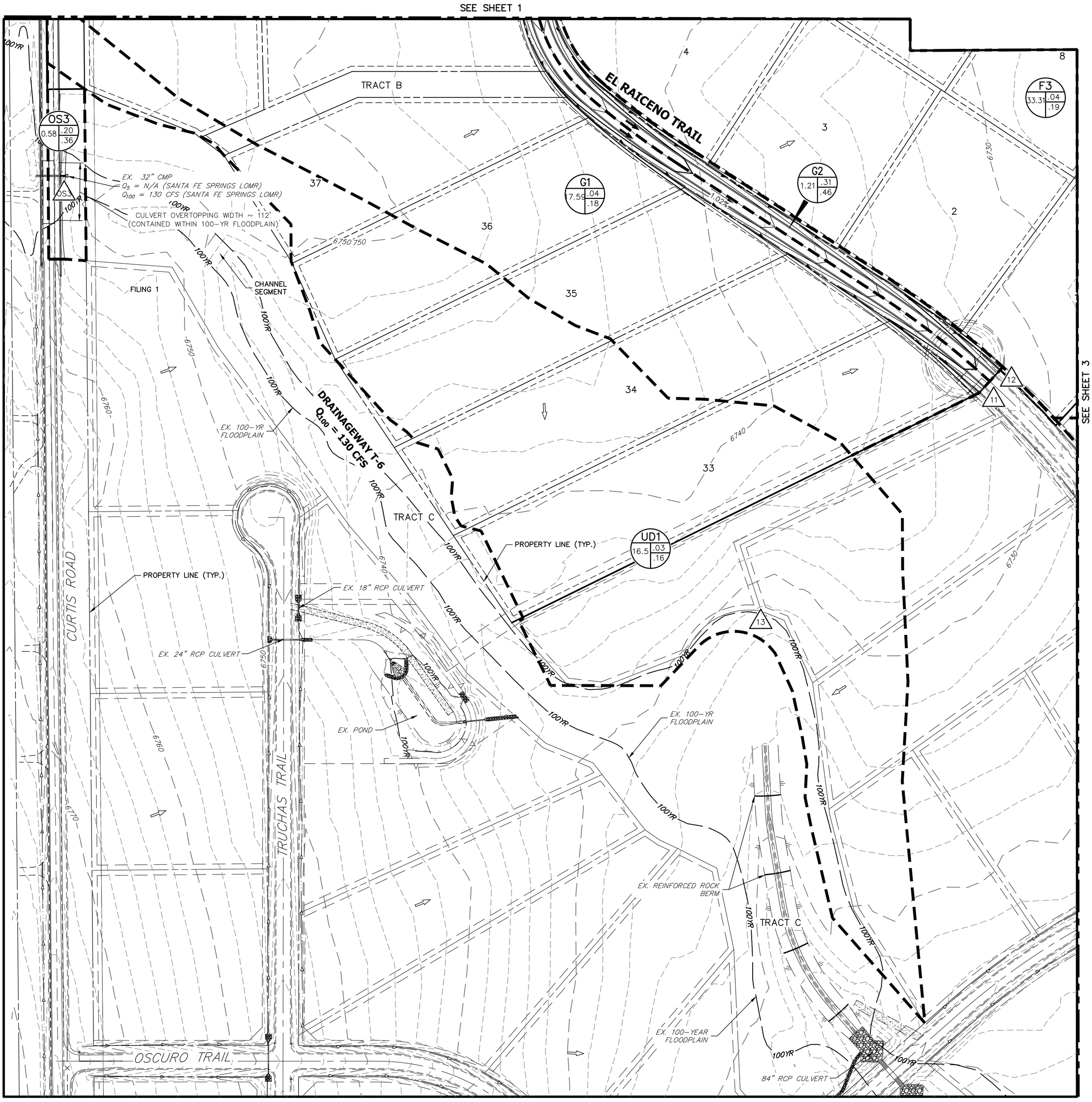
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
F1	4.93	14%	0.07	0.22	35.4	0.8	4.0
F2	3.77	21%	0.12	0.27	25.9	1.2	4.7
F3	33.31	10%	0.04	0.19	53.1	2.4	17.3
F4	14.38	8%	0.04	0.17	31.0	1.3	10.3
F5	19.25	12%	0.09	0.36	42.6	3.4	22.6
F6	7.67	11%	0.05	0.20	35.0	0.9	5.7
F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
G2	1.21	45%	0.31	0.46	16.4	1.3	3.2
UD1	16.50	6%	0.03	0.16	31.9	1.0	10.5
UD2	23.67	6%	0.05	0.27	28.0	2.8	28.2
UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
UD5	5.82	6%	0.03	0.16	22.6	0.4	4.5
OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
OS2	0.84	51%	0.36	0.51	14.0	1.1	2.6
OS3	0.58	32%	0.20	0.36	15.9	0.4	1.2

LEGEND

- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- 6100: EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100: PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP: PROPOSED HIGH POINT
- LP: PROPOSED LOW POINT

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 2 OF 4

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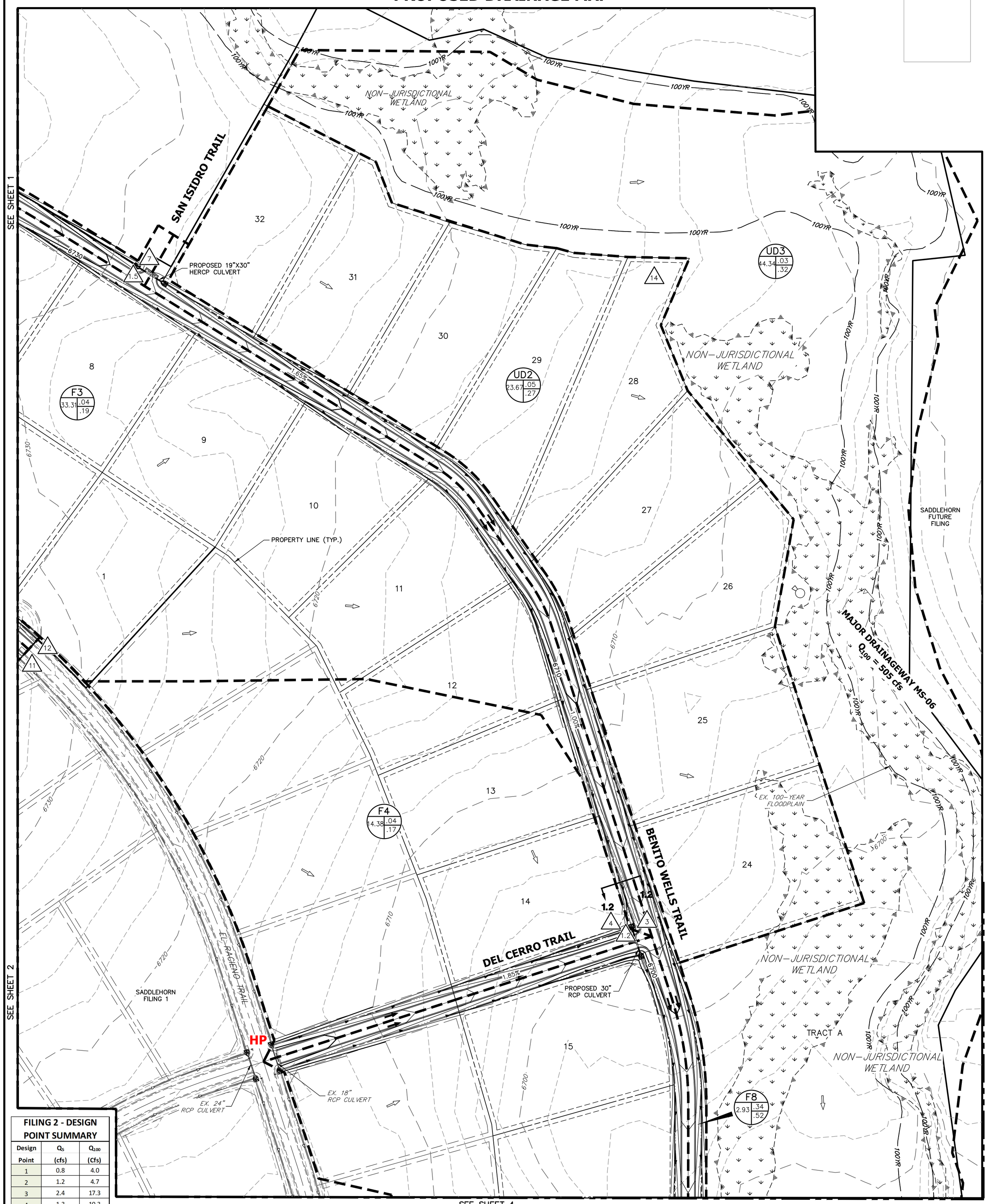
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
F1	4.93	14%	0.07	0.22	35.4	0.8	4.0
F2	3.77	21%	0.12	0.27	25.9	1.2	4.7
F3	33.31	10%	0.04	0.19	53.1	2.4	17.3
F4	14.38	8%	0.04	0.17	31.0	1.3	10.3
F5	19.25	12%	0.09	0.36	42.6	3.4	22.6
F6	7.67	11%	0.05	0.20	35.0	0.9	5.7
F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
G2	1.21	45%	0.31	0.46	16.4	1.3	3.2
UD1	16.50	6%	0.03	0.16	31.9	1.0	10.5
UD2	23.67	6%	0.05	0.27	28.0	2.8	28.2
UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
UD5	5.82	6%	0.03	0.16	22.6	0.4	4.5
OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
OS2	0.84	51%	0.36	0.51	14.0	1.1	2.6
OS3	0.58	32%	0.20	0.36	15.9	0.4	1.2

