Q_{100}=21.6 cfs discharge to an 8’ wide concrete stilling basin at the west property line. The 5-Year and 100-Year HWL are 6208.53 and 6210.86 respectively. The concentrated outflow will dissipate energy by using the standing water in the stilling basin. Runoff will then outfall onto the adjacent property from the stilling basin via sheet flow. This sheet flow matches the existing condition of the existing pond filling up overtopping and sheet flowing west offsite over the existing prairie. The 23’ wide emergency spillway is set at 6211.00 and has a flow of 0.69’ deep, thus giving a freeboard of 1.31’.

The estimated on-site discharge into Sand Creek in the existing condition is Q_5=30.8 cfs and Q_{100}=71.5 cfs. The estimated on-site discharge into Sand Creek in the proposed condition is Q_5=1.2 cfs and Q_{100}=26.7 cfs, indicating a decrease in the discharge rate into Sand Creek of $\%_5$=96.1% and $\%_{100}$=62.7%.

Unresolved:
Include discussion of suitable outfall. Where do these flows go, does it handle flows, even if they are less, etc

Basin PR-7 consists of 0.34 acres of earth embankment located on the northwest side of the site and its runoff (Q_5=0.2 cfs, Q_{100}=1.1 cfs) sheet flows northwest, off-site, to Design Point 7, indicating that the runoff flows into Sand Creek.

Basin PR-8 consists of 0.30 acres of earth embankment located at the west side of the site, west of the proposed private Pond 1 EDB and its runoff (Q_5=0.2 cfs, Q_{100}=1.0 cfs) sheet flows west, off-site, to Design Point 8, indicating that the runoff flows into Sand Creek.

Basin PR-9 consists of 0.59 acres of earth embankment and flatter area located at the southwest corner of the site and its runoff (Q_5=0.2 cfs, Q_{100}=1.5 cfs) sheet flows west, off-site, to Design Point 9, indicating that the runoff flows into Sand Creek.

There is one storm sewer system proposed on the site. This system collects runoff from the drain trench along the east property line and the two curb inlets in the mini-storage area and pipes the runoff to the detention pond. There are a series of area inlets along the storm pipe in the mini-storage area that are not required to capture runoff, but will lessen the surface flow along the central drive aisle. The storm pipes on the west side of the site have been sized to have some extra capacity so that the future commercial development can tie into them as well.

16. Micropool	1 EA	$ 5,000	$ 5,000
17. Pond Earthworks	3,157 CY	$ 6	$ 18,942
18. Spillway	1 EA	$ 7,000	$ 7,000
19. Reseed/Stabilization	1 EA	$ 2,000	$ 2,000
20. Aggregate Base Course	306 CY	$ 66	$ 20,196
21. Stilling Basin	1 EA	$ 5,000	$ 5,000
		Total	**$ 408,801**

DRAINAGE FEES

This drainage report is part of a site development application; therefore, no drainage fees are due.

MAINTENANCE

The Extended Detention Basin is private and will be maintained by the property owner. The proposed storm sewers are private and will be maintained by the property owner.

Unresolved:
Provide discussion earlier in report discussing suitable outfall location.

SUMMARY

Development of this site will not adversely affect the surrounding development. Site runoff and storm drain appurtenances from the development will not adversely affect the downstream and surrounding developments and will be safely routed to the proposed extended detention basin reduced to the allowable pre-developed rates while slowly treating the water quality capture volume. Runoff from areas of disturbance with no development are being excluded per exemptions and sheet flow offsite in historic paths and rates.

PREPARED BY:
TERRA NOVA ENGINEERING, INC.

Dane Frank, P.E.
Project Engineer

Jobs/2419.00/Drainage/241900 FDR.doc

TNES Response:
These are modeled as Type 13 inlets in the actual calculation pages, it says User Defined because we are modeling Type 13 inlets with multiple grates.

MHFD-Inlet, Version 5.03 (August 2023)

INLET MANAGEMENT

Worksheet Protected

The spreadsheet has Type 13 inlets under the Street inlet section

INLET NAME	DP 3A Inlet #7	DP 3B Inlet #6	DP 3C Inlet #5
Site Type (Urban or Rural)	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	AREA	AREA	AREA
Hydraulic Condition	Swale	Swale	Swale
Inlet Type	User-Defined	User-Defined	User-Defined

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	5.0	7.5	8.0
Major Q_{Known} (cfs)	8.9	14.4	16.6

Bypass (Carry-Over) Flow from Upstream

Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)			
Percent Impervious			
NRCS Soil Type			

Watershed Profile

Overland Slope (ft/ft)			
Overland Length (ft)			
Channel Slope (ft/ft)			
Channel Length (ft)			

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

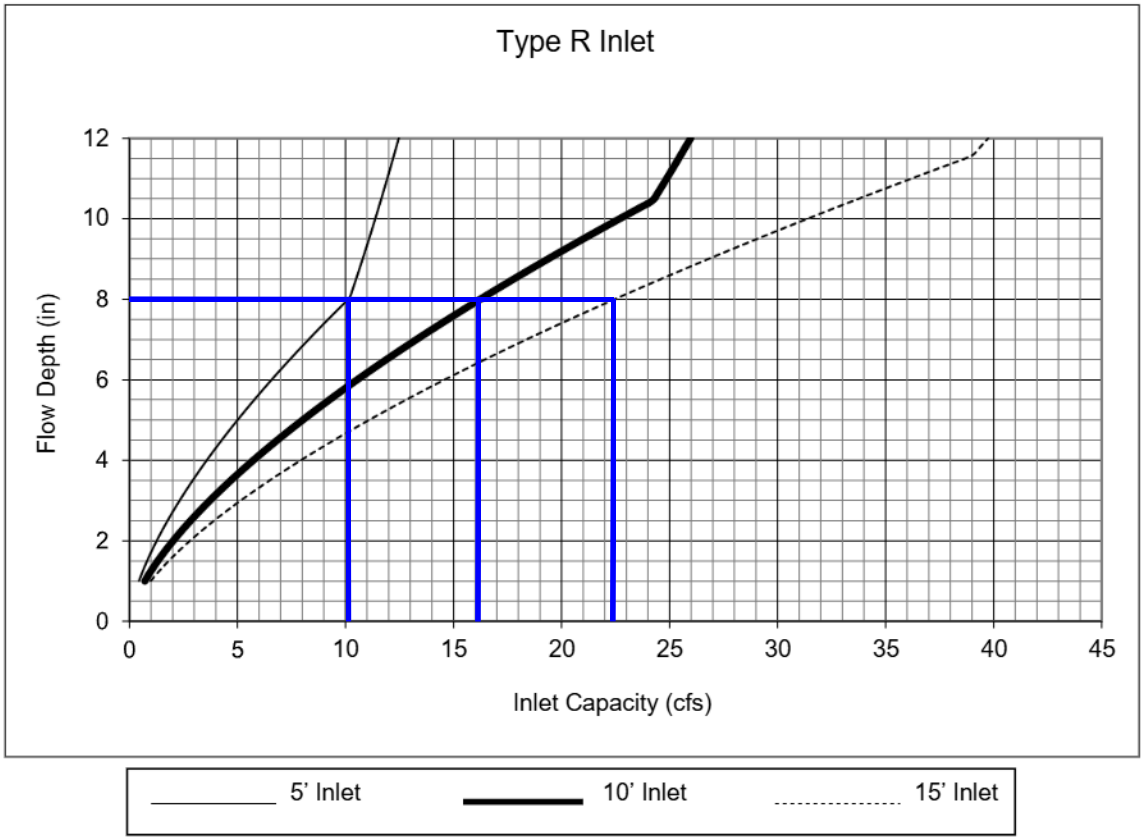
Major Storm Rainfall Input

Design Storm Return Period, T_r (years)			
One-Hour Precipitation, P_1 (inches)			

