

Monitoring Report

BUFFALO COLOR PENINSULA

Buffalo, NY



AUGUST 2018

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TABLE OF CONTENTS

1	Introduction	1
1.1	Background	1
1.2	The Project Area and Site Description	1
1.3	Habitat Restoration	2
2	Ecological and General Site Condition Data Collection Methods	4
3	Summary of Field Findings	7
4	Conclusion	13
5	References	14

List of Tables

Table 3-1. Latitude and Longitude of Sampling Plot Northwest Corner Locations (NAD 83)	8
Table 3-2. Data Summary for Vegetation Plots 1-10	9
Table 3-3. Species Observed in Project Area Plots 1-10	10
Table 3-4. Bird Species at the Buffalo Color Peninsula	12

List of Figures

Figure 2-1. Buffalo Color Peninsula Sampling Plot Locations	6
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List of Appendices

Appendix A. Excerpt from 2008 Remediation Record Drawings
Appendix B. Buffalo Color Peninsula Shoreline and Riparian Habitat Final Design (April 2017)
Appendix C. Datasheet Used for Field Data Collection
Appendix D. Photographs from Study Area Plots 1-10

1 INTRODUCTION

1.1 Background

This project was designed to restore and improve shoreline habitat at the Buffalo Color Peninsula site. Ecological restoration at this site contributes to the Buffalo Area of Concern (AOC) objective to improve approximately 2,645 linear feet of shoreline habitat and approximately 1.5 acres of riparian buffer habitat.

1.2 The Project Area and Site Description

The Buffalo Color Peninsula is located on the Buffalo River in the City of Buffalo, Erie County, New York. The site is located off of South Park Avenue on the right descending bank of the Buffalo River, approximately 4.25 miles upstream of the river's mouth. The site is bounded to the north by an abandoned railroad right-of-way owned by the Niagara Frontier Transit Authority and to the west by an active CSX Transportation rail corridor. The site is owned and managed by South Buffalo Development, LCC. Buffalo Niagara Waterkeeper (Waterkeeper) holds an Access and Restriction Agreement to the South Buffalo Development, LLC's property (signed February 2016). The Access and Restriction Agreement describes the Buffalo Color Peninsula project area and was used to map the project area on the figures in this report (Exhibit I of the Access and Restriction Agreement presents the site boundary limits).

The 19-acre site (also referred to as 'Buffalo Color Area D') was a former industrial facility used from 1905 to 1974 for manufacturing. In 1982, subsurface contaminant investigations were initiated at the site. The field investigations confirmed the presence of soil and groundwater contamination, which lead to subsequent remedial measures. These remedial design features include¹:

- Materials Consolidation – Remedial efforts included: 1) removal of fill material between the river and the cutoff wall to provide a uniform stable "outslope"²; 2) removal of soil near the western Conrail property boarder; and 3) placing and dewatering excavated contaminated fill in the cap system area for subsequent containment.
- Cutoff Wall - The cutoff wall was designed to limit the migration of shallow groundwater and free product to the Buffalo River and prevents inflow from the Buffalo River; a soil/bentonite slurry wall was selected as the cutoff wall design installed at the Area "D" site.
- Capping System - The capping system consists of layers of non-woven geotextile, HDPE flexible membrane liners, drainage net layers, 2-feet of unclassified fill and 6-inches of soil capable of supporting vegetation. The limits of the capping system extend to the perimeter of the cutoff wall.
- Erosion Protection –Stabilization of the outslope was required to protect the cutoff wall encircling the site and the capping system. The erosion protection extends from elevation 560 feet, seven feet below the minimum daily mean water level, to elevation 580 feet, which provides three feet of freeboard above the maximum daily mean water level. Rubble riprap was selected for erosion

¹ Based on the "Final Remedial Design Report, Buffalo Color Corporations Area "D" Site," Parsons Engineering Science, Inc., February, 1996; and Record Drawings Remediation Construction, Buffalo Color Corporations Area "D" Site, Parsons Engineering Science, Inc., May 1998.

² The majority of grossly contaminated material (GCM) along the riverbank was removed in accordance with design plans. However, a section of GCM along the southwestern peninsula arm was only partially removed. Approximately 4,000 cubic yards of GCM was isolated with a geosynthetic fabric, a sand layer and a riprap layer for erosion protection and left in-place submerged in the river along the riverbank.

protection. Riprap rocks range from a minimum of six inches to a maximum of 30 inches, with an average size of about 12 inches. The designed minimum riprap thickness is 24 inches with an average of 30 inches. Woven geotextile fabric was used beneath all riprap areas. Riprap was choked with substrate soil for planting.

- Groundwater Collection and Treatment – The groundwater collection system implemented to limit the migration of contaminants includes a network of well points, pumping wells, and perimeter drains. Extracted groundwater (and free product) is conveyed to an onsite groundwater treatment system.

Prior to restoration, the project area consisted of a shoreline buffer surrounding the peninsula. The surface in this area is covered in rip-rap, underlain by a woven synthetic geotextile fabric which, in turn, is underlain by unclassified fill material. In 1998, there was an effort to vegetate the rip-rap. Topsoil was used to fill the voids between the stones and planted with native shrub species including dogwoods (*Cornus spp.*), willows (*Salix spp.*), speckled alder (*Alnus incana*), and buttonbush (*Cephalanthus occidentalis*) (For more information, see [Appendix A](#)). Periodic monitoring occurred after this restoration effort, and were initially deemed successful (Parsons, 1999 as cited by [Raybuck, n.d.](#)). Over time, large gaps in the vegetative cover emerged, and a number of non-native and invasive species, including European black alder (*Alnus glutinosa*), tree of heaven (*Ailanthus altissima*), and Japanese knotweed (*Reynoutria japonica*) colonized the site. In many places, the topsoil fill installed in the interstitial spaces of the rip-rap had settled or washed away, leaving empty spaces among the rip-rap. The original plantings have been considered only partially successful.

In 2015, emergent and submerged aquatic vegetation was planted around the Buffalo Color Peninsula as part of the Great Lakes Legacy Act. These plantings will contribute to riverine habitat for fish, amphibians, reptiles, mammals, and birds. The monitoring plan for these plantings are outlined in Severson Environmental's monitoring plans ([Severson, 2016a](#) and [2016b](#)). The emergent and submerged aquatic plantings are not maintained or monitored by Waterkeeper and were not disturbed by this project.

1.3 Habitat Restoration

This project has built on the previous planting efforts completed in the late 1990s and the emergent restoration efforts made more recently as part of the Great Lakes Legacy Act, to create valuable habitat for native plants and wildlife. The project goal has been to create a resilient, adaptable native plant community. The natural community created by this effort will contribute to populations of native shrubs and herbs, as well as insects, birds, and reptiles and amphibians by enhancing a minimum of 805 linear feet of shoreline habitat and approximately 1.5 acres of riparian buffer habitat. Restoration efforts have allowed for the creation of valuable habitat without compromising the integrity of the site's environmental contamination protection features.

Prior to project implementation, success was defined as increased richness and areal percent cover increase between the initial inventory and the end of a three-year monitoring period in the project area. An additional measure of success would be evidence of a decrease in the invasive plant species richness and percent cover. Due to revisions in the project schedule, this monitoring report only covers one year of monitoring.

In addition to restoration in the project area, the project developed meadow management guidelines for the capped Area D. The guidelines were provided to the property owner, South Buffalo Development, LLC direction on how to manage the grassy area in a way that most benefits native insects and birds, without risking any harm to the cap and bentonite clay slurry wall. Waterkeeper was not responsible for any

alterations in the meadow, and South Buffalo Development, LLC has not changed their management based on recommendations; therefore, the meadow area was not monitored.

The engineering design for this project was completed in April 2017, and is attached as [Appendix B](#). Construction for this project took place in 2017 and 2018. Planting was completed in late spring 2018. Waterkeeper reported that plant installation was completed the week before the June 14th monitoring visit. The seed mix was spread, but, if they were already sprouting, plants from the seed mix were not of sufficient size to be identified to species. During project construction, Waterkeeper made field revisions to some design features. Gomez and Sullivan did not participate in site construction efforts and no records of construction revisions have been made available (i.e., as-built or record drawings).

2 ECOLOGICAL AND GENERAL SITE CONDITION DATA COLLECTION METHODS

A complete description of the ecological sampling methods is given in the Quality Assurance Project Plan for the project ([Gomez and Sullivan, 2016b](#)). Prior to fieldwork, background data, including digital imagery, ecological information about Buffalo River shoreline communities as well as historical information about land use at the Buffalo Color Peninsula site, particularly related documents provided to Waterkeeper by the New York State Department of Environmental Conservation (NYSDEC), were gathered. Digital imagery was updated for this monitoring report; however, the available imagery is from 2017 and does not show construction changes.

Gomez and Sullivan Field Ecologists gathered data on plant communities in the project area. Field Ecologists used the 10 established 5-meter by 5-meter plots that were established prior to construction (Figure 2-1). For each plot, the following data were collected on the datasheet shown in [Appendix C](#):

- A description of the plant community, based on the ecological communities described in Ecological Communities of New York State ([Edinger et al., 2014](#));
- Observed plant species rooted within the plot;
- Total areal percent cover of all the plant species together;
- Areal percent cover of invasive plant species;
- If non-native species appear to be interfering with native ecosystem function (yes or no);
- If the shoreline nearby appears stable (unstable, moderately unstable, moderately stable, or stable);
- Signs of erosion (e.g., exposed roots or undercutting);
- Additional site challenges; and
- 1 photograph, taken facing north.

For shoreline stability, field crews will use the bank stability definitions from the National Water and Climate Center *Stream Visual Assessment Protocol* ([USDA, 1998](#)):

- **Unstable:** Banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream annually, numerous slope failures apparent).
- **Moderately Unstable:** banks may be low, but typically are high (flooding occurs 1 year out of 5 or less frequently); outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into stream annually, some slope failures apparent).
- **Moderately Stable:** banks are low (at elevation of active flood plain); less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the baseflow elevation.
- **Stable:** banks are low (at elevation of active flood plain); 33% or more of eroding surface area of banks in outside bends is protected by roots that extend to the base-flow elevation.

Photographs were taken on the south side of each plot, looking north.

Breeding Bird Survey

To perform the breeding bird survey, the field ecologist stood at each of two permanent locations for fifteen minutes. Each bird seen and each call or song heard was considered an observation, even if the same species was seen or heard multiple times. The type of observation (visual or audial) was noted for each observation. Observations were grouped by five-minute intervals (0-5 minutes, 5-10 minutes, and 10-15 minutes).



**Figure 2-1. Buffalo Color Peninsula
Sampling Plot Locations**

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



3 SUMMARY OF FIELD FINDINGS

Vegetation

Gomez and Sullivan and Waterkeeper staff visited the project area on July 12, 2018. The ten 5-meter by 5-meter plots along the project area were located using a GPS unit ([Table 3-1](#) and [Figure 2-1](#)). [Table 3-2](#) shows a summary of the data collected at all of the plots. The plant species identified in each plot are shown in [Table 3-3](#) and photos taken on the south side of each plot are shown as in [Appendix D](#).

Several of the plots spanned the top of the rip-rap and included areas that were not directly modified during restoration. At a higher elevation and inland from the rip-rap, the plots were dominated by grasses and herbs; however, the invasive spotted knapweed (*Centaurea stoebe*) that had been in the area was notably reduced by invasive species herbicide treatments. Soils in this area appeared to be shallow and fast-draining. Overall the project area had fewer trees than before restoration efforts due to the removal of invasive European black alder and tree of heaven. Staghorn sumac (*Rhus typhina*) and large dogwoods (*Cornus spp.*) were still present as well as basswood (*Tilia americana*) and ash (*Fraxinus pennsylvanica*) trees.

Ten of the 18 installed shrub, herb, and vine species were captured within the monitoring plots. An additional eight species are assumed to be present at the site following planting, but were not within monitoring plots and, therefore, are not included on [Table 3-1](#). The specified seed mix included 22 herbaceous species. Five of the 22 seed mix species were observed within the monitoring plots, but it is unknown if these were already present on the site or sprouting from new seed.

There were 43 plant species identified within sample plots on the site in 2018. According to the New York Flora Atlas ([Weldy et al., 2016](#)), 24 of these species are native to New York State, and at least 18 are non-native. Four of the non-native species are on the 6 NYCRR Part 575 list of prohibited plants ([NYSDEC, 2016](#)). If all planted and seeded species are assumed to survive, 68 native species are assumed to be on the site.

The total average vegetation percent cover for all sample plots was 74.5%. This is an increase from the 2016 existing conditions average percent cover of 73.5% (Gomez and Sullivan, 2016a). There was less exposed rip-rap on the site due to soil-choking and construction of planting tiers and “Bio-D” planting beds.

Breeding Bird Survey

Gomez and Sullivan and Waterkeeper staff returned to the project area on July 20 to perform the breeding bird survey. Fourteen bird species were present at or over the Buffalo Color Peninsula site. Twenty-three visual observations and 79 audial observations were recorded. Observation data are shown in [Table 3-4](#).