LEGEND

- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- 6100: EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
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- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
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- LP: PROPOSED LOW POINT

N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 3 OF 4

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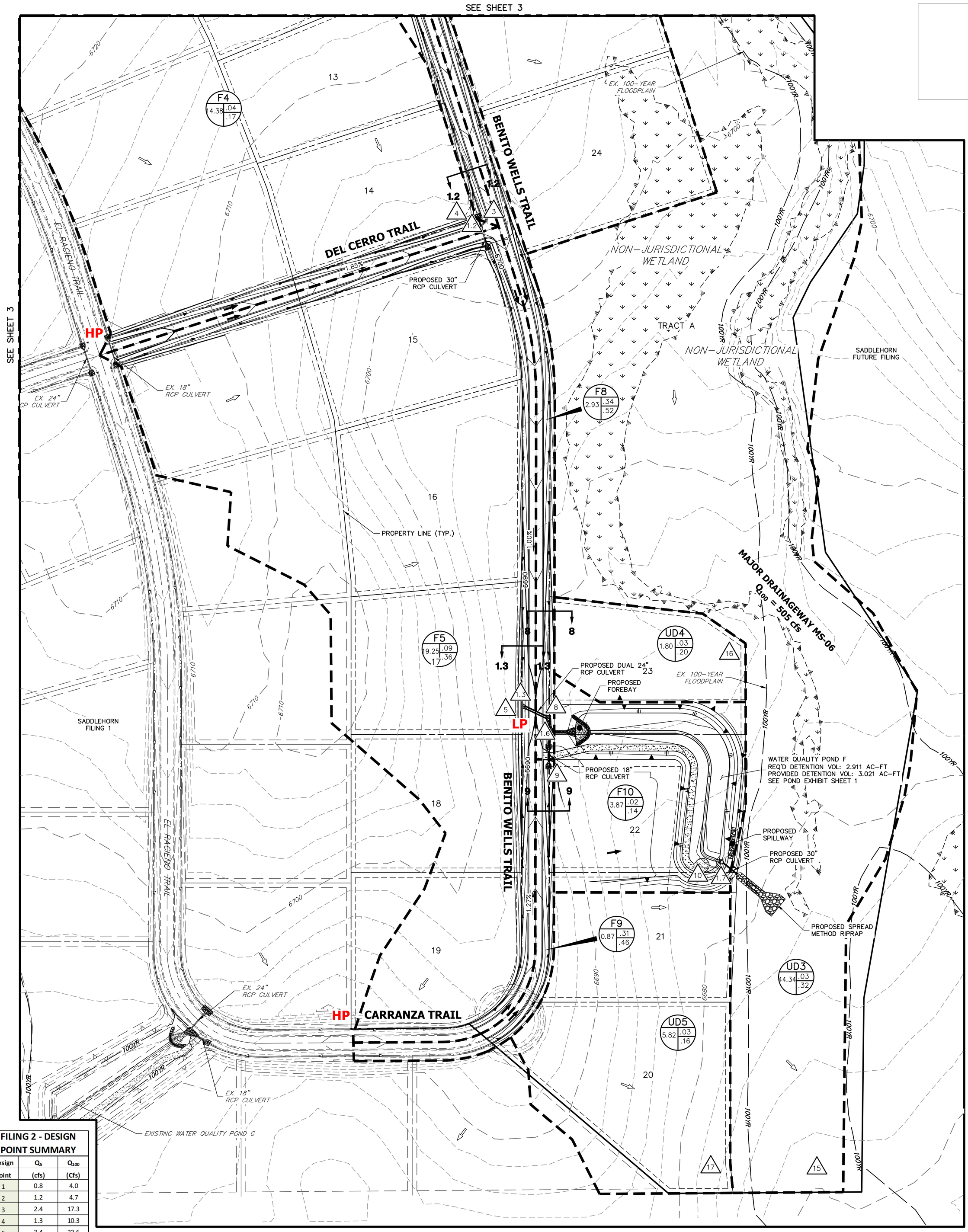
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY		
Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
F1	4.93	14%	0.07	0.22	35.4	0.8	4.0
F2	3.77	21%	0.12	0.27	25.9	1.2	4.7
F3	33.31	10%	0.04	0.19	53.1	2.4	17.3
F4	14.38	8%	0.04	0.17	31.0	1.3	10.3
F5	19.25	12%	0.09	0.36	42.6	3.4	22.6
F6	7.67	11%	0.05	0.20	35.0	0.9	5.7
F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
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UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
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OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
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OS3	0.58	32%	0.20	0.36	15.9	0.4	1.2

LEGEND

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N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 4 OF 4

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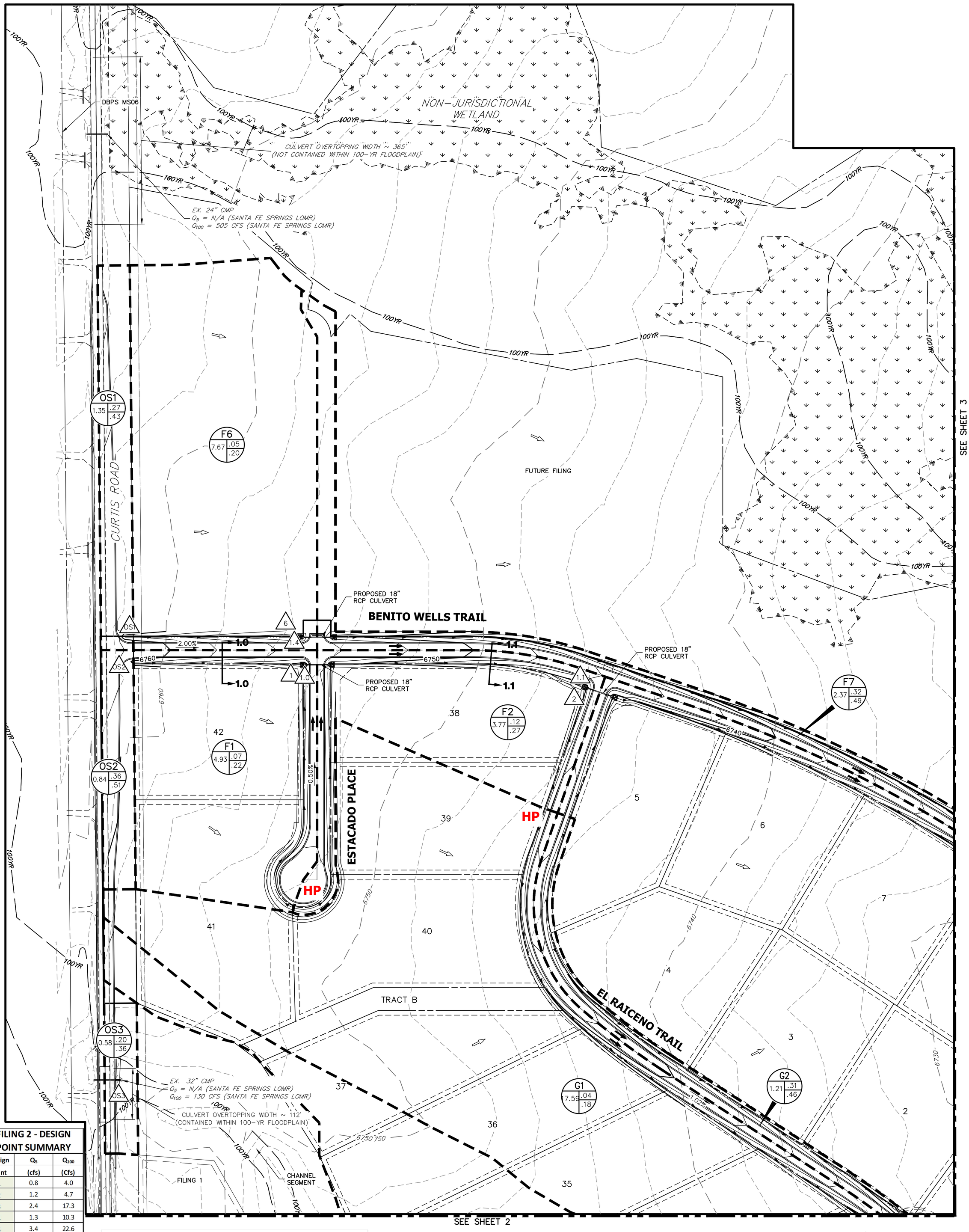
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
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16	0.2	1.6
17	0.4	4.5
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1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
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LEGEND

