COTTONWOOD RIVER
STREAMBANK STABILIZATION
SITE C105
CHASE COUNTY, KANSAS

NE 1/4 SECTION 13, TOWNSHIP 19 SOUTH, RANGE 9 EAST

LYON COUNTY MAP
NOT TO SCALE

Sheet Index

Sheet Number	Sheet Title
1	Cover Sheet
2 - 3	Plan Sheets
4 - 5	Detail Sheets
6 - 9	Cross Section Sheets

SITE QUANTITIES

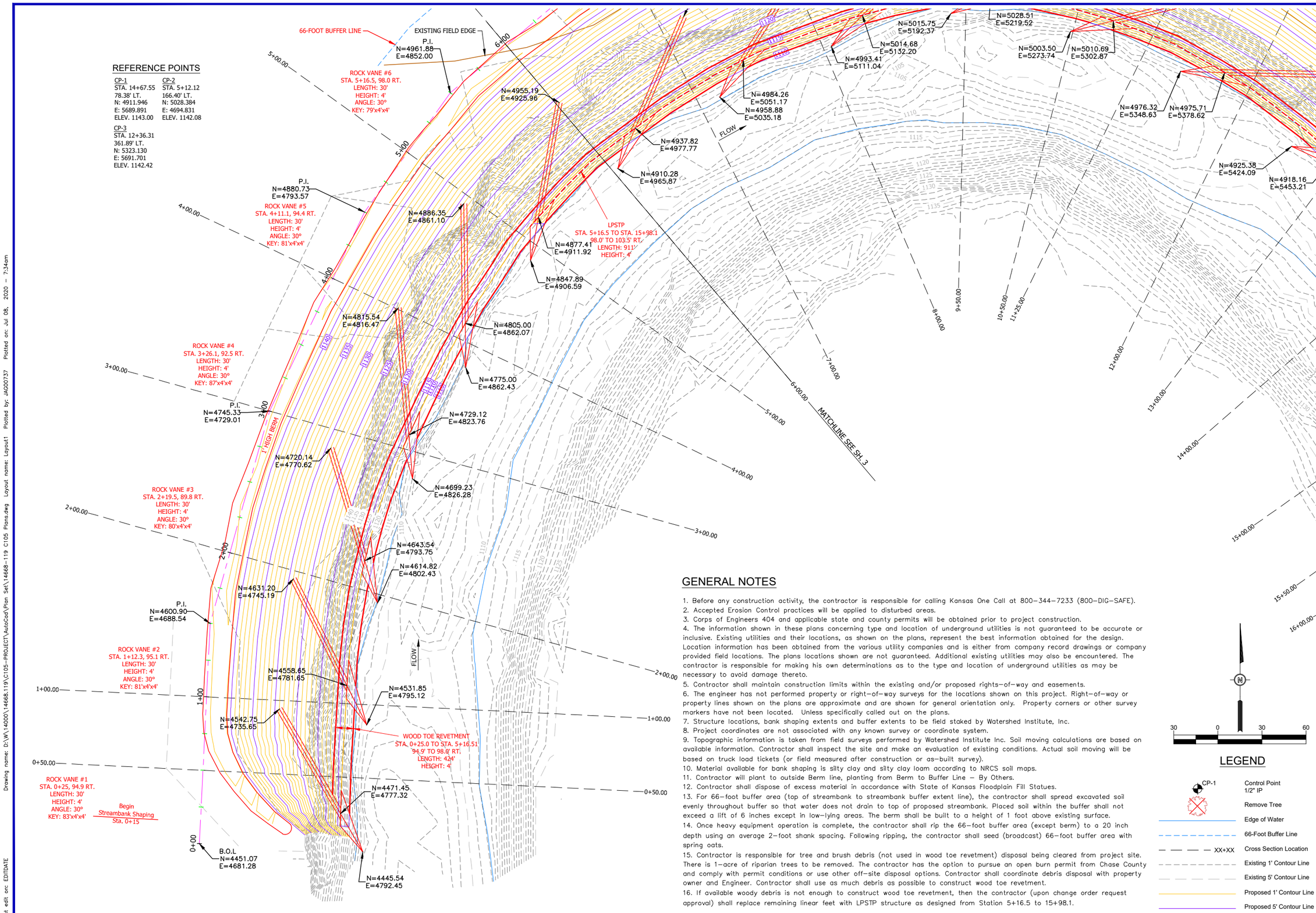
Quantities List	
Rock / Cubic Yards	2,007
Rock / Tons	3,197
Soil moving / Cubic Yards	43,526
Wood Toe Revetment / Linear Feet	424
Tree Removal / Lump Sum	1
Bare Root Trees / Each	350
Streambank Slope Native Grass Seeding / Acres	2.9
Streambank Slope Wildrye / Pounds Pure Live Seed	72.5
Streambank Slope Cover Crop Seeding / Acres	2.9
Streambank Slope Oats / Pounds Pure Live Seed	116.0
66-Foot Buffer Cover Crop Seeding / Acres	1.5
66-Foot Buffer Oats / Pounds Pure Live Seed	60.0
66-Foot Buffer Deep Ripping / Acres	1.5
Streambank Slope Mulching / Acres	2.9
Streambank Slope Mulching / Pounds	11,600

SITE LOCATION MAP
NOT TO SCALE

THE WATERSHED INSTITUTE
1200 SW Executive Dr. Topeka, KS 66615 (913) 685-4600

GREDELL Engineering Resources, Inc.
Environmental Engineering LAND - AIR - WATER
9718 Rosehill Road Telephone: (913) 808-5004
Lenexa, Kansas Fax: (913) 307-2028
When Experience Counts, Count on Us!