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**5.0**	**7.5**	**8.0**
Major Total Design Peak Flow, Q (cfs)	**8.9**	**14.4**	**16.6**
Minor Flow Bypassed Downstream, Q_b (cfs)	2.5	3.6	4.0
Major Flow Bypassed Downstream, Q_b (cfs)	5.4	8.8	10.6

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



- A 5' inlet has a capacity of 10.1 cfs.
- A 10' inlet has a capacity of 16.0 cfs.
- A 15' inlet has a capacity of 22.5 cfs.
- Combining 5' and 15' inlets would give a capacity of 32.6 cfs for a 20' inlet.

DP 3E (BASIN PR-3E) Q5=8.8 cfs, Q100=20.2 cfs
    20' Type R capacity: 32.6 cfs -> Thus, inlet has sufficient capacity.
DP 4 Q5=11.8 cfs, Q100=32.2 cfs
    20' Type R capacity: 32.6 cfs -> Thus, inlet has sufficient capacity.

Unresolved:
MHFD Inlet spreadsheet has all inlet types available. Please use that spreadsheet for inlet design of Type R and C inlets .

Notes:
1. The standard inlet parameters must apply to use this chart.

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project: **Platte Self Storage** Location: Drive Aisles S1 in Basins 3A-3E

By: John F Date: 11/6/2024

Chk By: Date:

version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

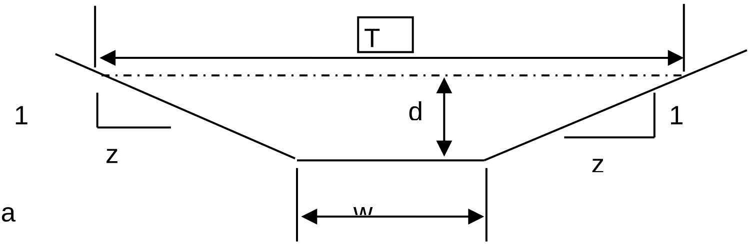
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT

z (sideslope)= 14.3

z (sideslope)= 16

b (btm width, ft)= 0

d (depth, ft)= 0.35

S (slope, ft/ft) 0.01

n_{low} = 0.013

n $_{high}$ = 0.013

Clear Data Entry Cells

				Low N		High N	
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs
0.35	1.86	10.63	0.17	3.570899	6.62714	3.570899	6.62714

T = 10.605

Dm = 0.175

Sc low = 0.0044 Sc high = 0.0044

.7 Sc	1.3 Sc	.7 Sc	1.3 Sc
0.0031	0.0057	0.0031	0.0057

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

Basins 3A thru 3E flow is split between north of and south of Design Points 3A thru 3E.
Basin 3A Q100=8.9 cfs split =4.5 cfs < 6.63 cfs
Basin 3B Q100=8.9 cfs split =4.5 cfs < 6.63 cfs
Basin 3C Q100=7.8 cfs split =3.9 cfs < 6.63 cfs
Basin 3D Q100=7.8 cfs split =3.9 cfs < 6.63 cfs
Basin 3E Q100=8.1 cfs split =4.1 cfs < 6.63 cfs

Please include back into report design sheet for the swale in the Central Drive Aisle which was in the last submittal.

TNES Response:
Referenced calculation has been removed and replaced with the calculation on the following sheet. Calculation was not added back in.

Which PR-3 Basin? Basins are labeled as PR-3A thru PR-3E.

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project:	**Platte Self Storage**	Location:	Drive Aisles S2 in Basins PR-3 and PR-4
By:	John F	Date:	11/6/2024
Chk By:		Date:	

version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

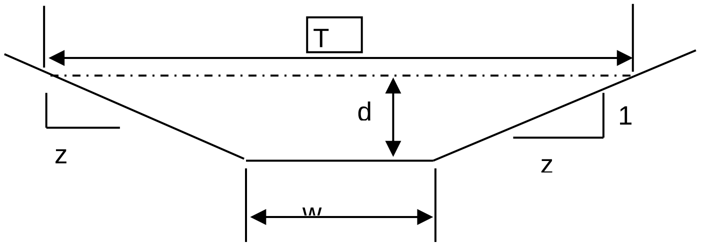
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

	INPUT
z (sideslope)=	50
z (sideslope)=	50
b (btm width, ft)=	0
d (depth, ft)=	0.35
S (slope, ft/ft)	0.02
n low =	0.013
n high =	0.013

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.35	6.13	35.01	0.17	5.05668645	30.9722	5.056686	30.9722	T =	35
								Dm =	0.175
				Sc low =	0.0044	Sc high =	0.0044		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0031	0.0057	0.0031	0.0057		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Created by: Mike O'Shea

Basin 3 Q100=20.2 cfs < 30.97 cfs

Basin 4 Q100=16.8 cfs < 30.97 cfs

MANNING'S EQUATION for OPEN CHANNEL FLOW

Project:	**Platte Self Storage**	Location:	Swale S3 in Basin OS-W
By:	John F	Date:	11/6/2024
Chk By:		Date:	

version 12-2004

Mannings Formula

$Q = (1.486/n)AR_h^{2/3}S^{1/2}$

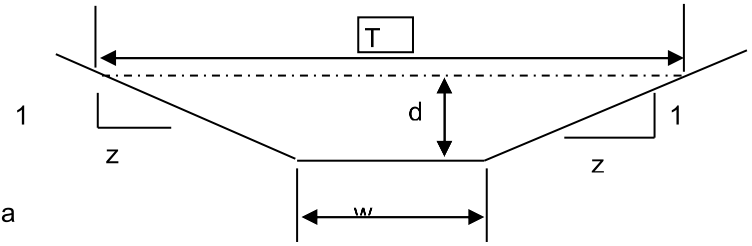
R = A/P

A = cross sectional area

P= wetted perimeter

S = slope of channel

n = Manning's roughness coefficient



$V = (1.49/n)R_h^{2/3}S^{1/2}$

Q = V x A

INPUT	
z (sideslope)=	8
z (sideslope)=	6
b (btm width, ft)=	0
d (depth, ft)=	0.3
S (slope, ft/ft)	0.076
n_{low} =	0.02
n_{high} =	0.03

Clear Data Entry Cells

				Low N		High N			
Depth, ft	Area, sf	Wetted Perimeter, ft	Hydraulic Radius, ft	Velocity, fps	Flow, cfs	Velocity, fps	Flow, cfs		
0.3	0.63	4.24	0.15	5.7426429	3.61787	3.828429	2.41191	T =	4.2
								Dm =	0.150
				Sc low =	0.0111	Sc high =	0.0250		
				.7 Sc	1.3 Sc	.7 Sc	1.3 Sc		
				0.0078	0.0144	0.0175	0.0325		

s_c = critical slope ft / ft

T = top width of the stream

d_m = a/T = mean depth of flow

Provide a more specific design as it appears velocity could be over allowable.