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N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 1 OF 4

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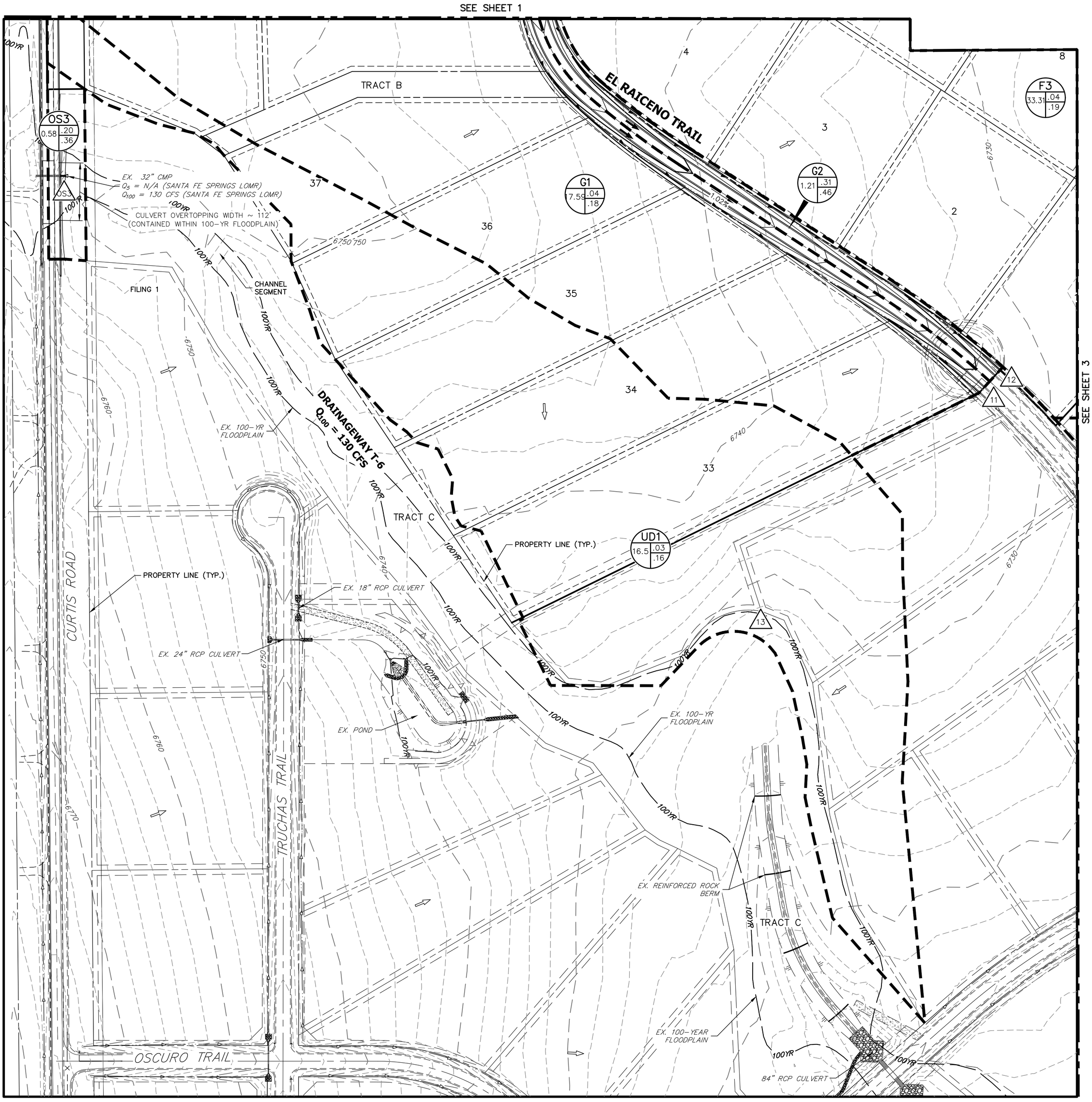
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
OS1	1.2	3.1
OS2	1.1	2.6
OS3	0.4	1.2

FILING 2 - SUB-BASIN SUMMARY TABLE

Tributary Sub-basin	Area (acres)	Percent Impervious	C_5	C_{100}	t_c (min)	Q_5 (cfs)	Q_{100} (cfs)
F1	4.93	14%	0.07	0.22	35.4	0.8	4.0
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F3	33.31	10%	0.04	0.19	53.1	2.4	17.3
F4	14.38	8%	0.04	0.17	31.0	1.3	10.3
F5	19.25	12%	0.09	0.36	42.6	3.4	22.6
F6	7.67	11%	0.05	0.20	35.0	0.9	5.7
F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
G2	1.21	45%	0.31	0.46	16.4	1.3	3.2
UD1	16.50	6%	0.03	0.16	31.9	1.0	10.5
UD2	23.67	6%	0.05	0.27	28.0	2.8	28.2
UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
UD5	5.82	6%	0.03	0.16	22.6	0.4	4.5
OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
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LEGEND

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100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 2 OF 4

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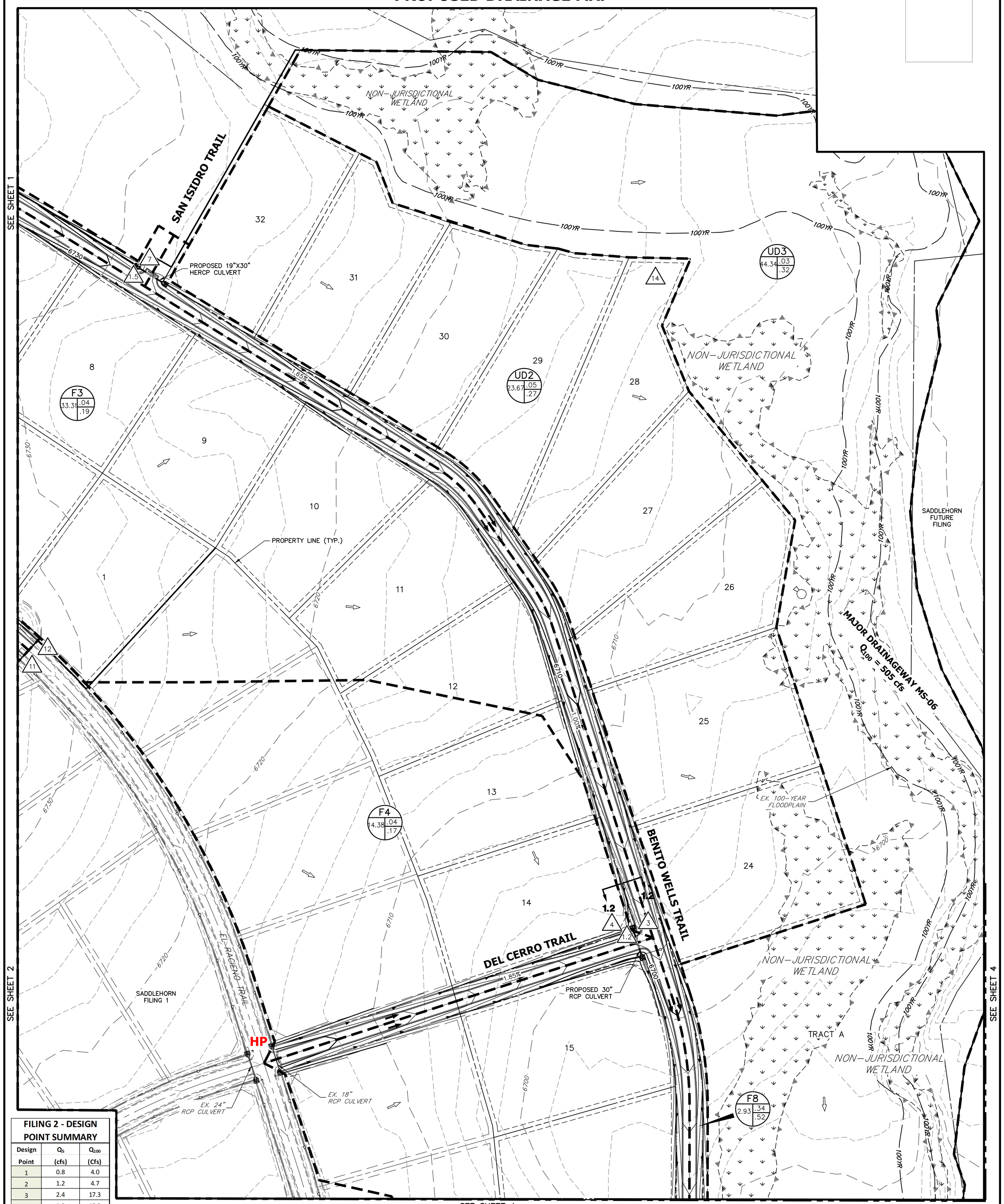
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY

Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
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F7	2.37	45%	0.32	0.49	29.8	1.9	4.9
F8	2.93	45%	0.34	0.52	32.3	2.3	6.0
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F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
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N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 3 OF 4

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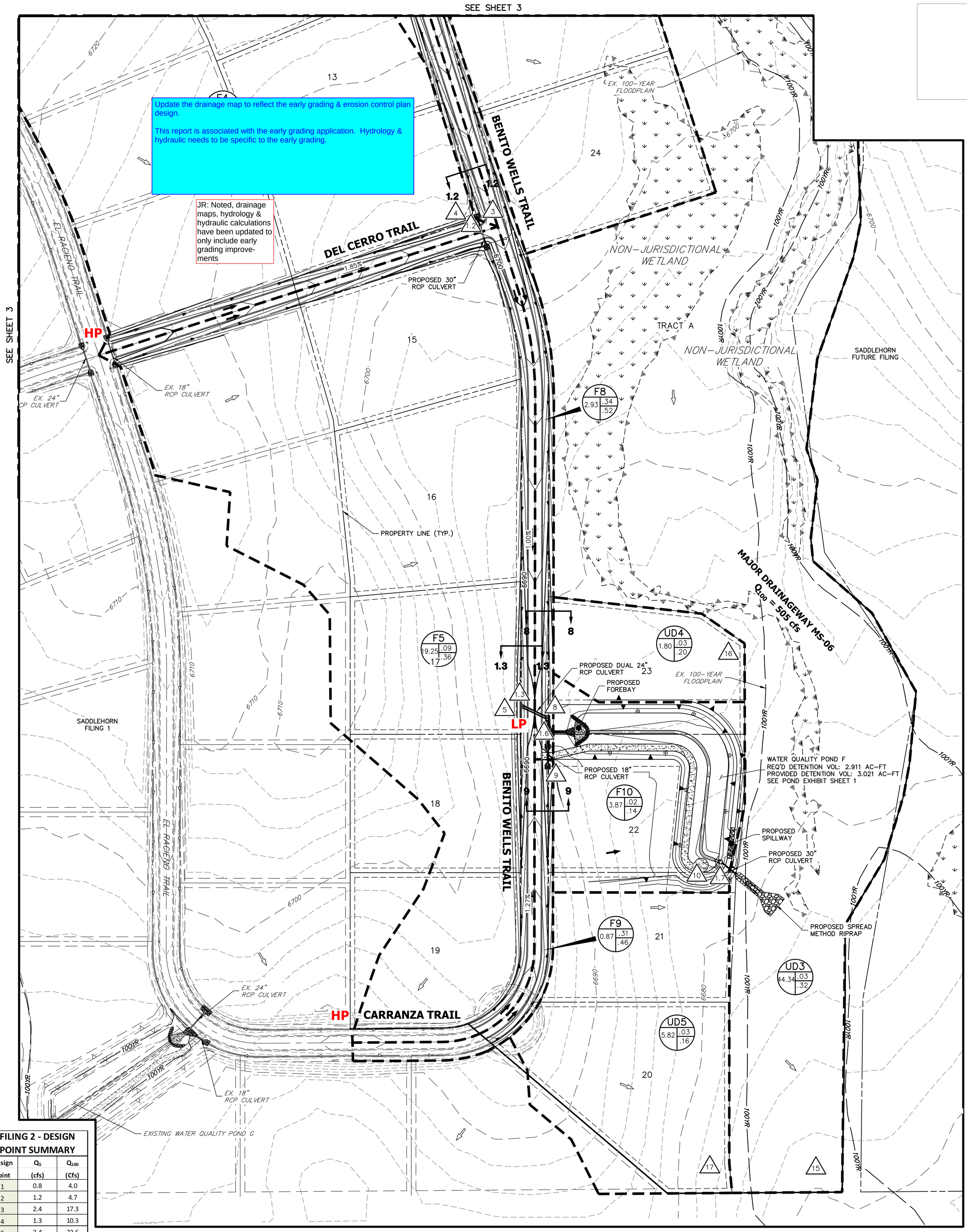
SADDLEHORN RANCH - FILING 2

PROPOSED DRAINAGE MAP



FILING 2 - DESIGN POINT SUMMARY		
Design Point	Q_5 (cfs)	Q_{100} (Cfs)
1	0.8	4.0
2	1.2	4.7
3	2.4	17.3
4	1.3	10.3
5	3.4	22.6
6	0.9	5.7
7	1.9	4.9
8	2.3	6.0
9	1.1	2.6
10	0.2	2.9
11	1.4	10.3
12	1.3	3.2
13	1.0	10.5
14	2.8	28.2
15	1.5	26.9
16	0.2	1.6
17	0.4	4.5
1.0	1.5	5.6
1.1	2.3	8.8
1.2	4.5	27.9
1.3	6.1	38.7
1.4	1.7	7.9
1.5	2.8	9.9
1.6	9.6	49.5
1.7	9.7	50.7
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F9	0.87	45%	0.31	0.46	11.4	1.1	2.6
F10	3.87	4%	0.02	0.14	19.9	0.2	2.9
G1	17.59	9%	0.04	0.18	43.8	1.4	10.3
G2	1.21	45%	0.31	0.46	16.4	1.3	3.2
UD1	16.50	6%	0.03	0.16	31.9	1.0	10.5
UD2	23.67	6%	0.05	0.27	28.0	2.8	28.2
UD3	44.34	2%	0.03	0.32	74.1	1.5	26.9
UD4	1.80	6%	0.03	0.20	27.4	0.2	1.6
UD5	5.82	6%	0.03	0.16	22.6	0.4	4.5
OS1	1.35	40%	0.27	0.43	19.3	1.2	3.1
OS2	0.84	51%	0.36	0.51	14.0	1.1	2.6
OS3	0.58	32%	0.20	0.36	15.9	0.4	1.2

LEGEND

- I.D. (A / B / C): BASIN DESIGNATION
  - I.D.: BASIN IDENTIFIER
  - A: BASIN AREA
  - B: C_5
  - C: C_{100}
- X: DESIGN POINT
- BASIN DELINEATION
- 6100: EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100: PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- HP: PROPOSED HIGH POINT
- LP: PROPOSED LOW POINT

N

100 50 0 100 200

ORIGINAL SCALE: 1" = 100'

SADDLEHORN RANCH FILING 2
PROPOSED DRAINAGE MAP
2514204
6/4/21
SHEET 4 OF 4

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PROPOSED DUAL 24" RCP CULVERTS

PROPOSED FOREBAY

PROPOSED 18" RCP CULVERT

PROPOSED 12' MAINTENANCE TRAIL

PROPOSED DRAINAGE EASEMENT

PROPOSED TOP OF SLOPE

PROPOSED TOE OF SLOPE

PROPOSED TRICKLE CHANNEL

PROPOSED SPILLWAY

PROPOSED OUTLET STRUCTURE

PROPOSED 30" RCP

PROPOSED RIPRAP OUTFALL

DRAINAGE EASEMENT (WIDTH VARIES)

EXISTING 100-YR FLOODPLAIN

NON-JURISDICTIONAL WETLAND

DRAINAGEWAY MS-06

BENITO WELLS TRAIL

6687 6688 6687 6686 6685 6684 6686 6685 6687 6690 6695 6685 6680

17.31% 4.00% 0.50% 21.00% 3.69% 6.08% 4.00% 3.82% 23.24% 1.13% 0.50% 24.94%

55.00' 10.00'

100YR

50 25 0 50 100

ORIGINAL SCALE: 1" = 50'

