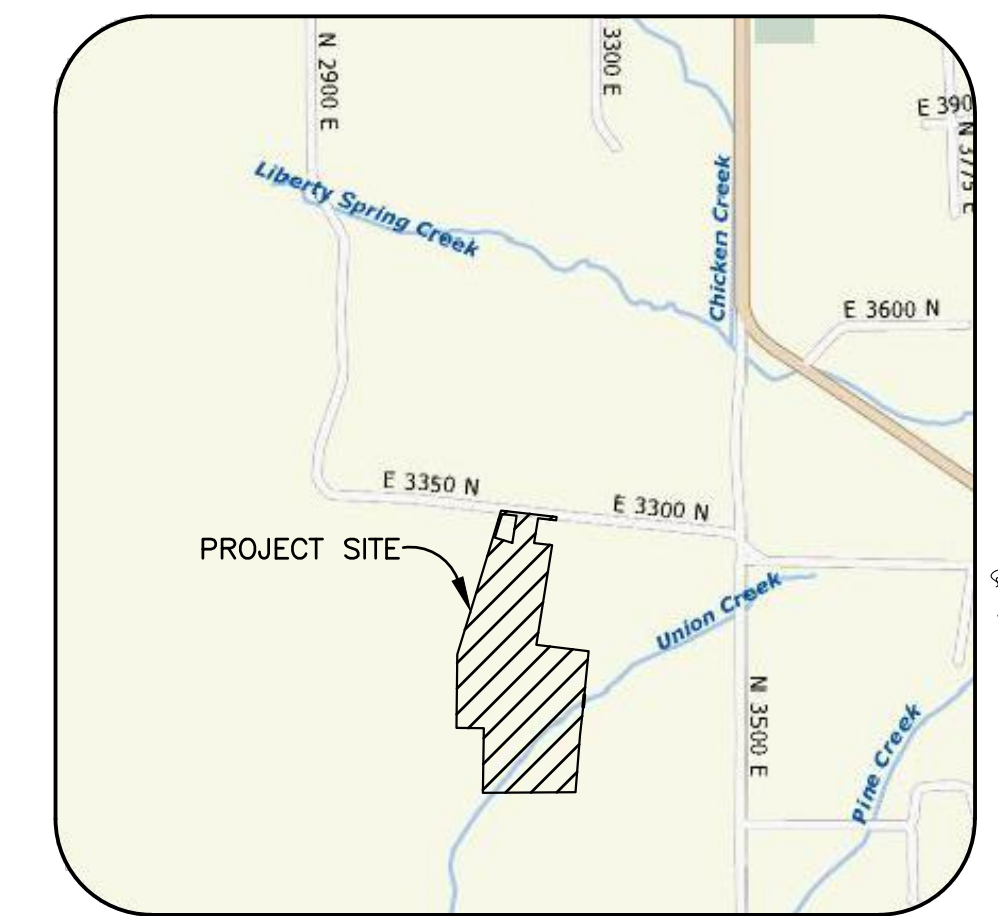


**Project Narrative/Notes/Revisions**

- 2021/04/30 CK - COMPLETED DESIGN FOR CLIENT & CITY REVIEW.
- 2021/12/06 TB - BASIN DESIGN, BASIN CALCS
- 2022/04/11 CK - UPDATED PER REVIEW COMMENTS.

# Harmony Ranch Subdivision Improvement Plans

WEBER COUNTY, UTAH  
APRIL 2022



**Vicinity Map**  
NOT TO SCALE



**Sheet Index Key Map**  
NOT TO SCALE

**Sheet Index**

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- Sheet 2 - Notes/Legend/Street Cross-Section
- Sheet 3 - Street A - 1+00.00 - 10+50.00
- Sheet 4 - Street A - 10+50.00 - 13+25.00
- Sheet 5 - Street B - 1+00.00 - 10+50.00
- Sheet 6 - Street B - 10+50.00 - 20+10.00
- Sheet 7 - Street C - 1+00.00 - 5+50.00
- Sheet 8 - Street D - 1+00.00 - 4+25.00
- Sheet 9 - Grading & Drainage Plan
- Sheet 10 - Grading & Drainage Plan
- Sheet 11 - Detention Basin Calculation Details
- Sheet 12 - Utility Plan
- Sheet 13 - Utility Plan
- Sheet 14 - Storm Drain Design Details
- Sheet 15 - Storm Water Pollution Prevention Plan Exhibit
- Sheet 16 - Storm Water Pollution Prevention Plan Details
- Sheet 17 - Open Space Preservation Plan

**Engineer's Notice To Contractors**

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED FROM AVAILABLE INFORMATION PROVIDED BY OTHERS. THE LOCATIONS SHOWN ARE APPROXIMATE AND SHALL BE CONFIRMED IN THE FIELD BY THE CONTRACTOR, SO THAT ANY NECESSARY ADJUSTMENT CAN BE MADE IN ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENT. THE CONTRACTOR IS REQUIRED TO CONTACT THE UTILITY COMPANIES AND TAKE DUE PRECAUTIONARY MEASURE TO PROTECT ANY UTILITY LINES SHOWN, AND ANY OTHER LINES OBTAINED BY THE CONTRACTOR'S RESEARCH, AND OTHERS NOT OF RECORD OR NOT SHOWN ON THESE PLANS.

**Surveyor:**

Trevor Hatch  
Reeve & Associates, Inc.  
5160 South 1500 West  
Riverdale, Utah, 84405  
PH: (801) 621-3100

**Landscape Architect:**

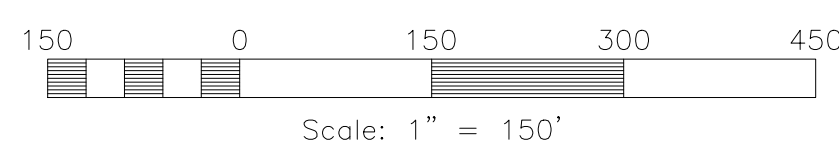
Nathan Peterson  
Reeve & Associates, Inc.  
5160 South 1500 West  
Riverdale, Utah, 84405  
PH: (801) 621-3100

**Developer Contact:**

Ian Silverberg  
P.O. Box 521  
Eden, Utah 84310  
PH: (805) 570-9560

**Project Contact:**

Jeremy Draper  
Reeve & Associates, Inc.  
5160 South 1500 West  
Riverdale, Utah, 84405  
PH: (801) 621-3100



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TRAFFIC ENGINEERS • STRUCTURAL ENGINEERS • LANDSCAPE ARCHITECTS

REVISIONS	DATE	DESCRIPTION
	12-06-2021	TB Basin Updates

**Harmony Ranch Subdivision**  
WEBER COUNTY, UTAH  
**Cover/Index Sheet**



**Project Info.**  
Engineer: JEREMY A. DRAPER, P.E.  
Drafted: C. KINGSLEY  
Begin Date: APRIL 2021  
Name: HARMONY RANCH SUBDIVISION  
Number: 7569-01

General Notes:

- 1. ALL CONSTRUCTION MUST STRICTLY FOLLOW THE STANDARDS AND SPECIFICATIONS SET FORTH BY: GOVERNING UTILITY MUNICIPALITY, GOVERNING CITY OR COUNTY (IF UNINCORPORATED), INDIVIDUAL PRODUCT MANUFACTURERS, AMERICAN PUBLIC WORKS ASSOCIATION (APWA), AND THE DESIGN ENGINEER. THE ORDER LISTED ABOVE IS ARRANGED BY SENIORITY. IF A CONSTRUCTION PRACTICE IS NOT SPECIFIED BY ANY OF THE LISTED SOURCES, CONTRACTOR MUST CONTACT DESIGN ENGINEER FOR DIRECTION.

Notice to Contractor:

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON RECORDS OF THE VARIOUS UTILITY COMPANIES AND/OR MUNICIPALITIES AND, WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THESE PLANS.

Legend

Table with 3 columns: Symbol, Description, and Additional Info. Includes symbols for proposed and existing water/land drain laterals, water/sewer lines, storm drain lines, fire hydrants, manholes, gates, valves, and various pavement and elevation markers.

Survey Control Note:

THE CONTRACTOR OR SURVEYOR SHALL BE RESPONSIBLE FOR FOLLOWING THE NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS (NSPS) MODEL STANDARDS FOR ANY SURVEYING OR CONSTRUCTION LAYOUT TO BE COMPLETED USING REEVE & ASSOCIATES, INC. SURVEY DATA OR CONSTRUCTION IMPROVEMENT PLANS. PRIOR TO PROCEEDING WITH CONSTRUCTION STAKING, THE SURVEYOR SHALL BE RESPONSIBLE FOR VERIFYING HORIZONTAL CONTROL FROM THE SURVEY MONUMENTS AND FOR VERIFYING ANY ADDITIONAL CONTROL POINTS SHOWN ON AN ALTA SURVEY.

Erosion Control General Notes:

THE CONTRACTOR TO USE BEST MANAGEMENT PRACTICES FOR PROVIDING EROSION CONTROL FOR CONSTRUCTION OF THIS PROJECT. ALL MATERIAL AND WORKMANSHIP SHALL CONFORM TO GOVERNING AGENCIES ORDINANCES AND ALL WORK SHALL BE SUBJECT TO INSPECTION BY THE COUNTIES. ALSO, INSPECTORS WILL HAVE THE RIGHT TO CHANGE THE FACILITIES AS NEEDED.

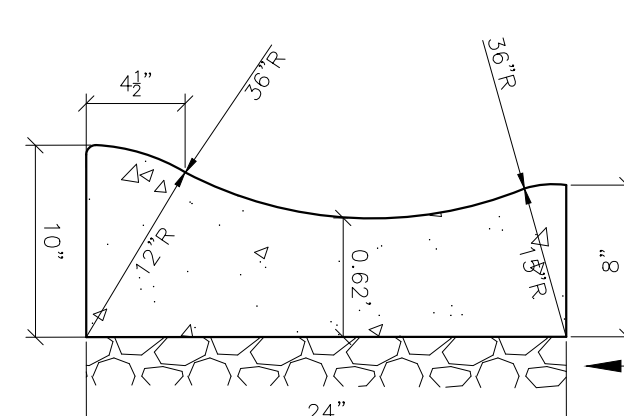
Maintenance:

ALL BEST MANAGEMENT PRACTICES (BMP'S) SHOWN ON THIS PLAN MUST BE MAINTAINED AT ALL TIMES UNTIL PROJECT CLOSE-OUT.

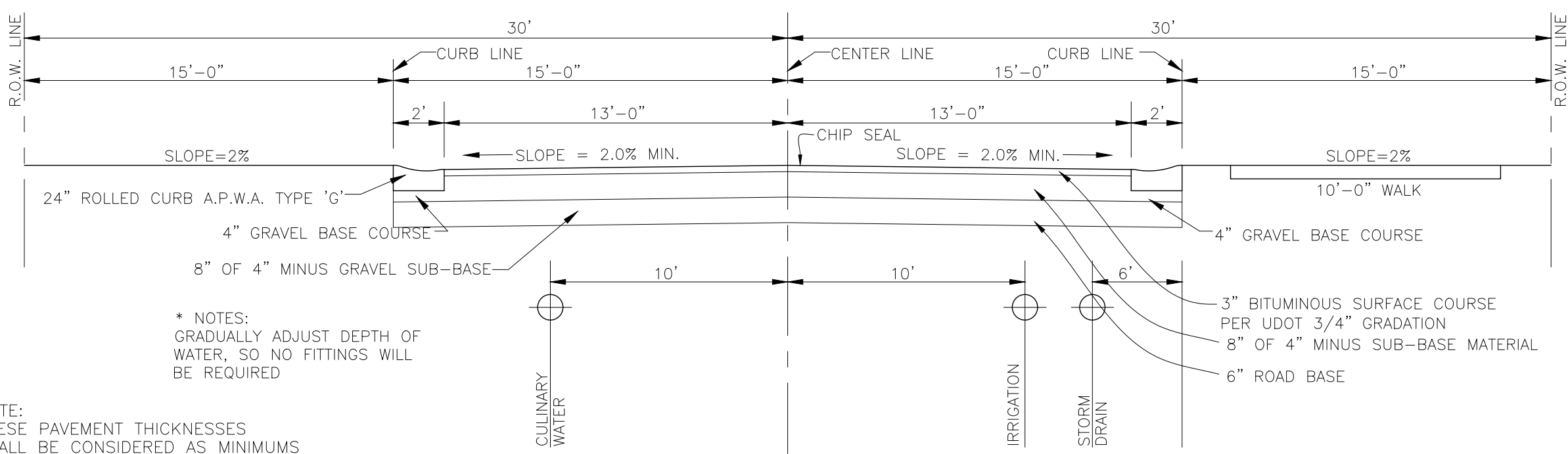
THE CONTRACTOR'S RESPONSIBILITY SHALL INCLUDE MAKING BI-WEEKLY CHECKS ON ALL EROSION CONTROL MEASURES TO DETERMINE IF REPAIR OR SEDIMENT REMOVAL IS NECESSARY. CHECKS SHALL BE DOCUMENTED AND COPIES OF THE INSPECTIONS KEPT ON SITE.

Utility Notes:

- 1. CONTRACTOR SHALL COORDINATE LOCATION OF NEW "DRY UTILITIES" WITH THE APPROPRIATE UTILITY COMPANY, INCLUDING BUT NOT LIMITED TO: TELEPHONE SERVICE, GAS SERVICE, CABLE, POWER, INTERNET.



APWA Type "G" Curb SCALE: NONE



Street Section (60' R.O.W.) SCALE: NONE

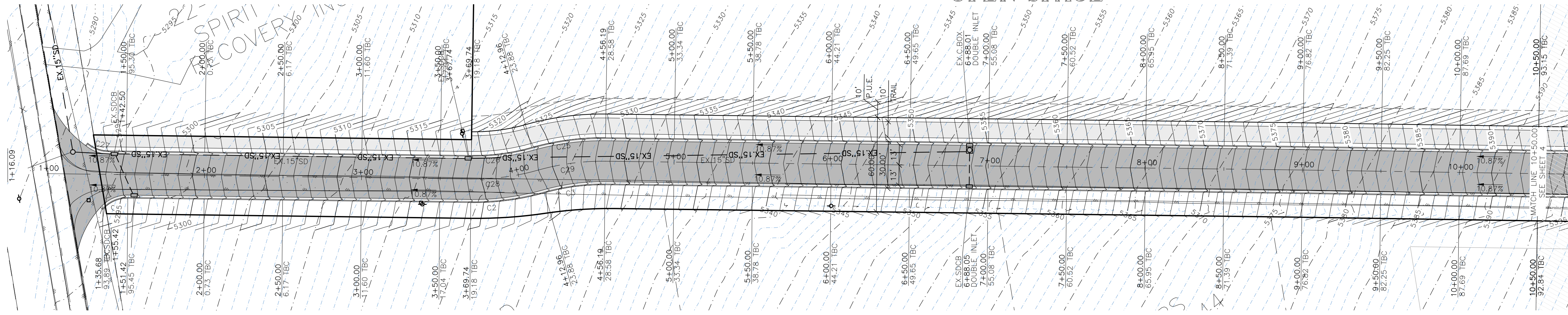
Reeve & Associates, Inc. logo and contact information including address, phone, and website.

Harmony Ranch Subdivision Notes/Legend/Street Cross-Section title block.

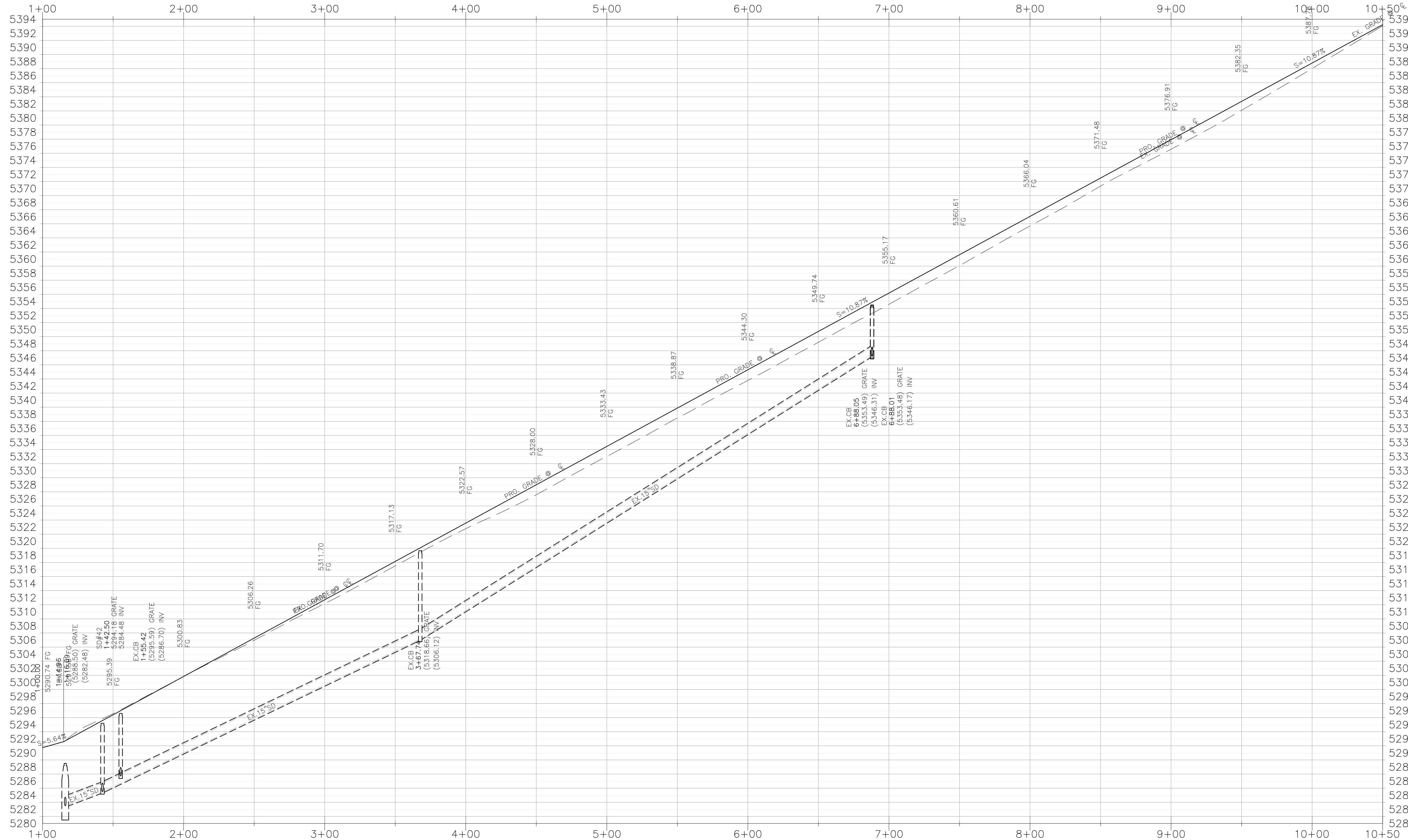
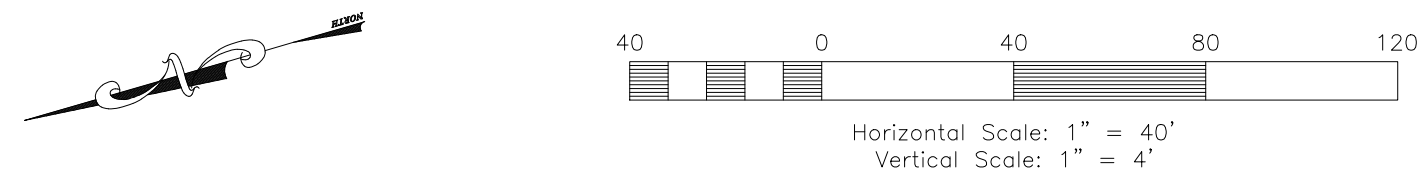
Professional Engineer seal for Jeremy A. Draper, State of Utah.