Table 3-1. Latitude and Longitude of Sampling Plot Northwest Corner Locations (NAD 83)

Plot	Location	Latitude	Longitude
1	project area	42.859823	-78.847852
2	project area	42.859341	-78.847261
3	project area	42.858679	-78.846753
4	project area	42.857976	-78.846333
5	project area	42.857906	-78.845468
6	project area	42.858166	-78.845262
7	project area	42.859000	-78.845361
8	project area	42.859874	-78.845971
9	project area	42.860664	-78.84634
10	project area	42.861396	-78.846002

Table 3-2. Data Summary for Vegetation Plots 1-10

	Plot Number									
	1	2	3	4	5	6	7	8	9	10
Plant community description	Brush cover	Brush cover	Brush cover as well as a mowed grassy access path.	Brush cover	Brush cover	Meadow grasses and herbs, with scattered small shrubs	Meadow grasses with brush cover closer to river	Meadow grasses and herbs, with scattered small shrubs	Brush cover with areas of meadow grasses	Meadow
Plant community from Edinger <i>et al</i>	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore	Rip-rap artificial lake shore
Pre-construction total cover of all species (%)	60	75	90	100	50	70	100	60	60	70
Post-construction total cover of all species (%)	60	75	100	100	80	70	80	50	50	80
Pre-construction total cover of non-native herbs and shrubs (%)	20	20	10	20	30	25	5	30	5	10
Post-construction total cover of non-native herbs and shrubs (%)	10	10	5	10	5	30	5	5	10	40
Pre-restoration were non-natives affecting functions?	No	No	No	No	Yes	Yes	No	Yes	No	Yes
Post-restoration were non-natives affecting functions?	No	No	No	No	Yes	Yes	No	No	No	Yes
Shoreline stability	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable	Stable
Signs of erosion	None	None	None	None	None	None	None	None	None	None
Rip-rap matrix	Rip-rap not visible	Medium stone with soil matrix	Light and medium stone with soil matrix	Light stone with soil matrix	Light and medium stone with soil matrix	Light and medium stone with soil matrix	Medium stone with fill and voids	Medium stone with fill and voids	Rip-rap not visible	Medium stone exposed

Table 3-3. Species Observed in Project Area Plots 1-10

Species	Common Name	NY status	Plot Number									
			1	2	3	4	5	6	7	8	9	10
<i>Acer negundo</i>	box elder	Native	x									
<i>Achillea millefolium</i>	yarrow	Native							x			
<i>Ailanthus altissima</i>	tree of heaven	Non-native		x		x						
<i>Alnus glutinosa</i>	black alder	Non-native				x						
<i>Apocynum cannabinum</i>	dogbane	Native				x			x	x		
<i>Aronia melanocarpa</i>	chokeberry	Native							x	x		
<i>Artemisia vulgaris</i>	mugwort	Non-native		x		x						
<i>Asclepias incarnata</i>	swamp milkweed	Native							x			
<i>Asclepias syriaca</i>	common milkweed	Native	x	x	x	x	x	x		x	x	x
<i>Brassica alba</i> or <i>hurta</i>	white mustard	Non-native		x								
<i>Centaurea stoebe</i>	spotted knapweed	Non-native					x	x				x
<i>Chenopodium album</i>	lambs quartet/pigweed	Non-native		x								
<i>Cirsium arvense</i>	Canada thistle	Non-native	x			x			x			
<i>Convolvulus spp.</i>	bindweed	Non-native		x						x		
<i>Cornus sericea</i>	red osier dogwood	Native					x					
<i>Cornus racemosa</i> or <i>Cornus racemosa</i>	grey or silky dogwood	Native	x	x				x	x	x	x	x
<i>Daucus carota</i>	Queen Anne's lace	Non-native			x				x		x	
<i>Euthamia graminifolia</i>	thin leaf goldenrod	Native									x	
<i>Fraxinus pennsylvanica</i>	green ash	Native										x
<i>Hibiscus moscheutos</i>	swamp rose mallow	Native	x									
<i>Hypericum perforatum</i>	common St. John's wort	Non-native		x						x		
<i>Leucanthemum vulgare</i>	ox-eye daisy	Non-native	x					x				
<i>Lindera benzoin</i>	northern spicebush	Native	x						x		x	
<i>Lonicera spp.</i>	honeysuckle shrub	Non-native	x					x				x
<i>Lotus corniculatus</i>	bird's foot trefoil	Non-native	x		x		x	x	x	x	x	x

Table 3-3. Species Observed in Project Area Plots 1-10

Species	Common Name	NY status	Plot Number									
			1	2	3	4	5	6	7	8	9	10
<i>Melilotus alba</i>	white sweet clover	Native			x		x	x	x		x	x
<i>Parthenocisus quinquefolia</i>	virginia creeper	Native		x				x			x	
<i>Persicaria pensylvanica</i>	smartweed	Native	x									
<i>Physocarpus opulifolius</i>	common ninebark	Native	x	x					x	x	x	x
<i>Plantago lanceolata</i>	ribwort plantain	Non-native	x					x		x		x
<i>Rhus typhina</i>	staghorn sumac	Native		x	x	x				x	x	
<i>Rubrus odorata</i>	flowering raspberry	Native							x			
<i>Rosa palustris</i> or <i>Rosa virginiana</i>	rose	Native	x					x		x	x	
<i>Rubus sp.</i>	blackberry	Native	x	x	x	x	x	x	x			
<i>Rubus odoratus</i>	raspberry	Native								x	x	
<i>Rudbeckia hirta</i>	black eyed Susan	Non-native						x	x			
<i>Rumex crispus</i>	curly dock	Non-native										x
<i>Securigera varia</i>	crown vetch	Non-native	x	x	x	x	x	x				
<i>Solidago spp.</i>	goldenrod	Native	x			x	x	x	x	x	x	x
<i>Stachys byzantina</i>	lambs ear	Non-native	x									
<i>Verbena hastata</i>	blue vervain	Native								x		
<i>Vitis riparia</i>	river grape	Native	x	x	x				x	x		
	grasses	unknown		x	x	x			x			x

Table 3-4. Bird Species at the Buffalo Color Peninsula

Site	Minute	Species	Number Heard	Number Seen	On-site or Over
Site A	0-5	Field Sparrow	2	3	on
		Mallard		10	water
		Song Sparrow	1	1	on
		American Crow		12	over
		Tree Swallow		2	over
	5-10	Field Sparrow		3	on
		Song Sparrow	1		on
		American Goldfinch		1	over
		American Crow		2	on
		Eastern Kingbird		2	
		Ring-billed Gull		1	
		Northern Cardinal	1		on
	10-15	American Crow	1		over
		Northern Cardinal	1		on
		Song Sparrow	1		on
		Mourning Dove	1		on
		European Starling	1		over
		Ring-billed Gull		2	over
		Tree Swallow		1	over
		Field Sparrow	1		on
Site B		0-5	Canada Goose		7
	Field Sparrow		2	4	on
	Ring-billed Gull			2	over
	Song Sparrow		1	4	on
	American Crow				over
	Tree Swallow			1	on
	Rock Dove			2	over
	5-10	Field Sparrow	1	4	on
		Ring-billed Gull		2	over
		Song Sparrow	3	1	on
		American Robin	1		across river
		American Crow	1		over
		Tree Swallow		1	over
	10-15	Field Sparrow	1	4	on
		Song Sparrow		1	on
		Ring-billed Gull		2	over
		Tree Swallow	1	3	over
		American Crow	1		over
		American Goldfinch		1	over
		Total	23	79	

4 CONCLUSION

Restoration efforts at the Buffalo Color Peninsula created spaces where native plants could grow well without threatening the nearby landfill cap. Numerous native herbs, shrubs, and vines planted on the site simultaneously reduced the abundance of non-native, invasive species. Although non-native trees including tree of heaven and black alder are still present along the peninsula's edge, they are no longer dominant species.

Almost immediately following installation, species richness within sampling plots has increased from 39 species (18 of which were native) to 43 species (24 of which are native), and areal percent cover within sampling plots has increased slightly from 73.5% to 74.5%. With time and continuous invasive species management, the installed native plants and native seed mix are expected to flourish, further increasing species richness and filling gaps in vegetation. This will provide exceptional riparian habitat along the Buffalo River.

5 REFERENCES

- Edinger, G.J., Evans, D.J., Gebauer, S., Howard, T.G., Hunt, D.M., & Olivero, A.M. (Eds). (2014). Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, New York State Department of Environmental Conservation: Albany, NY.
- Gomez and Sullivan Engineers. (2016a). Existing Conditions Report. Buffalo Color Peninsula. Prepared for Buffalo Niagara Waterkeeper. Buffalo, NY: Author.
- Gomez and Sullivan Engineers. (2016b). Quality Assurance Project Plan. Buffalo Color Peninsula. Prepared for Buffalo Niagara Waterkeeper. Buffalo, NY: Author.
- New York State Department of Environmental Conservation (NYSDEC). (2014). 6 NYCRR Park 575 Prohibited and Regulated Invasive Species. Retrieved January 2016 from http://www.dec.ny.gov/docs/lands_forests_pdf/islist.pdf.
- Raybuck, M. (No date). Shoreline Restoration and Habitat Enhancement at Buffalo Color Corporation Area "D". New York Water Environmental Association, Inc. Retrieved July 6, 2011 from <http://www.nywea.org/clearwaters/pre02fall/shorelinerestora.html>.
- Sevenson Environmental. (2016a) Draft Emergent Vegetation Monitoring Protocol: Buffalo River AOC Capping and Habitat Restoration. Author.
- Sevenson Environmental. (2016b) Draft SAV Monitoring Protocol: Buffalo River AOC Capping and Habitat Restoration. Author.
- US Department of Agriculture. Natural Resources Conservation Service. (1998). Stream Visual Assessment Protocol. National Water and Climate Center Technical Note 99-1.
- Weldy, T., Werier, D., & Nelson, A. (2016). New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), USF Water Institute. University of South Florida]. New York Flora Association: Albany, New York.

APPENDIX A. EXCERPT FROM 2008 REMEDIATION RECORD DRAWINGS

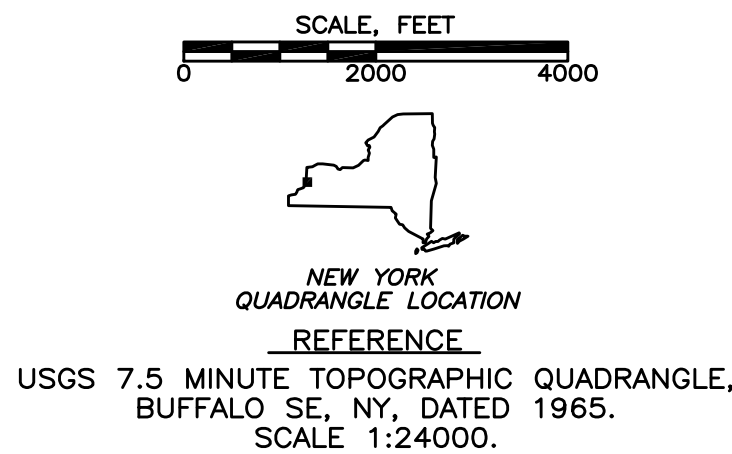


INDEX OF DRAWINGS

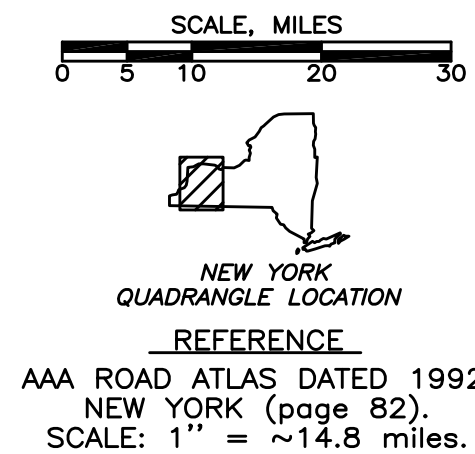


AlliedSignal Drawing No.	Parsons ES Drawing No.	DRAWING TITLE
435791	G-1	TITLE SHEET
435792	C-1	FINAL SITE PLAN
435793	C-2	CAPPING SYSTEM SUBGRADE PLAN-SURVEY RECORD
435794	C-3	TOP OF COVER SOIL LAYER PLAN-SURVEY RECORD
435795	C-4	FINAL SITE DRAWING-SURVEY RECORD
435796	C-5	CROSS SECTIONS
435797	C-6	CAPPING SYSTEM DETAILS
435798	C-7	GROUNDWATER COLLECTION SYSTEM DETAILS
435799	C-8	GROUNDWATER COLLECTION SYSTEM DETAILS
435800	C-9	TYPICAL EXTRACTION WELL AND OBSERVATION WELL DETAILS
435801	C-10	MISCELLANEOUS DETAILS
435802	C-11	HABITAT DETAILS
435803	C-12	MISCELLANEOUS DETAILS
435804	C-13	MISCELLANEOUS DETAILS
435805	C-14	YARD PIPING DETAILS
435806	E-1	ONE LINE DIAGRAM, INSTALLATION DETAILS AND CONTROL SCHEMATICS
435807	I-1	PROCESS & INSTRUMENTATION LEGEND AND DIAGRAM

SITE LOCATION MAP



SITE VICINITY MAP



RECORD DRAWINGS REMEDIATION CONSTRUCTION BUFFALO COLOR AREA "D" SITE BUFFALO, NEW YORK Project No. F0119ZA50 - Site No. 9-15-012 PREPARED FOR AlliedSignal Inc. MORRISTOWN, NEW JERSEY

RECORD DRAWING

THESE DRAWINGS HAVE BEEN REVISED TO REFLECT MAJOR CHANGES, IF ANY, WHICH OCCURRED DURING CONSTRUCTION. REVISIONS ARE BASED UPON INFORMATION FURNISHED BY CONTRACTOR.

DATE: _____ PER: _____

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DWG FILE: P:\732980\CAD\RECORD\32980G01.DWG PLOT FACTOR: 1=1

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			_____ DATE _____															BLDG/AREA _____	
			_____ DATE _____																APP. NO. _____
			_____ DATE _____																SCALE _____
			_____ DATE _____	1	RECORD DRAWING														EQUIP. NO. _____
		0	ISSUED FOR CONSTRUCTION			EWM					5/11/98					INV. NO. _____			