POND EXHIBIT
SADDLEHORN FILING 2
JOB NO. 2514204
6/4/21
SHEET 1 OF 1

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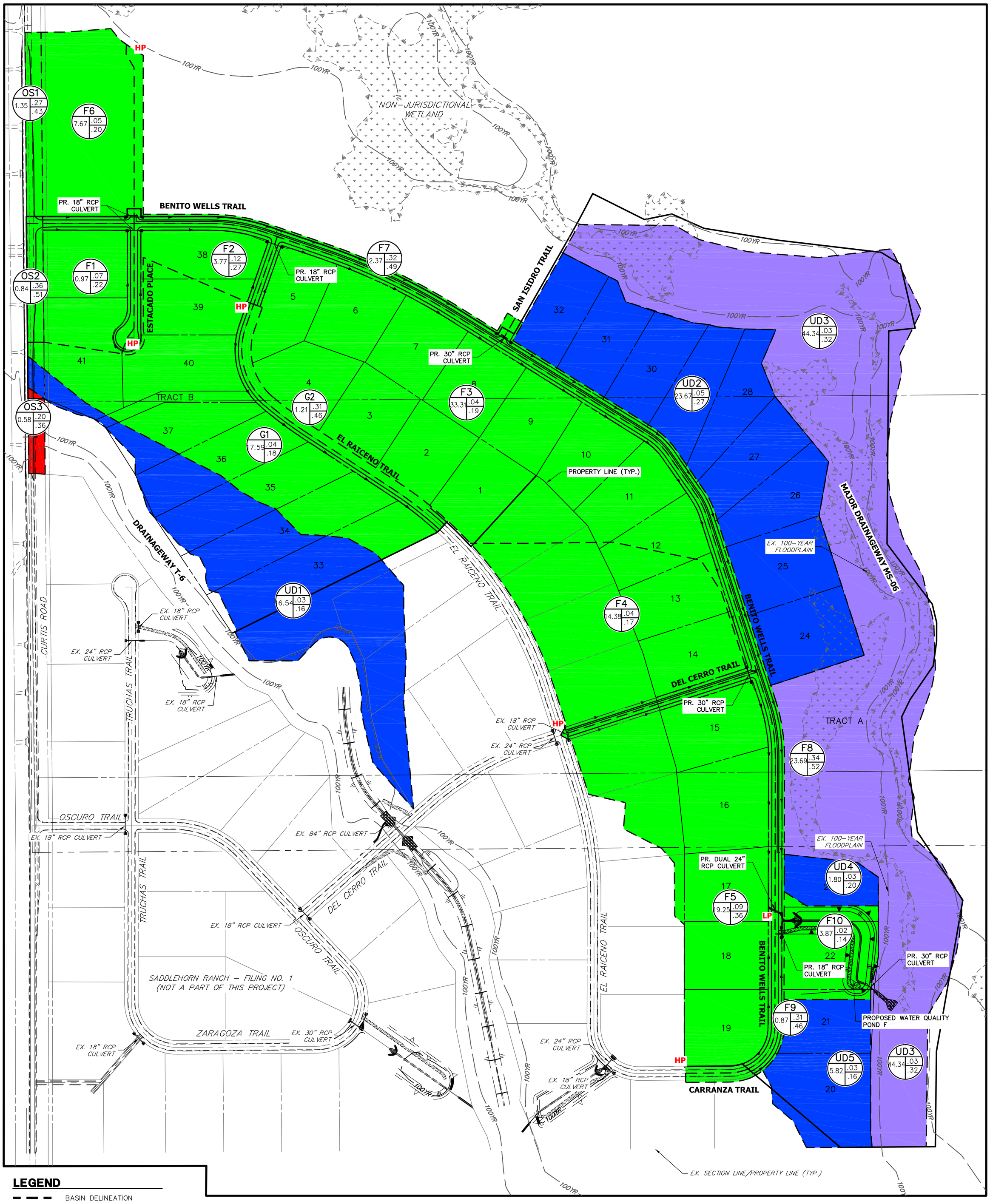
SADDLEHORN RANCH - FILING 2

PERMANENT BMP APPLICABILITY MAP



LEGEND

- BASIN DELINEATION
- –6100– EXISTING INDEX CONTOURS
- EXISTING INTERMEDIATE CONTOURS
- 6100 PROPOSED INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- **HP** PROPOSED HIGH POINT
- **LP** PROPOSED LOW POINT
- AREA DETAINED IN PBMP
- AREA NOT DETAINED IN PBMP PER SECTION I.7.1.B.5 (RURAL 2.5+ ACRE LOTS W/ IMPERVIOUSNESS < 10%)
- AREA NOT DETAINED IN PBMP PER SECTION I.7.1.C.1 (20%, UP TO 1 AC, OF DEVELOPMENT SITE CAN BE EXCLUDED – DUE TO TOPOGRAPHY)
- AREA NOT DETAINED IN PBMP PER SECTION I.7.1.B.7 (LAND DISTURBANCE TO UNDEV. LAND THAT WILL REMAIN UNDEV.)

200 100 0 200 400

ORIGINAL SCALE: 1" = 200'

SADDLEHORN RANCH FILING 2
MS4 PERMIT EXCLUSION AREAS
2514204
6/4/21
SHEET 1 OF 1

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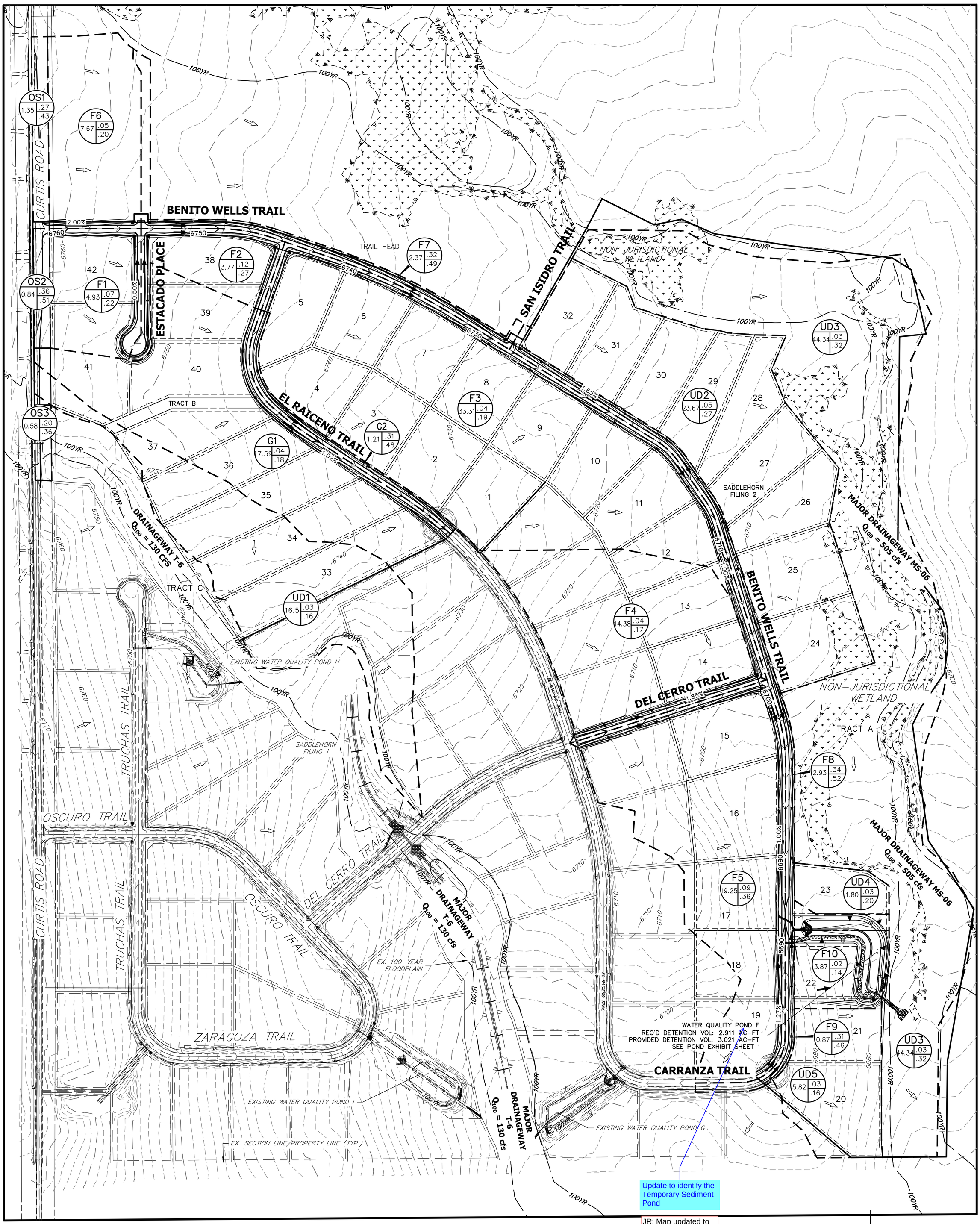
SADDLEHORN RANCH - FILING 2

EXISTING CONDITIONS PLAN



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EPC STORMWATER REVIEW COMMENTS ARE SHOWN IN ORANGE BOXES WITH BLACK TEXT

EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP)
EL PASO COUNTY APPLICATION AND PERMIT

PCD Project Number: SF-21-033 add EGP-22-001

JR: EGP Number added

APPLICANT INFORMATION ***PERM***

Owner Information	
Property Owner	GORILLA CAPITAL LLC
Applicant Name (Permit Holder)	JOHN HELMICK
Company/Agency	GORILLA CAPITAL LLC
Position of Applicant	CEO
Address (physical address, not PO Box)	1342 HIGH STREET
City	EUGENE
State	OREGON
Zip Code	97401
Mailing address, if different from above	
Telephone	541-393-9043
FAX number	
Email Address	JOHN@GORILLACAPITAL.COM
Cellular Phone number	
Contractor/Operator Information	
Name (person of responsibility)	ALL CONTRACTOR INFORMATION TBD
Company	
Address (physical address, not PO Box)	
City	
State	
Zip Code	
Mailing address, if different from above	
Telephone	
FAX number	
Email Address	
Cellular Phone number	
Erosion Control Supervisor (ECS)*	
ECS Phone number*	
ECS Cellular Phone number*	

*Required for all applicants. May be provided at later date pending securing a contract when applicable.