Project Info table with fields for Engineer, Drafter, Begin Date, Name, and Number.

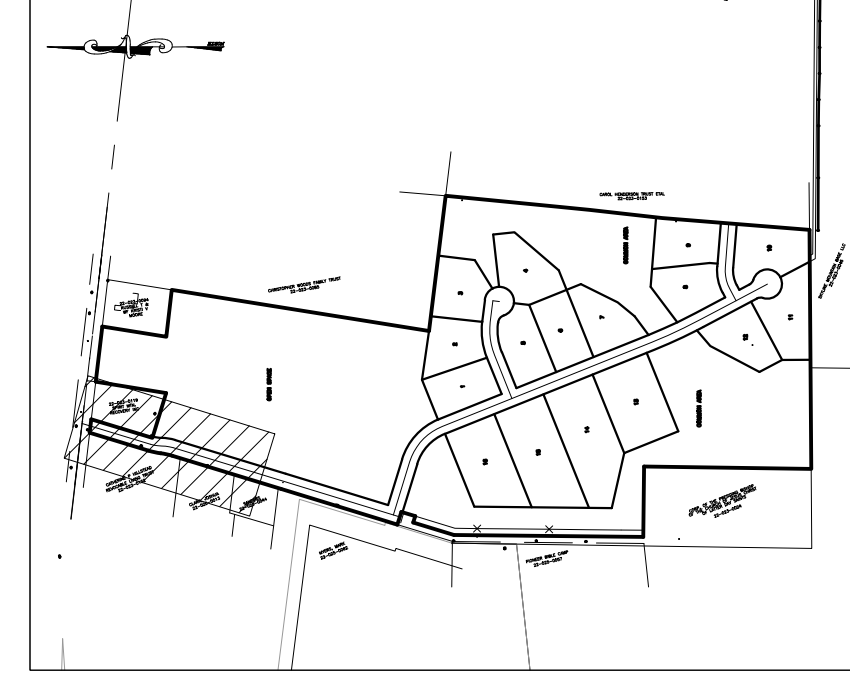
OPEN SPACE



STREET A 1+00.00 - 10+50.00



Key Map  
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W/10 - 10" PVC C-900 WATER LINE
- STORM DRAIN**  
SD/15 - 15" RCP STORM DRAIN  
SD/18 - 18" RCP STORM DRAIN

TBC Curve Data

#	Delta	Radius	Length	Tangent	Chord	CH Length
C1	50°09'30"	20.50'	17.95'	9.59'	N8°10'26"W	17.38'
C2	16°30'39"	165.00'	47.55'	23.94'	S8°39'00"W	47.38'
C3	16°30'39"	135.00'	38.90'	19.59'	N8°39'00"E	38.77'
C25	16°30'39"	165.00'	47.55'	23.94'	N8°39'00"E	47.38'
C26	16°30'39"	135.00'	38.90'	19.59'	S8°39'00"W	38.77'
C27	39°51'02"	20.50'	14.26'	7.43'	S36°49'50"W	13.97'

Centerline Curve Data

#	Delta	Radius	Length	Tangent	Chord	CH Length
C28	16°30'39"	150.00'	43.22'	21.76'	S8°39'00"W	43.08'
C29	16°30'39"	150.00'	43.22'	21.76'	S8°39'00"W	43.08'

**Reeve & Associates, Inc.**  
5160 SOUTH 1500 WEST, RIVERDALE, UTAH 84405  
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TRAFFIC ENGINEERS • STRUCTURAL ENGINEERS • LANDSCAPE ARCHITECTS

REVISIONS

DATE	DESCRIPTION
12-06-2021	TB Basin Updates

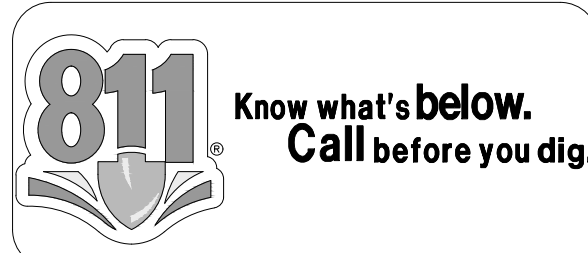
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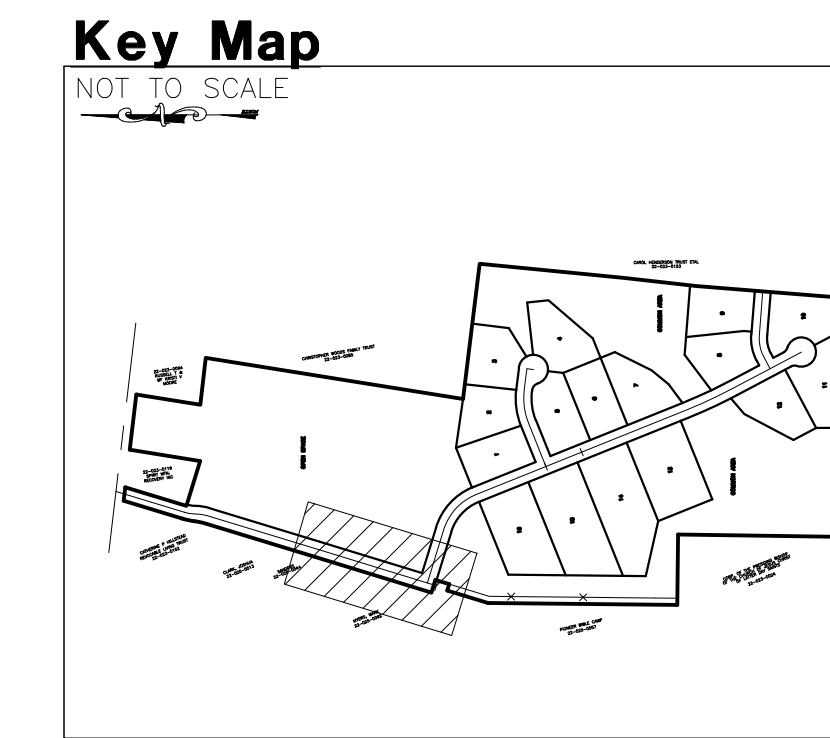
**Harmony Ranch Subdivision**  
WEBER COUNTY, UTAH

**STREET A 1+00.00 - 10+50.00**



**Project Info.**  
Engineer: JEREMY A. DRAPER, P.E.  
Drafted: C. KINGSLEY  
Begin Date: APRIL 2021  
Name: HARMONY RANCH SUBDIVISION  
Number: 7569-01



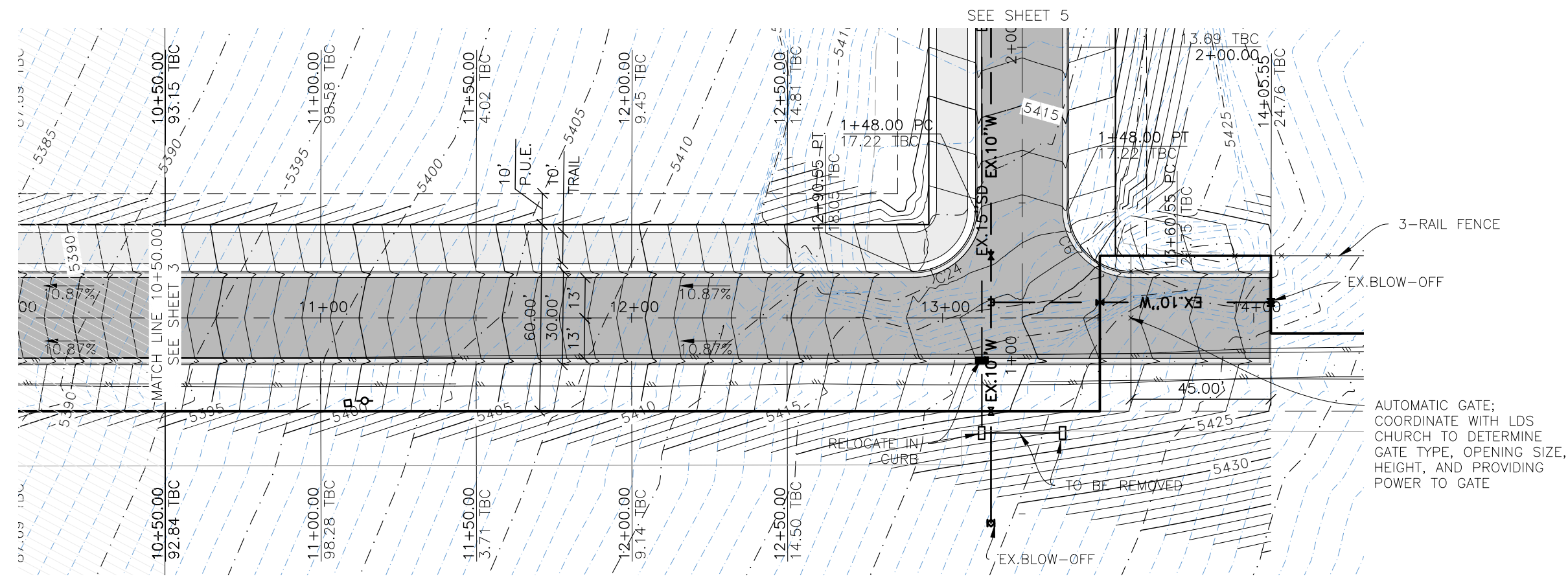


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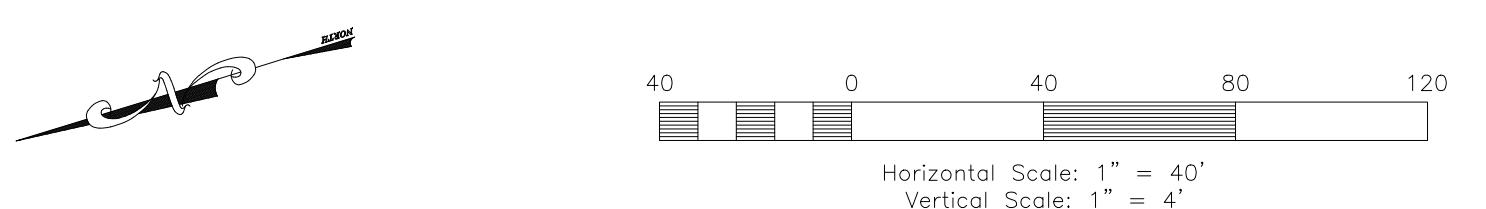
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	12-06-2021	TB Basin Updates

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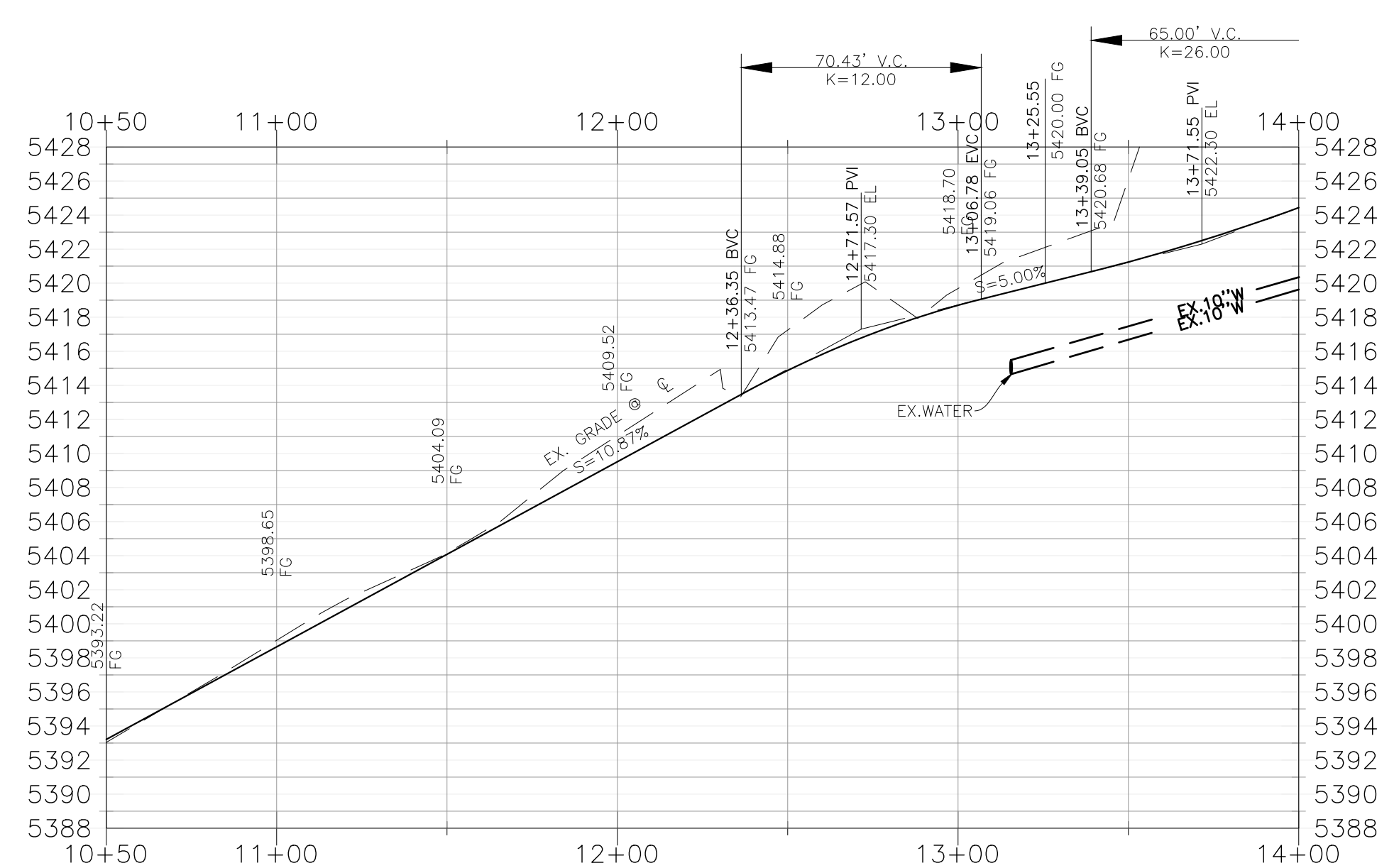
OPEN SPACE



STREET A 10+50.00 - 13+25.55



#	Delta	Radius	Length	Tangent	Chord	CH Length
C4	90°00'00"	20.00'	31.42'	20.00'	N62°03'24"E	28.28'
C5	90°00'00"	20.00'	31.42'	20.00'	N27°56'36"W	28.28'
C6	90°00'00"	20.00'	31.42'	20.00'	S62°03'24"W	28.28'
C24	90°00'00"	20.00'	31.42'	20.00'	S27°56'36"E	28.28'



**Construction Notes:**

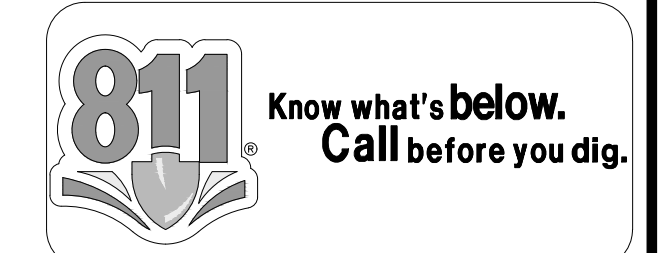
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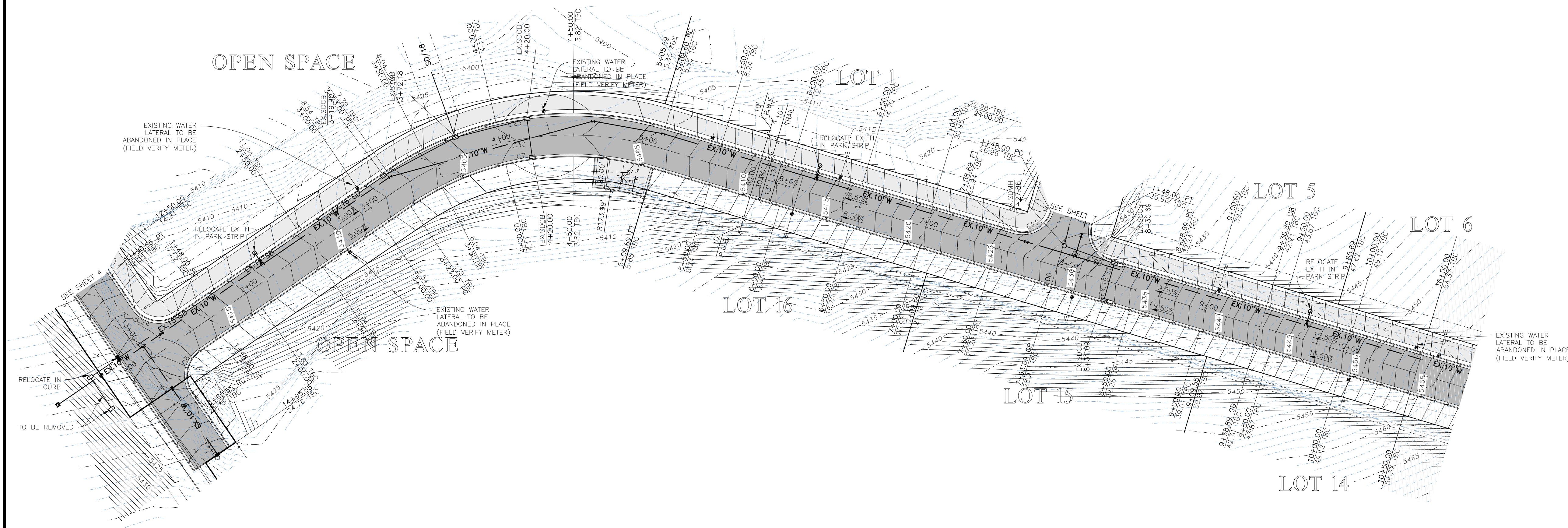
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**STREET A 10+50.00 - 13+25.55**