JOHN N. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER



REFERENCE POINTS

CP-1	CP-2
STA. 14+67.55	STA. 5+12.12
78.38' LT.	166.40' LT.
N: 4911.946	N: 5028.384
E: 5689.891	E: 4694.831
ELEV. 1143.00	ELEV. 1142.08

CP-3
STA. 12+36.31
361.89' LT.
N: 5323.130
E: 5691.701
ELEV. 1142.42

GENERAL NOTES

1. Before any construction activity, the contractor is responsible for calling Kansas One Call at 800–344–7233 (800–DIG–SAFE).
2. Accepted Erosion Control practices will be applied to disturbed areas.
3. Corps of Engineers 404 and applicable state and county permits will be obtained prior to project construction.
4. The information shown in these plans concerning type and location of underground utilities is not guaranteed to be accurate or inclusive. Existing utilities and their locations, as shown on the plans, represent the best information obtained for the design. Location information has been obtained from the various utility companies and is either from company record drawings or company provided field locations. The plans locations shown are not guaranteed. Additional existing utilities may also be encountered. The contractor is responsible for making his own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto.
5. Contractor shall maintain construction limits within the existing and/or proposed rights–of–way and easements.
6. The engineer has not performed property or right–of–way surveys for the locations shown on this project. Right–of–way or property lines shown on the plans are approximate and are shown for general orientation only. Property corners or other survey markers have not been located. Unless specifically called out on the plans.
7. Structure locations, bank shaping extents and buffer extents to be field staked by Watershed Institute, Inc.
8. Project coordinates are not associated with any known survey or coordinate system.
9. Topographic information is taken from field surveys performed by Watershed Institute Inc. Soil moving calculations are based on available information. Contractor shall inspect the site and make an evaluation of existing conditions. Actual soil moving will be based on truck load tickets (or field measured after construction or as–built survey).
10. Material available for bank shaping is silty clay and silty clay loam according to NRCS soil maps.
11. Contractor will plant to outside Berm line, planting from Berm to Buffer Line – By Others.
12. Contractor shall dispose of excess material in accordance with State of Kansas Floodplain Fill Statues.
13. For 66–foot buffer area (top of streambank to streambank buffer extent line), the contractor shall spread excavated soil evenly throughout buffer so that water does not drain to top of proposed streambank. Placed soil within the buffer shall not exceed a lift of 6 inches except in low–lying areas. The berm shall be built to a height of 1 foot above existing surface.
14. Once heavy equipment operation is complete, the contractor shall rip the 66–foot buffer area (except berm) to a 20 inch depth using an average 2–foot shank spacing. Following ripping, the contractor shall seed (broadcast) 66–foot buffer area with spring oats.
15. Contractor is responsible for tree and brush debris (not used in wood toe revetment) disposal being cleared from project site. There is 1–acre of riparian trees to be removed. The contractor has the option to pursue an open burn permit from Chase County and comply with permit conditions or use other off–site disposal options. Contractor shall coordinate debris disposal with property owner and Engineer. Contractor shall use as much debris as possible to construct wood toe revetment.
16. If available woody debris is not enough to construct wood toe revetment, then the contractor (upon change order request approval) shall replace remaining linear feet with LPSTP structure as designed from Station 5+16.5 to 15+98.1.

30 0 30 60

LEGEND

CP-1	Control Point 1/2" IP
	Remove Tree
	Edge of Water
	66-Foot Buffer Line
XX+XX	Cross Section Location
	Existing 1' Contour Line
	Existing 5' Contour Line
	Proposed 1' Contour Line
	Proposed 5' Contour Line

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COTTONWOOD RIVER
CHASE COUNTY, KANSAS

SITE C105
PLAN SHEET

JOHN A. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER

DESIGNED	PGB
DRAWN BY:	JAG
APPROVED BY:	JNB
DESIGN PROJ:	14668.119
CONST	-----
SCALETAG	AS NOTED
DATE:	2/12/2020
DRAWING NO:	CO2
SHEET NO:	2 of 9

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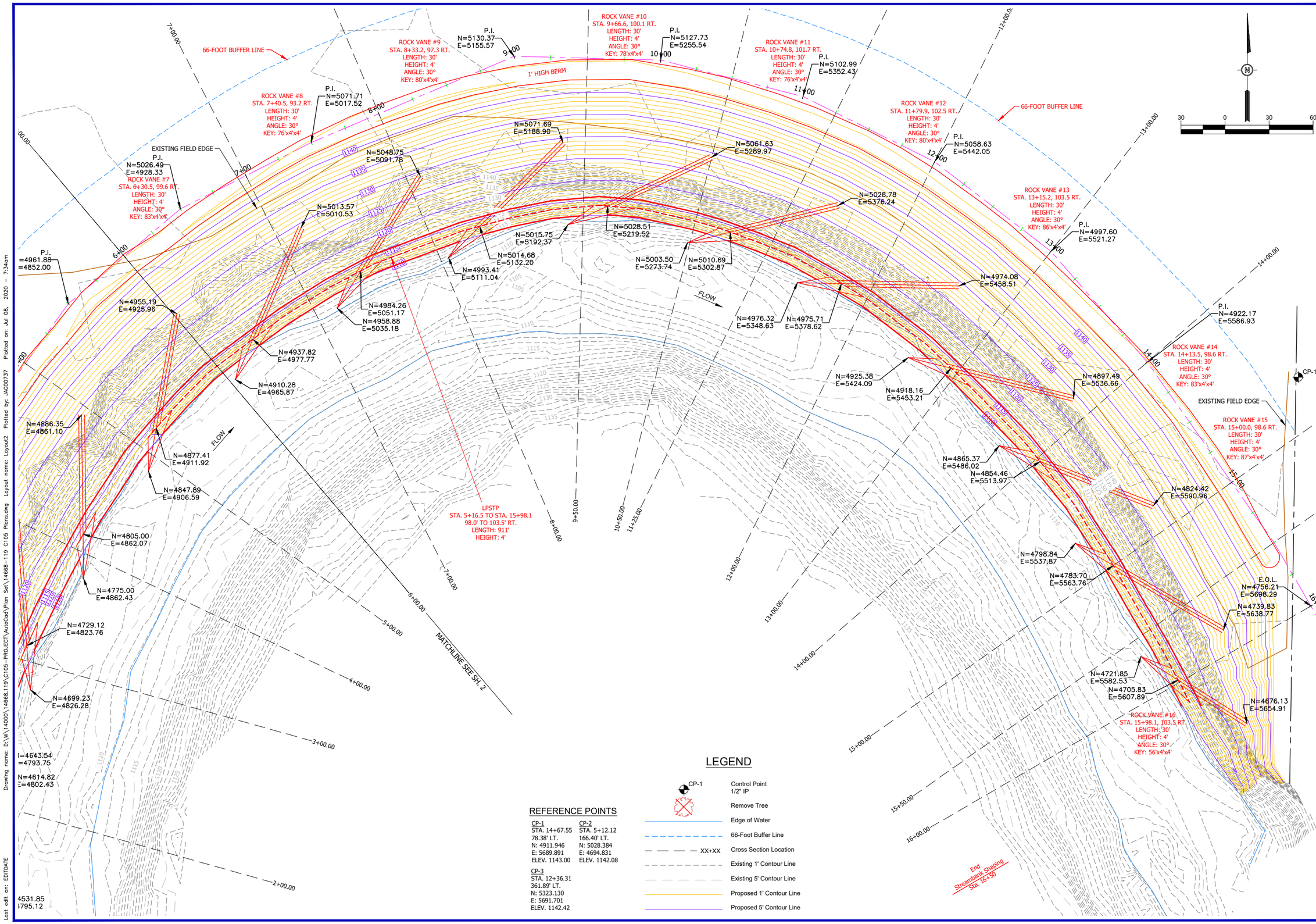

