



Structural Engineering
Municipal Services
Civil Engineering
Land Surveying

March 23, 2021

Weber County Engineering
2380 Washington Blvd Suite #240
Ogden, Utah 84401

RE: Highland Bluff Estates Subdivision, Stormwater and Detention Pond Design Summary
Highland Bluff Estates, Project No. 9455
2225 East 6225 South, Weber County

Engineering Department,

Per your request, we have designed the stormwater drainage for the Highland Bluff Estates Subdivision to safely convey the design storm events to the proposed detention pond. Below is a summary of the storm drain system for the subdivision.

Summary:

The drainage system for the Highland Bluff Estates Subdivision was modeled using the Rational Method to determine peak runoff and detention volumes. Precipitation data for this site was obtained from the NOAA Atlas 14 Precipitation Data server for the area. The storm drain conveyance system was designed to safely convey the 10-year storm event as required by the County. The piping for the system was designed to maintain a minimum scour velocity of 2 feet per second for all the pipes in the system. The detention calculations were based on the 100-year storm event. All calculations are shown on the attached C-200 existing drainage plan exhibit and C-201 proposed drainage plan.

The site consists of undisturbed ground with natural grassy vegetation and an asphalt drive and pavilion on the site. There are two subdivisions that border the site that have storm drain pipes that go directly through the site. These subdivisions are on the south (2225 East St) and west (6225 South St) of the site. Currently the existing subdivisions have an estimated total flow of 6.152 cubic feet per sec(cfs) that would be released at the north east corner of the site in SD EX3. This is based on a 10-year storm event. See attached exhibit C-200.

In order to alleviate the amount of storm water going into the system it is proposed to install a detention basin on the western edge of the highland bluff site. The detention basin is unable to be installed on the outfall side of the site because it is not accessible. This detention basin was sized using the area of the proposed development with a release rate of 0.10 cfs/acre. The required detention is calculated to be 7,930 cubic feet. The proposed pond would provide 7,912 cubic feet. The detention calculations show the peak release needed for the proposed site. As the flows from catchment EX-1 will flow through the control structure, this flow is modeled as a bypass flow for sizing the orifice. This calculation is needed because the offsite is not detained and is not free flowing through the orifice. An orifice plate and baffle wall would be installed in the proposed storm drain manhole #213 between SD-1 and SD-2. This orifice plate will discharge 1.926 cfs. This is the sum of the allowable basin discharge and the allowable bypass

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Cedar City, UT 84721
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TOOELE
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Tooele, UT 84074
P: 435.843.3590

RICHFIELD
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Richfield, UT 84701
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discharge. The baffle wall would be at the high-water line. The proposed storm drain system and detention basin would net a total discharge of 5.122 cfs at the north east corner of the site in SD EX3, which is less than the current discharge of 6.152 cfs discussed above. The difference between the existing flow and proposed flow would improve the system by alleviating some of the discharge by 1.03 cfs.

The storm drain conveyance system was designed to alleviate some of the discharge to the system while detaining the needed amount for the Highland Bluffs site. The existing storm drain system is free flowing with no existing detention. With the addition of a detention basin, orifice plate and baffle wall, the existing and proposed flows are mitigated as they flow through the system.

If you have any questions concerning the information noted above, feel free to contact us at any time.

Sincerely,

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Ike Buckley'.

Ike Buckley, E.I.T.
Engineer in Training

A handwritten signature in blue ink, appearing to read 'Cam Preston'.