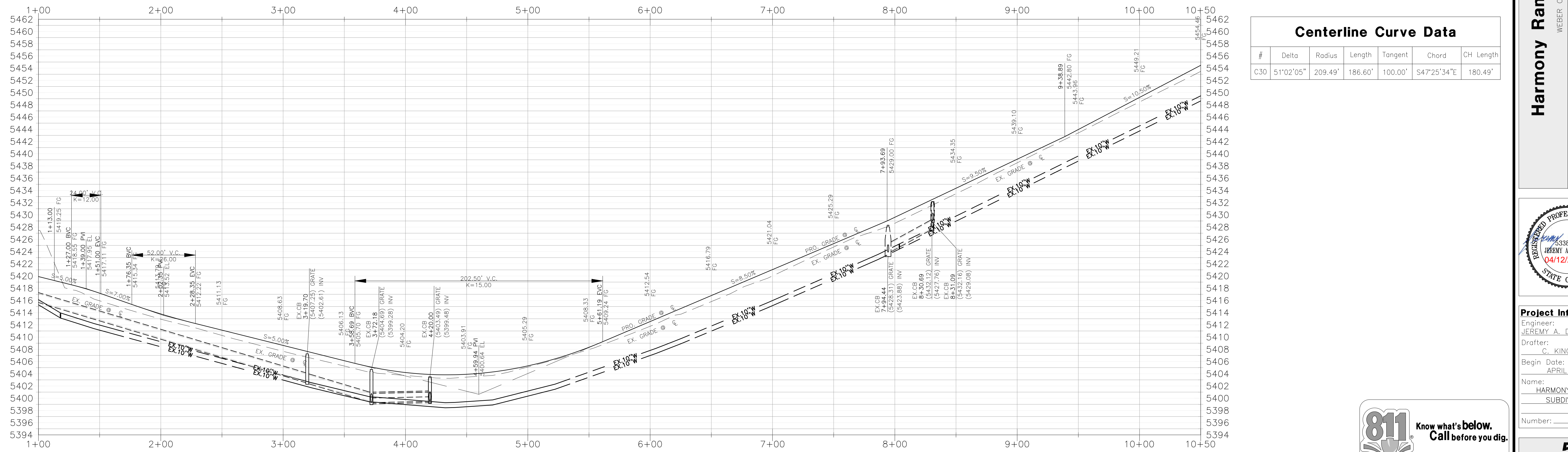
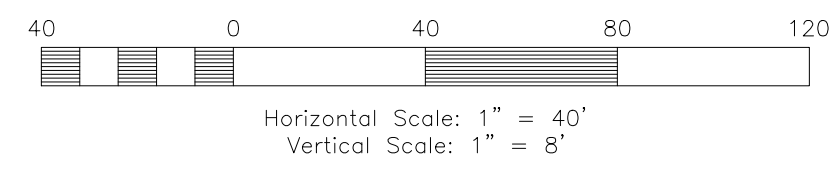
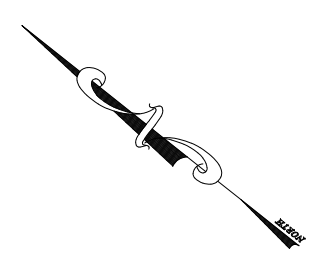


**Project Info.**  
 Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
 Name: HARMONY RANCH SUBDIVISION  
 Number: 7569-01

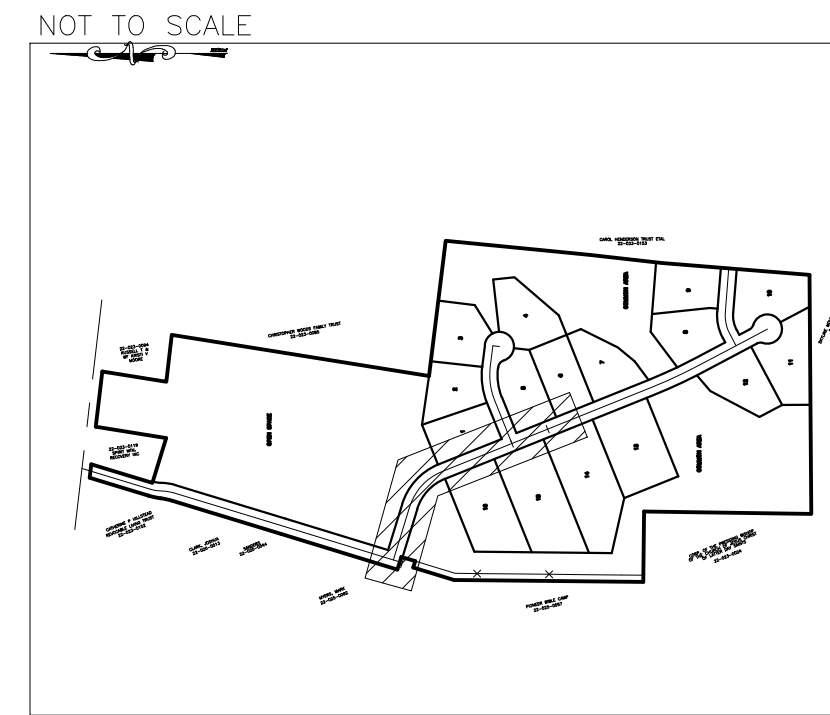




**STREET B 1+00.00 - 10+50.00**



**Key Map**



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**TBC Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C4	90°00'00"	20.00'	31.42'	20.00'	N62°03'24"E	28.28'
C5	90°00'00"	20.00'	31.42'	20.00'	N27°56'36"W	28.28'
C6	90°00'00"	20.00'	31.42'	20.00'	S62°03'24"W	28.28'
C7	51°02'05"	194.49'	173.24'	92.84'	N47°25'34"W	167.57'
C17	90°00'00"	20.00'	31.42'	20.00'	S23°05'29"W	28.28'
C22	90°00'00"	20.00'	31.42'	20.00'	S66°54'31"E	28.28'
C23	51°02'05"	224.49'	199.96'	107.16'	N47°25'34"W	193.41'
C24	90°00'00"	20.00'	31.42'	20.00'	S27°56'36"E	28.28'

**Centerline Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C30	51°02'05"	209.49'	186.60'	100.00'	S47°25'34"E	180.49'

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REVISIONS

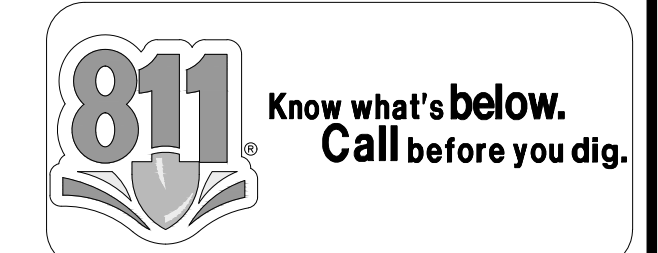
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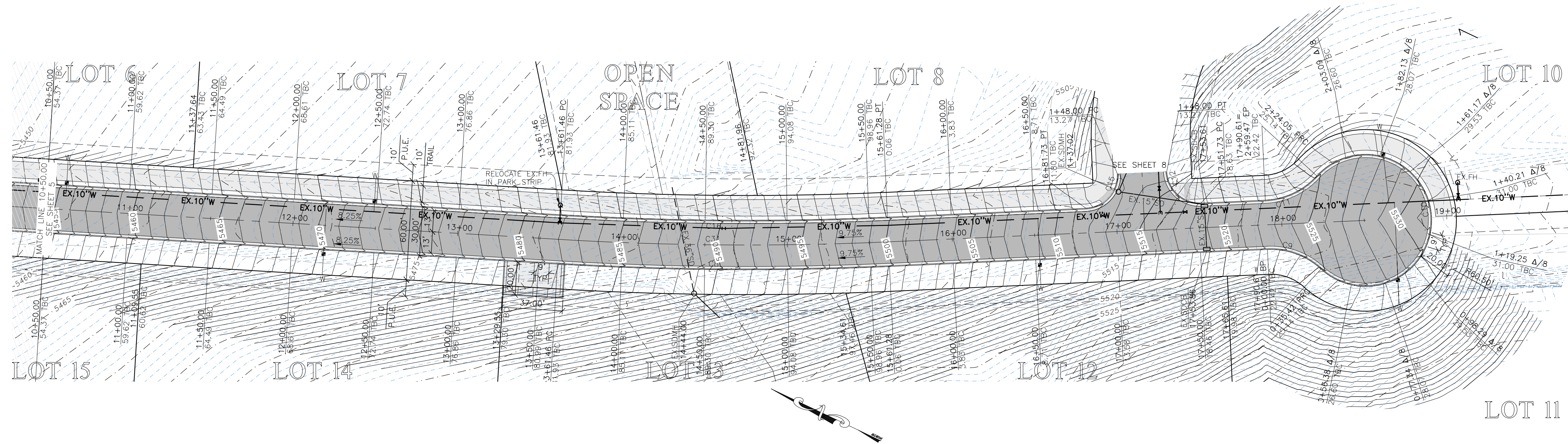
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**STREET B 1+00.00 - 10+50.00**

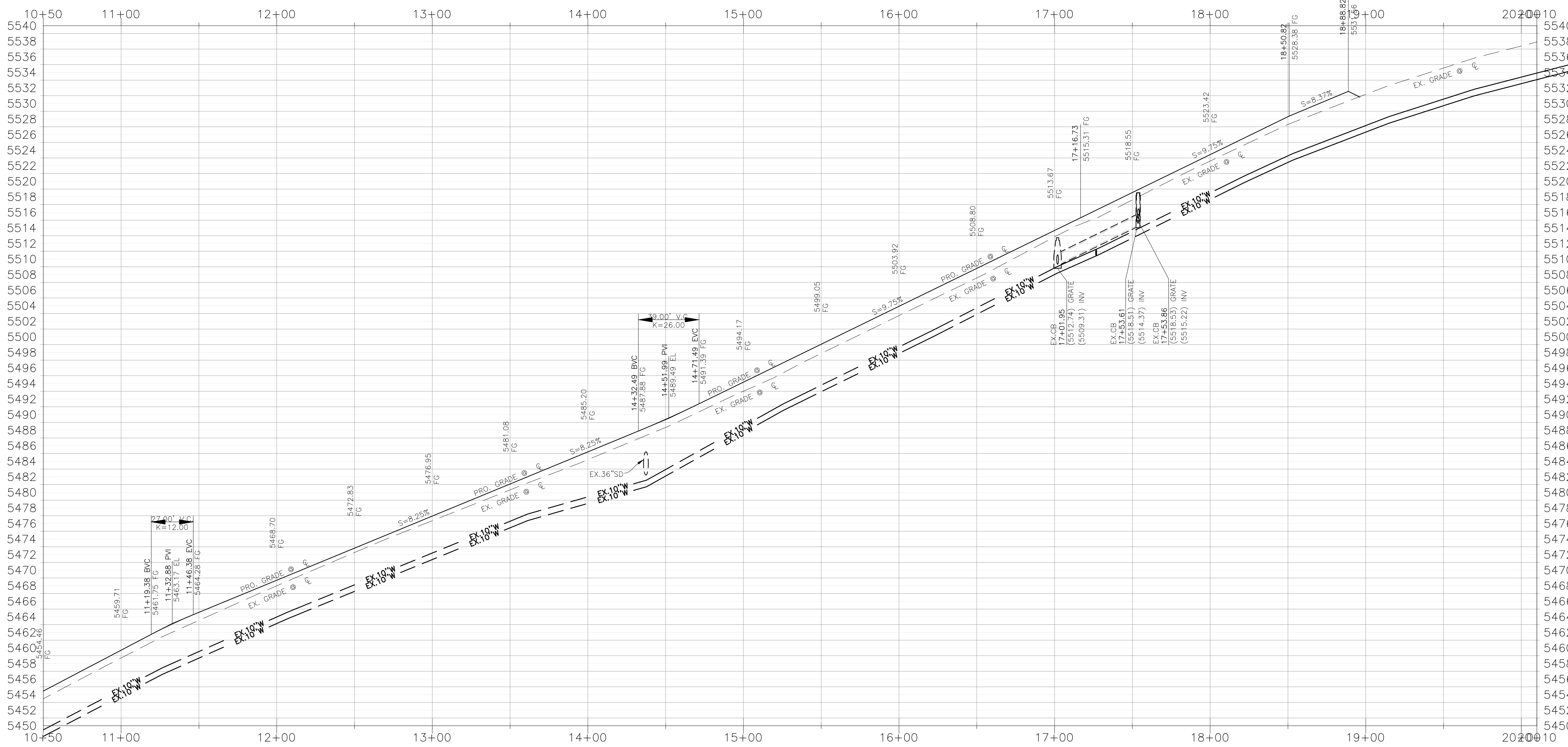
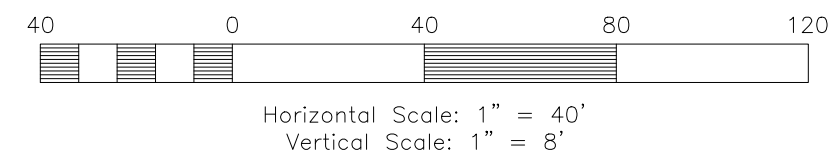


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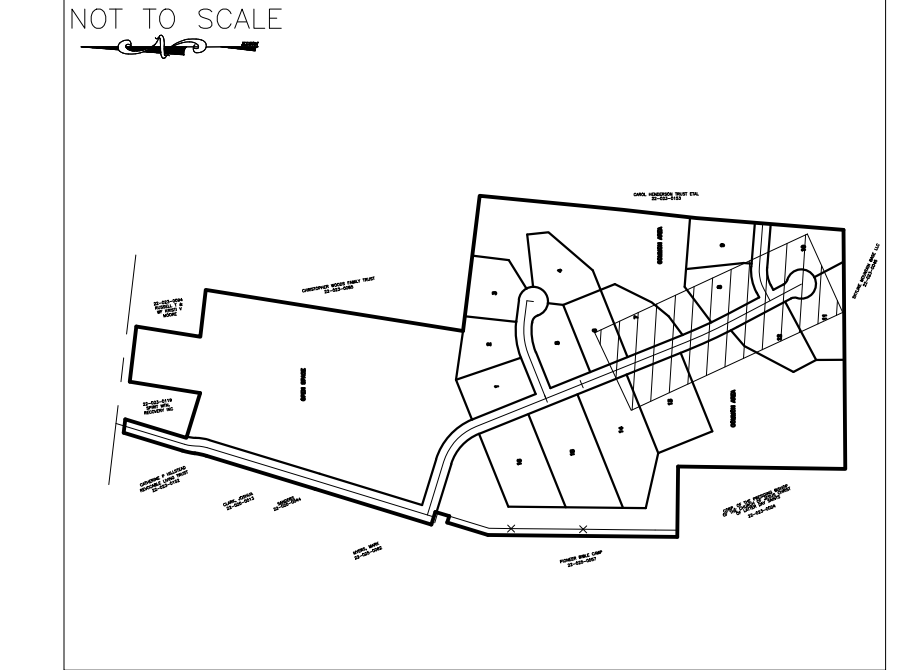




**STREET B 10+50.00 - 20+10.00**



**Key Map**



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 SD/15 - 15" RCP STORM DRAIN  
 SD/18 - 18" RCP STORM DRAIN

**TBC Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C8	6'00"36"	1919.94'	201.39'	100.79'	S24°54'49"E	201.30'
C9	45°05'38"	45.00'	35.42'	18.68'	N5°21'59"W	34.51'
C10	270°11'54"	40.00'	188.63'	39.86'	N62°04'53"E	56.47'
C11	45°05'57"	45.00'	35.42'	18.69'	S50°28'05"E	34.51'
C12	90°00'16"	20.00'	31.42'	20.00'	S17°04'45"W	28.29'
C15	90°00'00"	20.00'	31.42'	20.00'	S72°55'07"E	28.28'
C16	6'00"36"	1889.94'	198.24'	99.21'	S24°54'49"E	198.15'

**Centerline Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C31	6'00"36"	1904.94'	199.82'	100.00'	S24°54'49"E	199.72'

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REVISIONS	DESCRIPTION
DATE	12-06-2021
BY	EM
DESCRIPTION	EMain Updates

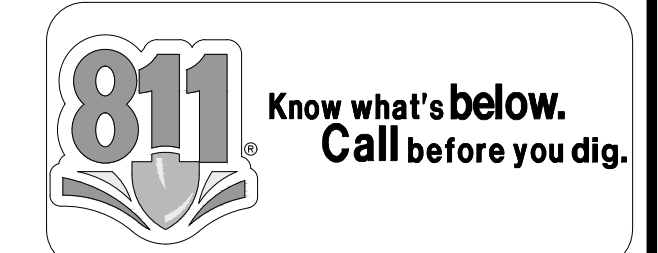
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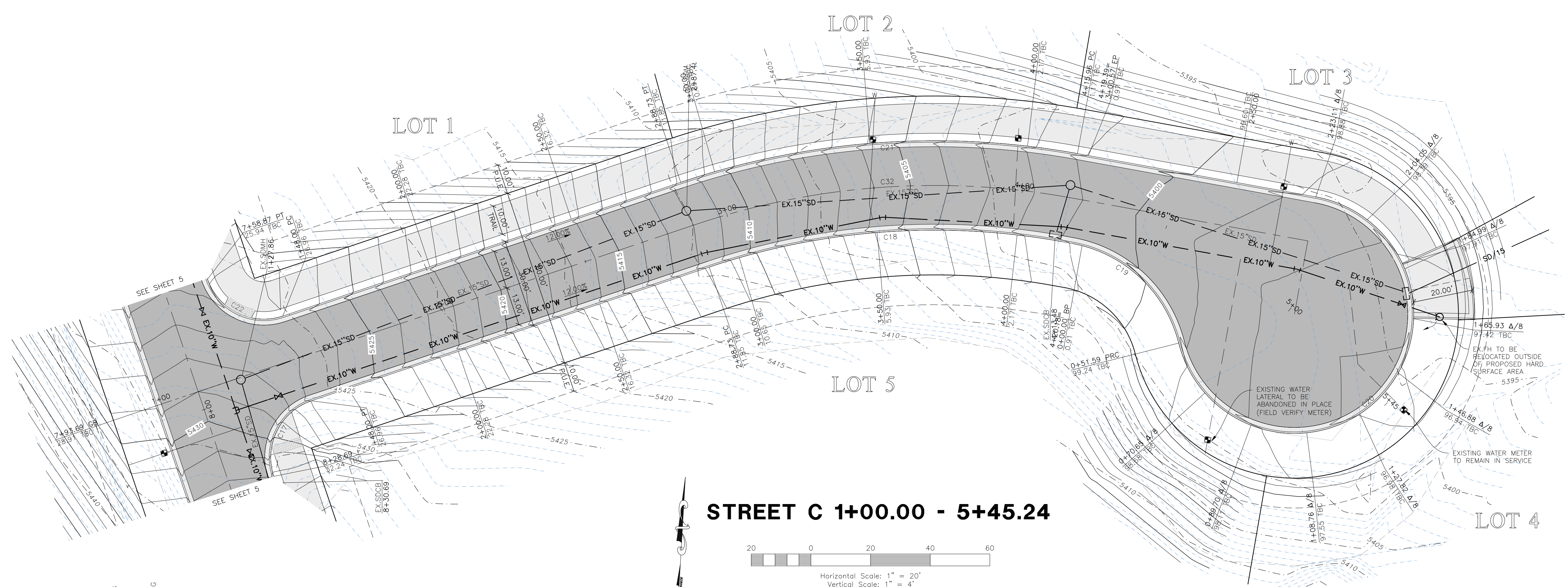
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**STREET B 10+50.00 - 20+10.00**