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CONST	-----
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DRAWING NO:	CO3
SHEET NO:	3 of 9

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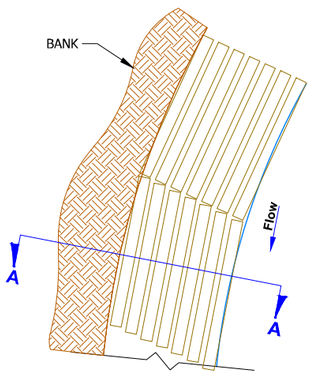
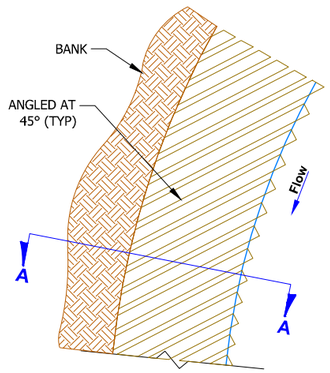


1ST, 3RD
WOOD TOE LAYER
PLAN

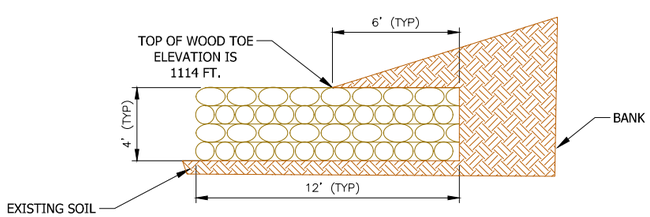


2ND, 4TH
WOOD TOE LAYER
PLAN

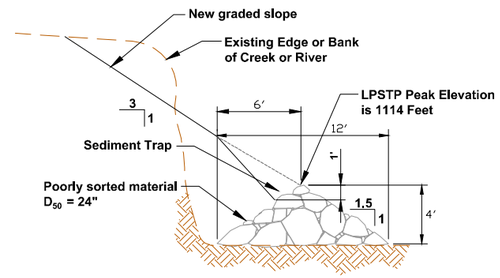
NUMBER OF TREES AND LAYERS WILL VARY DEPENDING ON DIAMETER AND LENGTH. MINIMUM TREE DIAMETER IS 12-INCHES.

USE SOIL AND SMALL BRANCHES TO FILL VOIDS BEFORE PLACING NEXT LAYER.

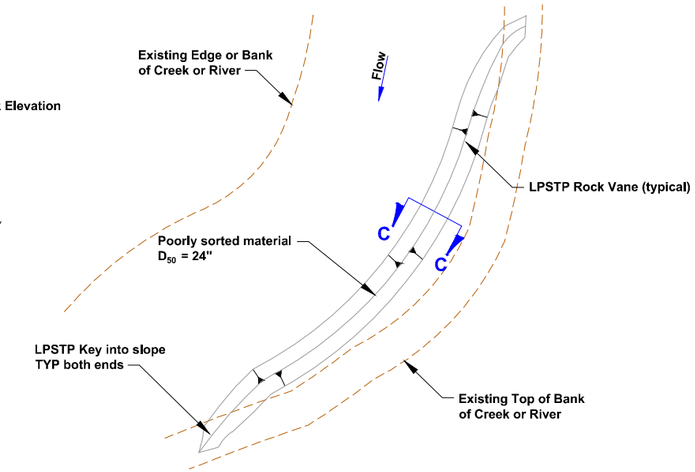
PLACE 6-INCHES OF SOIL ON TOP AND VEGETATE.



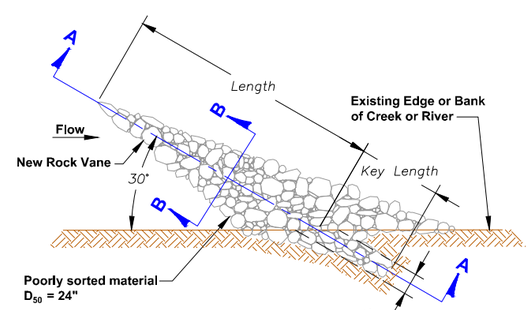
12 FOOT WOOD TOE SECTION
SECTION A - A



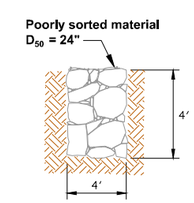
LPSTP 2 CROSS SECTION C-C



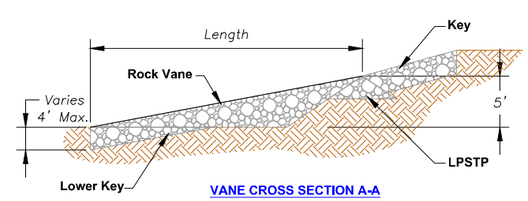
LONGITUDINAL PEAKED STONE TOE PROTECTION
(LPSTP)
PLAN VIEW



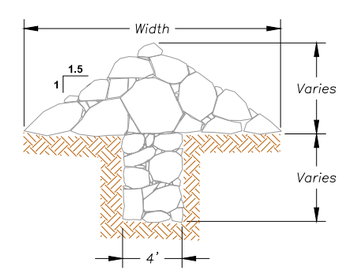
VANE PLAN VIEW



VANE KEY SECTION VIEW



VANE CROSS SECTION A-A



VANE CROSS SECTION B-B

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COTTONWOOD RIVER
CHASE COUNTY, KANSAS
SITE C105
DETIALS

JOHN A. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER

DESIGNED	BAE
DRAWN BY:	JAG
APPROVED BY:	JNB
DESIGN PROJ:	14668.119
CONST	-----
SCALE:	AS NOTED
DATE:	2/12/2020
DRAWING NO:	CO4
SHEET NO:	4 of 9