PROJECT INFORMATION

Project Information	
Project Name	SADDLEHORN RANCH-FILING 2
Legal Description	SEE END OF PDF FOR LEGAL DESCRIPTION
Address (or nearest major cross streets)	INTERSECTION OF JUDGE ORR ROAD & CURTIS
Acreage (total and disturbed)	Total: 177 acres Disturbed: 21 acres
Schedule	Start of Construction: 9/2021 - 10/2021 Completion of Construction: 10/2021 - 4/2022 Final Stabilization: 4/2022 - 9/2022
Project Purpose	TO PROVIDE 42 +/- RURAL 2.5 ACRE LOTS IN EL PASO COUNTY.
Description of Project	SADDLEHORN RANCH IS A RURAL 2.5 ACRE+ LOT SUBDIVISION IN EL PASO COUNTY, COLORADO
Tax Schedule Number	

update schedule

JR: Noted, schedule updated

FOR OFFICE USE ONLY

The following signature from the ECM Administrator signifies the approval of this ESQCP. All work shall be performed in accordance with the permit, the El Paso County Engineering Criteria Manual (ECM) Standards, City of Colorado Springs Drainage Criteria Manual, Volume 2 (DCM2) as adopted by El Paso County Addendum, approved plans, and any attached conditions. The approved plans are an enforceable part of the ESQCP. Construction activity, except for the installation of initial construction BMPs, is not permitted until issuance of a Construction Permit and Notice to Proceed.

Signature of ECM Administrator: _____ Date _____

1.1 REQUIRED SUBMISSIONS

In addition to this completed and signed application, the following items must be submitted to obtain an ESQCP:

- Permit fees;
- Stormwater Management Plan (SWMP) meeting the requirements of DCM2 and ECM either as part of the plan set or as a separate document;
- Operation and Maintenance Plan for any proposed permanent stormwater control measures; and
- Signed Private Detention Basin/Stormwater Quality Best Management Practice Maintenance Agreement and Easement, if any permanent stormwater control measures are to be constructed.

1.2 RESPONSIBILITY FOR DAMAGE

The County and its officers and employees, including but not limited to the ECM Administrator, shall not be answerable or accountable in any manner for damage to property or for injury to or death of any person, including but not limited to a permit holder, persons employed by the permit holder, or persons acting in behalf of the permit holder, from any cause. The permit holder shall be responsible for any liability imposed by law and for damage to property or injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder, arising out of work or other activity permitted and done under a permit, or arising out of the failure to perform the obligations under any permit with respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work or other activity, or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit.

The permit holder shall indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description brought for or on account of damage to property or injuries to or death of any person, including but not limited to the permit holder, persons employed by the permit holder, persons acting in behalf of the permit holder and the public, resulting from the performance of work or other activity under the permit, or arising out of the failure to perform obligations under any permit with respect to maintenance or any other obligations, or resulting from defects or obstructions, or from any cause whatsoever during the progress of the work or other activity, or at any subsequent time work or other activity is being performed under the obligations provided by and contemplated by the permit, except as otherwise provided by state law. The permit holder waives any and all rights to any type of expressed or implied indemnity against the County, its officers or employees. It is the intent of the parties that the permit holder will indemnify, save, and hold harmless the County, its officers and employees from any and all claims, suits or actions as set forth above regardless of the existence or degree of fault of or negligence, whether active or passive, primary or secondary, on the part of the County, the permit holder, persons employed by the permit holder, or persons acting in behalf of the permit holder

1.3 APPLICATION CERTIFICATION

We, as the Applicants or the representative of the Applicants, hereby certify that this application is correct and complete as per the requirements presented in this application, the El Paso County Engineering Criteria Manual, and Drainage Criteria Manual, Volume 2 and El Paso County Addendum.

We, as the Applicants or the representatives of the Applicants, have read and will comply with all of the requirements of the specified Stormwater Management Plan and any other documents specifying stormwater best management practices to be used on the site, including permit conditions that may be required by the ECM Administrator. We understand that the stormwater control measures are to be maintained on the site and revised as necessary to protect stormwater quality as the project progresses. We further understand that a Construction Permit must be obtained and all necessary stormwater quality control measures are to be installed in accordance with the SWMP, the El Paso County Engineering Criteria Manual, Drainage Criteria Manual, Volume 2 and El Paso County Addendum before land disturbance begins and that failure to comply will result in a Stop Work Order and may result in other penalties as allowed by law. We further understand and agree to indemnify, save, and hold harmless the County and its officers and employees, including but not limited to the BOCC and ECM Administrator, from all claims, suits or actions of every name, kind and description as outlined in Section 1.2 Responsibility for Damage

sign and date

_____ Date:_____

Signature of Owner or Representative

_____

Print Name of Owner or Representative

_____ Date:_____

JR: Noted, signature and date added

perator or Representative

_____

Print Name of Operator or Representative

Permit Fee $_____

Surcharge $_____

Financial Surety $_____ Type of Surety _____

Total $_____

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A Westrian Company

SADDLEHORN RANCH FILING NO. 2

PROPERTY DESCRIPTION

A PARCEL OF LAND LOCATED IN SECTION 3 AND THE NORTH HALF OF THE NORTH HALF OF SECTION 10, TOWNSHIP 13 SOUTH, RANGE 64 WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF SECTION 3, TOWNSHIP 13 SOUTH, RANGE 64 WEST OF THE 6TH PRINCIPAL MERIDIAN;

THENCE ON THE WEST LINE OF SAID SECTION 3, N00°32’28”W A DISTANCE OF 1987.87 FEET, TO THE NORTHWESTERLY CORNER OF SADDLEHORN RANCH FILING NO. 1 RECORDED UNDER RECEPTION NO. 221714749 IN THE RECORDS OF THE EL PASO COUNTY CLERK AND RECORDER AND THE POINT OF BEGINNING;

THENCE CONTINUING ON SAID WEST LINE, N00°32'28"W A DISTANCE OF 799.26 FEET;

THENCE DEPARTING SAID WEST LINE THE FOLLOWING THIRTY-TWO (32) COURSES:

1. S89°59'23"E A DISTANCE OF 442.27 FEET;
2. N00°00'37"E A DISTANCE OF 35.00 FEET;
3. S89°59'23"E A DISTANCE OF 60.00 FEET;
4. S00°00'37"W A DISTANCE OF 35.00 FEET;
5. S89°59'23"E A DISTANCE OF 303.52 FEET, TO A POINT OF CURVE;
6. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A RADIUS OF 780.00 FEET, A CENTRAL ANGLE OF 18°44'59" AND AN ARC LENGTH OF 255.25 FEET, TO A POINT OF TANGENT;
7. S71°14'24"E A DISTANCE OF 260.86 FEET, TO A POINT OF CURVE;
8. ON THE ARC OF A CURVE TO THE RIGHT, HAVING A RADIUS OF 2780.00 FEET, A CENTRAL ANGLE OF 13°06'52" AND AN ARC LENGTH OF 636.31 FEET, TO A POINT OF TANGENT;
9. S58°07'32"E A DISTANCE OF 223.80 FEET;
10. N29°44'39"E A DISTANCE OF 35.38 FEET;
11. S60°15'21"E A DISTANCE OF 60.00 FEET;
12. N29°44'39"E A DISTANCE OF 495.87 FEET, TO A POINT OF CURVE;
13. ON THE ARC OF A CURVE TO THE LEFT, HAVING A RADIUS OF 3780.00 FEET, A CENTRAL ANGLE OF 03°09'58" AND AN ARC LENGTH OF 208.89 FEET, TO A POINT OF NON-TANGENT;
14. S63°25'19"E A DISTANCE OF 253.86 FEET;
15. N78°29'56"E A DISTANCE OF 122.41 FEET;
16. S65°55'05"E A DISTANCE OF 154.37 FEET;
17. S80°55'05"E A DISTANCE OF 329.85 FEET;
18. S83°17'36"E A DISTANCE OF 453.41 FEET;
19. S58°21'31"E A DISTANCE OF 99.14 FEET;