MORRISTOWN, NJ

DRAWN	DATE	CHK.	DATE
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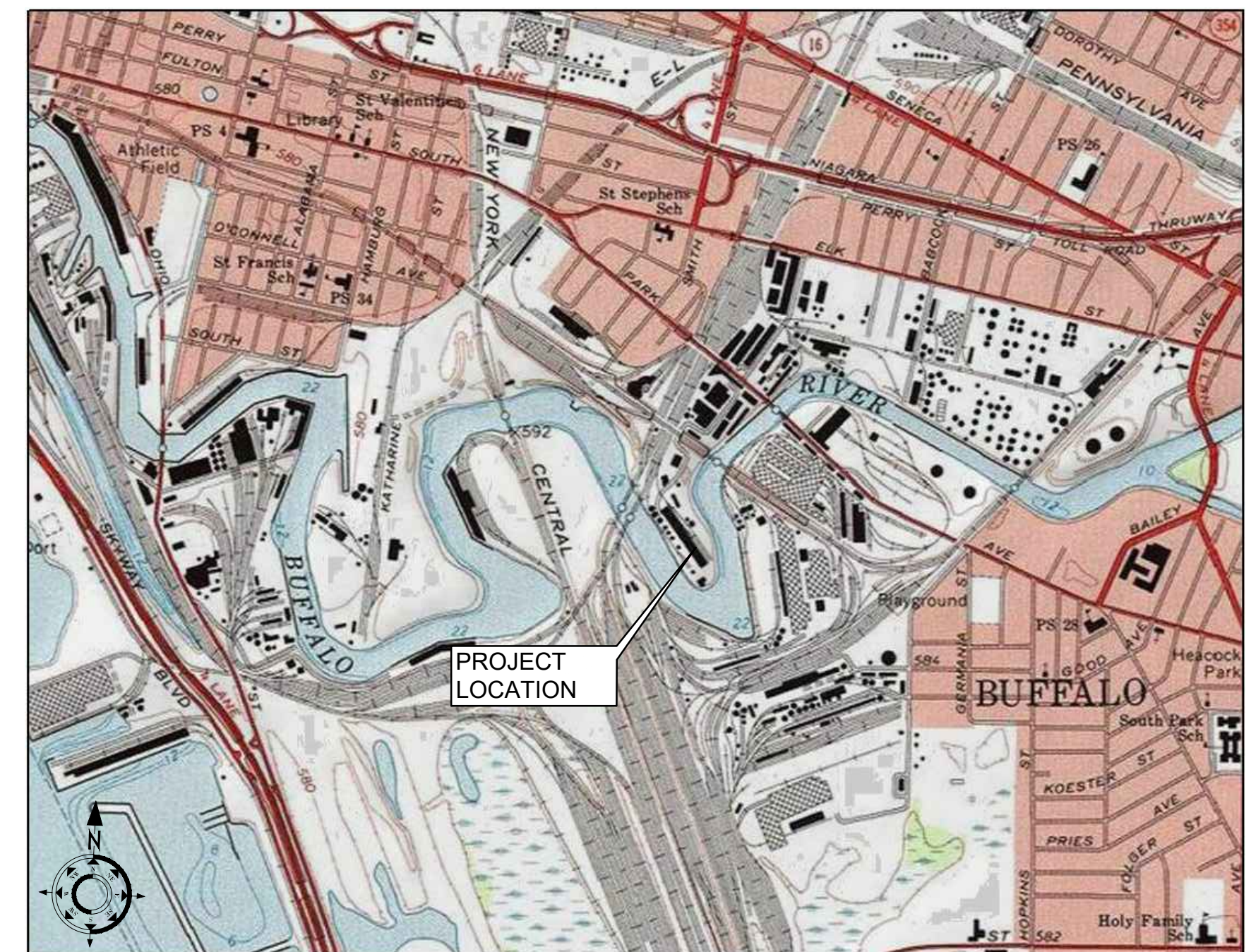
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APPENDIX B. BUFFALO COLOR PENINSULA SHORELINE AND RIPARIAN HABITAT FINAL DESIGN (APRIL 2017)

JOB MANAGER	D. FRAZIER	DESIGN	E. REDDING/J. WESOLOWSKI	DRAFTING	C. JENKINS	CHECK	M. STOTTILER
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DRAWING LIST	
SHEET NUMBER	DESCRIPTION
C1	COVER SHEET
P1	GENERAL NOTES
P2	PLANTING NOTES
P3	PLANTING TABLES AND DETAILS
P4	EXISTING CONDITIONS OVERVIEW
P5	PROPOSED CONDITIONS OVERVIEW
P6 – P11	PROPOSED CONDITIONS PLANS
P12	RESTORATION DETAILS

WARNING
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PARAGRAPH 7209 FOR ANY PERSON TO ALTER ITEMS ON THESE PLANS
IN ANY WAY, UNLESS UNDER THE DIRECTION OF A NEW YORK STATE
LICENSED PROFESSIONAL ENGINEER.


$$1'' = 2000'$$


REV NO	DATE	DESCRIPTION	DWN CHK	PROJ APP.
REVISIONS				



BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION



COVER

PREPARED BY:
CHJ/JSW

SCALE: AS NOTED

DWG.NO: **C1**

CONTRACT NO.

GENERAL NOTES

1. Buffalo Niagara Riverkeeper (RIVERKEEPER) will designate an authorized representative (i.e., RIVERKEEPER, Consultant, Construction Manager and/or Engineer of Record) to represent RIVERKEEPER during the construction phase.
2. It is the responsibility of the Contractor to review all the drawings, specifications, and referenced documents associated with the project prior to the initiation of construction. Should the Contractor find any conflict with the documents, it is the Contractor's responsibility to notify RIVERKEEPER's authorized representative, in writing, prior to the start of construction. Failure by the Contractor to notify RIVERKEEPER's authorized representative shall constitute acceptance of full responsibility by the Contractor to complete the scope of work as defined by the drawings and specifications and in full compliance with local regulations and codes.
3. It is the responsibility of the Contractor to fulfill all requirements of the contract and all amendments thereto, including but not limited to, general conditions, special conditions, technical specifications and these drawings in order to complete this project.
4. The Contractor shall assume there will be a kickoff meeting in the Buffalo area at the start of the project (the prime Contractor and subcontractors shall attend) and weekly update meetings or conference calls during the project (subcontractors shall attend as needed). Daily field reports shall be written on RIVERKEEPER's standard form and delivered to RIVERKEEPER's authorized representative for review and acceptance.
5. Prior to the commencement of the work the Contractor shall submit a Health and Safety Plan detailing the health and safety systems and procedures which will apply during the term of the contract. The Health and Safety Plan will be reviewed by and will be subject to approval by RIVERKEEPER and Owner.
6. The contractor shall hold daily safety meetings before the start of work.
7. All work shall be coordinated and performed in accordance with all local, state, and federal regulations.
8. RIVERKEEPER is authorized to issue Stop Work Orders directing that construction activities cease immediately. The Contractor shall, effective immediately upon Stop Work Order issuance, cease to issue any further orders and/or subcontracts for materials or services in support of this contract. The Contractor shall immediately comply with the order and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by this order during the period of work stoppage.
9. All materials shall be provided and work shall be performed in conformance with the New York State Department of Transportation Office of Engineering Standard Specifications dated May 1, 2008, as amended, and all addenda thereto, unless noted otherwise.
10. The Contractor shall obtain all relevant local, state and/or federal permits prior to the start of construction, including herbicide treatment permits. RIVERKEEPER will pay for the costs of these permits directly.
11. The Contractor shall comply with all conditions contained in relevant permits issued for this project.
12. The Contractor shall obtain all permits for temporary facilities.
13. No trees shall be disturbed unless indicated on the plans that they are to be removed.
14. All work shall take place between elevation 574 feet and the top of rip-rap line as shown on the project plans.
15. No wetlands shall be disturbed unless indicated on the plans and all appropriate permits are in place.
16. Should hazardous/unsuitable material be encountered, the Contractor shall stop work immediately and notify RIVERKEEPER's authorized representative. The Contractor will be responsible to notify the appropriate regulators and address regulatory requirements and/or guidance including calling the NYS Spill Hotline at 1-800-457-7362 if needed.
17. Precautions shall be taken by the Contractor to prevent any impacts to areas outside of the limits of proposed work. The Contractor shall submit to RIVERKEEPER's authorized representative for approval any impacts to areas outside the limits of proposed work at least two weeks in advance of the proposed impact. If the Contractor's activity adversely affects any area outside the limit of proposed work, the Contractor shall immediately restore the area to its pre-construction condition.
18. The Contractor shall NOT conduct ground breaking activities. This site is a remediated former industrial facility with subsurface containment features including a barrier cap and containment wall. If the Contractor identifies any conflicting information with respect to this directive, the Contractor shall immediately report in writing to RIVERKEEPER's authorized representative for clarification.
19. Work shall not be conducted when the ground is wet, soft, or otherwise easily rutted, in order to maintain the structural integrity of the slurry walls and cap. Work shall stop if rutting or any other subsurface disturbance occurs.
20. The Contractor shall be advised that the project is located in an area prone to flooding and severe weather is known to occur at this location. The Contractor shall take necessary precautions to protect the project while under construction, which may include sequencing the project to protect temporary and permanent structures. This includes, but is not limited to, protection from storms, floods, boat wakes, current, wind, and recreational users. The Contractor is solely responsible for the protection of the project site, temporary facilities, falsework, equipment, personnel, work, materials, and other properties, boats, the public, or industry. Falsework shall be removed if weather is anticipated to threaten the project, the Buffalo River, or other property.
21. No additional payment will be made for work activities impacted due to fluctuations in the water surface elevations. No additional payment will be made for increased pollution prevention, falsework, or temporary facilities required due to varying water surface elevations.
22. The Contractor shall prevent the transport of invasive plant material to the site. Equipment, vehicles, personal gear, and imported materials shall be clean and free of plant material. All equipment shall be cleaned using pressure wash prior to site mobilization. The equipment will be examined and photographed by RIVERKEEPER's authorized representative upon arrival at the site. If equipment is not acceptable, the Contractor will be required to conduct additional cleaning prior to initiating site activities.
23. Every contractor shall cooperate with and make allowances for other contractors.
24. The Contractor is responsible to design and install all temporary facilities so that they remain in place and functioning. All temporary facilities shall be located to avoid impacts to submerged aquatic vegetation (SAV), wetlands, and other sensitive resources.
25. Access to the site will be coordinated with RIVERKEEPER and the Owner, South Buffalo Development Corporation. The use of vehicles on the site will follow guidelines provided by South Buffalo Development Corporation.

SITE CONTROL NOTES

26. Access routes shall be approved by RIVERKEEPER and the Owner prior to use.
27. Site access shall be limited to tracked vehicles and equipment with maximum applied ground pressure of 8 PSI or less, or as approved by RIVERKEEPER's authorized representative. The purpose of this restriction is to prevent damage to and maintain the structural subsurface integrity of the slurry walls and cap. Work shall stop if rutting or any other intrusive surface disturbance occurs.
28. The Contractor shall clearly demarcate or flag and protect all existing structures, monitoring wells, and aboveground infrastructure in project area and on landfill cap.
29. The Contractor shall clearly demarcate the upper and lower work limits.
30. The Contractor shall submit a phased construction plan to RIVERKEEPER for approval before the start of work.
31. The Contractor shall submit a restoration plan regarding all access routes and staging areas to RIVERKEEPER and the Owner for approval prior to beginning work.

SURVEY NOTES

32. Survey data are based on September 2016 topographic survey by Foit-Albert Associates. Coordinates shown are expressed in U.S. survey feet and referenced to the North American Datum of 1983 (NAD83), New York State Plane Coordinate System, West Zone.
33. Elevations are shown in North American Vertical Datum 88.
34. The Buffalo River portion of the survey is in Zone AE, "base flood elevation determined". The upland portion of the survey is in Zone X, "area of 500-year flood, area of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood". Flood Insurance Rate Map Community No. 360230, Panel No. 0020d which bears an effective date of September 26, 2008.

SLOPE RESTORATION SYSTEM NOTES

PLANTING SOIL MIXTURE

1. Planting soil mixture shall consist of a mixture of 67% by volume topsoil and 33% by volume compost.
 - A. Topsoil
 - i. Suitable topsoil includes selectively excavated material that is imported from off-site sources within 100 miles of the site that produces growth of vegetation and is free from underlying subsoils, clay lumps, objectionable weeds, litter, brush, matted roots, toxic substances or any material that might be harmful to plant growth or be a hindrance to grading, planting or maintenance operations.
 - ii. Topsoil shall not contain any traces of hydrocarbons, petroleum products, chemically prohibited substances or any other elements considered to be toxic to any vegetation used on this project.
 - iii. Prior to the procurement and delivery of topsoil, the following information, samples, and analysis are required for review and approval for each source:
 - a. Proposed material source and vendor.
 - b. Certification that proposed vendor can provide sufficient quantities of material.
 - c. Certification that invasive plant species are not growing on the topsoil source.
 - d. A 5-pound sample of the proposed material, indicating the method of sampling and location of the sample.
 - iv. The Contractor shall have the topsoil tested by a reputable testing laboratory. The laboratory report shall indicate test results and the suitability of the topsoil for growing and maintaining plant materials. Testing shall include:
 - a. Particle size analysis by hydrometer method (ASTM D-422) including sand, silt and clay, sand size distribution
 - b. organic matter by combustion (ASTM F-1647, Method 1)
 - c. pH tests conducted in accordance with Soil Testing Procedures for The Northeastern United States, 3rd Edition, Northeast Regional Publication No. 493, Agricultural Experiment Station, University of Delaware, Newark, Delaware.
 - d. Results of soluble salts test conducted in accordance with Soil Testing Procedures for The Northeastern United States, 3rd Edition, Northeast Regional Publication No. 493, Agricultural Experiment Station, University of Delaware, Newark, Delaware. If topsoil test indicates the presence of soluble salts, it will not be acceptable.
 - e. Material delivery tickets shall be provided to RIVERKEEPER'S authorized representative upon arrival to site.
 - B. Compost
 - i. Compost shall be comprised of an equal mixture of the following two items:
 - a. Leaf Compost. The material shall consist exclusively of deciduous leaf material. Compost material that contains food waste, sewage waste, or other waste material is unacceptable. The leaf compost shall be mature (actively composted for 6 months minimum, and temperature slightly above air temperature) and humic (organic material is no longer rapidly degrading). Mature compost material shall be a dark, friable, partially decomposed substance that has an earthy odor. Visible fibers should be short and dark with no discernable particles of leaf material. Because not all items decompose at the same rate screening may be necessary to remove larger partially decomposed material and/or undecomposed material.
 - Organic Content – 25% to 100% by dry weight
 - Natural Inert Material – <5% by dry weight of woody or green yard debris material.
 - Man-made Inert Material – <1% by dry weight of man-made material such as glass or plastic.
 - Bulk Density – 636 to 812 kg/m3
 - Moisture Content – 30% to 60% by total weight.
 - b. Well-Rotted Manure. The material shall consist of animal excreta with litter material. The well-rotted manure shall be mature (aged a minimum of one year), dark brown or black in color, crumbly in texture, and shall not have an objectionable odor. The material's moisture content shall be such that no visible free water or dust is produced when handling it. It shall contain no visible admixture of refuse or other physical contaminants or any material toxic to plant growth.
 - ii. Prior to the procurement and delivery of compost, the following information and samples are required for review and approval for each source:
 - a. Proposed material source and vendor.
 - b. Certification that proposed vendor can provide sufficient quantities of material.
 - c. A 5-pound sample of the proposed material, indicating the method of sampling and location of the sample.
 - d. Results of pH, soluble salt concentration (electrical conductivity), moisture content, and particle size conducted in accordance with Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council).
 - iii. Material delivery tickets shall be provided to RIVERKEEPER'S authorized representative upon arrival to the site.