Cam Preston, PE, SE
Project Manager

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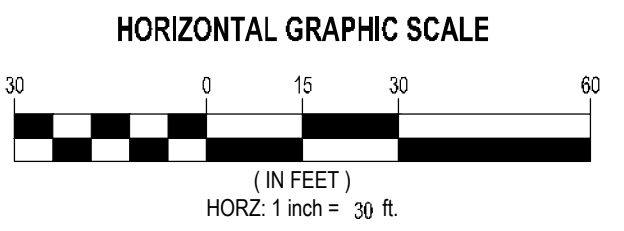
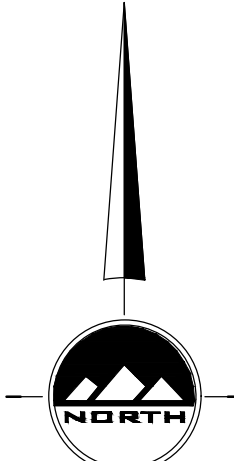
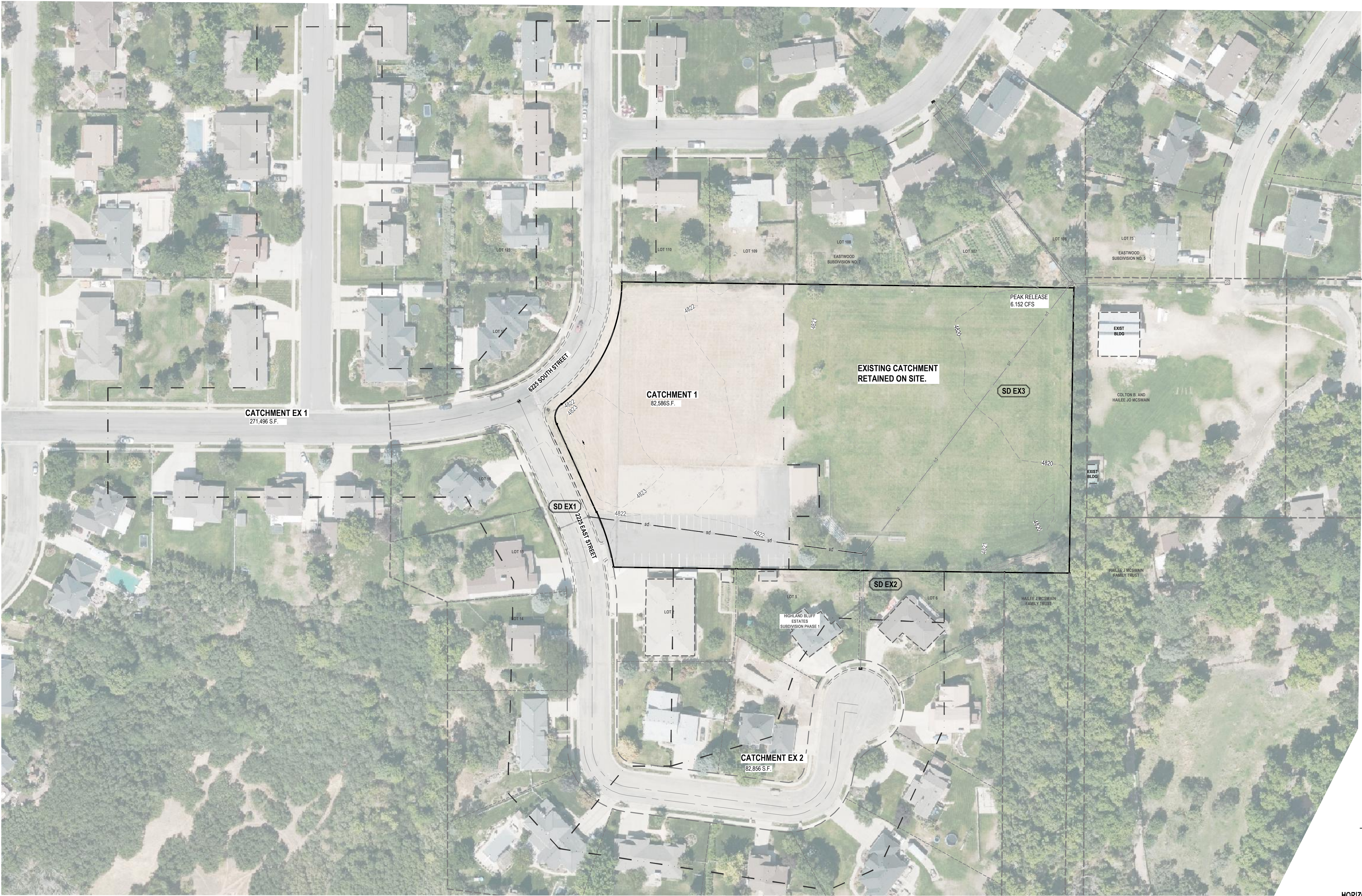
BENCHMARK
WEST QUARTER CORNER OF SECTION 23
TOWNSHIP 5 NORTH RANGE 1 WEST
SALT LAKE BASE AND MERIDIAN
ELEV = 4971.186