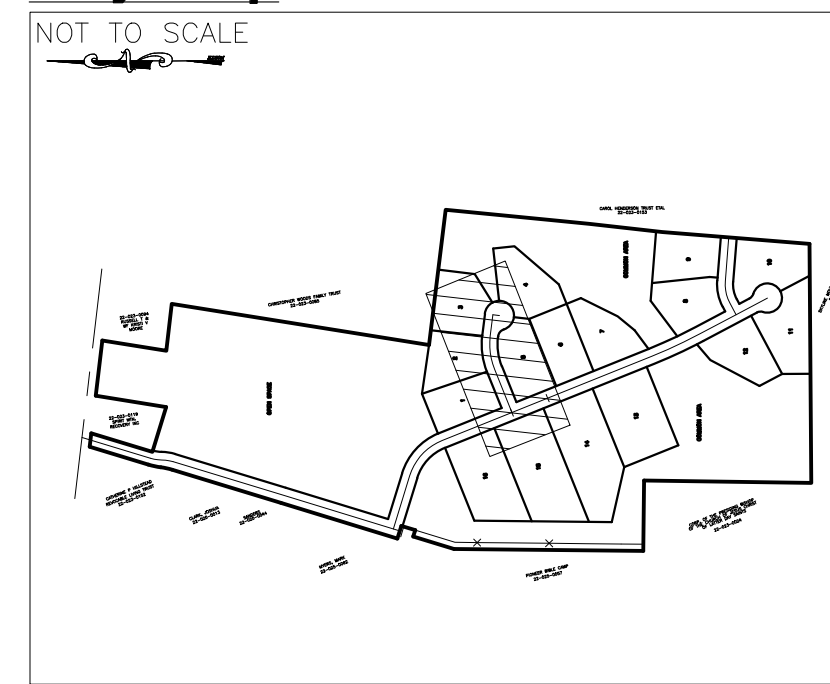


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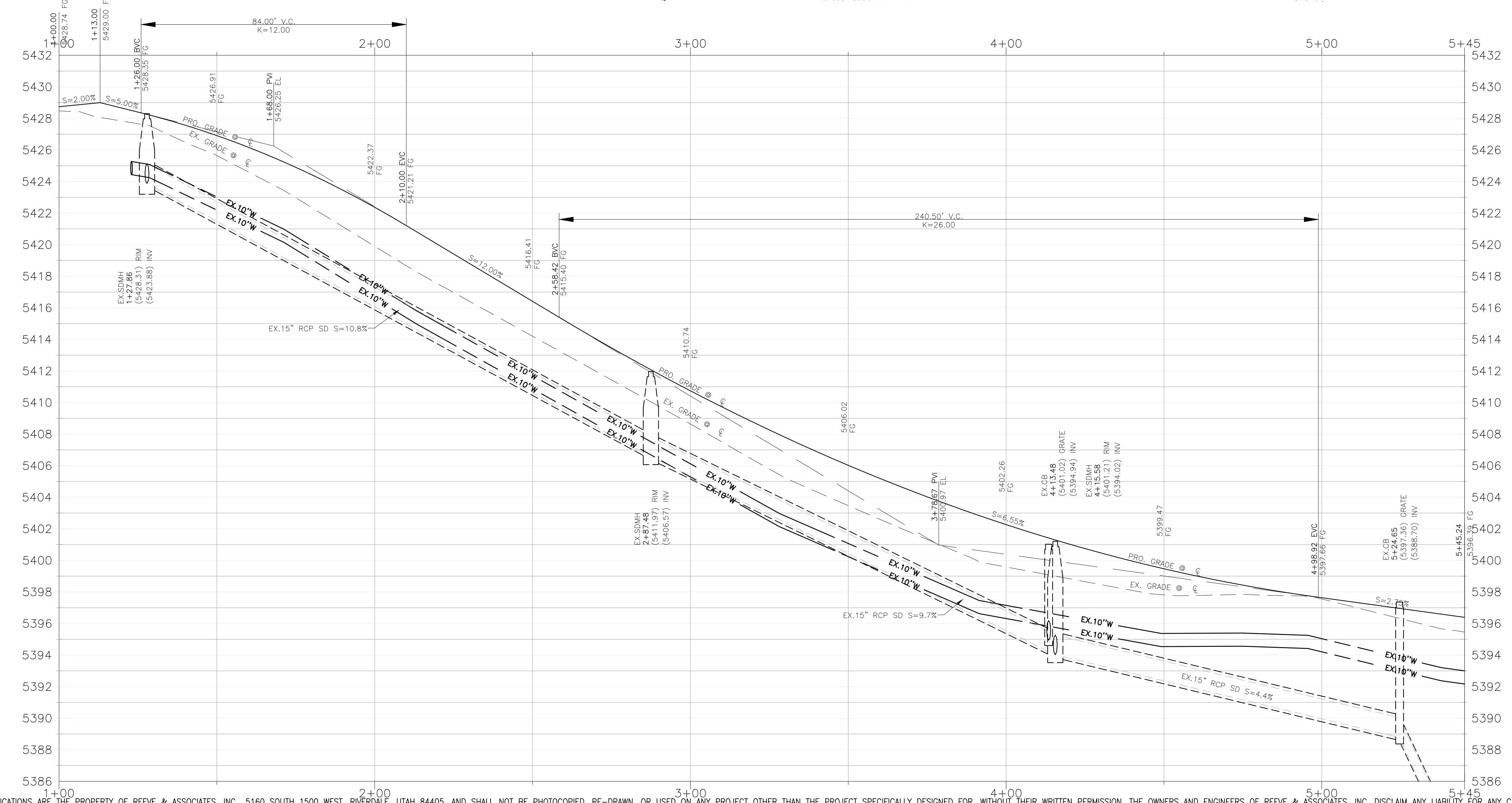
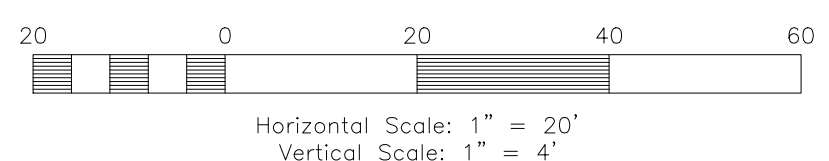
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- STORM DRAIN**  
 SD/15 - 15" RCP STORM DRAIN  
 SD/18 - 18" RCP STORM DRAIN

**STREET C 1+00.00 - 5+45.24**



**TBC Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C17	90°00'00"	20.00'	31.42'	20.00'	S23°05'29"W	28.28'
C18	28°53'15"	237.36'	119.67'	61.14'	S82°32'07"W	118.41'
C19	65°41'03"	45.00'	51.59'	29.05'	N5°10'44"W	48.81'
C20	245°41'03"	40.00'	171.52'	61.97'	N39°49'16"E	67.21'
C21	28°53'15"	267.36'	134.80'	68.86'	S82°32'07"W	133.37'
C22	90°00'00"	20.00'	31.42'	20.00'	S66°54'31"E	28.28'

**Centerline Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C32	28°53'15"	252.36'	127.23'	65.00'	N82°32'07"E	125.89'

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REVISIONS	DATE	DESCRIPTION
	12-06-2021	TB Ebasin Updates

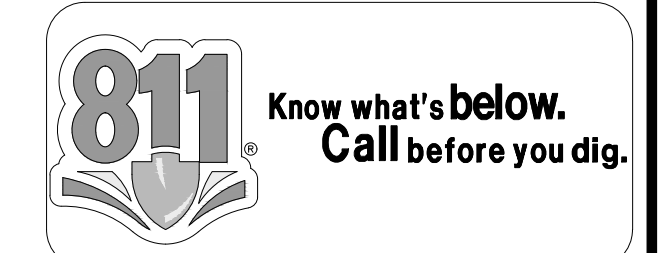
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**STREET C 1+00.00 - 5+45.24**



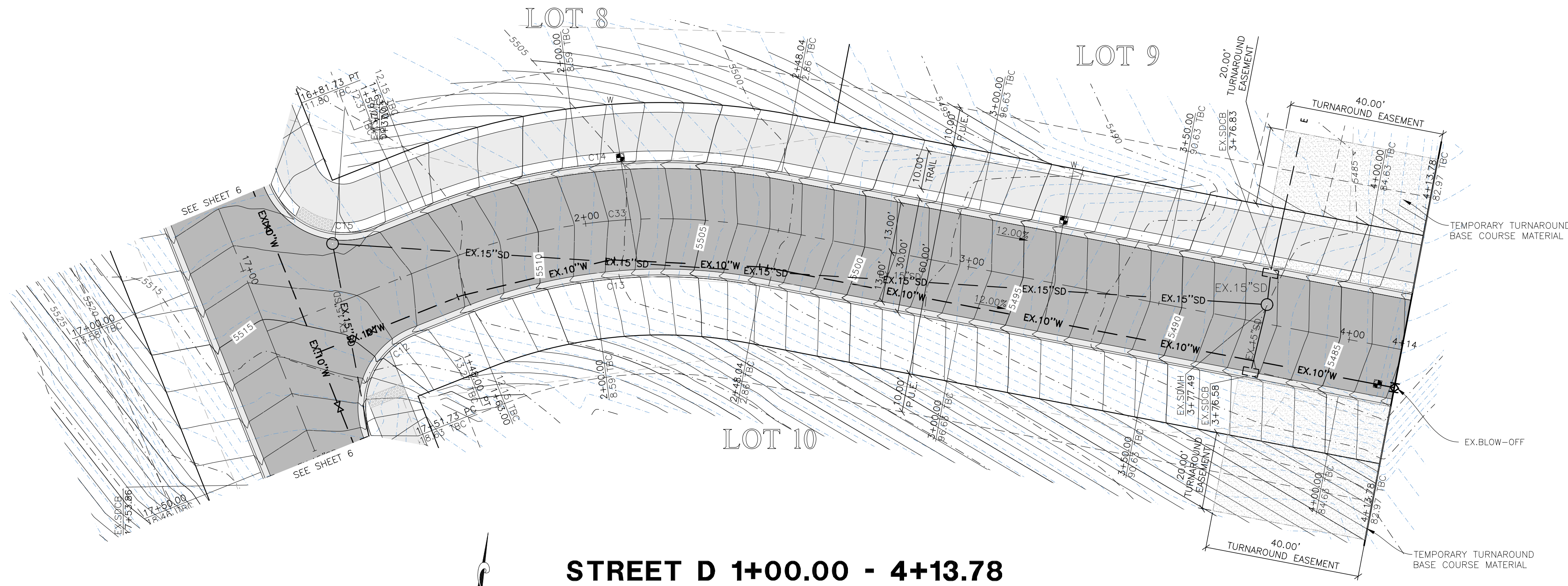
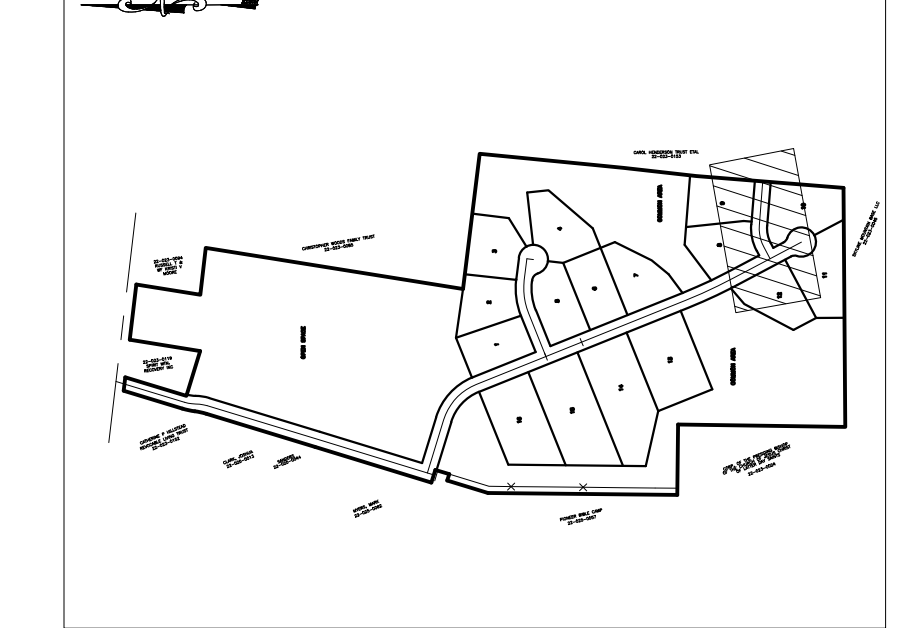
**Project Info.**

Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
 Name: HARMONY RANCH SUBDIVISION  
 Number: 7569-01

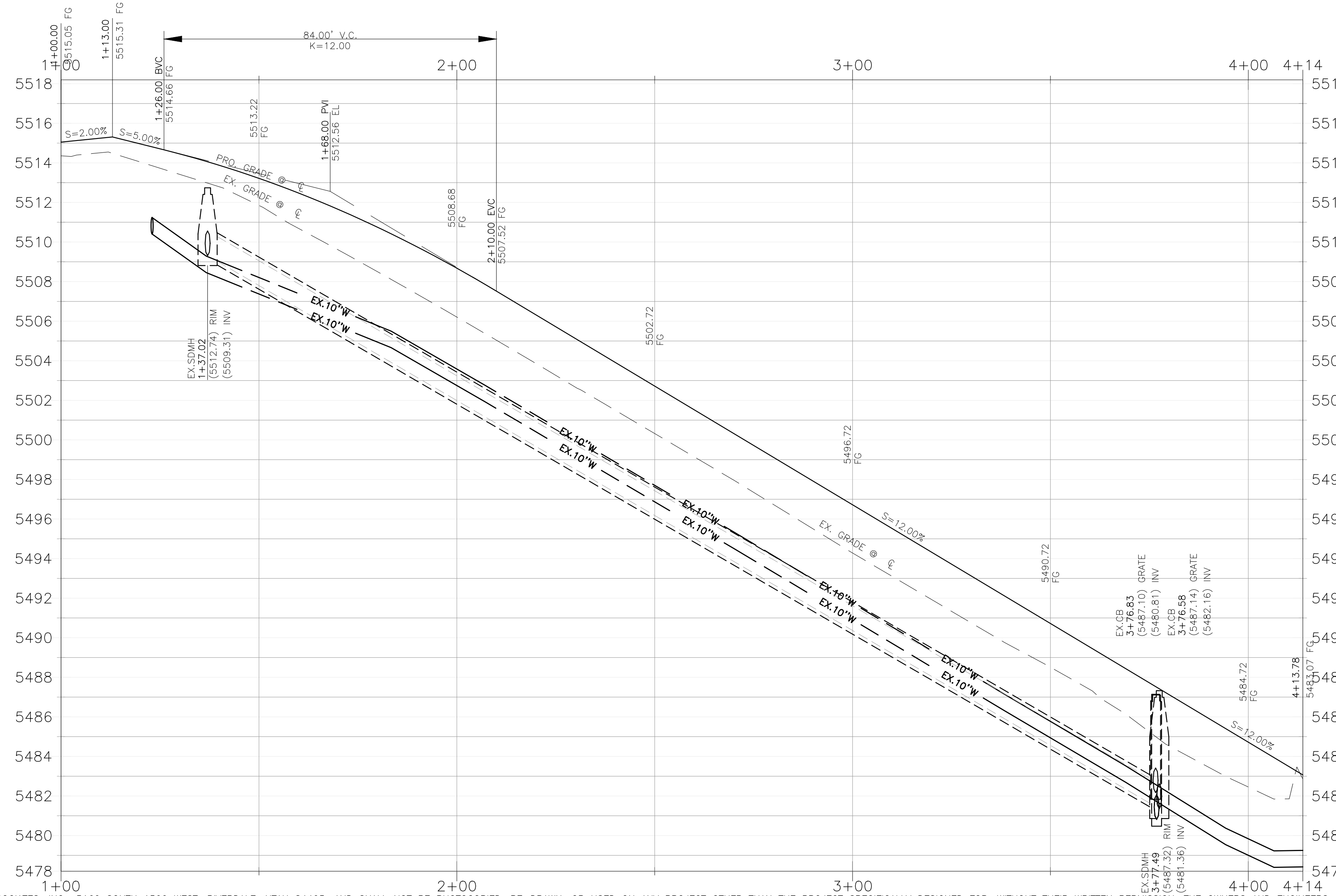
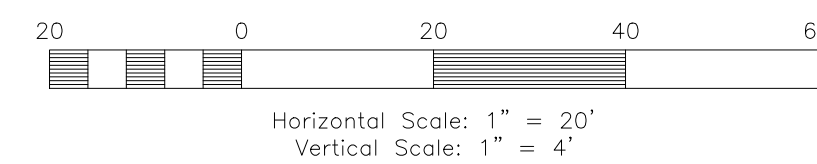


**Key Map**

NOT TO SCALE



**STREET D 1+00.00 - 4+13.78**



**TBC Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C12	90°00'16"	20.00'	31.42'	20.00'	S17°04'45"W	28.29'
C13	32°28'57"	135.00'	76.54'	39.33'	S78°19'21"W	75.51'
C14	32°28'57"	165.00'	93.54'	48.07'	S78°19'21"W	92.30'
C15	90°00'00"	20.00'	31.42'	20.00'	S72°55'07"E	28.28'