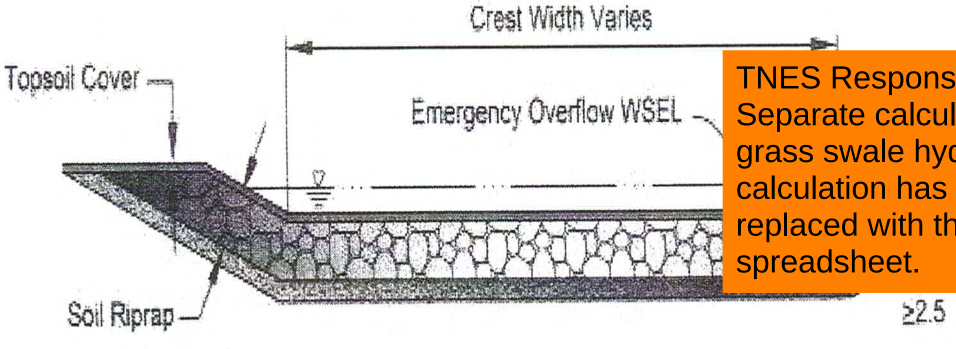
Created by: Mike O'Shea

Design Point W Q100=1.9 cfs < 2.4 cfs

SWALE S4 RIP RAP CALCS

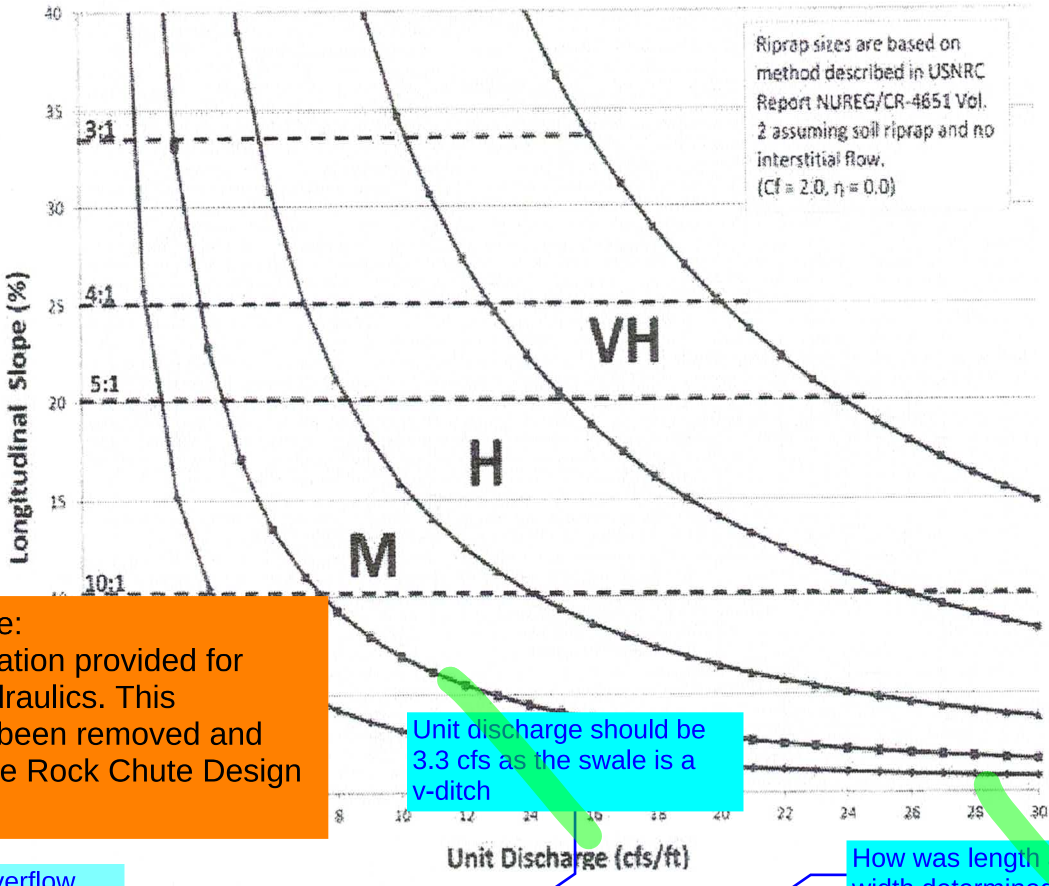
Drainage Map has this swale called out as grass. Please verify and update accordingly as to if it is riprap or grass.

Figure 13-12c. Emergency Spillway Protection



TNES Response:
Separate calculation provided for grass swale hydraulics. This calculation has been removed and replaced with the Rock Chute Design spreadsheet.

Figure 13-12d. Riprap Types for Emergency Spillway Protection



TNES Response:
Separate calculation provided for grass swale hydraulics. This calculation has been removed and replaced with the Rock Chute Design spreadsheet.

Unit discharge should be 3.3 cfs as the swale is a v-ditch

How was length and width determined?

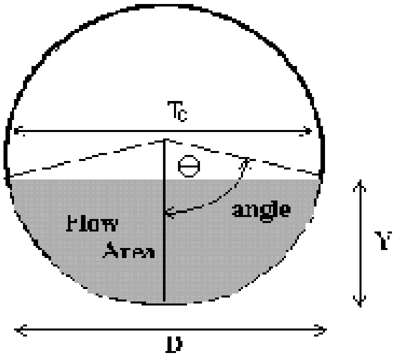
This graph is for the overflow spillways at a pond. Suggest using a riprap rundown spreadsheet instead of this one.

Q100=3.3 CFS
L=4.4 FT
UNIT DISCHARGE=0.75
USE TYPE VL D50=6" 8' W x 10' L

CIRCULAR CONDUIT FLOW (Normal & Critical Depth Computation)

Project: **Humprey Self Storage**
Pipe ID: **18" RCP Culvert**

Include label to indicate which culvert this is.