CRUSHED STONE FOR RIP-RAP VOIDS

2. ½-inch crushed stone shall consist of clean, durable, sharp-angled fragments of rock of uniform quality and shall meet the requirements of Crushed Stone, Type 1ST as shown on Table 703-4 of the NYS DOT Standard Specifications, shown in part below:

Partial Table 703-4 Size Designation - 1ST	
Screen Sizes	Percentage by weight passing the following square openings.
1 in	-
1/2 in	100
1/4 in	0-15
1/8 in	-
# 80	-
#200	0-10

The Contractor shall submit the results of gradation analysis of the proposed material to the RIVERKEEPER's authorized representative prior to procurement and delivery to the site for review and approval. Material delivery tickets shall be provided to RIVERKEEPER'S authorized representative upon arrival to the site.

STONE MIXTURE

3. Stone mixture shall consist of 80% ¾" stone and 20% 3" stone. Contractor shall submit the results of gradation analysis of the proposed material to the RIVERKEEPER's authorized representative prior procurement and delivery to the site for review and approval. Material delivery tickets shall be provided to RIVERKEEPER'S authorized representative upon arrival to the site.

BOULDERS

4. Boulders shall consist of washed NYS DOT light stone filling (Item 620.03). Contractor shall submit the results of gradation analysis of the proposed material to the RIVERKEEPER's authorized representative prior procurement and delivery to the site for review and approval. Material delivery tickets shall be provided to RIVERKEEPER'S authorized representative upon arrival to the site.

The Contractor may be required to separate larger stones from the light stone filling to be placed at the toe per direction from RIVERKEEPER'S authorized representative.

COIR FIBER BLOCK SYSTEM

5. Coir Fiber Block System shall be constructed using Rolanka BioD-Block or approved equivalent. (Alternatives that use North American materials will be preferred.)

TEMPORARY STRAW MULCH

6. Temporary Straw Mulch shall conform to NYS DOT Temporary Mulch (Item 209.100101).

SOIL AND EROSION CONTROL NOTES

1. All materials shall be provided and work shall be performed in accordance with the New York State Standards for erosion and sediment control.
2. The Contractor shall install all required pollution control devices prior to construction and shall be responsible for their maintenance, repositioning and removal upon completion of work.
3. Biodegradable fabric compost filter socks shall be installed as per manufacturer's instructions. Installation locations shall be approved by RIVERKEEPER or RIVERKEEPER'S authorized representative. At time of removal, the biodegradable compost filter socks shall be cut open and the outer material and stakes removed from the site. The compost shall be taken upland and spread evenly throughout the planting area as directed by RIVERKEEPER'S authorized representative. The Contractor shall provide cut sheets and purchase receipts to the RIVERKEEPER'S authorized representative for approval prior to installation.
4. All exposed areas, including stockpiles that will be left exposed more than fourteen (14) days, and not subject to construction traffic, will immediately receive temporary seeding. Mulch, water and anchor as necessary to establish grass and prevent loss to wind. If the season prevents the establishment of a temporary cover, the disturbed areas will be mulched with small grain straw at a rate of two (2) tons per acre, in accordance with State Standards.
5. Permanent vegetation to be seeded on all exposed areas immediately after final grading. Mulch to be used as shown in the plans for protection until seeding is established.
6. Should control of dust at the site be necessary, the site will be sprinkled until the surface is wet, temporary vegetative cover shall be established, or mulch shall be applied in accordance with State Standards for erosion control.
7. All soil washed, dropped, spilled, or tracked outside the limits of disturbance or onto public rights-of-way shall be removed immediately.
8. Stockpile and staging locations shall be approved by RIVERKEEPER or RIVERKEEPER'S authorized representative.
9. The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, structural practices, other controls, and areas where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more of rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once a month.

CONSTRUCTION WASTE MANAGEMENT NOTES

1. The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by its operation. Good housekeeping practices shall be maintained ion a continuous basis from work site to work site. Disposal of any waste materials on the construction site is prohibited.
2. The Contractor shall not disturb soil (clear, grub, grade, excavate, or dewater) in areas outside of those specified on the plan unless approved by RIVERKEEPER's authorized representative.
3. The Contractor will provide employee facilities, waste disposal, and sanitary facilities.
4. All combustible waste materials shall be placed in covered metal containers and promptly disposed of in an approved manner at an approved waste disposal facility.
5. Storage and/or use of chemicals, fuels, oils, greases, bituminous materials, solids, waste washings, and cement shall be handled as to prevent leaching or surface run-off into public waters or drains. All approved storage areas for these materials must be diked.
6. The Contractor is responsible for removal and proper disposal of all waste material and/or debris (including but not limited to invasive-species plant detritus). Waste material and debris shall not be released into the river or burned. All waste material and debris shall be disposed of in accordance with all local, state and federal laws and other applicable codes, at a location approved by RIVERKEEPER's authorized representative.
7. The Contractor's equipment must be free of hydraulic leaks. The equipment will be maintained in an operational condition at all times and may be inspected by RIVERKEEPER's authorized representative at any time for hydraulic leaks and general condition.

WATER POLLUTION CONTROL NOTES

1. Care shall be taken to protect the water.
2. All water resources (i.e. ground and surface waters), including all drains, shall be protected from leaching and/or run-off of chemical pollutants, solid wastes, and construction site debris.
3. Equipment, tools and trucks used in this project shall be cleaned in such a manner as to prevent wash water from entering any water body.
4. Spillage of hazardous substances into the waterway is prohibited by the Clean Water Act of 1977. Measures including proper maintenance of construction equipment, designating fuel/hazardous substances handling areas to allow spills to be contained before reaching the waterway, instructing personnel not to dispose of oil and other such materials into drains or into the waterway directly, and other necessary procedures shall be implemented prior to any construction activities.
5. Absorbent materials shall be retained onsite in the event that a spill occurs.

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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION



GENERAL NOTES

PREPARED BY:
CHJ/JSW

DWG.NO:
P1

SCALE: AS NOTED

CONTRACT NO.

JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTLER

REV NO	DATE	DESCRIPTION		DWN CHK	PROJ APP.
REVISIONS					

PLANTING NOTES

PLANTING

1. Plant materials furnished by the Contractor shall mean shrubs, vines, and plants of all descriptions, in accordance with Plans and as specified herein.

2. The Contractor shall follow general industry standards, planting tables, and the specifications provided.

3. All planting material shall be free of unwanted seed and non–native plant material.

4. All plants shall be native species indigenous to western New York. No hybrids or cultivars shall be used.

5. All plants shall conform to the latest edition of ANSI Z60.1 nursery stock standards. To ensure that containerized stock, stakes, and seed are available, the plants should be started far enough in advance to be ready for the scheduled planting times. All plants shall be true to name. Each tray of potted plants, individual container (for containerized stock), and bundles of live stakes shall be legible and securely labeled with the scientific species name. Care shall be taken throughout the operation to keep each plant species or variety segregated and labeled. RIVERKEEPER’s authorized representative will reject plants where there is doubt as to correct nomenclature, either at the time of delivery or at any subsequent time.

6. All precautions that are customary in good trade practice shall be taken to ensure the plants are in good condition for successful growth. RIVERKEEPER’s authorized representative reserves the right to reject plants not deemed satisfactory in his/her opinion as to quality, size, type or color. All plants must be healthy and vigorous, free from disease, injurious insects and their eggs or larva, mechanical wounds, broken branches, decay, leaf damage, chlorosis or wilting, or any other defects. All plants must have a good, healthy, well–formed upper growth and root system, including pliable stems and roots. Plants with dried–out roots or twigs or plants which have become overheated or stressed in transit or are found not to comply with these specifications in any way will be rejected.

7. The Contractor shall notify RIVERKEEPER’s authorized representative in writing prior to plant installation if conflicts between the contract documents and field conditions are found. Adjustments in the location of plantings necessitated by a change in field condition shall not constitute a change in contract price, unless the number of plantings is increased substantially.

8. The Contractor shall be responsible for the performance and completion of the work and shall retain competent staff at the site at all times when work is in progress.

9. For potted plants, all specimens shall be watered to saturation prior to transport to the job site.

10. When possible, plant material shall be planted on the day of delivery. When this is not possible, the Contractor shall protect the stock not planted. Plant material shall be protected from herbivory, sun and drying winds, and shall be kept well–watered. Shade cloth shall be present at the job site at all times.

11. Species substitutions shall not be permitted except by approval of RIVERKEEPER’s authorized representative. Substitutions shall not be permitted unless proof is submitted that specific plants or sizes are unobtainable after all resources have been exhausted. The Contractor shall submit proposal for substitution(s) for RIVERKEEPER’s authorized representative’s approval, to be considered for nearest size or variety with equitable adjustment to contract price.

12. The objective is to achieve a natural looking heterogeneous pattern with respect to densities and species within the planting areas specified on the design sheets. These areas were developed according to expected site conditions and the list of plants specified for each are species expected to thrive under those conditions. Field adjustments (e.g., more plants in a particular zone than specified balanced by less in another) require the expressed approval of RIVERKEEPER’s authorized representative. The location of each plant species to be planted is according to area shown on the plans. Plants shall be installed in the correct areas, as indicated on the design sheets. The exact locations of stakes and containerized stock within each area are not specified; as long as overall densities are achieved, spacing between individual plants shall be variable and field–determined. RIVERKEEPER’s authorized representative may assist in the layout of plant material.

13. For potted specimens, like species should typically be clumped into same–species–clumps of 3–6 units with adequate spacing between individual units to avoid crowding and stunting of growth. Clumps of plantings are typically separated from one another by about 1–3 feet (edge to edge).

14. Potted specimens shall be planted level with or slightly above existing grade into the soil medium. The root flare should be slightly above the top of the hole, never below the top of the hole.

15. The Contractor shall use a spade or hand dig individual holes, at least 1.5 times the size of the shrub or herbaceous plant root ball.

16. Pots shall be removed and circling roots shall be cut with pruners along the full height of the root ball. With a sharp square spade, root mats shall be sliced and removed from the bottom the root ball.

17. Planting holes shall be backfilled with soil mix. Do not cover top of root, do not mound soil up and above the root ball.

18. Each plant shall be watered to saturation promptly after planting.

19. Live stakes shall be freshly cut. No leaf buds on the stakes shall have initiated growth beyond ¼” and the cambium layer shall be moist, green and healthy. All live stake material shall be maintained in a continuously cool, covered, and moist state prior to use and be in good condition when installed.

20. Live stakes shall be driven into the ground (cut to a point at basal end) until approximately 3–6 inches remains exposed (and 2 live buds) or to refusal (2/3 of the stake shall be buried in the ground unless otherwise approved).

21. Live stakes shall be installed by hand or by using a dead blow hammer to drive stakes. The hammer head shall be filled with shot or sand. A dibble, iron bar, or similar tool shall be used to make a pilot hole to prevent damaging the stake during installation. This method shall only be used in soil or rock placed during construction of this project. No existing ground shall be disturbed.

22. Care shall be taken not to damage the live stakes during installation. Live stakes that are damaged at the top during installation shall be trimmed back to undamaged condition.

23. When possible, soil around live stakes shall be tamped down.

24. Plant Guarantee and Replacement

A. Plants shall be guaranteed and maintained for a period of establishment, beginning on the date of substantial completion when all planting has initially been accepted and ending on August 15, 2018. Plants that are dead or that are in unhealthy or unsightly condition or that have lost their natural shape due to dead branches, excessive pruning or inadequate or improper maintenance, as determined by RIVERKEEPER’s authorized representative, shall be removed from the site. Such plants shall be replaced with plants as originally specified, at no cost to RIVERKEEPER or South Buffalo Development Corporation.

B. The time for replacing unsatisfactory plants shall be determined by RIVERKEEPER’s authorized representative, or no later than the next succeeding planting season. Plants that exhibit unacceptable conditions, as determined by RIVERKEEPER’s authorized representative, shall be removed from the site and replaced with plants as originally specified, at no cost to RIVERKEEPER or South Buffalo Development Corporation.

C. Plant material shall be replaced in the same location only once and then RIVERKEEPER’s authorized representative will determine whether the plant material shall be relocated or deleted from the Contract, at no added cost to RIVERKEEPER.

i. Plant replacement shall take place as soon as is reasonably possible after their unsatisfactory condition is evident.
25. Sequence of Planting Construction

A. The Contractor shall install potted plant material during the growing season between June 1 and October 1 unless seasonal variations provide a longer planting season.

B. The Contractor shall install the dormant live stakes at locations shown on plans, after September 1 (expected to be the fall of 2017).

SEEDING

26. The Contractor shall proceed with seeding only when existing and forecasted weather conditions permit. Adverse weather conditions include, but are not limited to: intense rain, high winds, and other conditions that would decrease the opportunity for seed establishment.

27. The Contractor may need to coordinate with the Construction Contractor to ensure that areas are stabilized prior to seeding.

28. Seed will be inspected by RIVERKEEPER’s authorized representative upon delivery in original sealed, labeled, and undamaged containers. Labelling shall include:
- name and telephone number of supplier

• year of production

• date of packaging

• botanical and common names of species

• percentage by weight of each species and variety

• percentage of purity and germination

• percentage weed seed
29. Seed shall be stored in a cool, dark place until use and protected from all forms of moisture such as rain, snow, surface drainage, ground water, condensation etc.

30. Provide seed from available commercial sources which do not contain more than 1% weed content (defined as non–target species), not less than 85% purity, and not less than 90% germination for each variety and shall not contain any seed of exotic or invasive species.

31. All seed mix shall be spread in 2017.

32. The Contractor shall consult the seed supplier’s instructions for seeding.

33. The period of establishment for seeds will go through August 15, 2018.
- INVASIVE AND NON-NATIVE PLANT TREATMENT
1. All plant species listed on the New York State Department of Environmental Conservation’s 6 NYCRR Part 575 Prohibited and Regulated Invasive Species list (2014) shall be treated throughout the Project Area unless otherwise specified by RIVERKEEPER’s authorized representative. All species shall be treated throughout the project area, except for black alder, which shall be selectively removed where it occurs in the restoration areas shown on the project plans.

2. Invasive species that are known to be on the site shown on the table below. Two non–native species that are affecting ecosystem function, and shall therefore be included in treatment efforts, are also included on the table. Additional species may be identified by RIVERKEEPER’s authorized representative.

Species	Common name	Nativity
<i>Ailanthus altissima</i>	tree-of-heaven	Non-native
<i>Alnus glutinosa</i>	European black alder	Non-native
<i>Artemisia vulgaris</i>	mugwort	Invasive
<i>Centaurea stoebe</i>	spotted knapweed	Invasive
<i>Frangula alnus</i>	glossy buckthorn	Invasive
<i>Iris sp.</i>	iris	Invasive
<i>Lonicera spp.</i>	honeysuckle shrub	Invasive
<i>Lythrum salicaria</i>	purple loosestrife	Invasive
<i>Reynoutria japonica</i>	Japanese knotweed	Invasive

3. Prior to treatment, the Contractor shall identify stands of invasive or non–native plants and individual plants to be treated and report to RIVERKEEPER’s authorized representative. RIVERKEEPER’s authorized representative will identify the Iris plants on site to species prior to treatment. If the species of Iris cannot be determined, the Iris plants shall not be treated.