20. S12°59'32"E A DISTANCE OF 287.70 FEET;
21. S84°04'11"W A DISTANCE OF 116.39 FEET;
22. S00°27'54"W A DISTANCE OF 933.68 FEET;
23. S36°54'54"E A DISTANCE OF 330.03 FEET;
24. S13°21'17"E A DISTANCE OF 83.07 FEET;
25. S00°07'31"W A DISTANCE OF 82.66 FEET;
26. S07°55'12"W A DISTANCE OF 107.85 FEET;
27. S34°24'44"W A DISTANCE OF 178.42 FEET;
28. S26°04'25"W A DISTANCE OF 85.34 FEET;
29. S07°51'44"E A DISTANCE OF 510.21 FEET;
30. S33°40'12"E A DISTANCE OF 357.56 FEET;
31. S09°52'53"W A DISTANCE OF 673.53 FEET;
32. S00°38'45"W A DISTANCE OF 417.04 FEET, TO A POINT ON THE SOUTH LINE OF THE NORTH HALF OF THE NORTHEAST QUARTER OF SAID SECTION 10;

THENCE ON SAID SOUTH LINE, S89°34'01"W A DISTANCE OF 416.11 FEET, TO THE SOUTHEASTERLY CORNER OF SADDLEHORN RANCH FILING NO. 1;

THENCE ON THE EASTERLY AND NORTHELRLY LINES OF SADDLEHORN RANCH FILIING NO. 1 THE FOLLOWING TWENTY-ONE (21) COURSES:

1. N49°37'00"W A DISTANCE OF 565.00 FEET, TO A POINT OF NON-TANGENT CURVE;
2. ON THE ARC OF A CURVE TO THE RIGHT WHOSE CENTER BEARS N19°28'44"W, HAVING A RADIUS OF 170.00 FEET, A CENTRAL ANGLE OF 19°02'46" AND AN ARC LENGTH OF 56.51 FEET, TO A POINT OF TANGENT;
3. S89°34'03"W A DISTANCE OF 197.98 FEET;
4. N00°00'00"E A DISTANCE OF 964.76 FEET;
5. N05°58'59"W A DISTANCE OF 349.19 FEET;
6. N16°11'46"W A DISTANCE OF 257.34 FEET;
7. N16°11'46"W A DISTANCE OF 261.98 FEET;
8. N21°16'04"W A DISTANCE OF 343.92 FEET;
9. N26°10'49"W A DISTANCE OF 266.32 FEET;
10. N44°25'17"W A DISTANCE OF 280.03 FEET;
11. N56°30'41"W A DISTANCE OF 35.01 FEET;
12. S42°31'10"W A DISTANCE OF 422.77 FEET, TO A POINT OF NON-TANGENT CURVE;
13. ON THE ARC OF A CURVE TO THE LEFT WHOSE CENTER BEARS S47°44'09"W, HAVING A RADIUS OF 1680.00 FEET, A CENTRAL ANGLE OF 05°10'02" AND AN ARC LENGTH OF 151.51 FEET, TO A POINT OF NON-TANGENT;
14. S42°34'07"W A DISTANCE OF 60.00 FEET;
15. S63°48'26"W A DISTANCE OF 1002.65 FEET;
16. N33°50'17"W A DISTANCE OF 610.26 FEET;
17. N24°10'40"W A DISTANCE OF 207.55 FEET;

18. N32°24'01"W A DISTANCE OF 240.57 FEET;

19. N53°08'37"W A DISTANCE OF 71.78 FEET;

20. N68°03'22"W A DISTANCE OF 227.58 FEET;

21. S89°27'32"W A DISTANCE OF 72.00 FEET, TO THE POINT OF BEGINNING.

CONTAINING A CALCULATED AREA OF 7,703,680 SQUARE FEET OR 176.8522 ACRES.

✓ Satisfies criteria

X Needs to be addressed

2880 International Circle, Suite 110
Colorado Springs, CO 80910
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Fax 719-520-6695
www.elpasoco.com

EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

GRADING AND EROSION CONTROL PLAN CHECKLIST

EPC Project Number: EGP-22-001

Revised: July 2019

JR: EPC number added

		Applicant	PCD
1. GRADING AND EROSION CONTROL PLAN			
a	Vicinity map.	✓	✓
b	Adjacent city/town/jurisdictional boundaries, subdivision names, and property parcel numbers labeled.	✓	✓
c	North arrow and acceptable scale (1"=20' to 1"=100').	✓	✓
d	Legend for all symbols used in the plan.	✓	✓
e	Existing and proposed property lines. Proposed subdivision boundary for subdivision projects.	✓	✓
f	All existing structures.	✓	✓
g	All existing utilities.	✓	✓
h	Construction site boundaries.	✓	✓
i	Existing vegetation (notes are acceptable in cases where there is no notable vegetation, only grasses/weeds, or site has already been stripped).	✓	✓
j	FEMA 100-yr floodplain.	✓	✓
k	Existing and proposed water courses including springs, streams, wetlands, detention ponds, stormwater quality structures, roadside ditches, irrigation ditches and other water surfaces. Show maintenance of pre-existing vegetation within 50 feet of a receiving water.	✓	✓
l	Existing and proposed contours 2 feet or less (except for hillside).	✓	✓
m	Limits of disturbance delineating all anticipated areas of soil disturbance.	✓	✓
n	Identify and protect areas outside of the construction site boundary with existing fencing, construction fencing or other methods as appropriate.	✓	✓
o	Offsite grading clearly shown and called out. remove offsite grading from EGP	N/A	X
p	Areas of cut and fill identified.	✓	✓
q	Conclusions from soils/geotechnical report and (slopes, embankments, materials, mitigation, e	✓	✓
r	Proposed slopes steeper than 3:1 with top and er protective covering required.	✓	✓
s	Stormwater flow direction arrows.	✓	✓
t	Location of any dedicated asphalt / concrete batch plants.	N/A	N/A
u	Areas used for staging, storage of building materials, soils (stockpiles) or wastes. The use of construction office trailers requires PCD permitting.	✓	✓
v	All proposed temporary construction control measures, structural and non-structural. Temporary construction control measures shall be identified by phase of implementation to include" "initial," "interim," and "final" or shown on separate phased maps identifying each phase.	✓	✓
w	Vehicle tracking provided at all construction entrances/exits. Construction fencing, barricades, and/or signage provided at access points not to be used for construction.	✓	✓
x	Temporary sediment ponds provided for disturbed drainage areas greater than 1 acre.	✓	✓

JR: Color hatches showing offsite areas that must be excluded from early grading have been added to every applicable sheet and legend

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GRADING AND EROSION CONTROL PLAN CHECKLIST

	Revised: July 2019	Applicant	PCD
y	Dewatering operations to include locations of diversion, pump and discharge(s) as anticipated at time of design.	N/A	N/A
z	All proposed temporary construction control measure details. Custom or other jurisdiction's details used must meet or exceed EPC standards.	✓	✔
aa	Any offsite stormwater control measure proposed for use by the project and not under the direct control or ownership of the Owner or Operator.	N/A	N/A
bb	Existing and proposed permanent storm water management facilities, including areas proposed for stormwater infiltration or subsurface detention.	✓	✔
cc	Existing and proposed easements (permanent and construction) including required off site easements.	✓	✔
dd	Retaining walls (not to be located in County ROW unless approved via license agreement). Design by P.E. and building permit from Regional Building Department required for walls greater than or equal to 4 feet in height, series of walls, or walls supporting a surcharge.	N/A	N/A
ee	Plan certified by a Colorado Registered P.E., with EPC standard signature blocks for Engineer, Owner and EPC.	✓	✔
ff	Engineer's Statement (for standalone GEC Plan): This Grading and Erosion Control Plan was prepared under my direction and supervision and is correct to the best of my knowledge and belief. Said Plan has been prepared according to the criteria established by the County for Grading and Erosion Control Plans. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this plan. _____ _____ Engineer of Record Signature Date	✓	✔
gg	Engineer's Statement (for GEC Plan within Construction Drawing set): These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications. _____ _____ Engineer of Record Signature Date	N/A	N/A
hh	Owner's Statement (for standalone GEC Plan): I, the owner/developer have read and will comply with the requirements of the Grading and Erosion Control Plan. _____ _____ Owner Signature Date	✓	✔

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EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

GRADING AND EROSION CONTROL PLAN CHECKLIST

Revised: July 2019

		Applicant	PCD
ii	Owner's Statement (for GEC Plan within Construction Drawing set): I, the owner/developer have read and will comply with the requirements of the grading and erosion control plan and all of the requirements specified in these detailed plans and specifications. _____ _____ Owner Signature Date	N/A	N/A
jj	El Paso County (standalone GEC Plan): 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 completeness and/ or accuracy of this document. Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and Engineering Criteria Manual, as amended. In accordance with ECM Section 1.12, these construction documents will be valid for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years, the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Director's discretion. _____ _____ County Engineer/ECM Administrator Date	✓	✓
2. ADDITIONAL REPORTS/PERMITS/DOCUMENTS			
a	Soils report / geotechnical investigation as appropriate for grading/utilities/drainage/road construction.	✓	
b	Use Agreement/easement between the Owner or Operator and other third party for use of all offsite grading or stormwater control measures, used by the owner or operator but not under their direct control or ownership.	N/A	
c	Floodplain Development Permit	N/A	
d	USACE 404/wetlands permit/mitigation plan	N/A	
e	FEMA CLOMR	N/A	
f	State Engineer's permit/Notice Of Intent to Construct		
g	Stormwater Management Plan (SWMP)	X	
h	Financial Assurance Estimate (FAE) (signed)	X	
i	Erosion and Stormwater Quality Control Permit (ESQCP) (signed)	X	
j	Pre-Development Site Grading Acknowledgement and Right of Access Form (signed)	X	
k	Conditions of Approval met?	X	