Design Information (Input)

Pipe Invert Slope	So =	0.0220	ft/ft
Pipe Manning's n-value	n =	0.0130	
Pipe Diameter	D =	18.00	inches
Design discharge	**Q =**	**1.30**	**cfs**

Full-flow Capacity (Calculated)

Full-flow area	Af =	1.77	sq ft
Full-flow wetted perimeter	Pf =	4.71	ft
Half Central Angle	Theta =	3.14	radians
Full-flow capacity	Qf =	15.62	cfs

Calculation of Normal Flow Condition

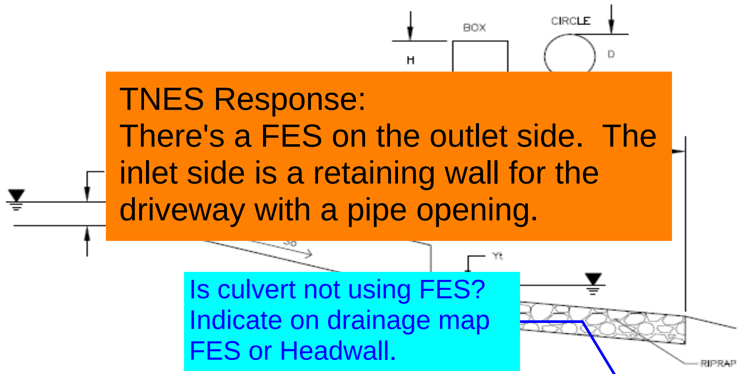
Half Central Angle (0<Theta<3.14)	Theta =	0.91	radians
Flow area	An =	0.24	sq ft
Top width	Tn =	1.19	ft
Wetted perimeter	Pn =	1.37	ft
Flow depth	Yn =	0.29	ft
Flow velocity	Vn =	5.36	fps
Discharge	Qn =	1.30	cfs
Percent Full Flow	Flow =	8.3%	of full flow
Normal Depth Froude Number	Fr_n =	2.09	supercritical

Calculation of Critical Flow Condition

Half Central Angle (0<Theta-c<3.14)	Theta-c =	1.13	radians
Critical flow area	Ac =	0.41	sq ft
Critical top width	Tc =	1.35	ft
Critical flow depth	Yc =	0.43	ft
Critical flow velocity	Vc =	3.14	fps
Critical Depth Froude Number	Fr_c =	1.00	

Determination of Culvert Headwater and Outlet Protection

Project: **Humphrey Self Storage**
Basin ID: **18" RCP Culvert**



TNES Response:
There's a FES on the outlet side. The inlet side is a retaining wall for the driveway with a pipe opening.

Is culvert not using FES? Indicate on drainage map FES or Headwall.

Soil Type:
Choose One:
○ Sandy
● Non-Sandy

Supercritical Flow! Using Da to calculate protection type.

Design Information (Input):

Design Discharge	Q =	1.3	cfs
Circular Culvert:			
Barrel Diameter in Inches	D =	18	inches
Inlet Edge Type (Choose from pull-down list)		Grooved End with Headwall	
Box Culvert:		**OR**	
Barrel Height (Rise) in Feet	Height (Rise) =		ft
Barrel Width (Span) in Feet	Width (Span) =		ft
Inlet Edge Type (Choose from pull-down list)			
Number of Barrels	No =	1	
Inlet Elevation	Elev IN =	6240	ft
Outlet Elevation **OR** Slope	Elev OUT =	6239	ft
Culvert Length	L =	46	ft
Manning's Roughness	n =	0.013	
Bend Loss Coefficient	k_b =	0	
Exit Loss Coefficient	k_x =	1	
Tailwater Surface Elevation	Elev Y_t =		ft
Max Allowable Channel Velocity	V =	7	ft/s

Required Protection (Output):

Tailwater Surface Height	Y_t =	0.60	ft
Flow Area at Max Channel Velocity	A_t =	0.19	ft^2
Culvert Cross Sectional Area Available	A =	1.77	ft^2
Entrance Loss Coefficient	k_e =	0.20	
Friction Loss Coefficient	k_f =	0.83	
Sum of All Losses Coefficients	k_s =	2.03	ft
Culvert Normal Depth	Y_n =	0.29	ft
Culvert Critical Depth	Y_c =	0.43	ft
Tailwater Depth for Design	d =	0.96	ft
Adjusted Diameter **OR** Adjusted Rise	D_a =	0.90	ft
Expansion Factor	1/(2*tan(Θ)) =	6.70	
Flow/Diameter$^{2.5}$ **OR** Flow/(Span * Rise$^{1.5}$)	Q/D^2.5 =	0.47	$ft^{0.5}/s$
Froude Number	Fr =	2.08	**Supercritical!**
Tailwater/Adjusted Diameter **OR** Tailwater/Adjusted Rise	Yt/D =	0.67	
Inlet Control Headwater	HW_I =	0.57	ft
Outlet Control Headwater	HW_O =	-0.02	
Design Headwater Elevation	**HW =**	**6,240.57**	**ft**
Headwater/Diameter OR Headwater/Rise Ratio	**HW/D =**	**0.38**	

Indicate what is being done for supercritical condition. Per criteria, FR # needs to be less than 0.9.

TNES Response:
1. I can't find anything in the County standards that say culverts have a required froude number.
2. This is a culvert spreadsheet. The froude number shown is for the pipe. The spreadsheet doesn't include any inputs for the outfall or swale (which is where the County standards do talk about froude numbers).
3. In answer to your comment: nothing is being done about the supercritical condition in a concrete pipe, beyond it being inside a concrete pipe. There is a FES and riprap pad after the concrete pipe that would have very different input values.
Note: The only way we found to get this froude number below 0.9 was to use CMP so it had a much higher n value. Putting CMP under a driveway that's going to have heavy truck traffic isn't a good idea.

INLET#10 & PR#10	17.70	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET #11 & PR#13	17.70	CIRCULAR	24.00 in	24.00 in	21.00 in	21.00 in	24.00 in	24.00 in	3.14	
INLET #18 & PR#20	7.40	CIRCULAR	15.00 in	15.00 in	18.00 in	18.00 in	15.00 in	15.00 in	1.23	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise
INLET #17 & PR#19	5.80	CIRCULAR	15.00 in	15.00 in	15.00 in	15.00 in	15.00 in	15.00 in	1.23	
INLET #16 & PR#18	3.40	CIRCULAR	12.00 in	12.00 in	12.00 in	12.00 in	12.00 in	12.00 in	[illegible]	
INLET #15 & PR#17	5.00	CIRCULAR	18.00 in	18.00 in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
INLET #14 & PR#16	2.60	CIRCULAR	15.00 in	15.00 in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
INLET #13 & PR#15	1.90	CIRCULAR	15.00 in	15.00 in	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
INLET #12 & PR#14	1.30	CIRCULAR	12.00 in	12.00 in	9.00 in	9.00 in	12.00 in	12.00 in	0.79	

Address this comment

TNES Response:
This UDSewer warning is based on the default parameters in the program, which is not at all tied to county standards. Design meets county standards.