Structure Specification Sheet

Project Name	Stream	County	State	Streambank		
C105	Cottonwood River	Chase	Kansas	Length		Height
				Shaped	Total	30.3
				1,700	1,825	

Structure Number	Type	Spacing (ft)	Angle (Degrees)	Height (ft)	Length (ft)	Key Length (ft)	Volume (yd^3)	Key Volume (yd^3)	Tons	Material Specifications
1	Rock Vane	90	30	4	30	83	27	50	120	Poorly Sorted Limestone Rock (D_{50} = 24")
2	Rock Vane	90	30	4	30	81	27	48	117	Poorly Sorted Limestone Rock (D_{50} = 24")
3	Rock Vane	90	30	4	30	80	27	48	117	Poorly Sorted Limestone Rock (D_{50} = 24")
4	Rock Vane	90	30	4	30	87	27	52	123	Poorly Sorted Limestone Rock (D_{50} = 24")
5	Rock Vane	90	30	4	30	81	27	48	117	Poorly Sorted Limestone Rock (D_{50} = 24")
1	LPSTP	-	-	4	911	-	810	-	1,337	Poorly Sorted Limestone Rock (D_{50} = 24")
6	Rock Vane	90	30	4	30	79	27	47	115	Poorly Sorted Limestone Rock (D_{50} = 24")
7	Rock Vane	90	30	4	30	83	27	50	120	Poorly Sorted Limestone Rock (D_{50} = 24")
8	Rock Vane	90	30	4	30	76	27	46	114	Poorly Sorted Limestone Rock (D_{50} = 24")
9	Rock Vane	90	30	4	30	80	27	48	117	Poorly Sorted Limestone Rock (D_{50} = 24")
10	Rock Vane	90	30	4	30	78	27	47	115	Poorly Sorted Limestone Rock (D_{50} = 24")
11	Rock Vane	90	30	4	30	76	27	46	114	Poorly Sorted Limestone Rock (D_{50} = 24")
12	Rock Vane	90	30	4	30	80	27	48	117	Poorly Sorted Limestone Rock (D_{50} = 24")
13	Rock Vane	90	30	4	30	86	27	51	121	Poorly Sorted Limestone Rock (D_{50} = 24")
14	Rock Vane	90	30	4	30	83	27	50	120	Poorly Sorted Limestone Rock (D_{50} = 24")
15	Rock Vane	90	30	4	30	87	27	52	123	Poorly Sorted Limestone Rock (D_{50} = 24")
16	Rock Vane	-	30	4	30	56	27	34	96	Poorly Sorted Limestone Rock (D_{50} = 24")
						Total	**1,242**	**765**	**3,197**	

Site Information

Bank Erodibility Hazard Index	33.2	BkF Elev	1,131.2	At Station	6+00
Near Bank Stress (lb./sq. ft)	1	Rosgen Classification		E6	
Estimated Annual Erosion (ft/yr.)	0.8	Width/Depth Ratio		10.0	
Schumm Channel Stage	IV	Entrenchment Ratio		39.8	
Radius of Curvature (ft)	479	Channel Width (ft)		154	
Tortuosity	3.11	Shear Stress (lbs./sq. ft)		0.56	
Hydraulic Radius (ft)	14.4	Slope = (ft/ ft)		0.00062	
Mean Depth (ft)	15.4	Wetted Perimeter (ft)		164.6	
Cross Sectional Area (sq. ft)	2,366	Manning's n		0.050	
Bank Full Discharge (cfs)	10,470	Mean Velocity (ft/sec)		4.43	
Q_5 Discharge (cfs)	34,277	Drainage Area (sq. mi)		1,730.0	

Quantities List

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Rock / Tons	3,197
Soil moving / Cubic Yards	43,526
Wood Toe Revetment / Linear Feet	424
Tree Removal / Lump Sum	1
Bare Root Trees / Each	350
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66-Foot Buffer Cover Crop Seeding / Acres	1.5
66-Foot Buffer Oats / Pounds Pure Live Seed	60.0
66-Foot Buffer Deep Ripping / Acres	1.5
Streambank Slope Mulching / Acres	2.9
Streambank Slope Mulching / Pounds	11,600

Streambank Slope Native Grass Seeding Table

Species	Variety	PLS (lbs/acre)	Percent of Mix	PLS (lbs/acre)	Acres	Total PLS (lbs)
Virginia Wildrye	Omaha	25.0	100	25.00	2.9	72.50

Notes:
Native Grass to be planted between August 15-October 1; December 1-April 15

Streambank Slope Cover Crop Seeding Table

Species	PLS (lbs/acre)	Percent of Mix	PLS (lbs/acre)	Acres	Total PLS (lbs)
Oats	40.0	100	40.00	2.9	116.00

Notes:
Cover Crop to be planted following construction

66-Foot Buffer Cover Crop Seeding Table

Species	PLS (lbs/acre)	Percent of Mix	PLS (lbs/acre)	Acres	Total PLS (lbs)
Oats	40.0	100	40.00	1.5	60.00