4. Prior to treatment, the Contractor shall submit an invasive species treatment plan to RIVERKEEPER for approval.

5. Treatment applications, conducted by the Contractor, shall be conducted by a two or more person treatment crew consisting of, at a minimum, a New York State Certified Commercial Pesticide Applicator (Category 5A Aquatic Vegetation Control) and a Certified Commercial Pesticide Technician.

6. Where appropriate, Contractors may utilize different treatment methods for each target species. Various methods may need to be employed for each species as well (e.g., low volume foliar herbicide application for larger stands and the cut and treat method for smaller stands). The seasonal timing of invasive treatment may vary by species and the density of treatment areas as well. Treatments to be applied may include:

Low volume foliar treatment – An appropriate low volume herbicide mixture applied to targeted plants during foliar season. It is assumed that low–volume foliar treatments will be primarily applied to herbaceous species and to tree and shrub species less than 10 feet tall. Low volume foliar applications shall be carefully applied to target species only.

Cut and treat – cutting the stem of the plant, removing the cuttings and treating the cut stem with an herbicide. This method may be appropriate for small populations that are very close to desirable, non–target species. Cut and treat shall primarily be used to kill woody shrubs and trees. This treatment shall be used to selectively remove black alder and tree of heaven where directed, and may also be used on honeysuckle and buckthorn shrubs.

Stem Injection – herbicide is injected directly into the stem of an herbaceous plant. This method may be appropriate for treating the Japanese knotweed on the site.

Other Methods – Contractors are encouraged to provide recommendations for other treatment methods e.g., hand pulling, hand wicking.

7. Stumps of cut trees and shrubs shall not be removed, ground or grubbed.

WARNING
IT IS A VIOLATION OF NEW YORK EDUCATION LAW TITLE 8, ARTICLE 145, PARAGRAPH 7209 FOR ANY PERSON TO ALTER ITEMS ON THESE PLANS IN ANY WAY, UNLESS UNDER THE DIRECTION OF A NEW YORK STATE LICENSED PROFESSIONAL ENGINEER.

REV NO	DATE	DESCRIPTION	DWN	PROJ	
			CHK	APP.	
REVISIONS					



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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION



PLANTING NOTES

PREPARED BY:
CHJ/JSW

SCALE: AS NOTED

DWG.NO:
P2

CONTRACT NO.

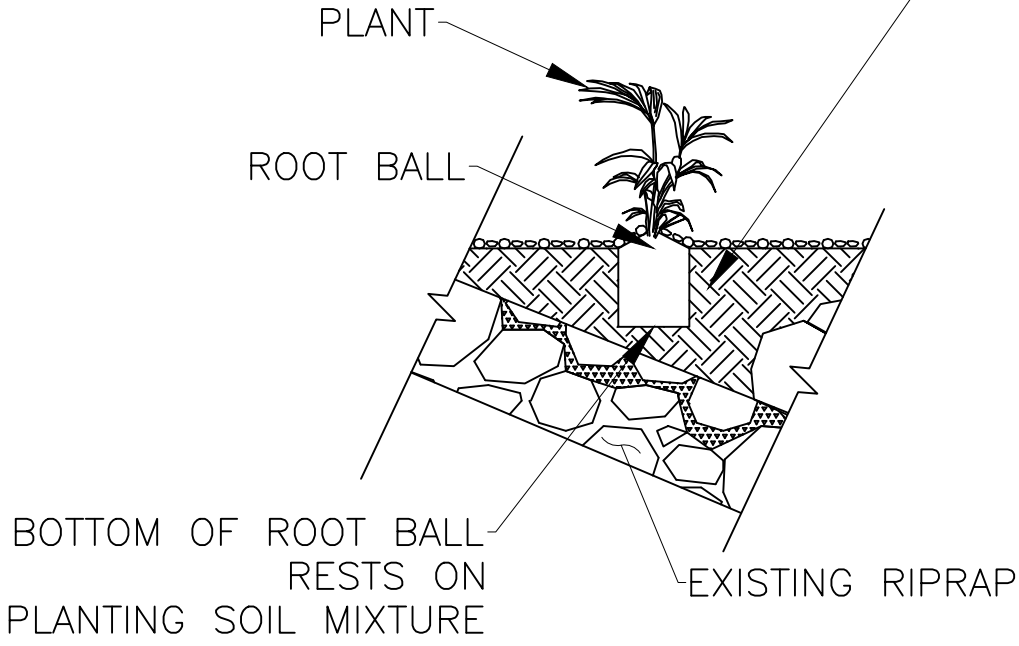
Species Name	Common Name	Minimum Plant Size	Vegetated Bench Areas Lower Bench Number of Plants	Vegetated Bench Areas Upper Bench Number of Plants	Coir Fiber Block Areas Number of Plants	Number of Additional Plants to be Placed as Directed by RIVERKEEPER's Authorized Representative
Shrubs						
<i>Aronia melanocarpa</i>	black chokeberry	#2 container (approx. 24" tall, 1/3" caliper)	20	0	100	0
<i>Cephalanthus occidentalis</i>	buttonbush	#2 container (approx. 24" tall, 1/3" caliper)	20	0	100	0
<i>Cornus amomum</i>	silky dogwood	#2 container (approx. 24" tall, 1/3" caliper)	20	60	100	0
<i>Cornus racemosa</i>	gray dogwood	#2 container (approx. 24" tall, 1/3" caliper)	20	60	100	0
<i>Cornus sericea</i>	redosier dogwood	3' livestake	100	0	300	350
<i>Physocarpus opulifolius</i>	ninebark	#2 container (approx. 24" tall, 1/3" caliper)	0	60	100	0
<i>Lindera benzoin</i>	spicebush	#2 container (approx. 24" tall, 1/3" caliper)	0	60	100	0
<i>Rosa palustris</i>	swamp rose	#2 container (approx. 24" tall, 1/3" caliper)	20	0	100	0
<i>Rosa virginiana</i>	virginia rose	#2 container (approx. 24" tall, 1/3" caliper)	0	60	100	0
<i>Rubus occidentalis</i>	black raspberry	#2 container (approx. 24" tall, 1/3" caliper)	0	50	100	0
<i>Rubus odoratus</i>	purple flowering raspberry	#2 container (approx. 24" tall, 1/3" caliper)	0	50	100	0
<i>Salix discolor</i>	pussy willow	3' live stake	100	0	300	350
<i>Viburnum opulus</i> (aka <i>V. trilobum</i>)	highbush cranberry	#2 container (approx. 24" tall, 1/3" caliper)	0	50	100	0
Shrubs Total			300	450	1,700	700
Herbaceous Plants						
<i>Carex pennsylvanica</i>	Pennsylvania sedge	DP 50 plug	10	30	5	0
<i>Carex vulpinoidea</i>	fox sedge	DP 50 plug	10	30	5	0
<i>Eutrochium maculatum</i>	joe-pye weed	DP 50 plug	10	30	5	0
<i>Juncus tenuis</i>	path rush	DP 50 plug	10	30	5	0
<i>Scirpus cyperinus</i>	wool grass	DP 50 plug	10	30	10	0
<i>Verbena hastata</i>	blue vervain	DP 50 plug	10	30	5	0
Herbaceous Plugs Total			60	180	35	0
Vines						
<i>Clematis virginiana</i>	virgin's bower	18" length	30	40	300	0
<i>Parthenocissus quinquefolius</i>	Virginia creeper	18" length	50	50	500	0
Vines Total			80	90	800	0
Plants Total			440	720	2,535	700

Seed Mix		
Plant at 20 lbs/acre		
Species Name	Common Name	Percentage
<i>Elymus virginicus</i> var. <i>virginicus</i>	virginia wildrye	20.0%
<i>Achillea millefolium</i>	yarrow	2.5%
<i>Anaphalis margaritacea</i>	pearly everlasting	2.5%
<i>Apocynum cannabinum</i>	dogbane	5.0%
<i>Asclepias syriaca</i>	common milkweed	10.0%
<i>Asclepias tuberosa</i>	butterflyweed	5.0%
<i>Chamaecrista fasciculata</i>	partridge pea	10.0%
<i>Euthamia graminifolia</i>	grassleaf goldenrod	2.5%
<i>Eupatorium altissimum</i>	tall thoroughwort	2.5%
<i>Eutrochium maculatum</i>	joe-pye weed	2.5%
<i>Helianthus decapetalus</i>	thin-leaved sunflower	2.5%
<i>Helopsis helianthoides</i>	oxeye sunflower	5.0%
<i>Lolium perenne</i>	annual rye	5.0%
<i>Monarda didyma</i>	beeibalm	2.5%
<i>Monarda fistulosa</i>	wild bergamot	2.5%
<i>Panicum virgatum</i>	switchgrass	2.5%
<i>Pycnanthemum tenuifolium</i>	slender mountainmint	2.5%
<i>Rudbeckia laciniata</i>	green-headed coneflower	2.5%
<i>Symphyotrichum laeve</i>	smooth blue aster	2.5%
<i>Symphyotrichum novae-angliae</i>	New England aster	5.0%
<i>Symphyotrichum novi-belgii</i>	New York aster	2.5%
<i>Vernonia noveboracensis</i>	ironweed	2.5%
Seed Mix Total		100%

	Vegetated Bench Areas Lower Bench Pounds of Seed	Vegetated Bench Areas Upper Bench Pounds of Seed	Coir Mat Areas Pounds of Seed	Soil Choked Rip-rap Areas Pounds of Seed	Remaining Project Area for Overseeding Pounds of Seed
Seed Mix Total Pounds per Area	0.4	0.4	1.6	4.0	10.8

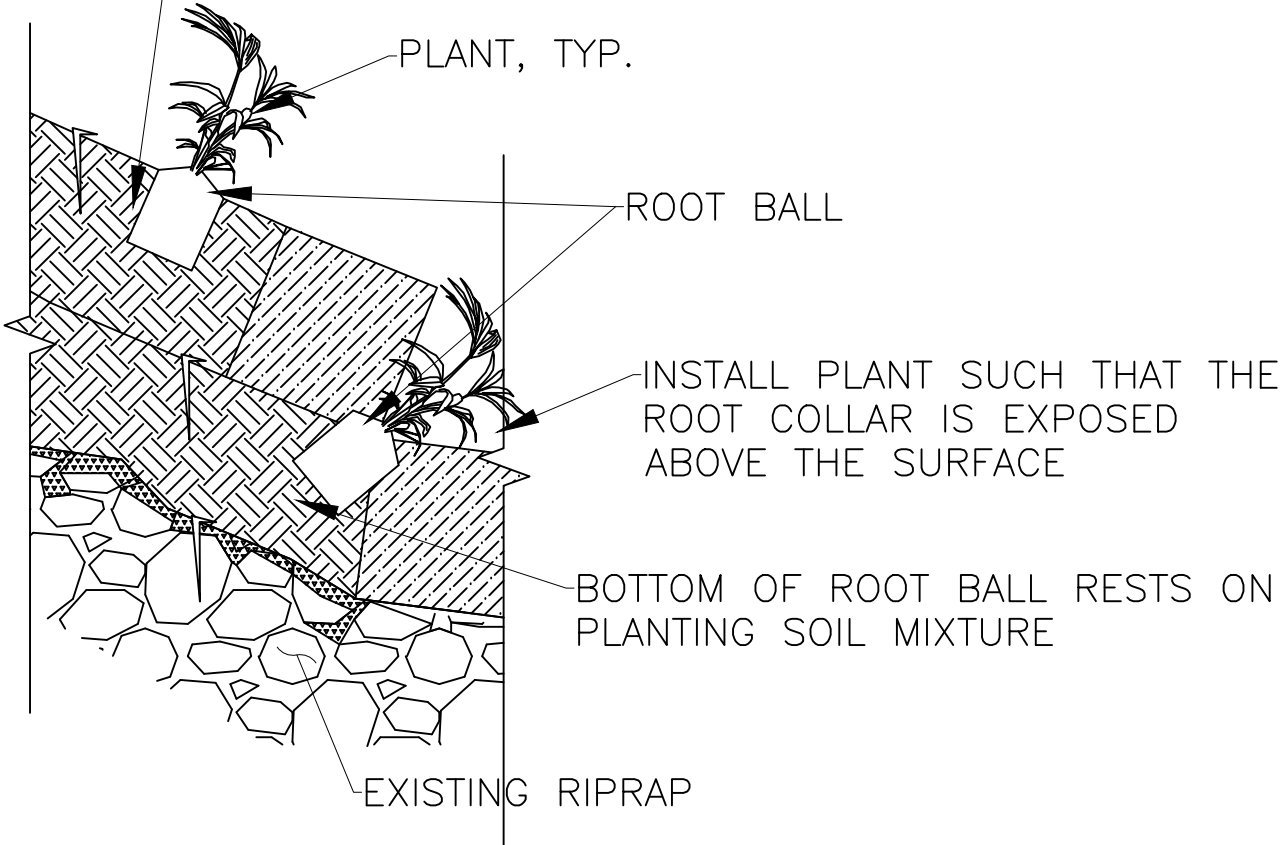
Seeding Notes:
1. Contractor must be familiar with specifications shown on Sheet P1 and have them available at all times.
2. Seeds shall be provided as per species named. No substitutes without prior written approval from RIVERKEEPER's authorized representative.

LIGHTLY TAMP SOIL AROUND THE ROOT BALL IN 6" LIFTS TO BRACE SHRUB. DO NOT OVERCOMPACT. WHEN THE PLANTING HOLE HAS BEEN BACKFILLED, POUR WATER AROUND THE ROOT BALL TO SETTLE THE SOIL.



DETAIL A
PLANTING IN VEGETATED BENCH
NOT TO SCALE

LIGHTLY TAMP SOIL AROUND THE ROOT BALL IN 6" LIFTS TO BRACE SHRUB. DO NOT OVERCOMPACT. WHEN THE PLANTING HOLE HAS BEEN BACKFILLED, POUR WATER AROUND THE ROOT BALL TO SETTLE THE SOIL.



DETAIL B
PLANTING IN COIR SYSTEM
NOT TO SCALE

NOTE: 1. CONTAINERS SHALL BE CUT/REMOVED FROM PLANTS AND FEATHER ROOTS. ALL TAGS, LABELS, ETC. SHALL BE REMOVED FROM PLANTS.