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

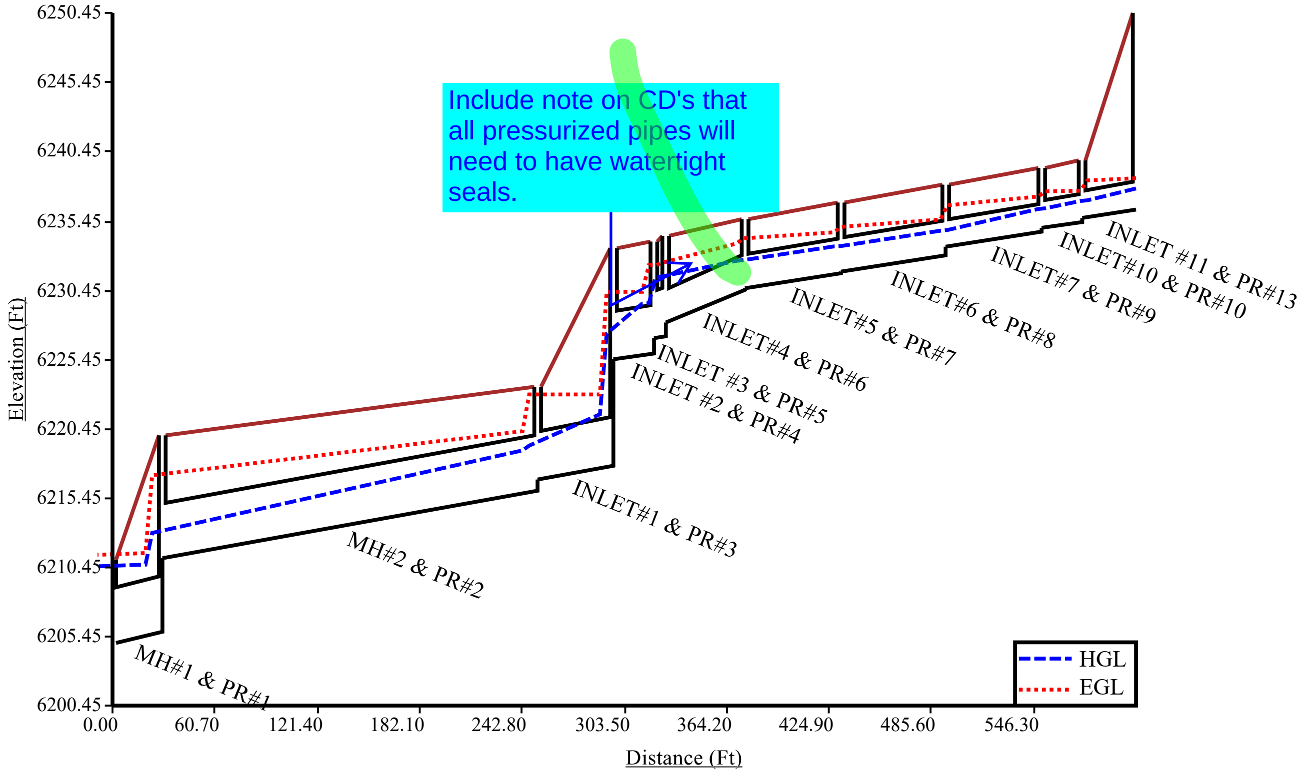
Grade Line Summary:

Tailwater Elevation (ft): 6210.54

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
MH#1 & PR#1	6205.00	6205.80	0.00	0.00	6210.54	6210.66	6211.36	0.12	6211.48
MH#2 & PR#2	6211.11	6216.00	0.04	0.00	6212.93	6218.90	6217.08	3.18	6220.26
INLET#1 & PR#3	6216.81	6217.80	0.34	0.00	6219.23	6221.52	6222.92	0.00	6222.92
INLET #2 & PR#4	6225.49	6225.90	0.20	0.00	6227.33	6229.49	6230.34	0.00	6230.34

100-YEAR

PR 1 - PR 13



Include note on CD's that all pressurized pipes will need to have watertight seals.

PLATTE SELF STORAGE
SITE DEVELOPMENT PLAN
EXISTING DRAINAGE MAP
NOVEMBER 2024

LEGEND

P-7 / 12.22 / #% IMP	BASIN DESIGNATION AREA IN BASIN (AC) PERCENT IMPERVIOUS
△ D	DESIGN POINT
▬ ▬	BASIN BOUNDARY
— — —	EXISTING 1' CONTOUR
←	GROUND SURFACE FLOW DIRECTION
⬅	ROAD AND DITCH FLOW DIRECTION
—— · · ——	TIME OF CONCENTRATION PATH

NOTES

1. BROWN GROUND SURFACE CONTOURS ARE LIDAR DATA DOWNLOADED FROM THE COLORADO HAZARD MAPPING & RISK MAP PORTAL, DATA SET: 2018 3DEP EAST CO EL PASO. THIS DATA IS APPROXIMATE. LIDAR DATA IS FROM 2018 AND AT 2' INTERVALS.

2. THE EXISTING SITE IS A LANDSCAPING MATERIALS YARD. GROUND SURFACES ARE DIRT, GRAVEL, AND ASPHALT. THE EDGE OF ASPHALT IS OFTEN COVERED BY DIRT/GRAVEL AND IT'S EXTENTS ARE ONLY ROUGHLY KNOWN.

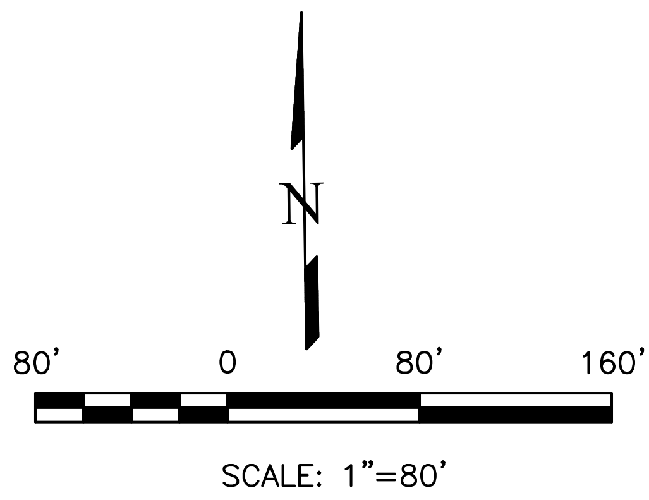
Show and label Base Flood Elevations in floodplain