Existing Catchment Calculations (10-year storm)

Time of Concentration:	21 min			
Rainfall Intensity I:	2.06 in/hr			
Mannings N	0.013			
Catchment	Area (SF)	C	Flow (CFS)	Destination
1 EX	271,496	0.30	3.823	SD-EX1
2 EX	82,856	0.30	1.167	SD-EX2
1	82,586	0.30	1.163	SD EX3
Total	436,938	0.30	6.152	SD EX3

Existing Pipe Design (10-year storm)

Mannings N (ADS)	0.011									
Mannings N (RCP)	0.013									
Pipe	Tributary	Surface	Upstream	Pipe Flow	Total	Pipe	Diameter	Pipe Type	Full Flow	% of Full-
SD-EX1	1 EX	3.823	none	0.000	3.823	0.35%	18"	RCP	6.231	61.4%
SD-EX2	2 EX	1.167	none	0.000	1.167	0.35%	18"	RCP	6.231	18.7%
SD EX3	1	1.163	EX1,2	4.990	6.152	0.35%	18"	RCP	6.231	98.7%



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FOR:
MOORE HOMES
5691 S GRANITE WOODS CIRCLE
SANDY, UTAH 84092

CONTACT:
CLIENT CONTACT
PHONE: 801-400-0000

**HIGHLANDS BLUFF ESTATES
PHASE 2
2225 EAST 6225 SOUTH
OGDEN, UTAH**



NO.	DATE	REVISION	BY
1		FOR REVIEW	
2			
3			
4			
5			
6			
7			
8			

**EXISTING DRAINAGE
PLAN EXHIBIT**

PROJECT NUMBER: 9455
PRINT DATE: 3/19/21

DRAWN BY: J.MOSS
CHECKED BY: C.PRESTON

PROJECT MANAGER:
C.PRESTON

C-200

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TOWNSHIP 5 NORTH RANGE 1 WEST
SALT LAKE BASE AND MERIDIAN
ELEV = 4971.186

Detention Calculations (100-year storm)

Basin Tributary Area: 199,859 SF
Runoff coefficient C: 0.30
Release Rate: 0.10 cfs/acre
Peak Release: 0.459 cfs

Time (min)	i (in/hr)	Cumulative Runoff to Basin (c.f.)	Net Allowed Basin Discharge (c.f.)	Required Storage (c.f.)
5	7.37	3,043	138	2,906
10	5.80	4,625	275	4,350
15	4.85	5,736	413	5,323
30	3.12	7,730	826	6,904
60	1.93	9,564	1,652	7,912
120	1.12	11,100	3,303	7,796
180	0.77	11,432	4,955	6,476
360	0.43	12,784	9,910	2,874
720	0.27	15,895	19,821	(3,925)
1440	0.15	18,314	39,641	(21,327)
2880	0.09	21,882	79,283	(57,401)
		Required Detention:		7,912
		Provided Detention:		7,930

Catchment Calculations (10-year storm)

Time of Concentration: 21 min
Rainfall Intensity I: 2.06 in/hr
Mannings N: 0.013

Catchment	Area (SF)	C	Flow (CFS)	Destination
1 EX	271,496	0.30	3,823	SD-EX1
2 EX	82,856	0.30	1,167	SD-EX2
1	17,200	0.30	0.242	Offsite
2	74,482	0.30	1.049	SD EX3
3	69,641	0.30	0.981	SD EX3
4	19,532	0.30	0.275	Offsite
5	19,004	0.30	0.268	SD 1