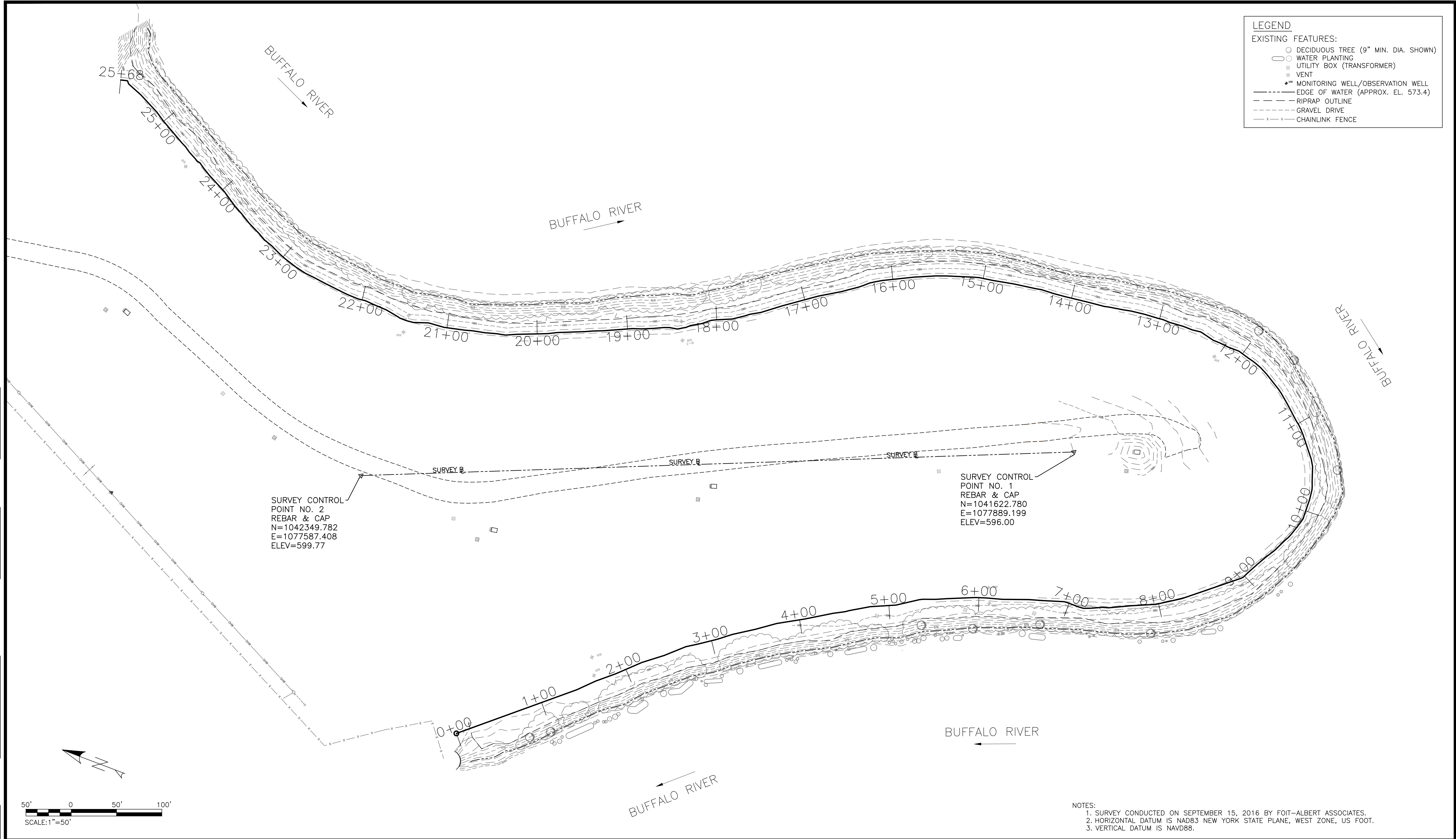
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PLANTING TABLES AND DETAILS	
PREPARED BY: CHJ/JSW	DWG.NO: P3
SCALE: AS NOTED	CONTRACT NO.

JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTLER



REV NO	DATE	DESCRIPTION	DWN CHK	PROJ APP.	
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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION

BUFFALO NIAGARA RIVERKEEPER®

EXISTING CONDITIONS OVERVIEW

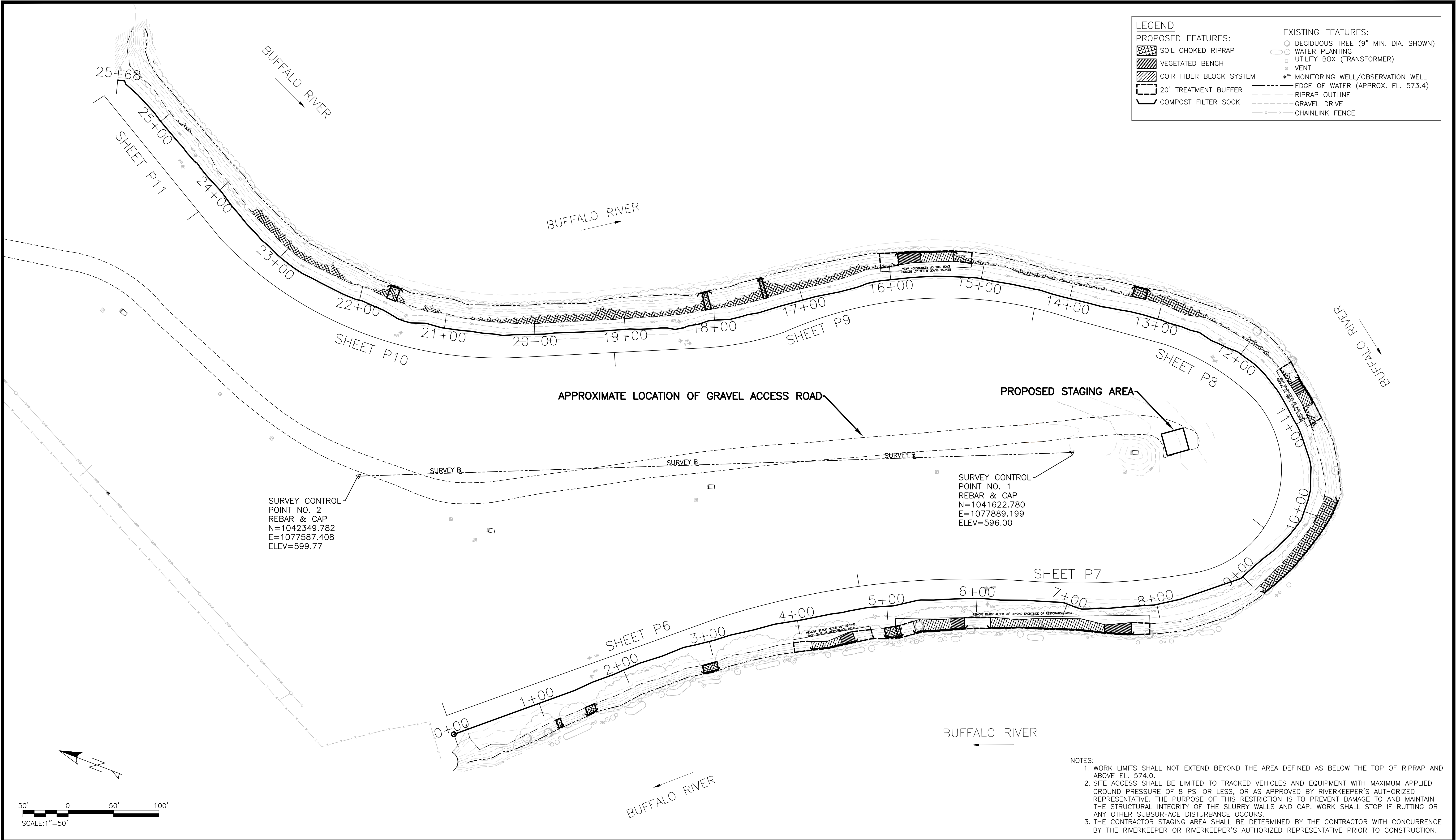
PREPARED BY: **CHJ/JSW**

DWG.NO: **P4**

SCALE: AS NOTED

CONTRACT NO.

JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTILER



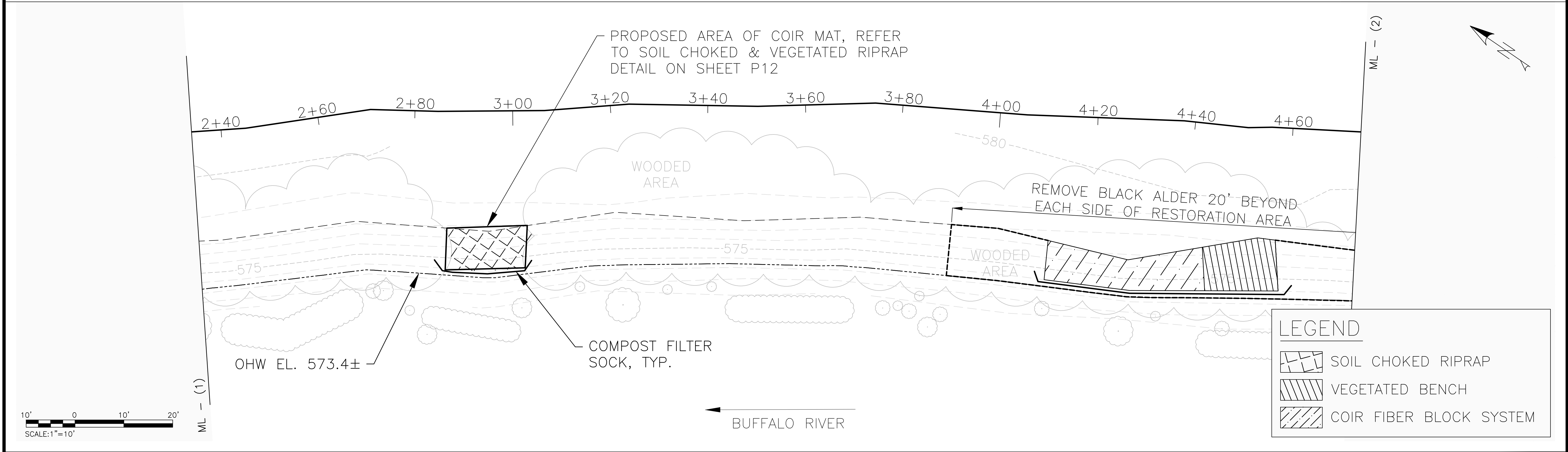
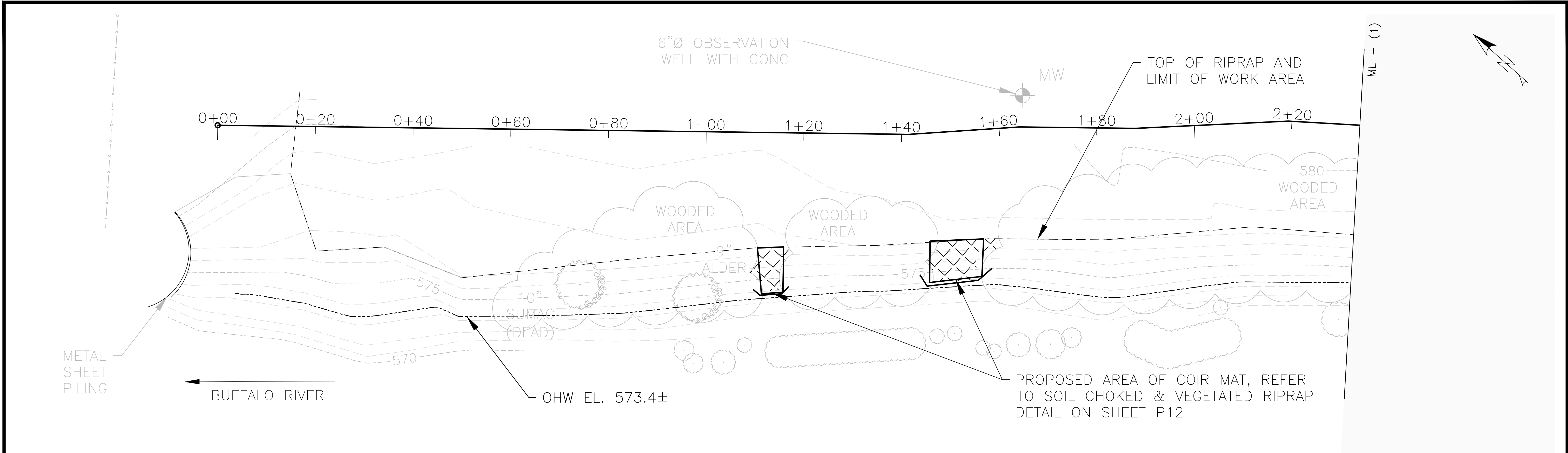
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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION

PROPOSED CONDITIONS OVERVIEW	
PREPARED BY: CHJ/JSW	DWG.NO: P5
SCALE: AS NOTED	CONTRACT NO.