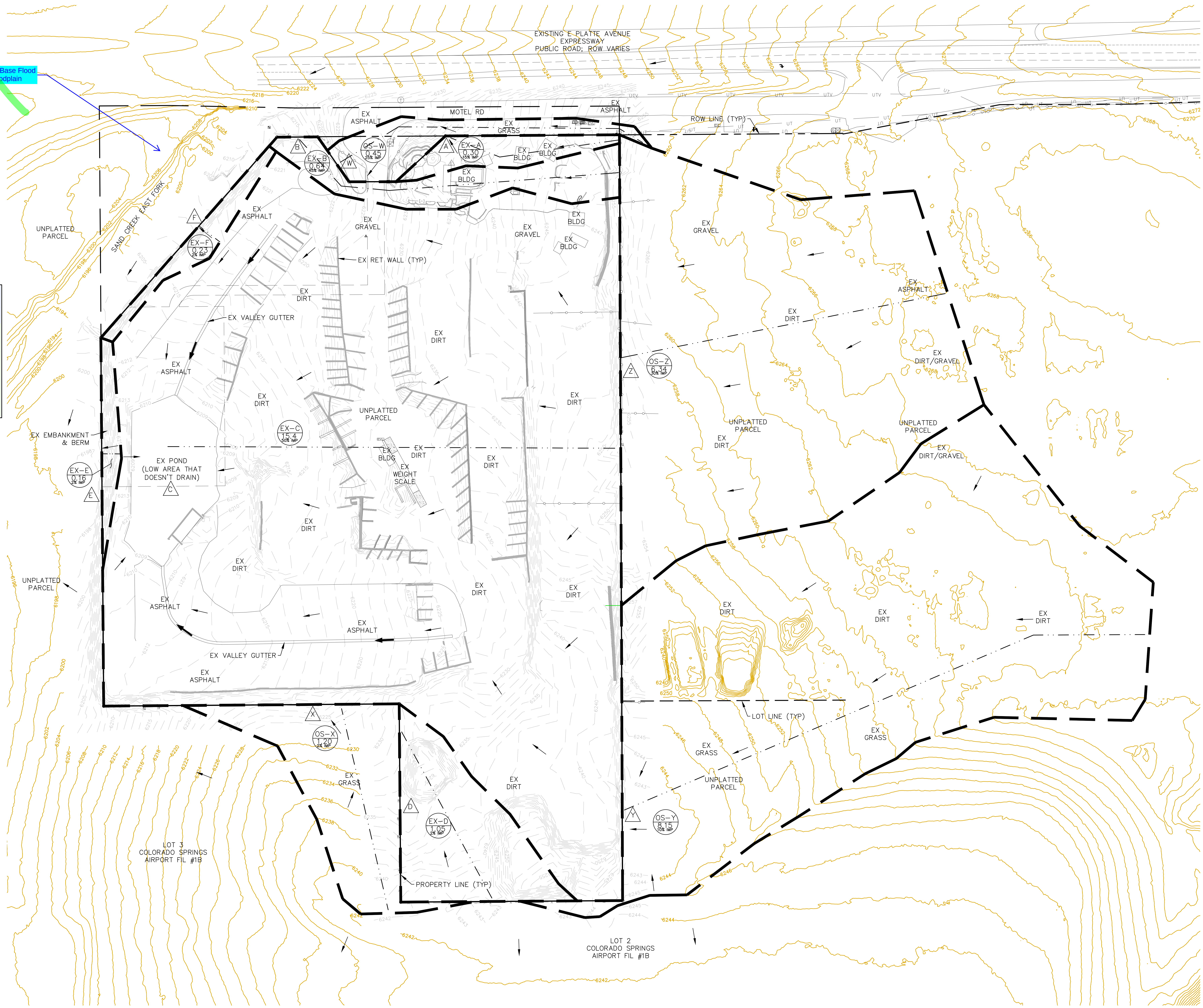
BASIN SUMMARY

BASIN	AREA TOTAL	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				TC	INTENSITY		TOTAL FLOWS	
		C5	C100	C5	Length	Slope	Tt	Length	Slope	Velocity	Tt	TOTAL	I5	I100	Q5	Q100
	(Acres)	* For Calcs See Runoff Summary			(ft)	(ft/ft)	(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
OS-Z	6.34	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	6.1	16.7
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3
EX-A	0.30	0.22	0.45	0.22	300	0.07	14.5	0	7.0%	2.6	0.0	14.5	3.6	6.0	0.2	0.8
EX-B	0.64	0.45	0.63	0.45	300	0.07	10.7	250	7.0%	2.6	1.6	12.2	3.8	6.4	1.1	2.6
EX-C	15.4	0.49	0.66	0.49	300	0.07	10.0	330	7.0%	2.6	2.1	12.1	3.8	6.4	29.0	65.0
EX-D	1.05	0.10	0.36	0.10	300	0.03	21.9	40	3.0%	1.7	0.4	22.2	2.9	4.9	0.3	1.9
EX-E	0.16	0.08	0.35	0.08	30	0.40	3.0	0	40.0%	6.3	0.0	5.0	5.2	8.7	0.1	0.5
EX-F	0.23	0.08	0.35	0.08	35	0.24	3.8	0	24.0%	4.9	0.0	5.0	5.2	8.7	0.1	0.7

DESIGN POINT SUMMARY

Design Point(s)	*Contributing Basins*	*Area*	*Flow (cfs)*	
		(ac)	*Q5*	*Q100*
Z	**OS-Z**	6.34	6.1	16.7
Y	**OS-Y**	8.15	3.6	15.4
X	**OS-X & DP D**	2.25	0.7	4.2
W	**OS-W & DP A**	0.75	0.7	2.2
A	**EX-A**	0.30	0.2	0.8
B	**EX-B & DP W**	1.39	1.8	4.7
C	**EX-C, DP D, DP X, & DP Y**	26.85	33.6	86.5
D	**EX-D**	1.05	0.3	1.9
E	**EX-E**	0.16	0.1	0.5
F	**EX-F**	0.23	0.1	0.7





REVISIONS

NO.	DESCRIPTION	DATE

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PLATTE SELF STORAGE
EXISTING DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD
H-SCALE AS SHOWN
V-SCALE N/A
JOB NO. 2419.00
DATE ISSUED 11/8/24
SHEET NO. 1 OF 3

PLATTE SELF STORAGE

SITE DEVELOPMENT PLAN

PROPOSED DRAINAGE MAP

NOVEMBER 2024

LEGEND

P-7 12.22 #% IMP	BASIN DESIGNATION AREA IN BASIN (AC) PERCENT IMPERVIOUS
D	DESIGN POINT
— —	BASIN BOUNDARY
- - -	EXISTING 1' CONTOUR
—6231—	PROPOSED CONTOURS – 1'
——	EXISTING PROPERTY LINE
—○—○—	PROPOSED FENCE
⌇⌇⌇	PROPOSED RETAINING WALL
▨	PROPOSED RIPRAP
←	GROUND SURFACE FLOW DIRECTION
⬅	ROAD AND DITCH FLOW DIRECTION
— · · —	TIME OF CONCENTRATION PATH
S#	SWALE IDENTIFIER

NOTES

1. BROWN GROUND SURFACE CONTOURS ARE LIDAR DATA DOWNLOADED FROM THE COLORADO HAZARD MAPPING & RISK MAP PORTAL, DATA SET: 2018 3DEP EAST CO EL PASO. THIS DATA IS APPROXIMATE. LIDAR DATA IS FROM 2018 AND AT 2' INTERVALS.