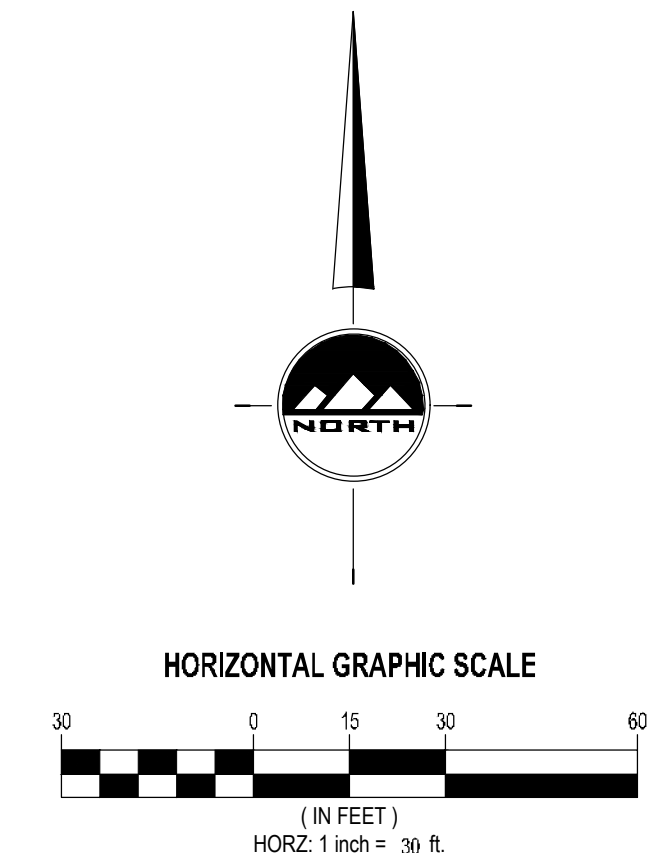
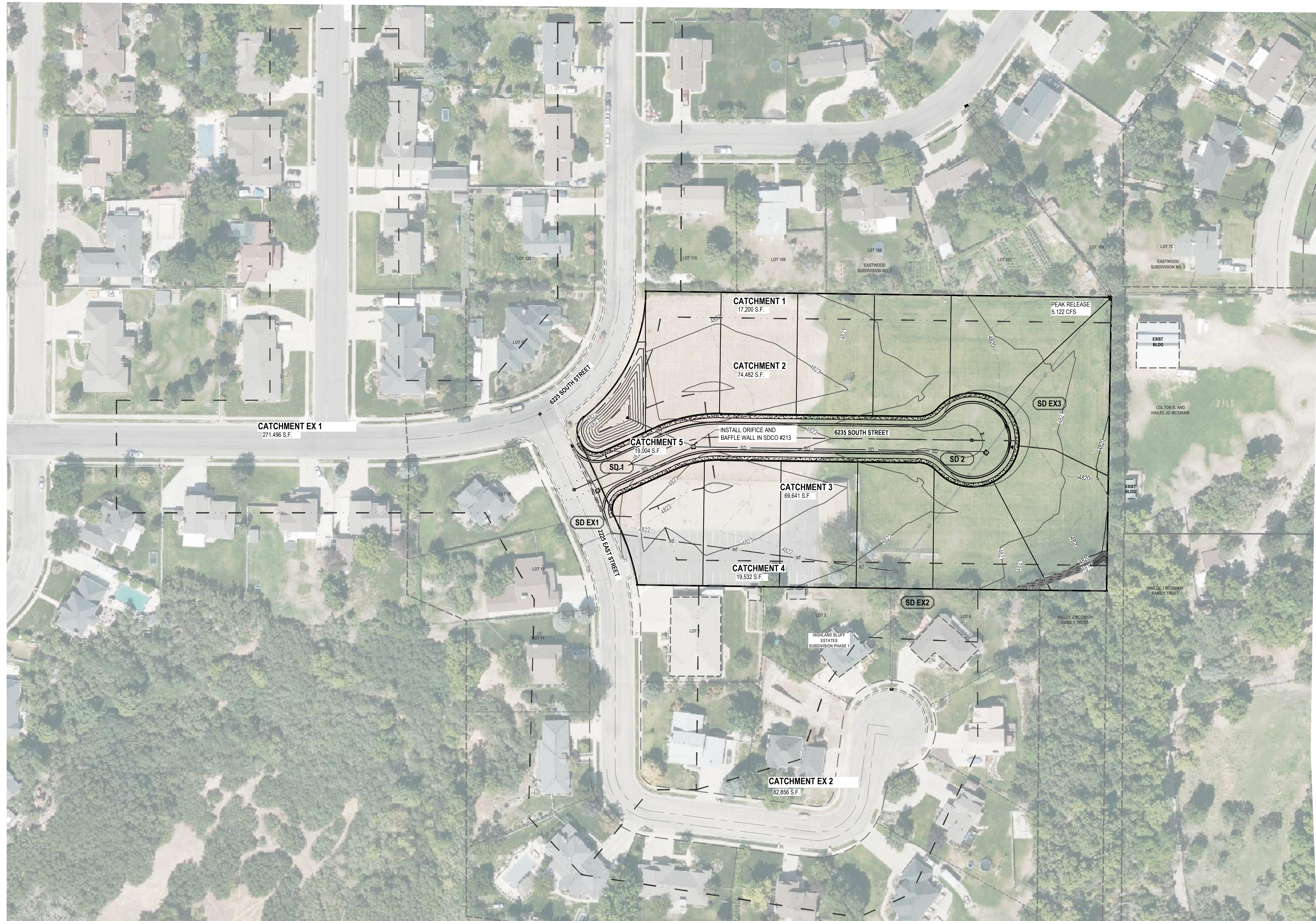
Pipe Design (10-year storm)