Notes:
Cover Crop to be planted following construction

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CHASE COUNTY, KANSAS
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APPROVED BY:	JNB
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SCALE:	AS NOTED
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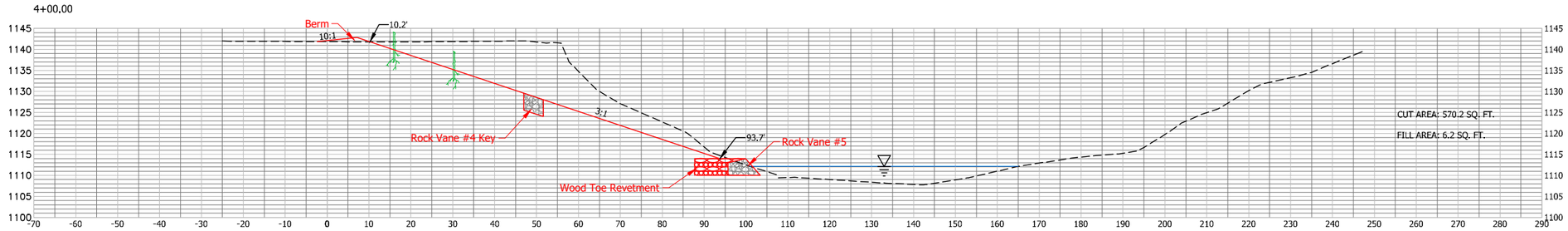
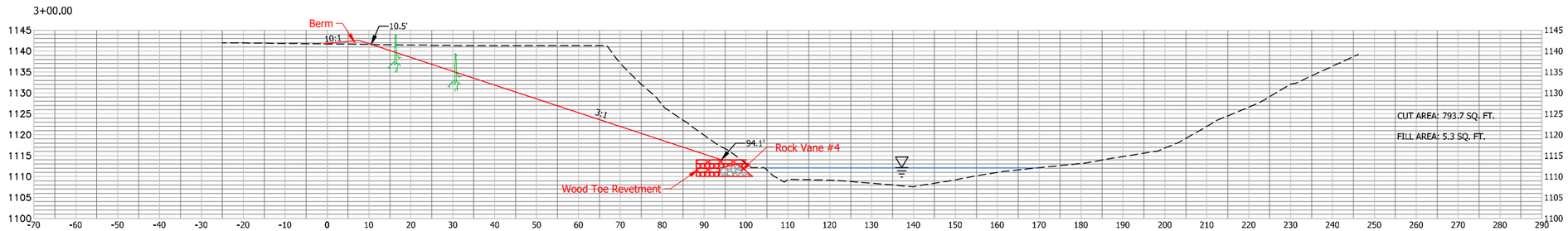
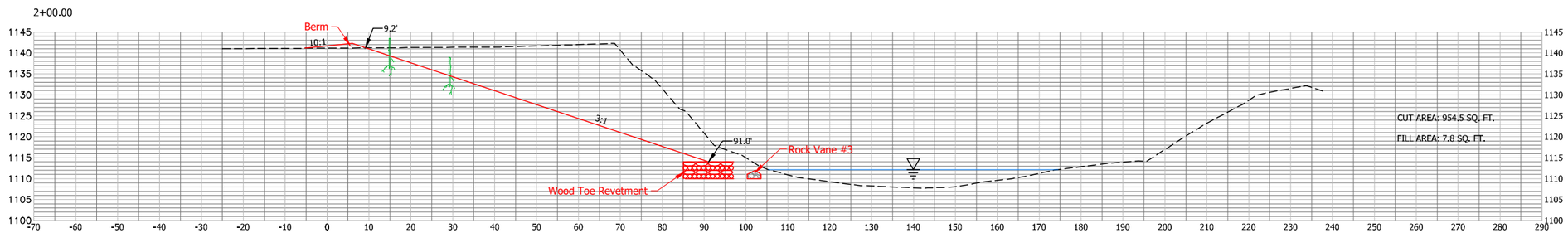
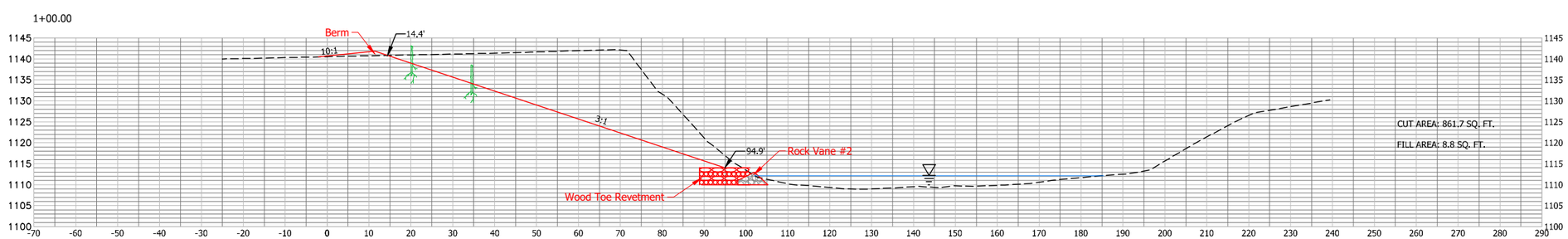
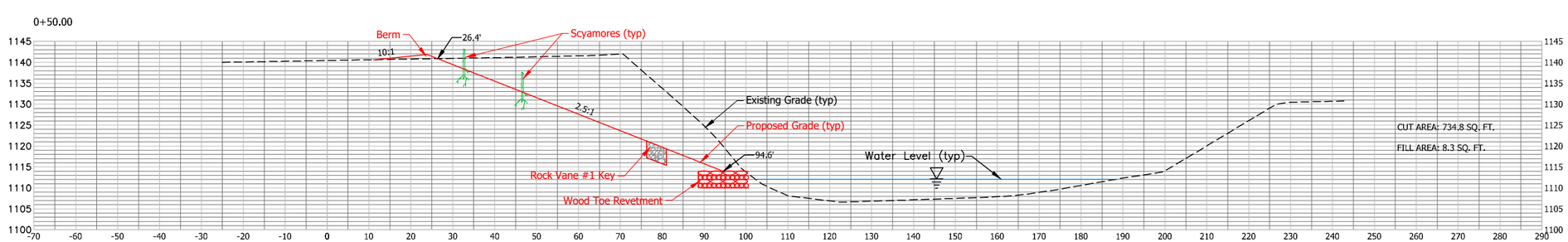
DRAWING NO:	CO5
SHEET NO:	5 of 9











The first sycamore row is located 21-feet down-slope from top of bank. The second sycamore row is located 6-feet down-slope from top of bank. Within row spacing is 10-feet and between row spacing is 15-feet. Sycamores to be planted between March 1 - May 1.