**Centerline Curve Data**

#	Delta	Radius	Length	Tangent	Chord	CH Length
C33	32°28'57"	150.00'	85.04'	43.70'	N78°19'21"E	83.90'

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REVISIONS

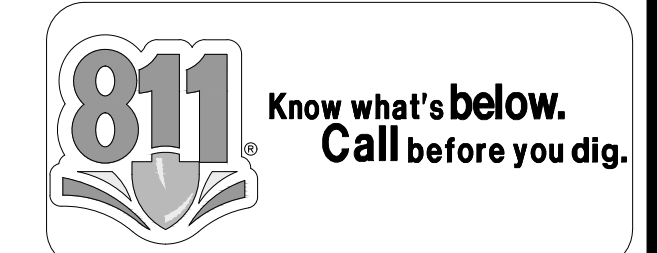
DATE	DESCRIPTION
12-06-2021	TB Basin Updates

**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**STREET D 1+00.00 - 4+13.78**



**Project Info.**  
 Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
 Name: HARMONY RANCH SUBDIVISION  
 Number: 7569-01







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REVISIONS	DATE	DESCRIPTION
12-06-2021	TB	Basin Updates

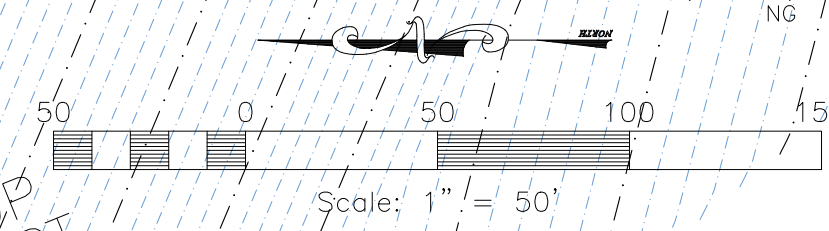
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

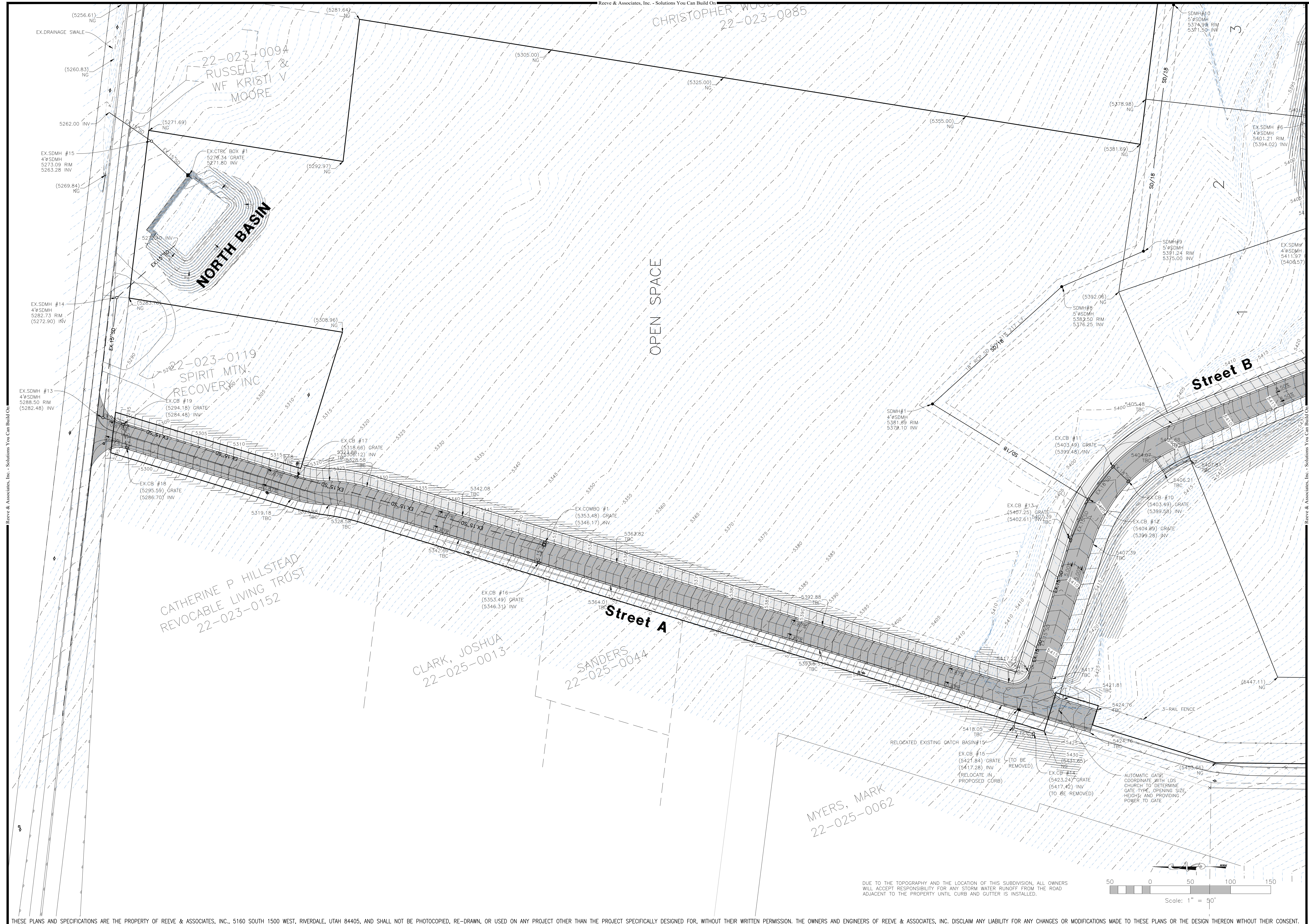
**Grading & Drainage Plan**



**Project Info.**

Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
 Name: HARMONY RANCH SUBDIVISION  
 Number: 7569-01





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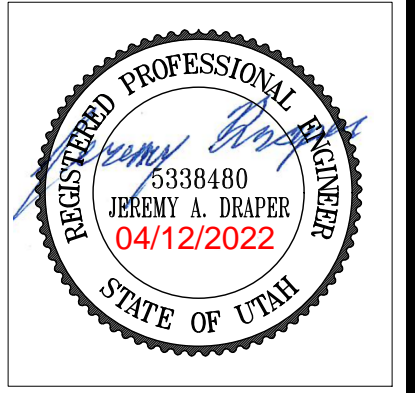
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REVISIONS	DATE	DESCRIPTION
12-06-2021	TB	Basin Updates

**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**Grading & Drainage Plan**



**Project Info.**

Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
 Name: HARMONY RANCH SUBDIVISION  
 Number: 7569-01

### North Basin Calculations:



**Storm Runoff Calculations**  
Harmony Ranch  
7569-01 10/26/2021 PER

The following runoff calculations are based on the Rainfall - Intensity - Duration Frequency Curve for the Eden, UT area taken from the NOAA Atlas 14 database. Calculations have been completed for the 100-yr 24-hr storm event. Storm water runoff has been calculated for a fully developed site and limited to a release rate of 0.1-cfs.

**North Basin:**  
The calculations are as follows:

**Drainage Area:**

Total Area =	3.00 acre or	130,594 ft <sup>2</sup>	
Runoff Coefficients			
Paved Area	48,814	C = 0.9	
Driveway	0	C = 0.9	
Roof	0	C = 0.9	
Landsaped Area	81,780	C = 0.2	
Weighted Runoff Coefficient		C = 0.46	

**LID Retention**  
80<sup>th</sup> Percentile Rainfall Event (d) 0.48 in  
Is the site Feasible for LID? Yes  
Site Imperviousness (i) 0.37  
NRCS Soil Group B (USDA)  
Rv Equation 0.84\*(1.169)  
R<sub>i</sub> (Soil Group A: 0.84\*(1.302); B: 0.84\*(1.169); C/D: 0.83\*(1.122)) 0.27  
V<sub>pond</sub> = Rv x d x Total Site SF 1402 c.f.

**Volume of Run-off for 100-year Storm Event:**

C = 0.46  
I = See Below in/hr  
A = 130594.00 ft<sup>2</sup>

Q(out) = 0.30 ft<sup>3</sup>/s (0.1-cfs per ac)

time (min)	time (sec)	i (in./hr.)	Q (cfs)	Vol. in (cf)	Vol. out (cf)	Difference (cf)
0	0	0.00	0.00	0	0	0
5	300	7.96	11.11	3333	90	3243
10	600	6.05	8.44	5066	180	4886
15	900	5	6.98	6280	270	6010
30	1800	3.37	4.70	8466	540	7926
60	3600	2.08	2.90	10450	1070	9371
120	7200	1.23	1.72	12359	2150	10201
180	10800	0.85	1.19	12811	3238	9573
360	21600	0.488	0.68	14710	6476	8235
720	43200	0.315	0.44	18991	12951	6039
1440	86400	0.201	0.28	24236	25903	-1687

**Orifice Sizing**  
Given: Q = 0.30 cfs  
2g = 64.4 ft/s<sup>2</sup>  
H = 3.00 ft  
Cd = 0.62 for circular openings  
R = SQRT(Q/pi/(0.7\*(64.4H)<sup>0.5</sup>))  
R = 0.11 feet  
D = 2.53 inches  
A = 5.01 inches \*2 0.0348 ft \*2

**SUMMARY:**  
The required 100-yr storage volume is 10,201 cubic feet  
The required LID Retention volume is 1,402 cubic feet  
The required orifice size is 3 in  
Total Required Basin Storage Volume is 11,603 cubic feet  
Designed Basin Storage Volume (3 ft Depth) is 11,681 cubic feet

### East Basin Calculations:



**Storm Runoff Calculations**  
Harmony Ranch  
7569-01 10/26/2021 PER

The following runoff calculations are based on the Rainfall - Intensity - Duration Frequency Curve for the Eden, UT area taken from the NOAA Atlas 14 database. Calculations have been completed for the 100-yr 24-hr storm event. Storm water runoff has been calculated for a fully developed site and limited to a release rate of 0.1-cfs.

**East Basin:**  
The calculations are as follows:

**Drainage Area:**

Total Area =	33.07 acre or	1,440,677 ft <sup>2</sup>	
Runoff Coefficients			
Paved Area	112,760	C = 0.9	
Driveway	11,700	C = 0.9	
Roof	39,000	C = 0.9	
Landsaped Area	1,277,218	C = 0.2	
Weighted Runoff Coefficient		C = 0.28	

**LID Retention**  
80<sup>th</sup> Percentile Rainfall Event (d) 0.48 in  
Is the site Feasible for LID? Yes  
Site Imperviousness (i) 0.11  
NRCS Soil Group B (USDA)  
Rv Equation 0.84\*(1.169)  
R<sub>i</sub> (Soil Group A: 0.84\*(1.302); B: 0.84\*(1.169); C/D: 0.83\*(1.122)) 0.07  
V<sub>pond</sub> = Rv x d x Total Site SF 3838 c.f.

**Volume of Run-off for 100-year Storm Event:**

C = 0.28  
I = See Below in/hr  
A = 1440677.00 ft<sup>2</sup>

Q(out) = 3.31 ft<sup>3</sup>/s (0.1-cfs per ac)

time (min)	time (sec)	i (in./hr.)	Q (cfs)	Vol. in (cf)	Vol. out (cf)	Difference (cf)
0	0	0.00	0.00	0	0	0
5	300	7.96	74.17	22252	982	21260
10	600	6.05	56.38	33826	1984	31842
15	900	5	46.59	41933	2977	38956
30	1800	3.37	31.40	56526	5953	50573
60	3600	2.08	19.38	69777	11906	57870
120	7200	1.23	11.46	82524	23813	58711
180	10800	0.85	7.92	85543	35719	49824
360	21600	0.488	4.55	98224	71439	26785
720	43200	0.315	2.94	128605	142877	-16072
1440	86400	0.201	1.87	161828	285754	-123926

**Orifice Sizing**  
Given: Q = 3.31 cfs  
2g = 64.4 ft/s<sup>2</sup>  
H = 3.00 ft  
Cd = 0.62 for circular openings  
R = SQRT(Q/pi/(0.7\*(64.4H)<sup>0.5</sup>))  
R = 0.35 feet  
D = 4.20 inches  
A = 55.29 inches \*2 0.3840 ft \*2

Constructed Basin: 49,905  
Needed Storage: 12,645

**SUMMARY:**  
The required 100-yr storage volume is 58,711 cubic feet  
The required LID Retention volume is 3,838 cubic feet  
The required orifice size is 8 in  
Total Required Basin Storage Volume is 62,550 cubic feet  
Designed Basin Storage Volume (1' Freeboard) is 63,139 cubic feet

### South Basin Calculations:



**Storm Runoff Calculations**  
Harmony Ranch  
7569-01 10/26/2021 PER

The following runoff calculations are based on the Rainfall - Intensity - Duration Frequency Curve for the Eden, UT area taken from the NOAA Atlas 14 database. Calculations have been completed for the 100-yr 24-hr storm event. Storm water runoff has been calculated for a fully developed site and limited to a release rate of 0.1-cfs.

**South Basin:**  
The calculations are as follows:

**Drainage Area:**

Total Area =	3.42 acre or	148,852 ft <sup>2</sup>	
Runoff Coefficients			
Paved Area	23,295	C = 0.9	
Driveway	2,250	C = 0.9	
Roof	7,500	C = 0.9	
Landsaped Area	115,807	C = 0.2	
Weighted Runoff Coefficient		C = 0.36	

**LID Retention**  
80<sup>th</sup> Percentile Rainfall Event (d) 0.48 in  
Is the site Feasible for LID? Yes  
Site Imperviousness (i) 0.22  
NRCS Soil Group B (USDA)  
Rv Equation 0.84\*(1.169)  
R<sub>i</sub> (Soil Group A: 0.84\*(1.302); B: 0.84\*(1.169); C/D: 0.83\*(1.122)) 0.15  
V<sub>pond</sub> = Rv x d x Total Site SF 869 c.f.

**Volume of Run-off for 100-year Storm Event:**

C = 0.36  
I = See Below in/hr  
A = 148852.00 ft<sup>2</sup>

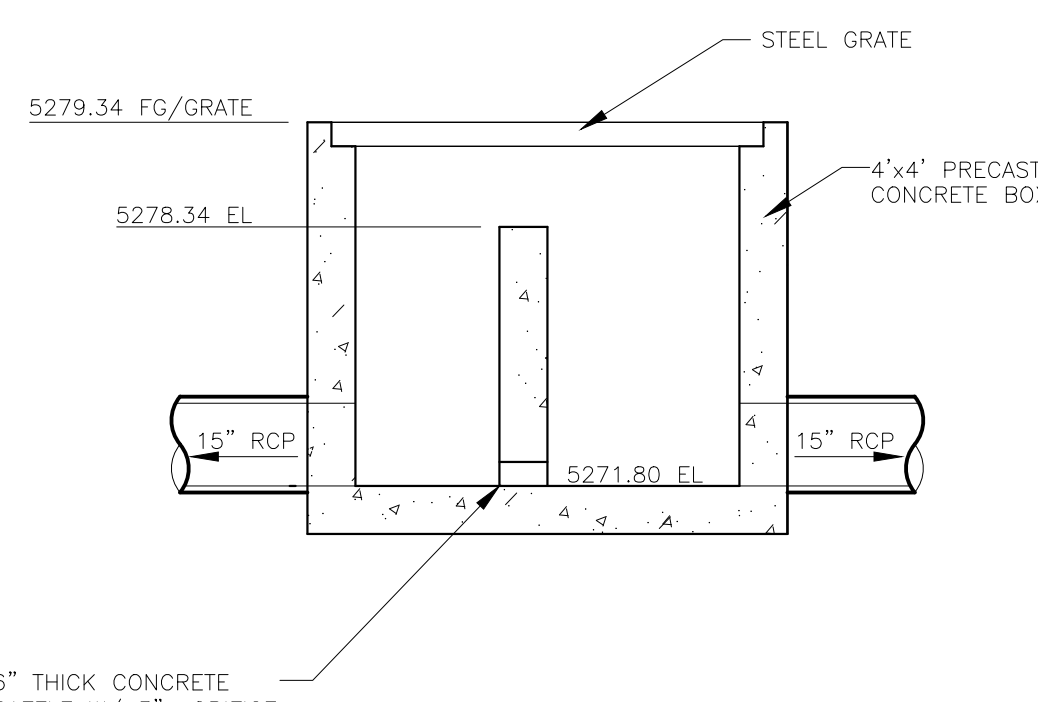
Q(out) = 0.34 ft<sup>3</sup>/s (0.1-cfs per ac)

time (min)	time (sec)	i (in./hr.)	Q (cfs)	Vol. in (cf)	Vol. out (cf)	Difference (cf)
0	0	0.00	0.00	0	0	0
5	300	7.96	9.75	2924	103	2822
10	600	6.05	7.41	4445	205	4240
15	900	5	6.12	5511	308	5203
30	1800	3.37	4.13	7428	615	6813
60	3600	2.08	2.55	9170	1230	7939
120	7200	1.23	1.51	10845	2460	8385
180	10800	0.85	1.04	11242	3691	7551
360	21600	0.488	0.60	12398	7381	5027
720	43200	0.315	0.39	16664	14762	1902
1440	86400	0.201	0.25	21267	29524	-8258

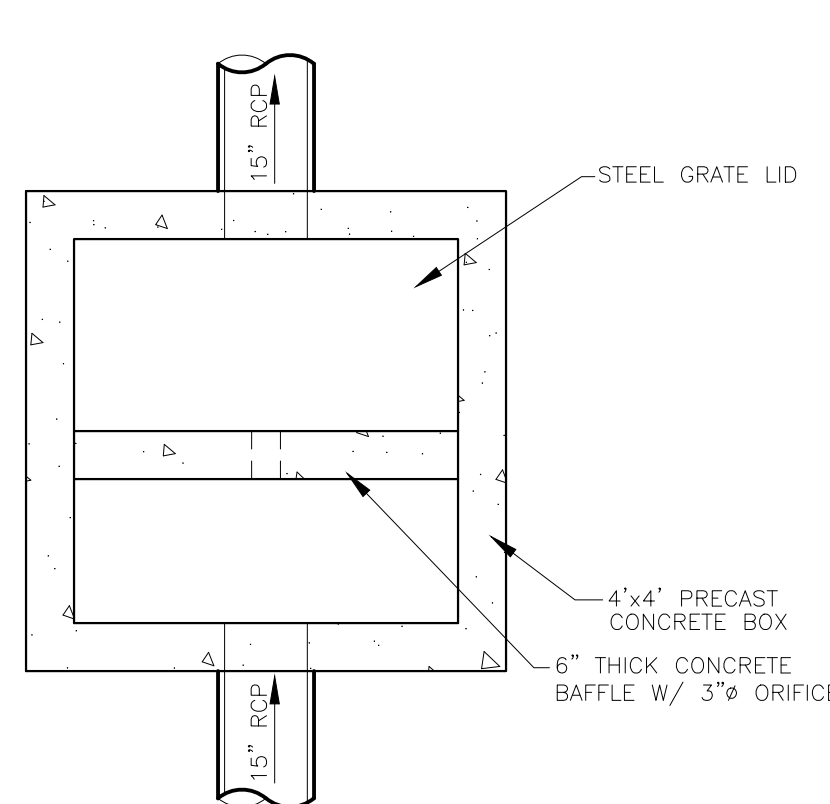
**Orifice Sizing**  
Given: Q = 0.34 cfs  
2g = 64.4 ft/s<sup>2</sup>  
H = 3.00 ft  
Cd = 0.62 for circular openings  
R = SQRT(Q/pi/(0.7\*(64.4H)<sup>0.5</sup>))  
R = 0.11 feet  
D = 2.70 inches  
A = 5.71 inches \*2 0.0397 ft \*2