Mannings N (ADS): 0.011
Mannings N (RCP): 0.013

Pipe	Tributary	Surface	Upstream	Pipe Flow	Total	Pipe	Diameter	Pipe Type	Full Flow	% of Full
SD-EX1	1 EX	3.823	none	0.000	3.823	0.35%	18	RCP	6.231	61.4%
SD-EX2	2 EX	1.167	none	0.000	1.167	0.35%	18	RCP	6.231	18.7%
SD 1	5	0.268	EX1	3.823	4.090	0.35%	18	RCP	6.231	65.6%
SD 2	None	0.000	Orifice	1.926	1.926	0.15%	18	RCP	4.079	47.2%
SD EX3	2, 3	2.029	SD2, EX2	3.093	5.122	0.35%	18	RCP	6.231	82.2%

Orifice Calculations: $Q = C_d A_o (2gh)^{1/2}$

High Water Elevation: 4,821.45 FT
Box Invert: 4,816.30 FT
Allowed Basin Discharge*: 0.459 CFS
Allowable Bypass: 1.468 CFS
Total Discharge: 1.926 CFS
C_d: 0.62
Orifice Area: 24.57 IN²
Orifice Diameter: 5.6 IN



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**HIGHLANDS BLUFF ESTATES
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2225 EAST 6225 SOUTH
OGDEN, UTAH**

PROFESSIONAL ENGINEER
No. 5049039
3-7-2021
STATE OF UTAH
CLEAN BESS PRESTON

ID	DATE	REVISION	BY
1		FOR REVIEW	
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7			
8			

OVERALL DRAINAGE PLAN

PROJECT NUMBER: 9455
PRINT DATE: 3/22/21

DRAWN BY: J.MOSS
CHECKED BY: C.PRESTON

PROJECT MANAGER:
C.PRESTON

C-201