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SITE C105
CROSS SECTIONS SHEET

JOHN A. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER

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SHEET NO:	6 of 9

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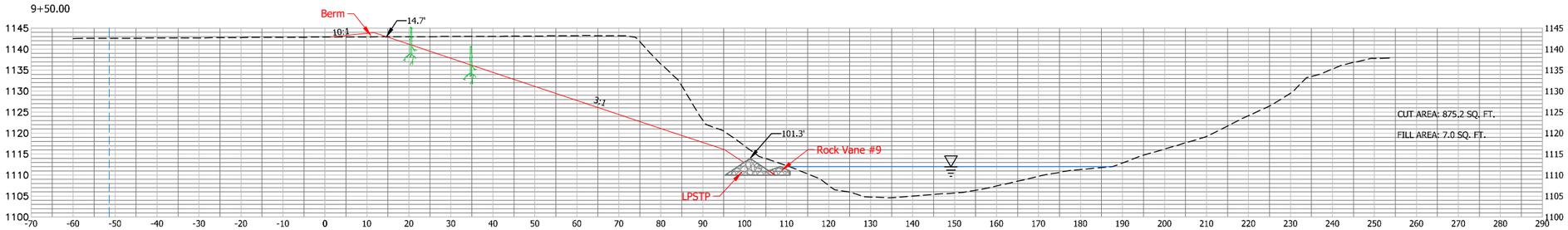