Constructed Basin: 49,905  
Needed Storage: 634

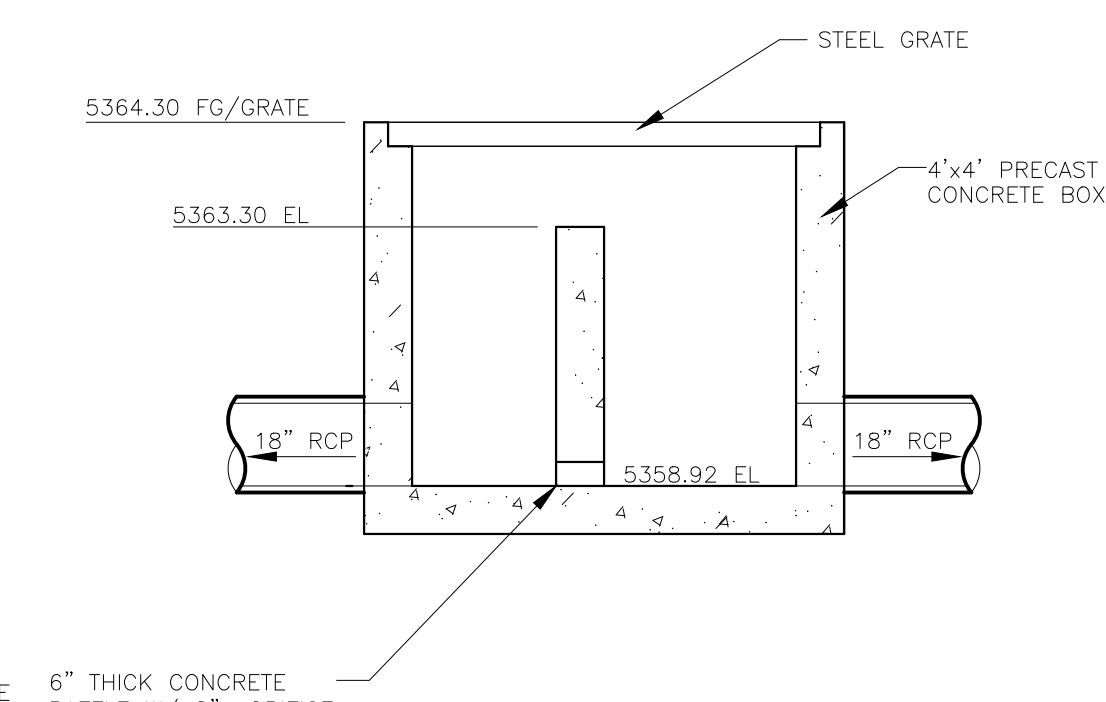
**SUMMARY:**  
The required 100-yr storage volume is 8,385 cubic feet  
The required LID Retention volume is 869 cubic feet  
The required orifice size is 3 in  
Total Required Basin Storage Volume is 9,254 cubic feet  
Designed Basin Storage Volume (1' Freeboard) is 9,630 cubic feet



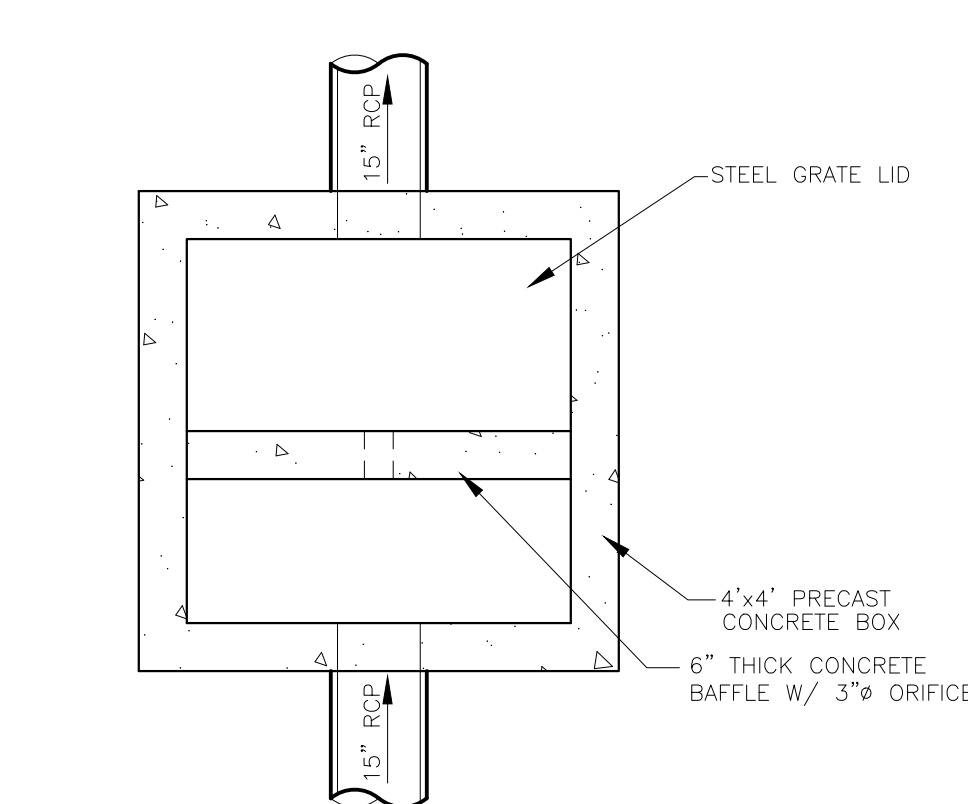
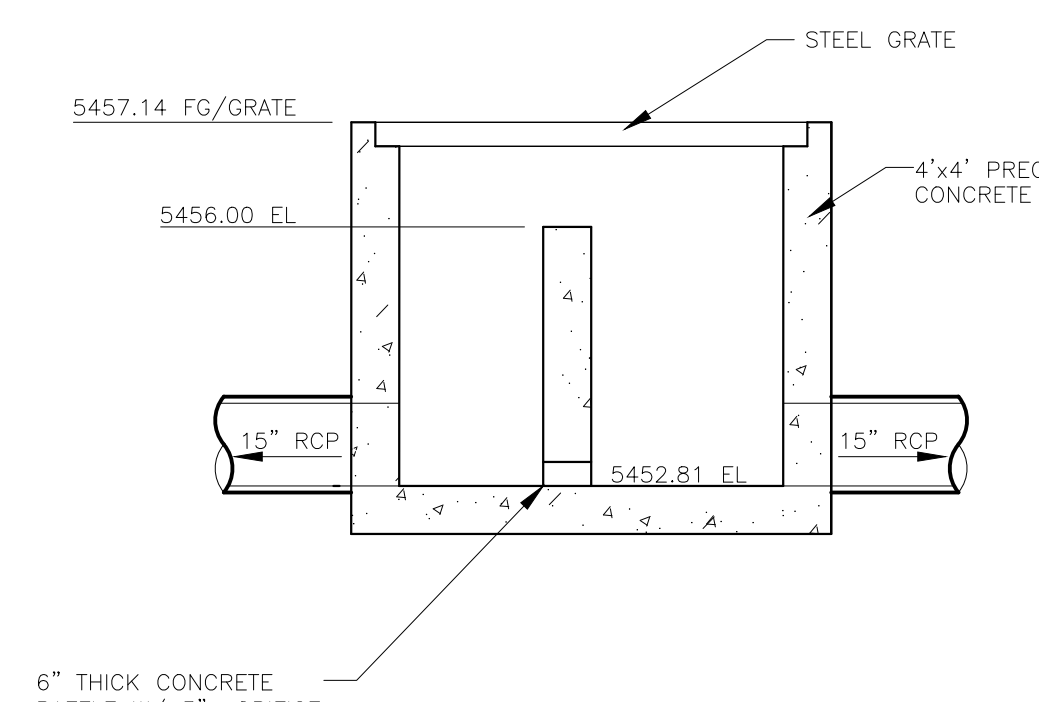
**4'x4' Ex. Control Box #1 Detail**  
SCALE: 1"=2"



**4'x4' Ex. Control Box #2 Detail**  
SCALE: 1"=2"



**4'x4' Control Box #1 Detail**  
SCALE: 1"=2"



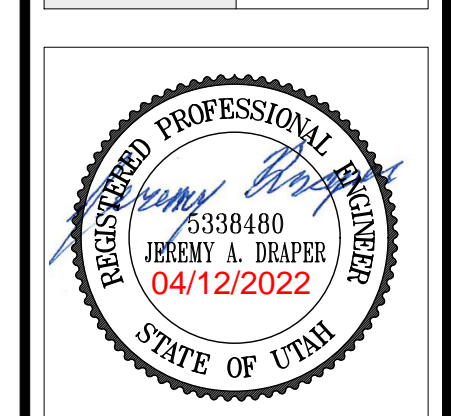
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REVISIONS

DATE	DESCRIPTION
12-06-2021	TB Basin Updates

**Harmony Ranch Subdivision**  
WEBER COUNTY, UTAH

**Detention Basin Calculation Details**



**Project Info.**  
Engineer: JEREMY A. DRAPER, P.E.  
Drafter: C. KINGSLEY  
Begin Date: APRIL 2021  
Name: HARMONY RANCH SUBDIVISION  
Number: 7569-01

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REVISIONS	DATE	DESCRIPTION
12-06-2021	TB	Basin Updates

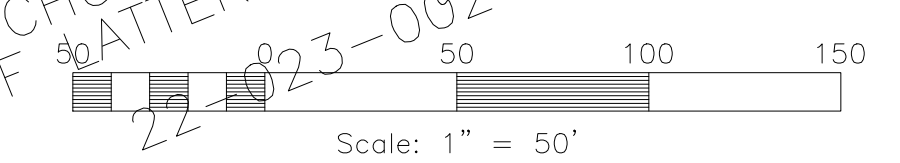
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH  
**Utility Plan**



**Project Info.**

Engineer:	JEREMY A. DRAPER, P.E.
Drafter:	C. KINGSLEY
Begin Date:	APRIL 2021
Name:	HARMONY RANCH SUBDIVISION
Number:	7569-01

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22-023-0085

22-023-0094  
RUSSELL T &  
WF KRISTI V  
MOORE

22-023-0119  
SPIRIT MTN.  
RECOVERY INC

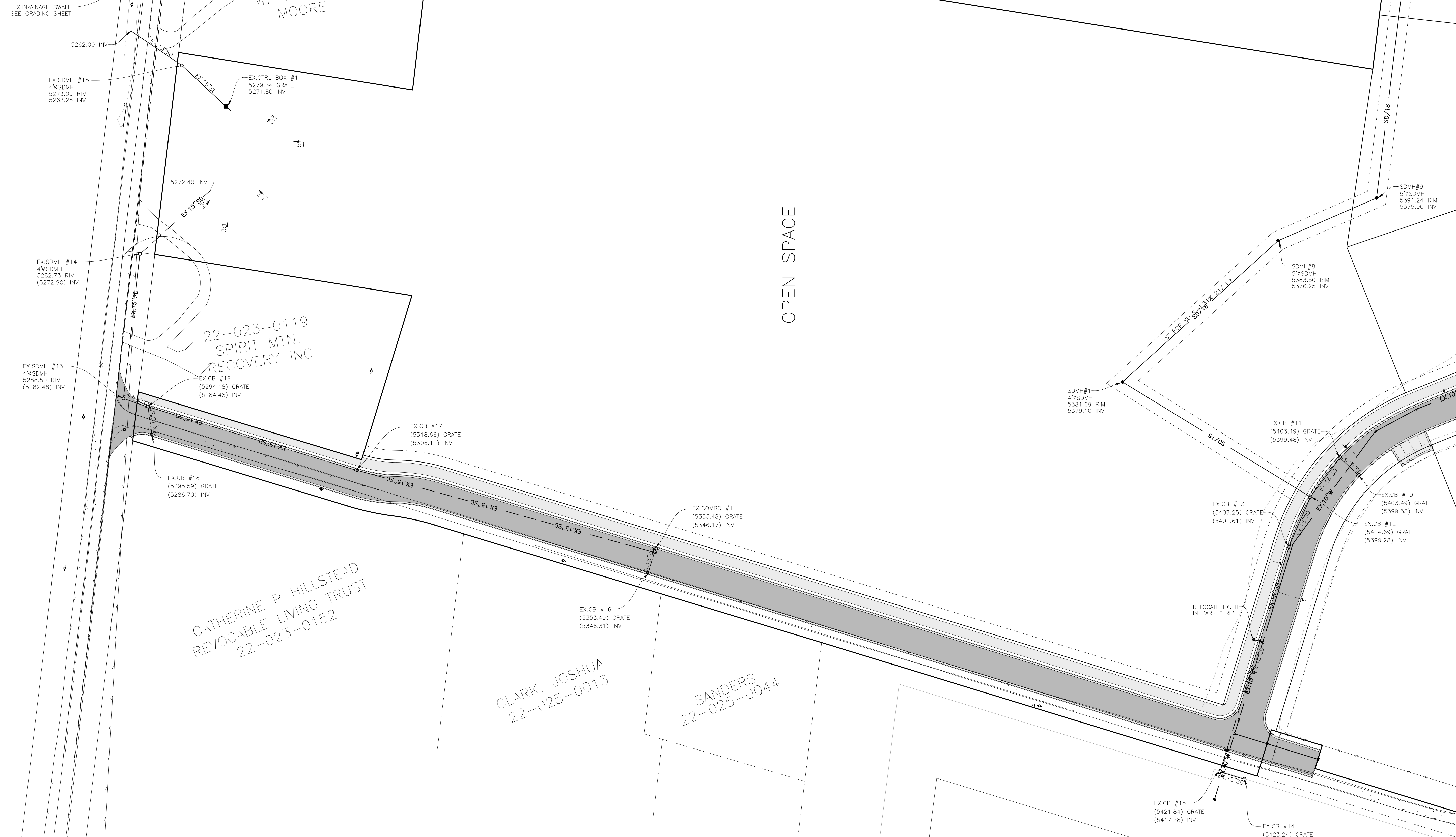
CATHERINE P HILLSTEAD  
REVOCABLE LIVING TRUST  
22-023-0152

CLARK, JOSHUA  
22-025-0013

SANDERS  
22-025-0044

MYERS, MARK  
22-025-0062

OPEN SPACE



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**IRA**

REVISIONS	DATE	DESCRIPTION
12-06-2021	TB	Basin Updates

**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

**Utility Plan**



**Project Info.**  
 Engineer: JEREMY A. DRAPER, P.E.  
 Drafter: C. KINGSLEY  
 Begin Date: APRIL 2021  
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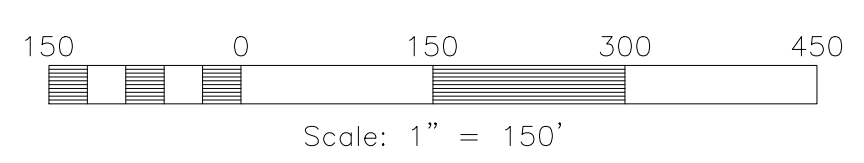
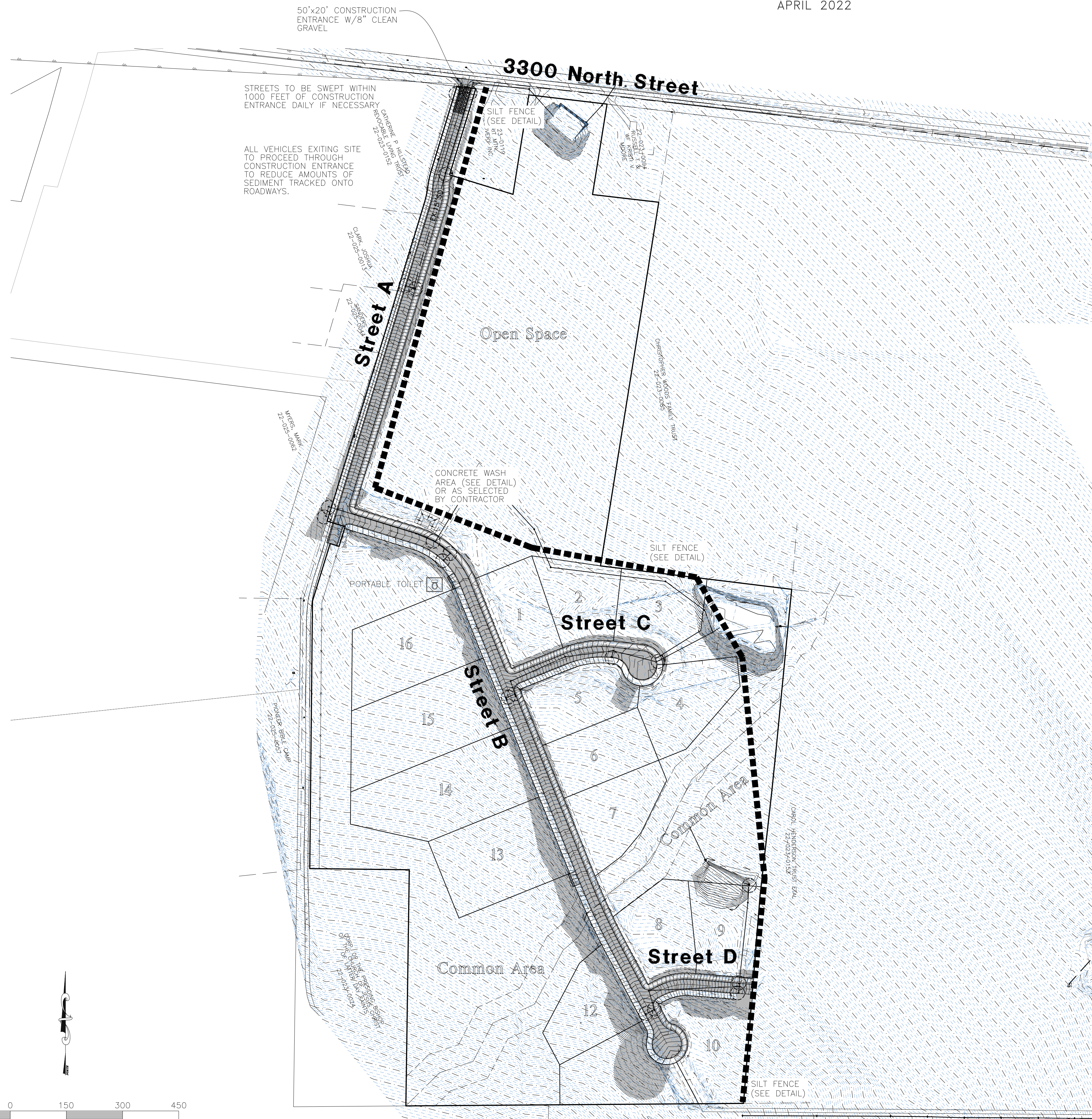
SEE SHEET 10 FOR STORM DRAIN CONTINUATION