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EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

GRADING AND EROSION CONTROL PLAN CHECKLIST

Revised: July 2019

		Applicant	PCD
3. STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS			
1	Stormwater discharges from construction sites shall not cause or threaten to cause pollution, contamination, or degradation of State Waters. All work and earth disturbance shall be done in a manner that minimizes pollution of any on-site or off-site waters, including wetlands.	✓	✓
2	Notwithstanding anything depicted in these plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code, the Engineering Criteria Manual, the Drainage Criteria Manual, and the Drainage Criteria Manual Volume 2. Any deviations from regulations and standards must be requested, and approved, in writing.	✓	✓
3	A separate Stormwater Management Plan (SMWP) for this project shall be completed and an Erosion and Stormwater Quality Control Permit (ESQCP) issued prior to commencing construction. Management of the SWMP during construction is the responsibility of the designated Qualified Stormwater Manager or Certified Erosion Control Inspector. The SWMP shall be located on site at all times during construction and shall be kept up to date with work progress and changes in the field.	✓	✓
4	Once the ESQCP is approved and a “Notice to Proceed” has been issued, the contractor may install the initial stage erosion and sediment control measures as indicated on the approved GEC. A Preconstruction Meeting between the contractor, engineer, and El Paso County will be held prior to any construction. It is the responsibility of the applicant to coordinate the meeting time and place with County staff.	✓	✓
5	Control measures must be installed prior to commencement of activities that could contribute pollutants to stormwater. control measures for all slopes, channels, ditches, and disturbed land areas shall be installed immediately upon completion of the disturbance.	✓	✓
6	All temporary sediment and erosion control measures shall be maintained and remain in effective operating condition until permanent soil erosion control measures are implemented and final stabilization is established. All persons engaged in land disturbance activities shall assess the adequacy of control measures at the site and identify if changes to those control measures are needed to ensure the continued effective performance of the control measures. All changes to temporary sediment and erosion control measures must be incorporated into the Stormwater Management Plan.	✓	✓
7	Temporary stabilization shall be implemented on disturbed areas and stockpiles where ground disturbing construction activity has permanently ceased or temporarily ceased for longer than 14 days.	✓	✓
8	Final stabilization must be implemented at all applicable construction sites. Final stabilization is achieved when all ground disturbing activities are complete and all disturbed areas either have a uniform vegetative cover with individual plant density of 70 percent of pre-disturbance levels established or equivalent permanent alternative stabilization method is implemented. All temporary sediment and erosion control measures shall be removed upon final stabilization and before permit closure.	✓	✓
9	All permanent stormwater management facilities shall be installed as designed in the approved plans. Any proposed changes that effect the design or function of permanent stormwater management structures must be approved by the ECM Administrator prior to implementation.	✓	✓

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EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

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10	Earth disturbances shall be conducted in such a manner so as to effectively minimize accelerated soil erosion and resulting sedimentation. All disturbances shall be designed, constructed, and completed so that the exposed area of any disturbed land shall be limited to the shortest practical period of time. Pre-existing vegetation shall be protected and maintained within 50 horizontal feet of a waters of the state unless shown to be infeasible and specifically requested and approved.	✓	✓
11	Compaction of soil must be prevented in areas designated for infiltration control measures or where final stabilization will be achieved by vegetative cover. Areas designated for infiltration control measures shall also be protected from sedimentation during construction until final stabilization is achieved. If compaction prevention is not feasible due to site constraints, all areas designated for infiltration and vegetation control measures must be loosened prior to installation of the control measure(s).	✓	✓
12	Any temporary or permanent facility designed and constructed for the conveyance of stormwater around, through, or from the earth disturbance area shall be a stabilized conveyance designed to minimize erosion and the discharge of sediment off site.	✓	✓
13	Concrete wash water shall be contained and disposed of in accordance with the SWMP. No wash water shall be discharged to or allowed to enter State Waters, including any surface or subsurface storm drainage system or facilities. Concrete washouts shall not be located in an area where shallow groundwater may be present, or within 50 feet of a surface water body, creek or stream.	✓	✓
14	During dewatering operations of uncontaminated ground water may be discharged on site, but shall not leave the site in the form of surface runoff unless an approved State dewatering permit is in place.	✓	✓
15	Erosion control blanketing or other protective covering shall be used on slopes steeper than 3:1.	✓	✓
16	Contractor shall be responsible for the removal of all wastes from the construction site for disposal in accordance with local and State regulatory requirements. No construction debris, tree slash, building material wastes or unused building materials shall be buried, dumped, or discharged at the site.	✓	✓
17	Waste materials shall not be temporarily placed or stored in the street, alley, or other public way, unless in accordance with an approved Traffic Control Plan. control measures may be required by El Paso County Engineering if deemed necessary, based on specific conditions and circumstances.	✓	✓
18	Tracking of soils and construction debris off-site shall be minimized. Materials tracked off-site shall be cleaned up and properly disposed of immediately.	✓	✓
19	The owner/developer shall be responsible for the removal of all construction debris, dirt, trash, rock, sediment, soil, and sand that may accumulate in roads, storm drains and other drainage conveyance systems and stormwater appurtenances as a result of site development.	✓	✓
20	The quantity of materials stored on the project site shall be limited, as much as practical, to that quantity required to perform the work in an orderly sequence. All materials stored on-site shall be stored in a neat, orderly manner, in their original containers, with original manufacturer's labels.	✓	✓
21	No chemical(s) having the potential to be released in stormwater are to be stored or used onsite unless permission for the use of such chemical(s) is granted in writing by the ECM Administrator. In granting approval for the use of such chemical(s), special conditions and monitoring may be required.	✓	✓

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22	Bulk storage of allowed petroleum products or other allowed liquid chemicals in excess of 55 gallons shall require adequate secondary containment protection to contain all spills onsite and to prevent any spilled materials from entering State Waters, any surface or subsurface storm drainage system or other facilities.	✓	✔
23	No person shall cause the impediment of stormwater flow in the curb and gutter or ditch except with approved sediment control measures.	✓	✔
24	Owner/developer and their agents shall comply with the "Colorado Water Quality Control Act" (Title 25, Article 8, CRS), and the "Clean Water Act" (33 USC 1344), in addition to the requirements of the Land Development Code, DCM Volume II and the ECM Appendix I. All appropriate permits must be obtained by the contractor prior to construction (1041, NPDES, Floodplain, 404, fugitive dust, etc.). In the event of conflicts between these requirements and other laws, rules, or regulations of other Federal, State, local, or County agencies, the most restrictive laws, rules, or regulations shall apply.	✓	✔
25	All construction traffic must enter/exit the site only at approved construction access points.	✓	✔
26	Prior to construction the permittee shall verify the location of existing utilities.	✓	✔
27	A water source shall be available on site during earthwork operations and shall be utilized as required to minimize dust from earthwork equipment and wind.	✓	✔
28	The soils report for this site has been prepared by _____ and shall be considered a part of these plans.	X	X
29	At least ten (10) days prior to the anticipated star that will disturb one (1) acre or more, the owner or operator of construction a plication for stormwater discharge to the Colorado Department of Public er Quality Division. The application contains certification of completion of lan (SWMP), of which this Grading and Erosion Control Plan may be a part. For information or application materials contact: Colorado Department of Public Health and Environment Water Quality Control Division WQCD – Permits 4300 Cherry Creek Drive South Denver, CO 80246-1530 Attn: Permits Unit	✓	✔

JR: This GEC check-list has been up-dated. This note is note #29 on sheet 2 of the GEC plans.

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4. Applicant Comments:			
a	ALL ITEMS MARKED 'N/A' ARE ITEMS THAT ARE NOT ASSOCIATED WITH THE PROJECT. ALL REQUIRED ITEMS APPLICABLE TO THIS PROJECT ARE INCLUDED IN GEC PLANS.		
b			
c			
5. Checklist Review Certifications:			
a	Engineer of Record: The Grading and Erosion Control Plan was prepared under my direction and supervision and is complete and correct to the best of my knowledge and belief. Said Plan has been prepared according to the criteria established by the County for Grading and Erosion Control Plans. sign and date _____ _____ Engineer JR: Noted, signature and date added Date		
b	Review Engineer: The Grading and Erosion Control Plan was reviewed and found to meet the checklist requirements except where otherwise noted or allowed by an approved deviation request. _____ _____ Review Engineer Date		