PIPE RUN SUMMARY

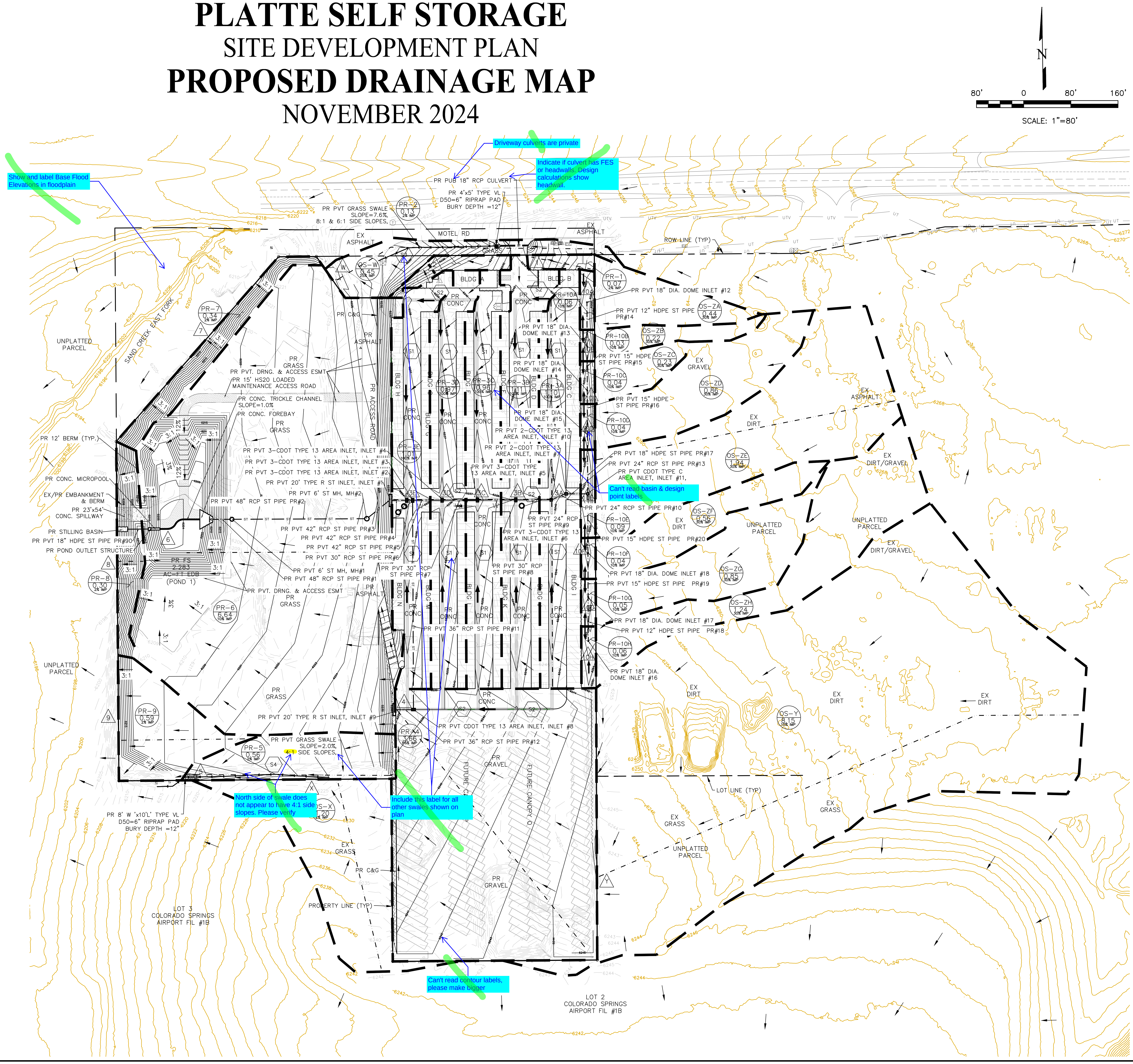
Pipe Run	Inlet #	Contributing Flow Sources	5 Year Flow (cfs)	100 Year Flow (cfs)	Slope	Pipe Size & Type	Owner
PR#1	-	PR#2	41.2	91.4	2.7%	48" RCP	PVT
PR#2	-	PR#3	41.2	91.4	2.2%	48" RCP	PVT
PR#3	#1	DP 3E & PR#4	41.2	91.4	2.2%	42" RCP	PVT
PR#4	#2	PR#5	32.4	71.2	1.7%	42" RCP	PVT
PR#5	#3	PR#6 & PR#11	32.4	71.2	2.1%	42" RCP	PVT
PR#6	#4	DP 3D & PR#7	20.6	39.0	5.0%	30" RCP	PVT
PR#7	#5	DP 3C & PR#8	16.5	32.7	1.9%	30" RCP	PVT
PR#8	#6	DP 3B & PR#9	12.5	26.7	1.9%	30" RCP	PVT
PR#9	#7	DP3A & PR#13	8.7	21.1	1.9%	24" RCP	PVT
PR#10	#10	PR#13	6.2	17.7	1.7%	24" RCP	PVT
PR#11	#8	PR#12	11.8	32.2	1.0%	36" RCP	PVT
PR#12	#9	DP 4	11.8	32.2	1.0%	36" RCP	PVT
PR#13	#11	DP 10E & PR#17 & 20	6.2	17.7	1.0%	24" RCP	PVT
PR#14	#12	DP 10A	0.4	1.3	1.0%	12" HDPE	PVT
PR#15	#13	DP 10B & PR#14	0.7	1.9	1.0%	15" HDPE	PVT
PR#16	#14	DP 10C & PR#15	0.9	2.6	1.0%	15" HDPE	PVT
PR#17	#15	DP 10D & PR#16	1.7	5.0	1.0%	18" HDPE	PVT
PR#18	#16	DP 10H	1.2	3.4	1.0%	12" HDPE	PVT
PR#19	#17	DP 10G & PR#18	2.0	5.8	1.0%	15" HDPE	PVT
PR#20	#18	DP 10F & PR#19	2.6	7.4	1.0%	15" HDPE	PVT
PR#90	-	Pond outlet	0.5	11.3	1.4%	18" HDPE	PVT