SEE SHEET 10 FOR STORM DRAIN CONTINUATION



# Harmony Ranch Subdivision Storm Water Pollution Prevention Plan Exhibit

WEBER COUNTY, UTAH  
APRIL 2022



Construction Activity Schedule	
- PROJECT LOCATION.....	WEBER COUNTY, UTAH
- PROJECT BEGINNING DATE.....	APRIL 2021
- BMP'S DEPLOYMENT DATE.....	APRIL 2021
- STORM WATER MANAGEMENT CONTACT / INSPECTOR.....	JAN SILVERBERG (805) 570-9560
- SPECIFIC CONSTRUCTION SCHEDULE INCLUDING BMP CONSTRUCTION SCHEDULE TO BE INCLUDED WITH SWPPP BY OWNER/DEVELOPER	

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**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH

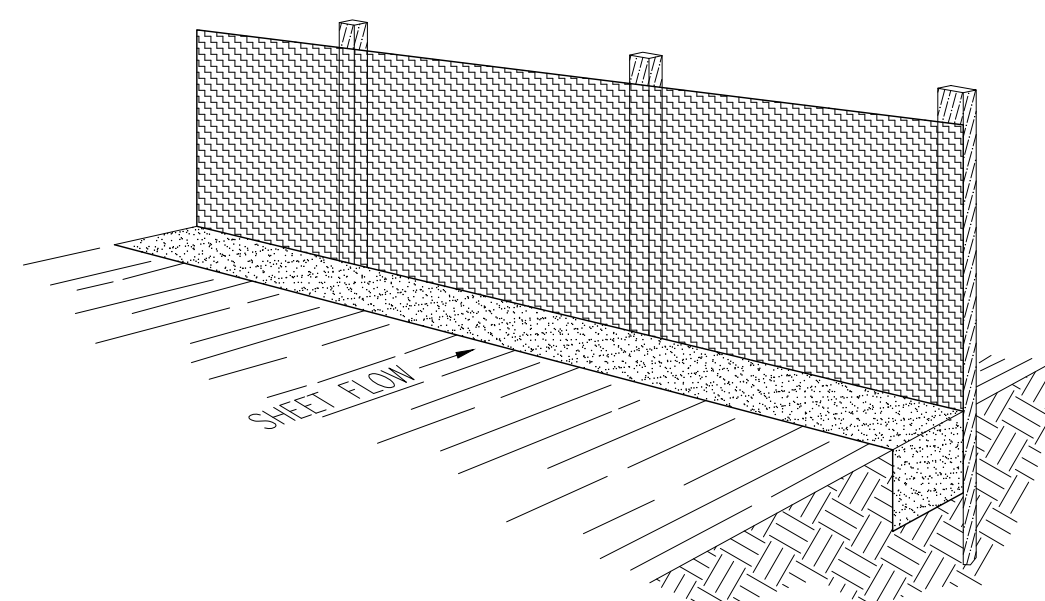
**Storm Water Pollution Prevention Plan Exhibit**



<b>Project Info.</b>	
Engineer:	JEREMY A. DRAPER, P.E.
Drafter:	C. KINGSLEY
Begin Date:	APRIL 2021
Name:	HARMONY RANCH SUBDIVISION
Number:	7569-01

**Notes:**

- Describe all BMP's to protect storm water inlets:  
All storm water inlets to be protected by straw wattle barriers, or gravel bags (see detail).
- Describe BMP's to eliminate/reduce contamination of storm water from:
  - Equipment / building / concrete wash areas:  
To be performed in designated areas only and surrounded with silt fence barriers.
  - Soil contaminated by soil amendments:  
If any contaminants are found or generated, contact environmental engineer and contacts listed.
  - Areas of contaminated soil:  
If any contaminants are found or generated, contact environmental engineer and contacts listed.
  - Fuelling area:  
To be performed in designated areas only and surrounded with silt fence.
  - Vehicle maintenance areas:  
To be performed in designated areas only and surrounded with silt fence.
  - Vehicle parking areas:  
To be performed in designated areas only and surrounded with silt fence.
  - Equipment storage areas:  
To be performed in designated areas only and surrounded with silt fence.
  - Materials storage areas:  
To be performed in designated areas only and surrounded with silt fence.
  - Waste containment areas:  
To be performed in designated areas only and surrounded with silt fence.
  - Service areas:  
To be performed in designated areas only and surrounded with silt fence.
- BMP's for wind erosion:  
Stockpiles and site as needed to be watered regularly to eliminate / control wind erosion
- Construction Vehicles and Equipment:
  - Maintenance
    - Keep all construction equipment to prevent oil or other fluid leaks.
    - Keep vehicles and equipment clean, prevent excessive build-up of oil and grease.
    - Regularly inspect on-site vehicles and equipment for leaks, and repair immediately.
    - Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment on-site.
    - Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
  - Fueling
    - If fueling must occur on-site, use designated areas away from drainage.
    - Locate on-site fuel storage tanks within a bermed area designed to hold the tank volume.
    - Cover retention area with an impervious material and install in a manner to ensure that any spills will be contained in the retention area. To catch spills or leaks when removing or changing fluids.
    - Use drip pans for any oil or fluid changes.
  - Washing
    - Use as little water as possible to avoid installing erosion and sediment controls for the wash area.
    - If washing must occur on-site, use designated, bermed wash areas to prevent waste water discharge into storm water, creeks, rivers, and other water bodies.
    - Use phosphate-free, biodegradable soaps.
    - Do not permit steam cleaning on-site.
- Spill Prevention and Control
  - Minor Spills:  
Minor spills are those which are likely to be controlled by on-site personnel. After contacting local emergency response agencies, the following actions should occur upon discovery of a minor spill:
    - Contain the spread of the spill.
    - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (i.e. absorbent materials, cat litter, and / or rags).
    - If the spill occurs in dirt areas, immediately contain the spill by constructing an earth dike. Dig up and properly dispose of contaminated soil.
    - If the spill occurs during rain, cover the impacted area to avoid runoff.
    - Record all steps taken to report and contain spill.
  - Major Spills:  
On-site personnel should not attempt to control major spills until the appropriate and qualified emergency response staff have arrived at the site. For spills of federal reportable quantities, also notify the National Response Center at (800) 424-8802. A written report should be sent to all notified authorities. Failure to report major spills can result in significant fines and penalties.
- Post Roadway / Utility Construction
  - Maintain good housekeeping practices.
  - Enclose or cover building material storage areas.
  - Properly store materials such as paints and solvents.
  - Store dry and wet materials under cover, away from drainage areas.
  - Avoid mixing excess amounts of fresh concrete or cement on-site.
  - Perform washout of concrete trucks offsite or in designated areas only.
  - Do not wash out concrete trucks into storm drains, open ditches, streets or streams.
  - Do not place material or debris into streams, gutters or catch basins that stop or reduce the flow of runoff water.
  - All public streets and storm drain facilities shall be maintained free of building materials, mud and debris caused by grading or construction operations. Roads will be swept within 1000' of construction entrance daily, if necessary.
  - Install straw wattle around all inlets contained within the development and all others that receive runoff from the development.
- Erosion Control Plan Notes
  - The contractor will designate an emergency contact that can be reached 24 hours a day 7 days a week. A stand-by crew for emergency work shall be available at all times during potential rain or snow runoff events. Necessary materials shall be available on site and stockpiled at convenient locations to facilitate rapid construction of emergency devices when rain or runoff is eminent.
  - Erosion control devices shown on the plans and approved for the project may not be removed without approval of the engineer of record. If devices are removed, no work may continue that have the potential of erosion without consulting the engineer of record. If deemed necessary erosion control should be reestablished before this work begins.
  - Graded areas adjacent to fill slopes located at the site perimeter must drain away from the top of the slope at the conclusion of each working day. This should be confirmed by survey or other means acceptable to the engineer of record.
  - All silt and debris shall be removed from all devices within 24 hours after each rain or runoff event.
  - Except as otherwise approved by the inspector, all removable protective devices shown shall be in place at the end of each working day and through weekends until removal of the system is approved.
  - All loose soil and debris, which may create a potential hazard to offsite property, shall be removed from the site as directed by the engineer of record of the governing agency.
  - The placement of additional devices to reduce erosion damage within the site is left to the discretion of the engineer of record.
  - Desilting basins may not be removed or made inoperable without the approval of the engineer of record and the governing agency.
  - Erosion control devices will be modified as need as the project progresses and plans of these changes submitted for approval by the engineer of record and the governing agency.
- Conduct a minimum of one inspection of the erosion and sediment controls every two weeks. Maintain documentation on site.
  - Part III.D.4 of general permit UTRC00000 identifies the minimum inspection requirements.
  - Part III.D.4.C identifies the minimum inspection report requirements.
  - Failure to complete and/or document storm water inspections is a violation of part III.D.4 of Utah General Permit UTR 300000.



**Perspective View**

Figure 2

**INSTALLATION**

The silt fence should be installed prior to major soil disturbances in the drainage area. The fence should be placed across the slope along a line of uniform elevation wherever flow of sediment is anticipated. Table 1 shows generally-recommended maximum slope lengths (slope spacing between fences) at various site grades for most silt fence applications.

Slope Steepness (%)	Max. Slope Length m (ft)
<2%	30.5m (100ft)
2-5%	22.9m (75ft)
5-10%	15.2m (50ft)
10-20%	7.6m (25ft)
>20%	4.5m (15ft)

**PREFABRICATED SILT FENCE ROLLS**

- Excavate a minimum 15.2cm x 15.2cm (6"x6") trench at the desired location.
- Unroll the silt fence, positioning the post against the downstream wall of the trench.
- Adjacent rolls of silt fence should be joined by nesting the end post of one fence into the other. Before nesting the end posts, rotate each post until the geotextile is wrapped completely around the post, then abut the end posts to create a light seal as shown in Figure 1.
- Drive posts into the ground until the required fence height and/or anchorage depth is obtained.

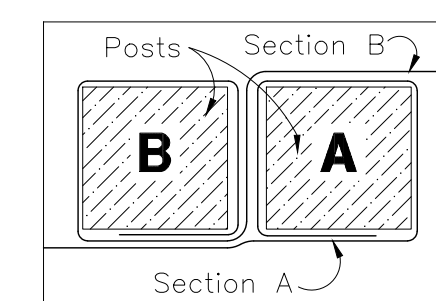


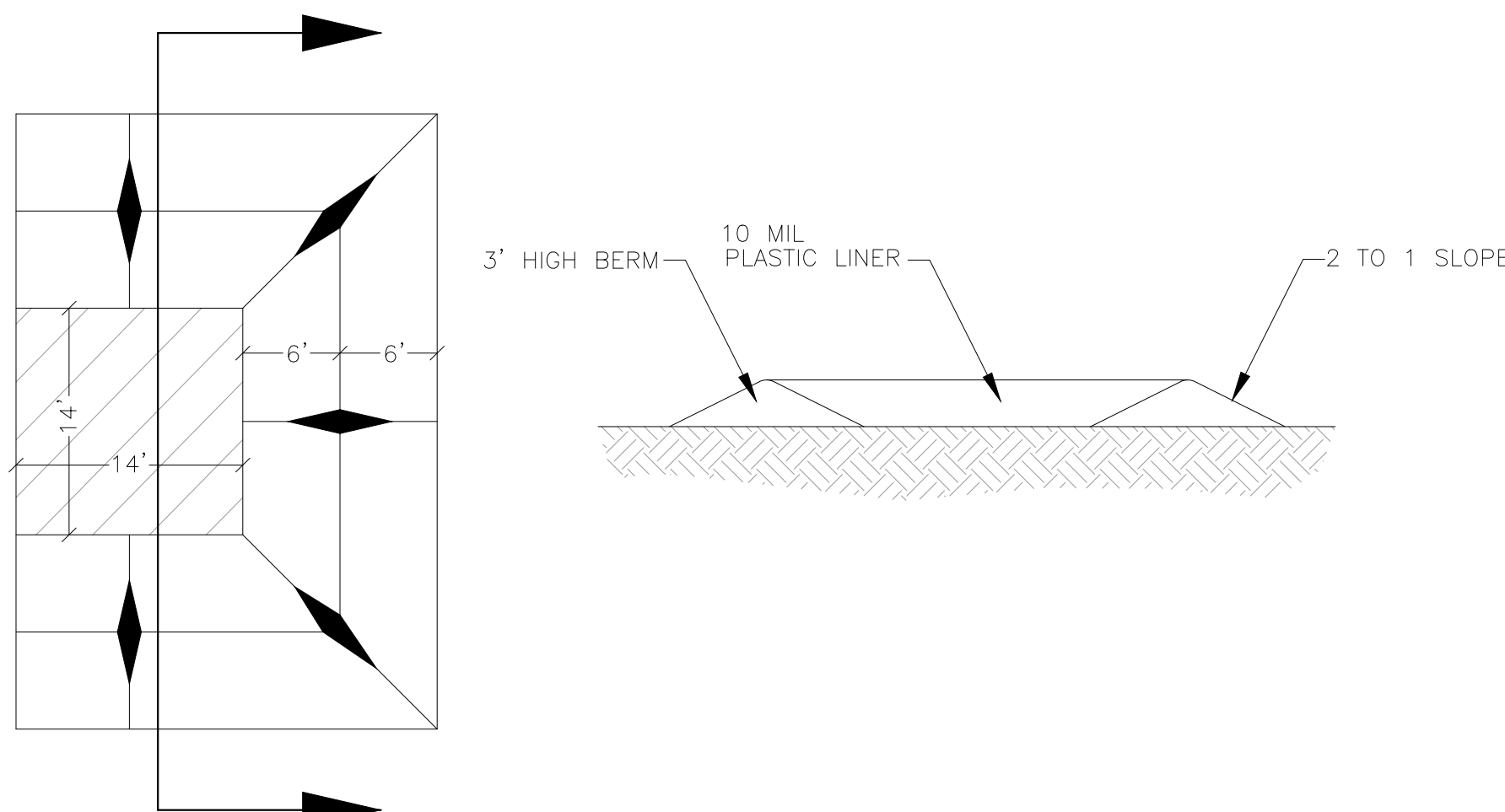
Figure 1: Top View of Roll-to-Roll Connection

**FIELD ASSEMBLY:**

- Excavate a minimum 15.2cm x 15.2cm (6"x6") trench at the desired location.
- Drive wooden posts, or steel posts with fastening projections, against the downstream wall of the trench. Maximum post spacing should be 2.4-3.0m (8-10ft). Post spacing