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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION

PROPOSED LAYOUT PLAN I

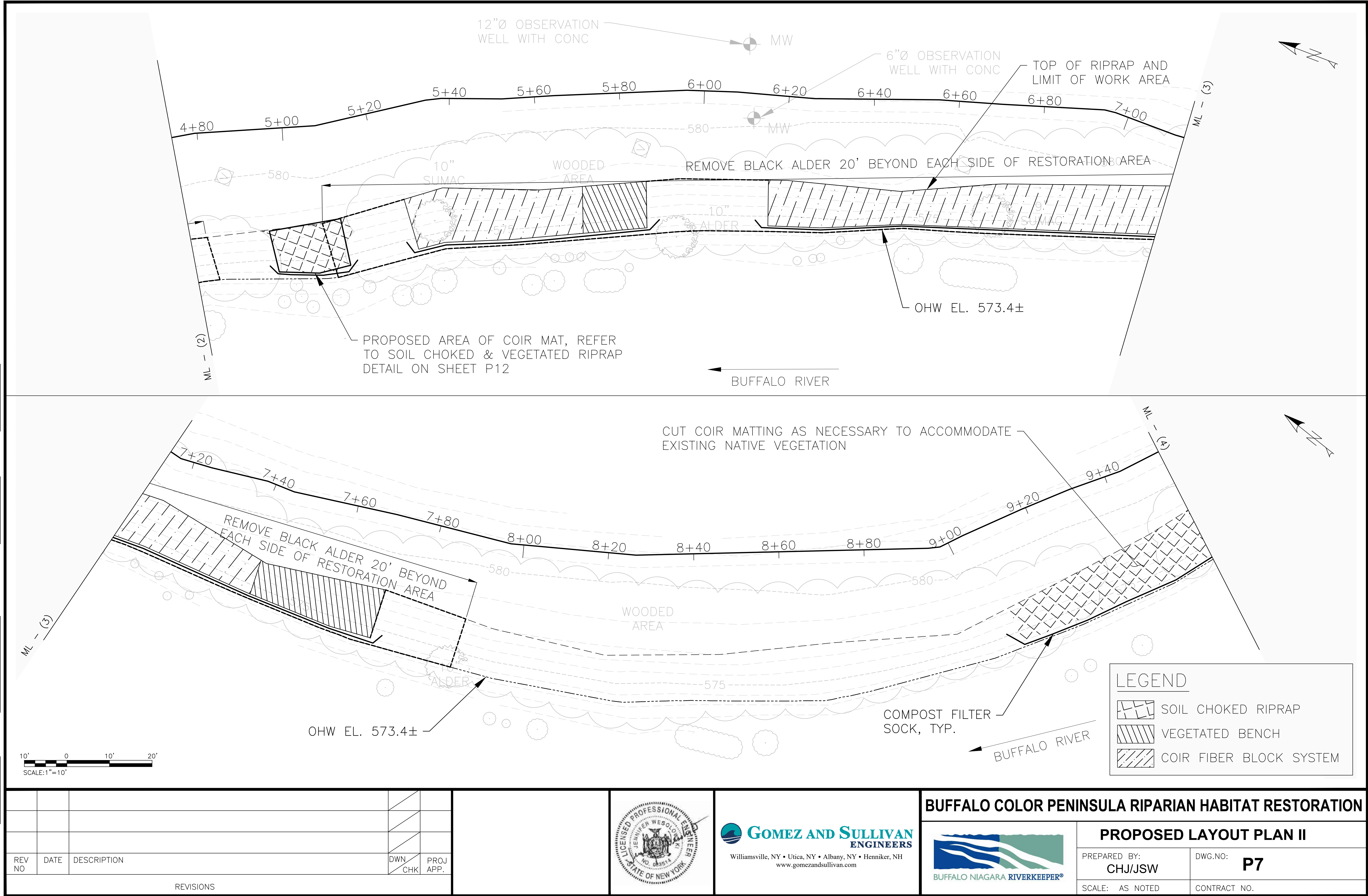
PREPARED BY: CHJ/JSW

DWG.NO: **P6**

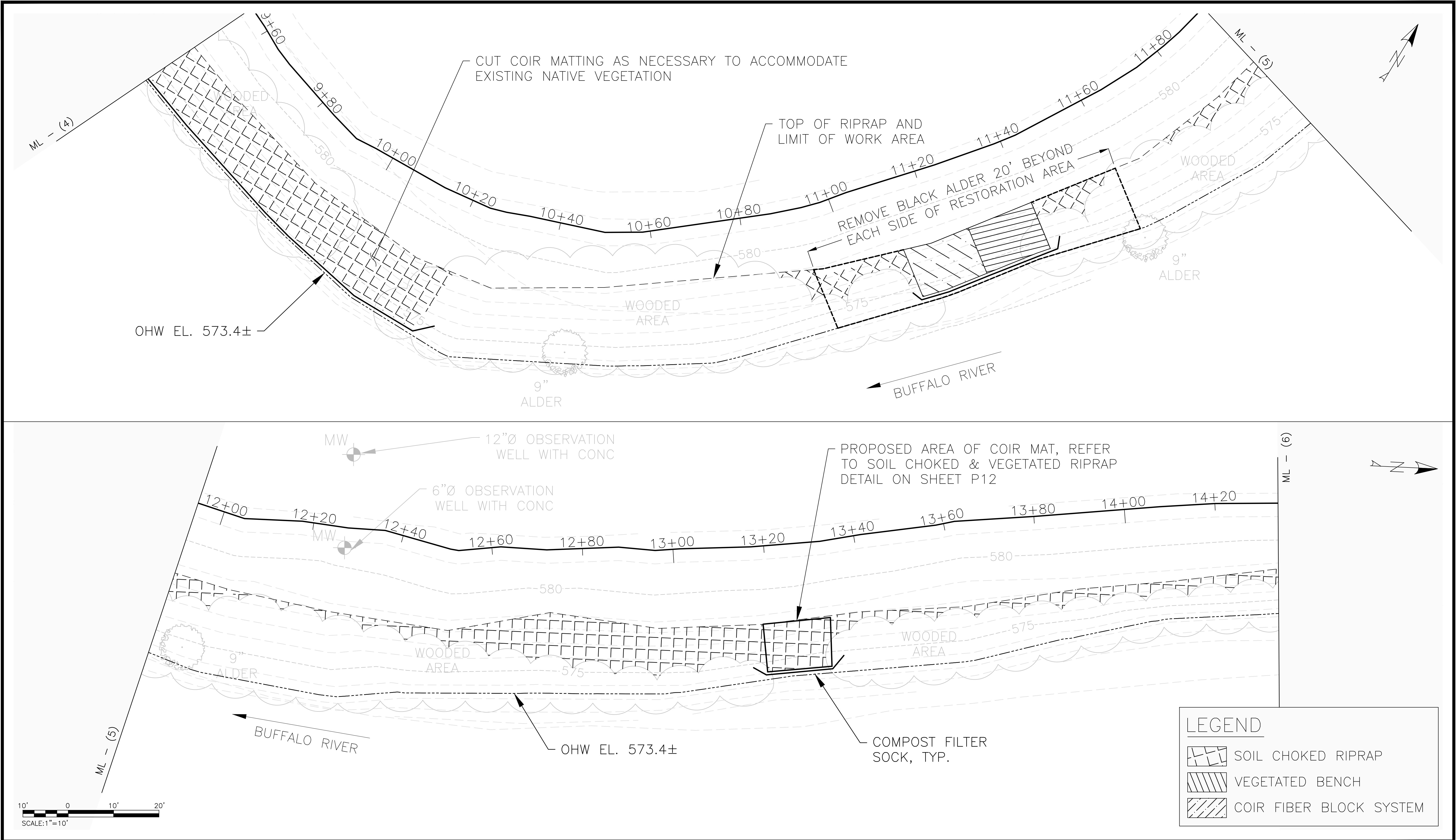
SCALE: AS NOTED

CONTRACT NO.

JOB MANAGER D. FRAZIER
DESIGN E. REDDING/J. WESOLOWSKI
DRAFTING C. JENKINS
CHECK M. STOTTLER



JOB MANAGER D. FRAZIER
DESIGN E. REDDING/J. WESOLOWSKI
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PROPOSED LAYOUT PLAN III

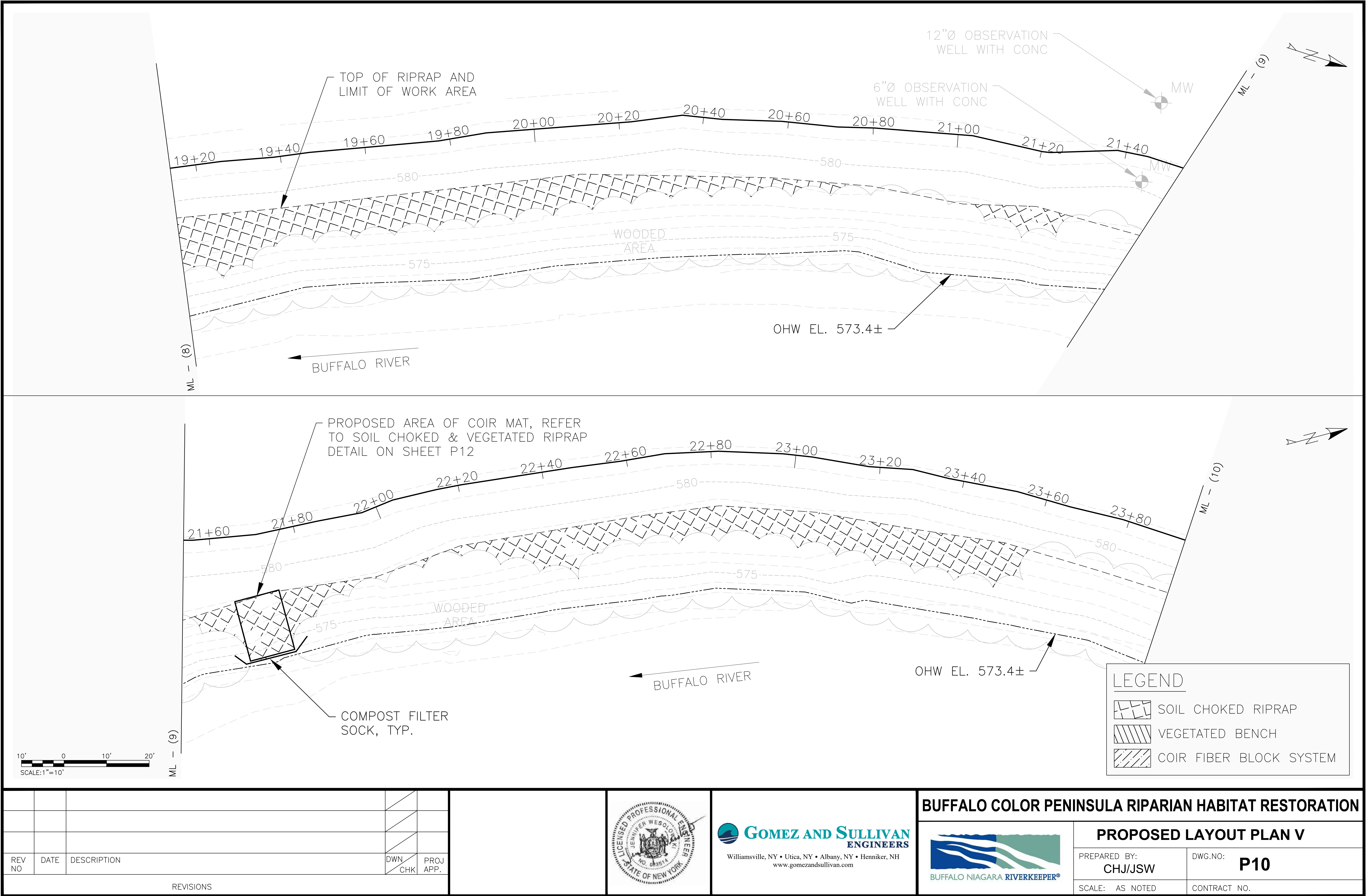
PREPARED BY: CHJ/JSW
SCALE: AS NOTED

DWG.NO: **P8**
CONTRACT NO.

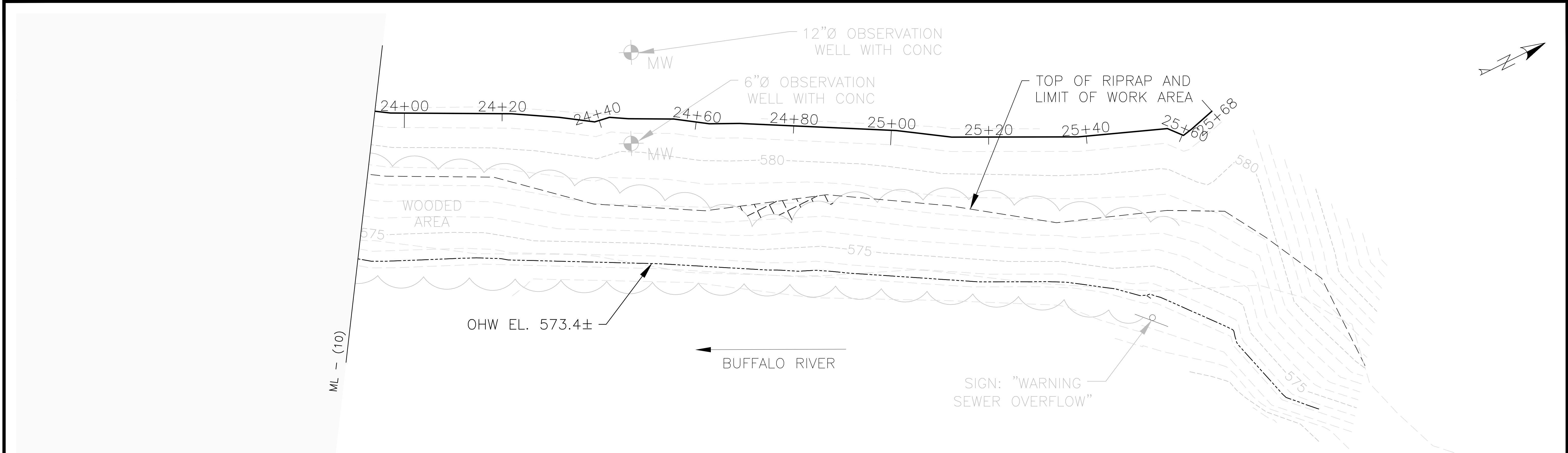
JOB MANAGER D. FRAZIER



JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTLER



JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTLER



LEGEND

SOIL CHOKED RIPRAP

VEGETATED BENCH

COIR FIBER BLOCK SYSTEM

REV NO	DATE	DESCRIPTION	DWN CHK	PROJ APP.
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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION

BUFFALO NIAGARA RIVERKEEPER®

PROPOSED LAYOUT PLAN VI

PREPARED BY:
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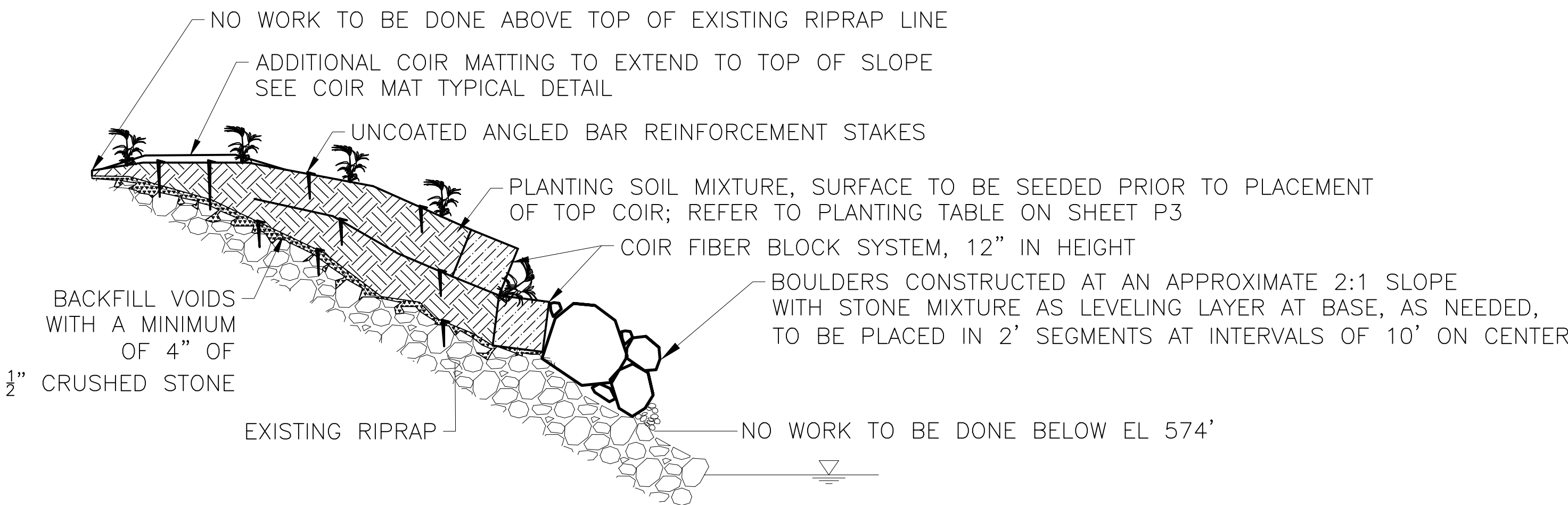
SCALE: AS NOTED

DWG.NO:
P11

CONTRACT NO.