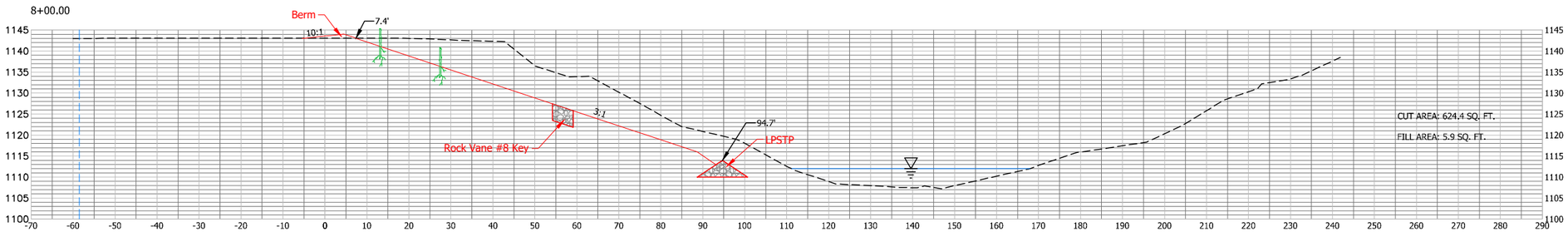

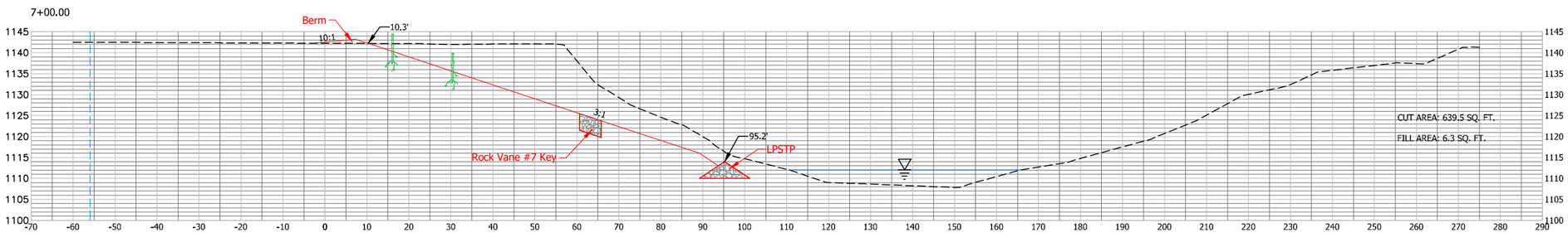

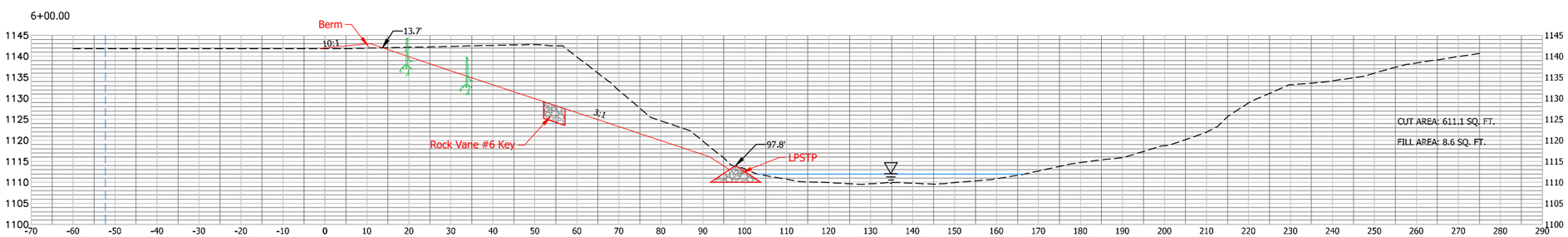

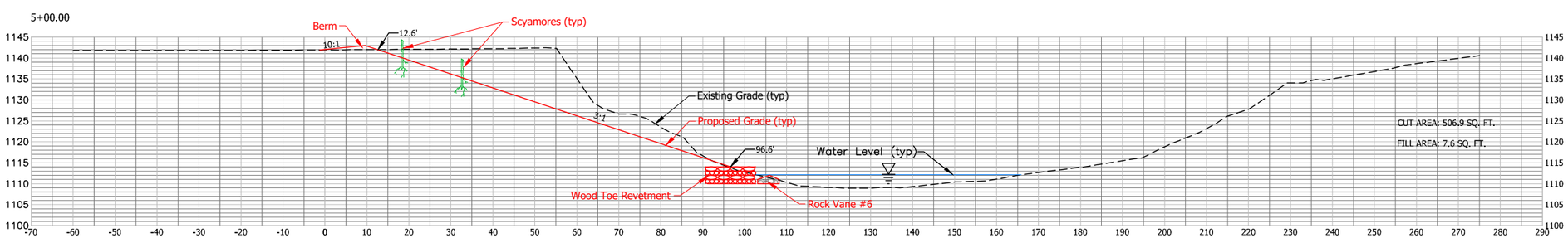

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CHASE COUNTY, KANSAS

SITE C105
CROSS SECTIONS SHEET

JOHN N. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER

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APPROVED BY:	JNB
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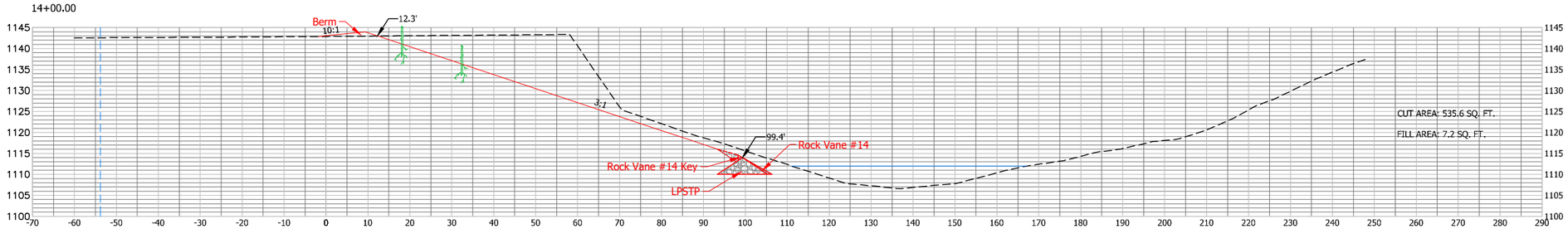
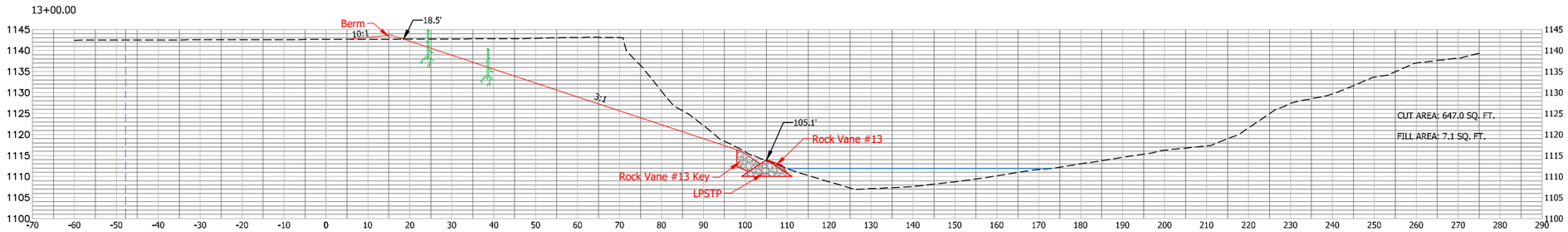
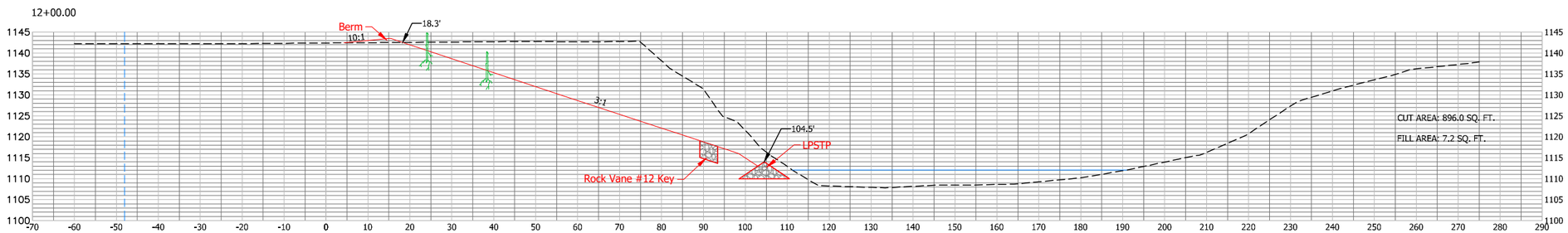
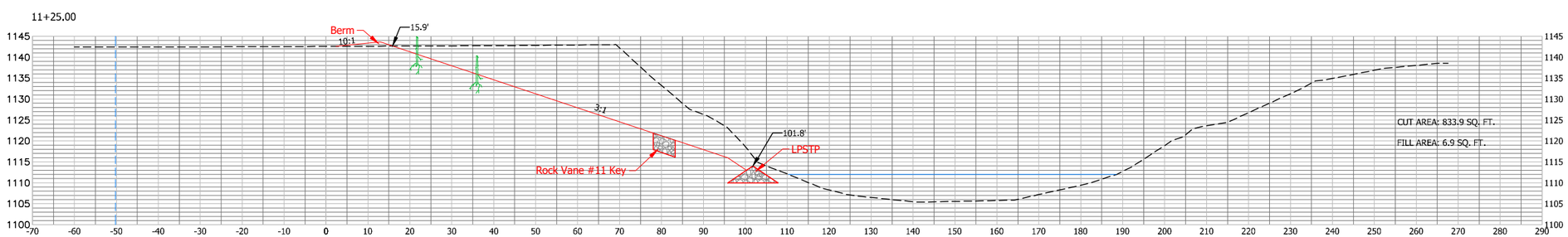
DRAWING NO:	CO7
SHEET NO:	7 of 9

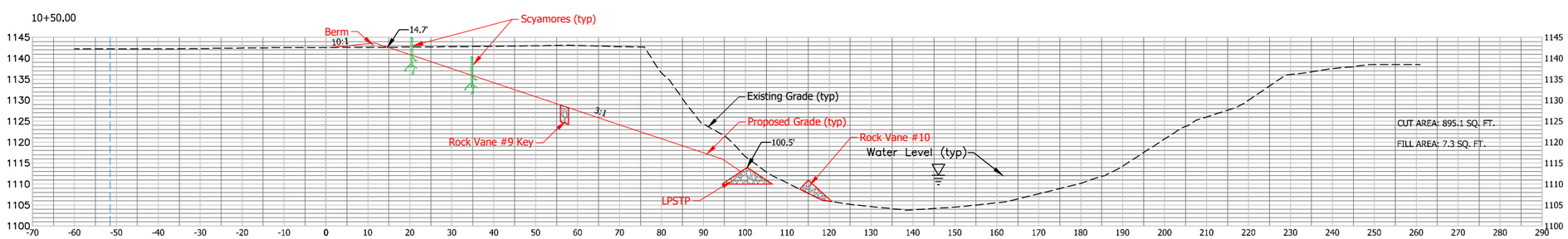
Drawing name: D:\W\14000\14668.119\C105-PROJECT\AutoCad\Plan Set\14668-119 C105 X-Sections.dwg Layout name: Layout2 Plotted by: JAG00737 Plotted on: Jul 08, 2020 - 7:39am
Last edit on: EDITDATE











The first sycamore row is located 21-feet down-slope from top of bank. The second sycamore row is located 6-feet down-slope from top of bank. Within row spacing is 10-feet and between row spacing is 15-feet. Sycamores to be planted between March 1 - May 1.