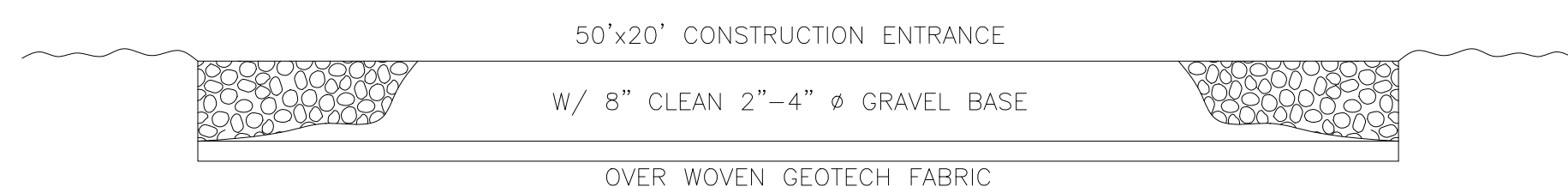
**Silt Fence Detail**

SCALE: NONE

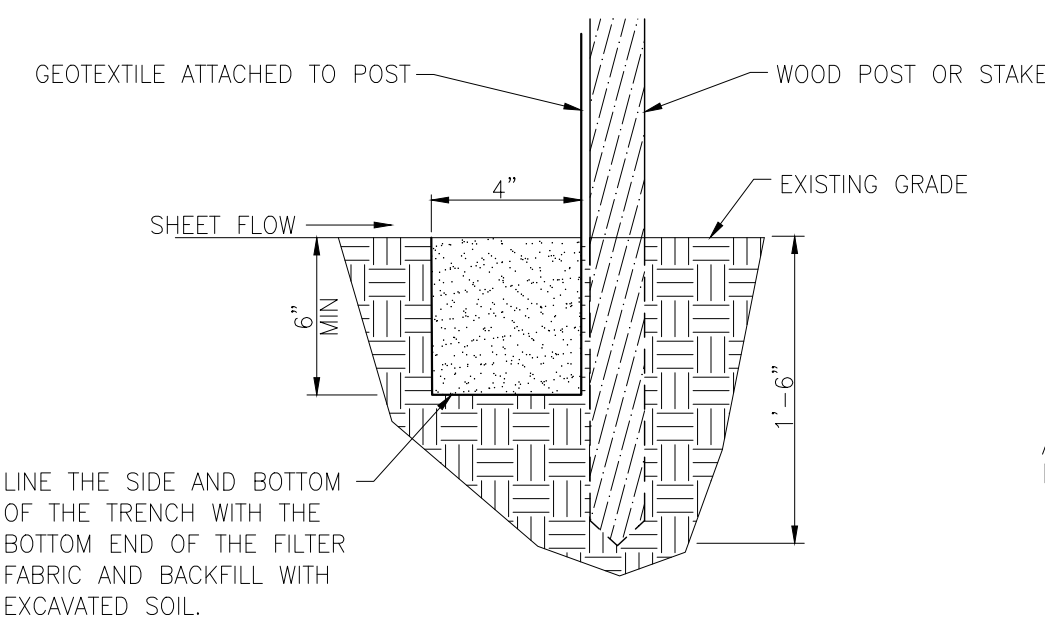


**Concrete Washout Area w/ 10 mil Plastic Liner**

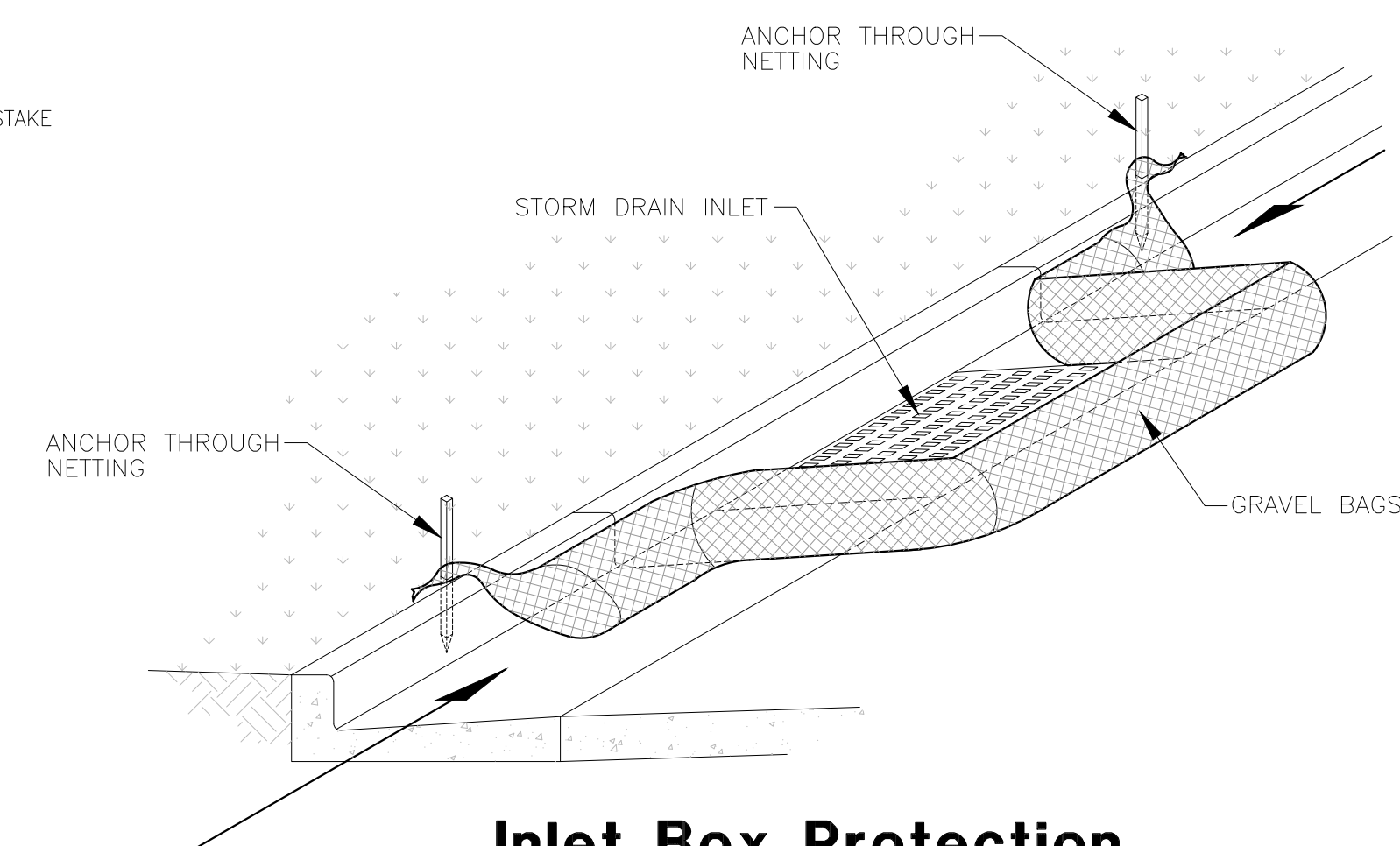
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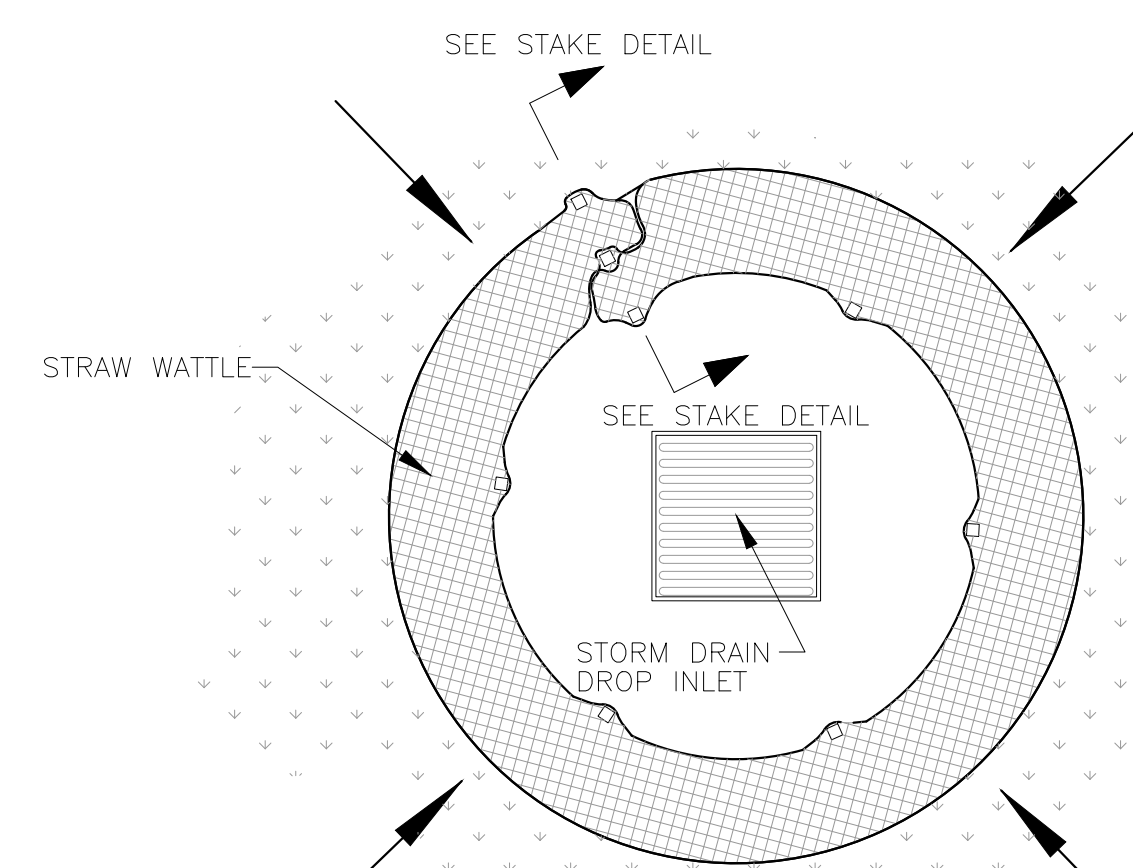
**Cross Section 50' x 20' Construction Entrance**



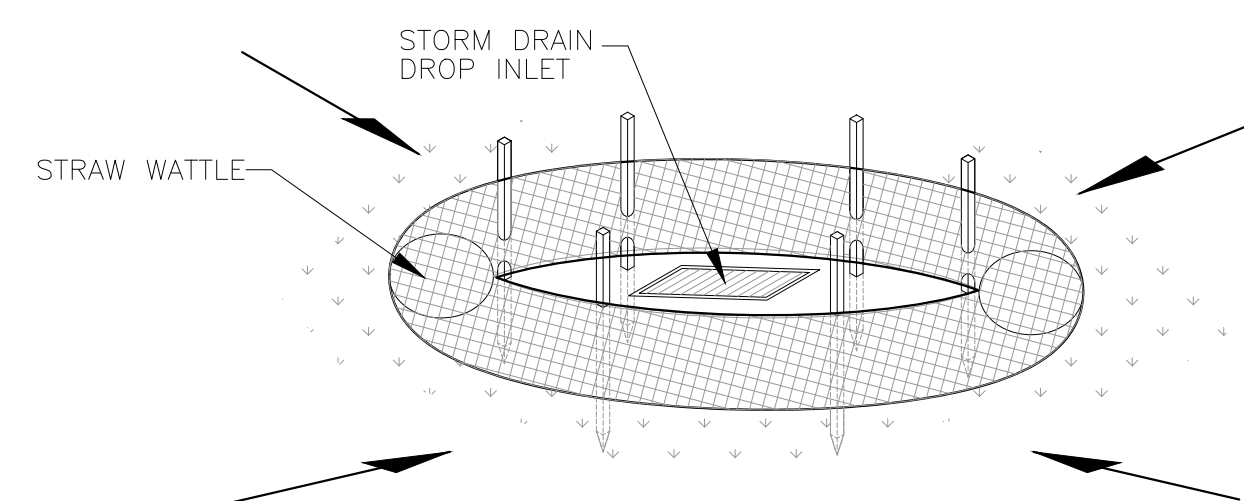
**Section**



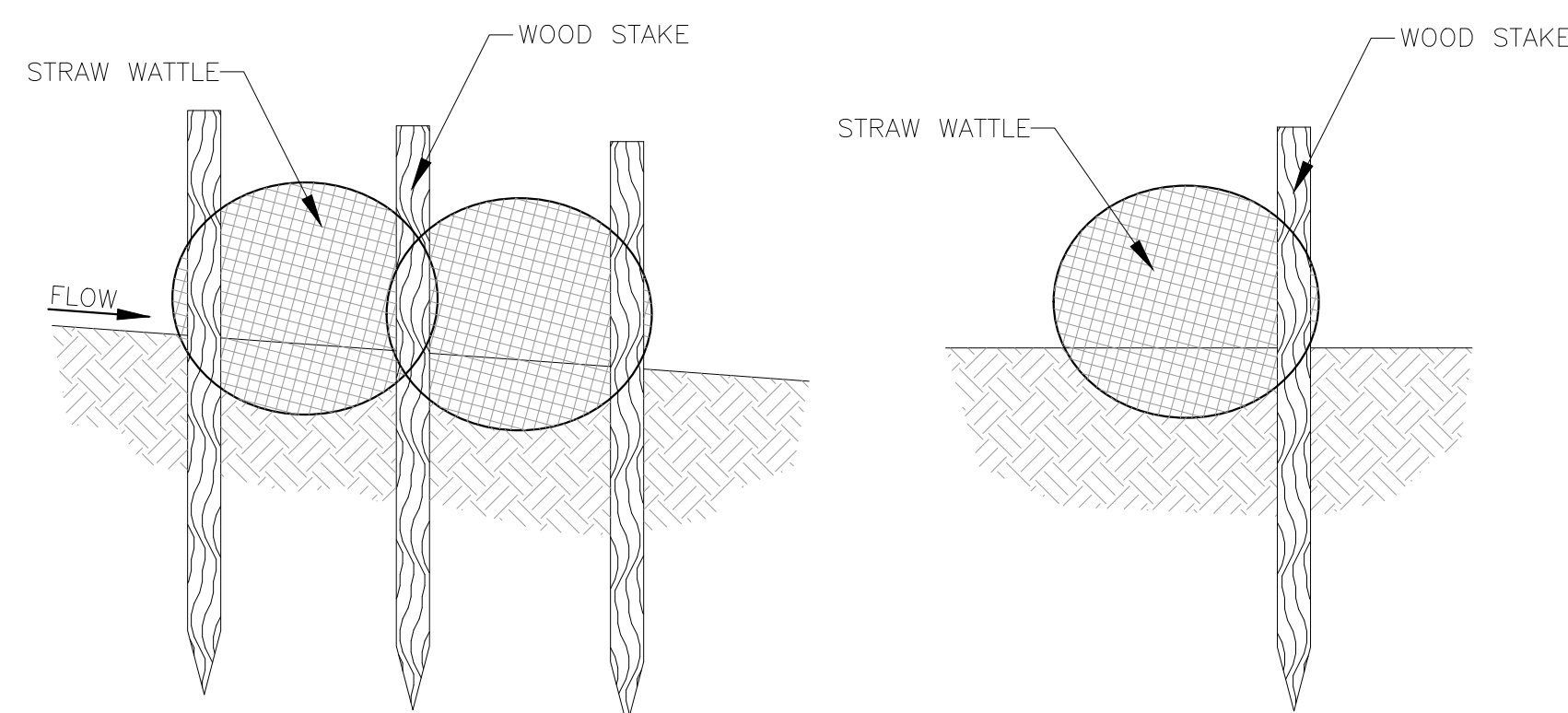
**Inlet Box Protection**



**Plan View**



**Drop Inlet Protection**



**Stake Detail**

**Reeve & Associates, Inc.**  
 5160 SOUTH 1500 WEST, RIVERDALE, UTAH 84405  
 TEL: (801) 671-3100 www.reeve-assoc.com  
 LAND PLANNERS • CIVIL ENGINEERS • LAND SURVEYORS  
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REVISIONS	DATE	DESCRIPTION
	12-06-2021	TB Basin Updates

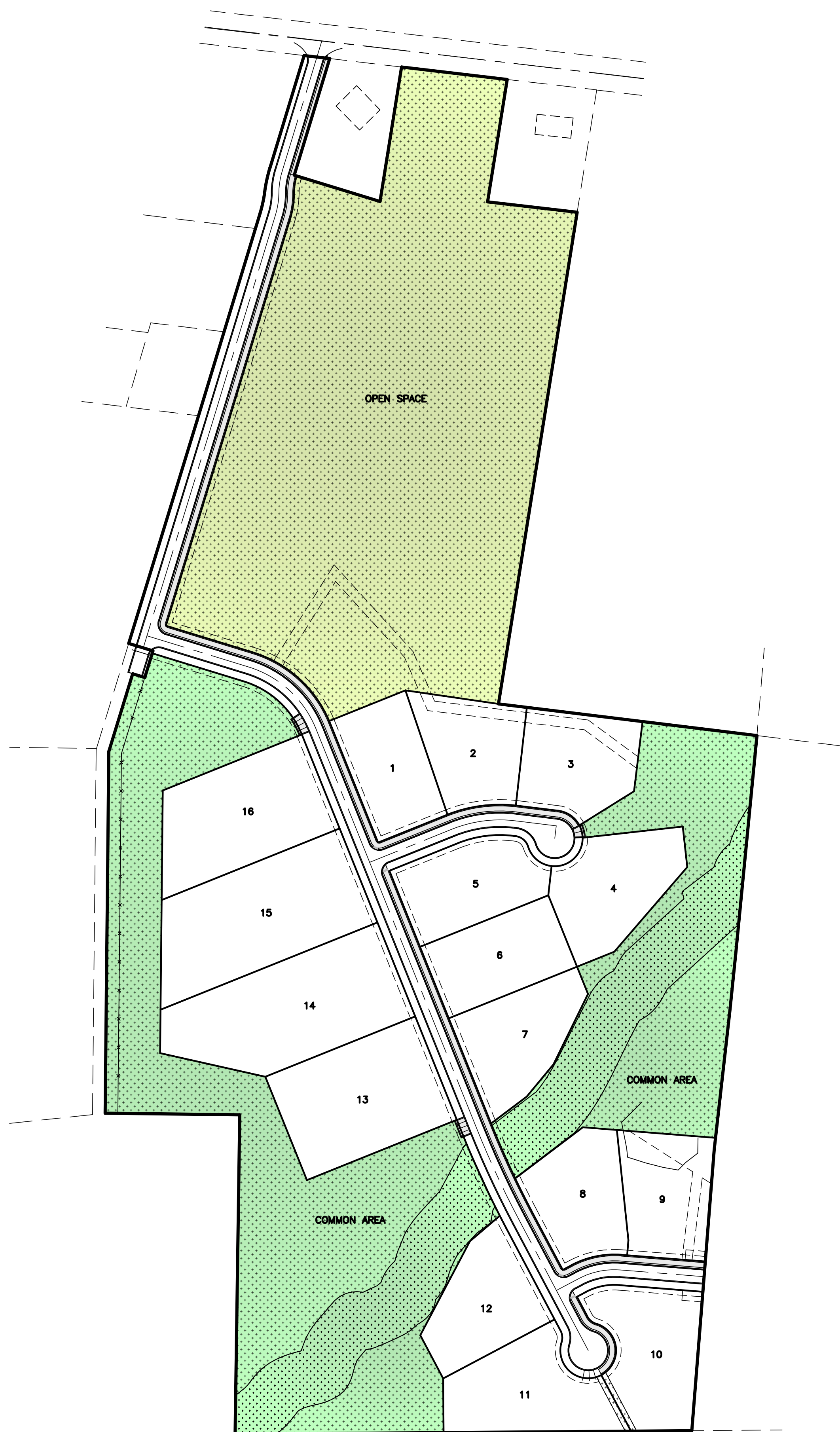
**Harmony Ranch Subdivision**  
 WEBER COUNTY, UTAH  
**Storm Water Pollution Prevention Plan Details**



**Project Info.**

Engineer:	JEREMY A. DRAPER, P.E.
Drafter:	C. KINGSLEY
Begin Date:	APRIL 2021
Name:	HARMONY RANCH SUBDIVISION
Number:	7569-01



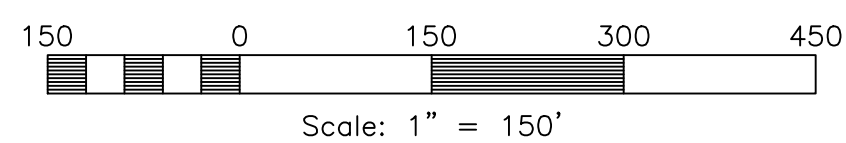


### LEGEND

Symbol	Description	Size/Type
	EXISTING VEGETATION TO REMAIN - Protect from damage during construction.	
	EXISTING VEGETATION TO REMAIN - Re-seed damaged areas caused during construction with a non-irrigated seed mix.	Hydroseed
	AGRI-TOURISM / OPENS SPACE - To be owned and maintained by the developer.	
	OPEN SPACE / COMMON AREA - To be owned and maintained by the HOA.	

**NARRATIVE:**  
The Agri-Tourism parcel will have agriculture, tourism and educational facilities as permitted under the cluster ordinance. The parcel may also contain a clubhouse that will be owned by the HOA. The parcel will be owned and maintained by the developer.

The common area parcels will have a private trail system and gathering areas for use by the lot owners.



REVISIONS	DESCRIPTION
DATE	

**Harmony Ranch Subdivision**  
WEBER COUNTY, UTAH

**Open Space Preservation Plan**



**Project Info.**  
Engineer: JEREMY A. DRAPER, P.E.  
Drafted: N. PETERSON  
Begin Date: APRIL 2021  
Name: HARMONY RANCH SUBDIVISION  
Number: 7569-01

**Reeve & Associates, Inc.**  
5160 SOUTH 1500 WEST, RIVERDALE, UTAH 84405  
TEL: (801) 621-3100 www.reeve-assoc.com

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