BASIN SUMMARY

BASIN	AREA TOTAL	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				T_C	INTENSITY		TOTAL FLOWS	
		C_5	C_{100}	C_5	Length	Slope	T_t	Length	Slope	Velocity	T_t	TOTAL	I_5	I_{100}	Q_5	Q_{100}
	(Acres)	*For Calcs See Runoff Summary			(ft)	(ft/ft)	(min)	(ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(c.f.s.)	(c.f.s.)
OS-ZA	0.44	0.33	0.53	0.33	300	0.02	19.3	230	2.0%	1.4	2.7	22.0	2.9	4.9	0.4	1.1
OS-ZB	0.22	0.33	0.53	0.33	300	0.02	19.3	231	2.0%	1.4	2.7	22.0	2.9	4.9	0.2	0.6
OS-ZC	0.23	0.33	0.53	0.33	300	0.02	19.3	232	2.0%	1.4	2.7	22.0	2.9	4.9	0.2	0.6
OS-ZD	0.86	0.33	0.53	0.33	300	0.02	19.3	233	2.0%	1.4	2.7	22.0	2.9	4.9	0.8	2.3
OS-ZE	1.94	0.33	0.53	0.33	300	0.02	19.3	234	2.0%	1.4	2.8	22.0	2.9	4.9	1.9	5.1
OS-ZF	0.56	0.33	0.53	0.33	300	0.02	19.3	235	2.0%	1.4	2.8	22.0	2.9	4.9	0.5	1.5
OS-ZG	0.85	0.33	0.53	0.33	300	0.02	19.3	236	2.0%	1.4	2.8	22.0	2.9	4.9	0.8	2.3
OS-ZH	1.24	0.33	0.53	0.33	300	0.02	19.3	237	2.0%	1.4	2.8	22.0	2.9	4.9	1.2	3.3
OS-Y	8.15	0.16	0.41	0.16	300	0.03	20.4	505	3.0%	1.7	4.9	25.3	2.7	4.6	3.6	15.4
OS-X	1.20	0.09	0.36	0.09	300	0.05	18.5	0	5.0%	2.2	0.0	18.5	3.2	5.4	0.4	2.3
OS-W	0.45	0.28	0.50	0.28	300	0.07	13.5	160	7.0%	2.6	1.0	14.5	3.6	6.0	0.5	1.3
PR-1	0.07	0.08	0.35	0.08	100	0.08	9.3	0	8.0%	2.8	0.0	9.3	4.2	7.1	0.0	0.2
PR-2	0.13	0.08	0.35	0.08	45	0.25	4.3	0	25.0%	5.0	0.0	5.0	5.2	8.7	0.1	0.4
PR-3A	1.10	0.90	0.96	0.90	100	0.02	2.9	450	2.0%	2.8	2.7	5.5	5.0	8.4	5.0	8.9
PR-3B	1.11	0.90	0.96	0.90	100	0.02	2.9	451	2.0%	2.8	2.7	5.5	5.0	8.4	5.0	8.9
PR-3C	0.96	0.90	0.96	0.90	100	0.02	2.9	452	2.0%	2.8	2.7	5.5	5.0	8.4	4.3	7.8
PR-3D	0.97	0.90	0.96	0.90	100	0.02	2.9	453	2.0%	2.8	2.7	5.5	5.0	8.4	4.4	7.8
PR-3E	1.01	0.90	0.96	0.90	100	0.02	2.9	454	2.0%	2.8	2.7	5.5	5.0	8.4	4.5	8.1
PR-4	3.66	0.61	0.75	0.61	100	0.02	7.0	400	2.0%	1.0	6.7	13.7	3.7	6.1	8.2	16.8
PR-5	0.56	0.09	0.36	0.09	300	0.02	25.0	0	2.0%	1.0	0.0	25.0	2.8	4.6	0.1	0.9
PR-6	6.64	0.16	0.41	0.16	300	0.02	23.3	0	2.0%	1.0	0.0	23.3	2.9	4.8	3.1	13.1
PR-7	0.34	0.10	0.37	0.10	25	0.33	2.8	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.1
PR-8	0.30	0.11	0.37	0.11	35	0.33	3.3	0	33.0%	4.0	0.0	5.0	5.2	8.7	0.2	1.0
PR-9	0.59	0.09	0.36	0.09	100	0.06	10.1	0	6.0%	1.7	0.0	10.1	4.1	6.9	0.2	1.5
PR-10A	0.06	0.08	0.35	0.08	100	0.06	10.2	1	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1
PR-10B	0.03	0.08	0.35	0.08	100	0.06	10.2	2	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1
PR-10C	0.04	0.08	0.35	0.08	100	0.06	10.2	3	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1
PR-10D	0.04	0.08	0.35	0.08	100	0.06	10.2	4	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.1
PR-10E	0.09	0.08	0.35	0.08	100	0.06	10.2	5	1.0%	1.7	0.0	10.2	4.1	6.9	0.0	0.2
PR-10F	0.04	0.08	0.35	0.08	100	0.06	10.2	6	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1
PR-10G	0.05	0.08	0.35	0.08	100	0.06	10.2	7	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1
PR-10H	0.06	0.08	0.35	0.08	100	0.06	10.2	8	1.0%	1.7	0.1	10.3	4.1	6.9	0.0	0.1

DESIGN POINT SUMMARY

Design Point(s)	Contributing Basins	Area	Flow (cfs)	
		(ac)	Q_5	Q_{100}
1	PR-1	0.07	0.0	0.2
2	PR-2	0.13	0.1	0.4
3A	PR-3A	1.10	5.0	8.9
3B	PR-3B & PR 3A FLOW BY	1.11	7.5	14.4
3C	PR-3C & PR 3B FLOW BY	0.96	8.0	16.6
3D	PR-3D & PR 3C FLOW BY	0.97	8.4	18.4
3E	PR-3E & PR 3D FLOW BY	1.01	8.8	20.2
4	PR-4 & DP Y	11.81	11.8	32.2
5	PR-5 & DP X	1.76	0.5	3.3
6	PR-6 & PR#1	7.74	44.3	104.5
7	PR-7	0.34	0.2	1.1
8	PR-8	0.30	0.2	1.0
9	PR-9	0.59	0.2	1.5
10A	PR-10A & OS-ZA	0.49	0.4	1.3
10B	PR-10B & DP ZB	0.25	0.2	0.6
10C	PR-10C & DP ZC	0.27	0.2	0.7
10D	PR-10D & DP ZD	0.90	0.8	2.4
10E	PR-10E & DP ZE	2.03	1.9	5.3
10F	PR-10F & DP ZF	0.60	0.6	1.6
10G	PR-10G & DP ZG	0.90	0.8	2.4
10H	PR-10H & DP ZH	1.30	1.2	3.4
W	OS-W, DP 1 & DP 2	0.65	0.5	1.9
X	OS-X	1.20	0.4	2.3
Y	OS-Y	8.15	3.6	15.4



Driveway culverts are private

Indicate if culvert has FES or headwalls. Design calculations show headwall.

Show and label Base Flood Elevations in floodplain

Can't read basin & design point labels

North side of swale does not appear to have 4:1 side slopes. Please verify

Include this label for all other swales shown on plan

Can't read contour labels, please make bigger

REVISIONS

NO.	DESCRIPTION	DATE

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PLATTE SELF STORAGE

PROPOSED DRAINAGE MAP

DESIGNED BY DLF
DRAWN BY DLF
CHECKED BY LD

H–SCALE AS SHOWN
V–SCALE N/A

JOB NO. 2419.00
DATE ISSUED 11/8/24
SHEET NO. 2 OF 3