THE WATERSHED INSTITUTE
1200 SW Executive Dr. Topeka, KS 66615 (913) 685-4600

GREDELL Engineering Resources, Inc.
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COTTONWOOD RIVER
CHASE COUNTY, KANSAS

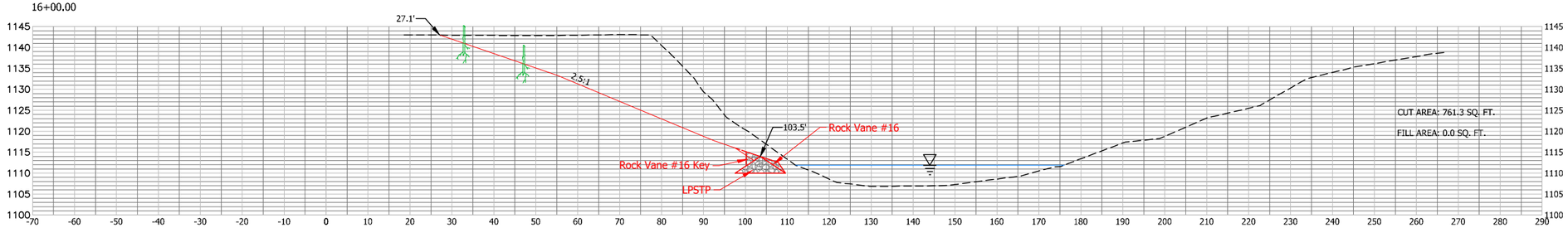
SITE C105
CROSS SECTIONS SHEET

JOHN N. BROWNING LICENSED 10599 02-07-2020 KANSAS PROFESSIONAL ENGINEER

DESIGNED	PGB
DRAWN BY:	JAG
APPROVED BY:	JNB
DESIGN PROJ:	14668.119
CONST	-----
SCALETAG	AS NOTED
DATE:	2/12/2020
DRAWING NO:	CO8
SHEET NO:	8 of 9

Drawing name: D:\W\14000\14668.119\C105-PROJECT\AutoCad\Plan Set\14668-119 C105 X-Sections.dwg Layout name: Layout3 Plotted by: JAG00737 Plotted on: Jul 08, 2020 - 7:40am
Last edit on: EDITDATE

16+00.00



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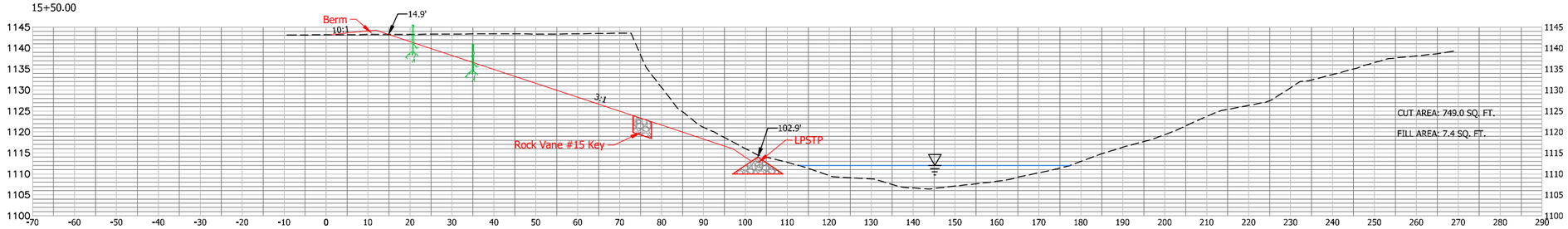

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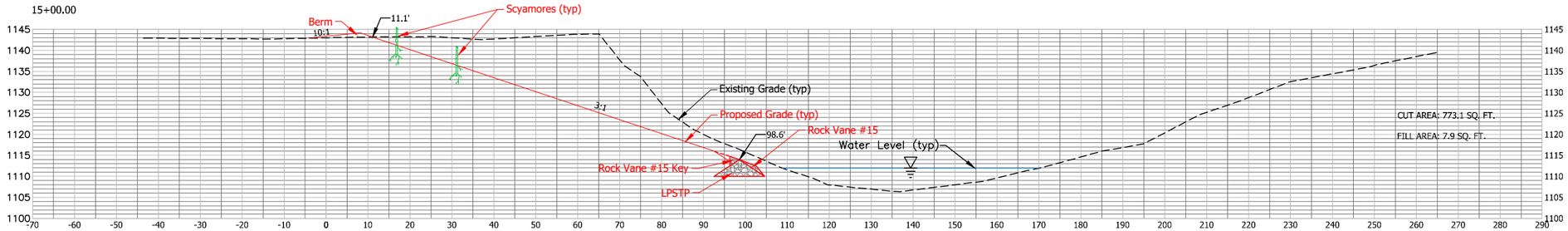

The first sycamore row is located 21-feet down-slope from top of bank. The second sycamore row is located 6-feet down-slope from top of bank. Within row spacing is 10-feet and between row spacing is 15-feet. Sycamores to be planted between March 1 - May 1.

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COTTONWOOD RIVER
CHASE COUNTY, KANSAS

SITE C105
CROSS SECTIONS SHEET

JOHN A. BROWNING LICENSED 10599 07-07-2020 KANSAS PROFESSIONAL ENGINEER

DESIGNED	PGB
DRAWN BY:	JAG
APPROVED BY:	JNB
DESIGN PROJ:	14668.119
CONST	-----
SCALETAG	AS NOTED
DATE:	2/12/2020
DRAWING NO:	CO9
SHEET NO:	9 of 9

Drawing name: D:\W\14000\14668.119\C105-PROJECT\AutoCad\Plan Set\14668-119 C105 X-Sections.dwg Layout name: Layout4 Plotted by: JAG00737 Plotted on: Jul 08, 2020 - 7:40am
Last edit on: EDITDATE