JOB MANAGER D. FRAZIER DESIGN E. REDDING/J. WESOLOWSKI DRAFTING C. JENKINS CHECK M. STOTTLER

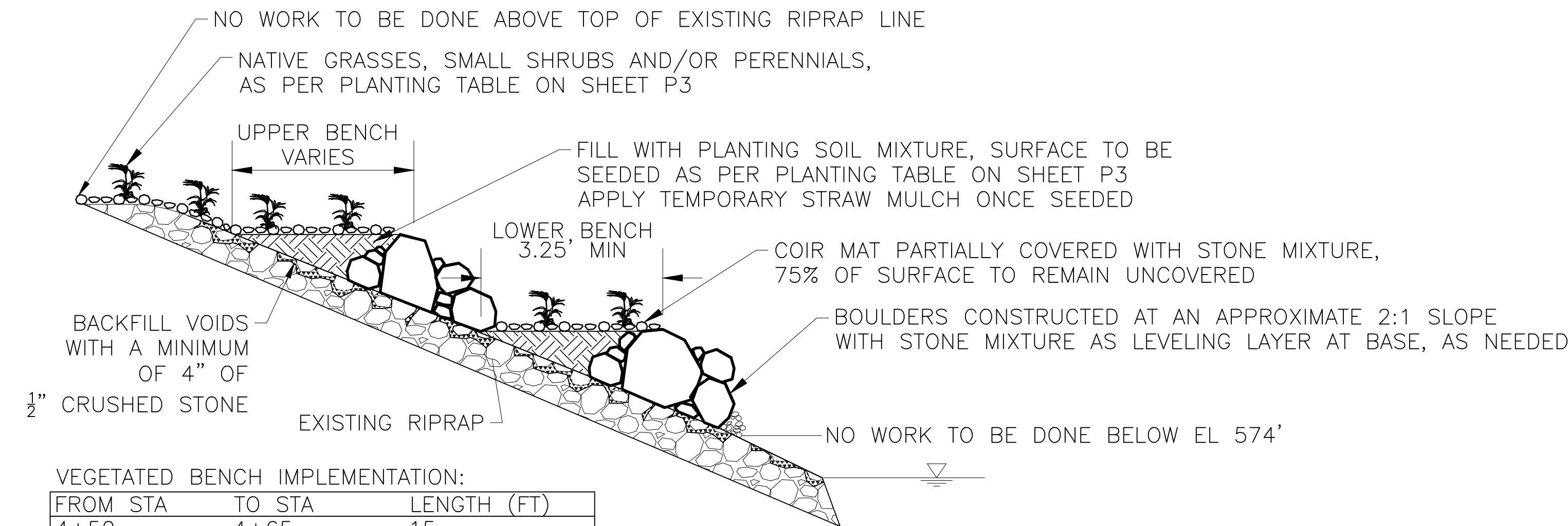
COIR FIBER BLOCK SYSTEM TYPICAL DETAIL



COIR FIBER BLOCK IMPLEMENTATION:

FROM STA	TO STA	LENGTH (FT)
4+20	4+50	30
5+40	5+80	40
6+20	7+50	130
11+15	11+30	15
15+35	15+70	35

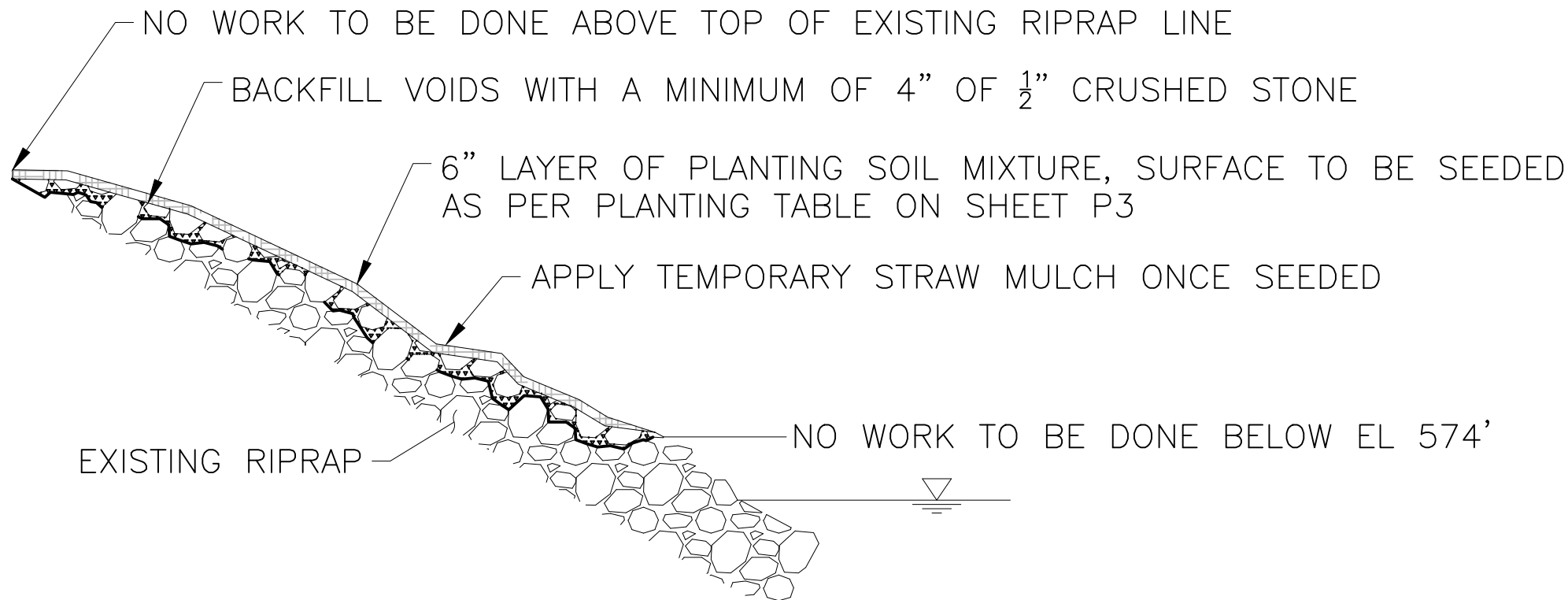
VEGETATED BENCH TYPICAL DETAIL



VEGETATED BENCH IMPLEMENTATION:

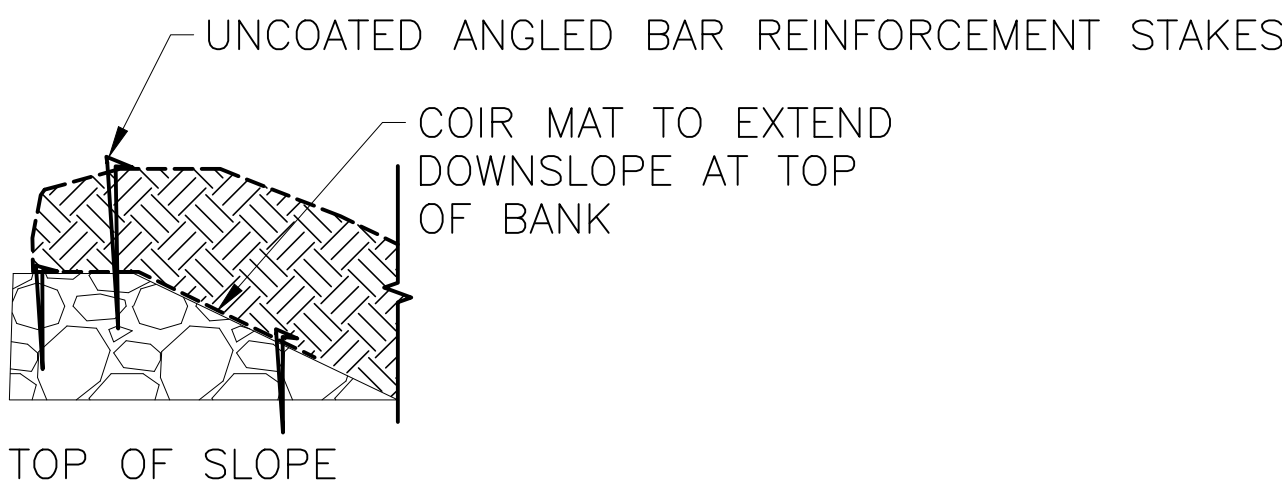
FROM STA	TO STA	LENGTH (FT)
4+50	4+65	15
5+80	5+95	15
7+50	7+80	30
11+30	11+45	15
15+70	15+95	25

SOIL CHOKED AND VEGETATED RIPRAP TYPICAL DETAIL

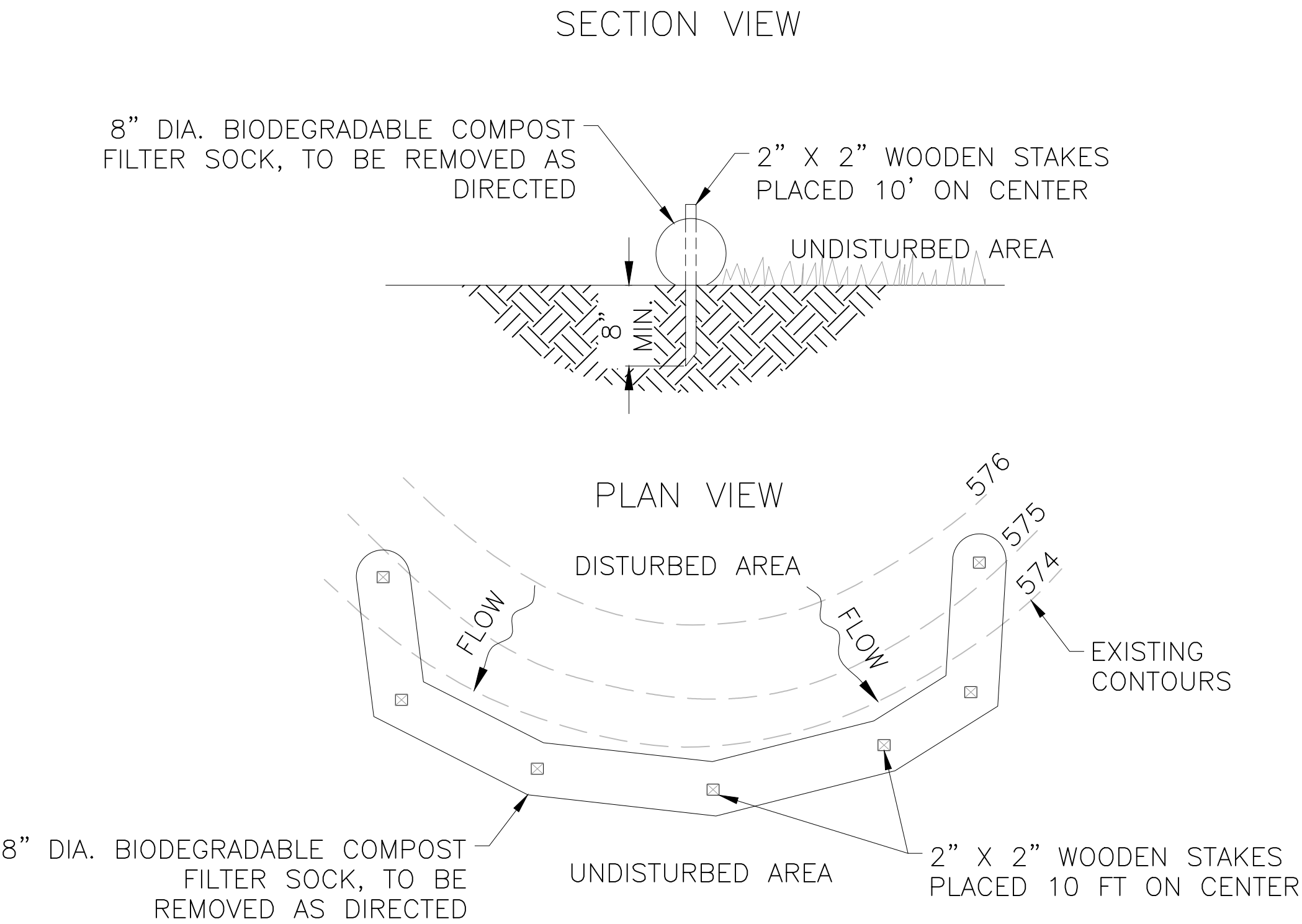


NOTE: IN AREAS WHERE SOIL CHOKED RIPRAP EXTENDS TO THE WATERLINE, A LENGTH OF COIR MAT SHALL BE INSTALLED FROM THE TOE AND EXTEND TO TOP OF BANK. COIR MAT SHALL BE PLACED ABOVE THE SOIL AND SEED MIXTURE, AND PINNED IN PLACE WITH REBAR. COIR MAT SHALL BE PARTIALLY COVERED WITH STONE MIXTURE. 75% OF SURFACE TO REMAIN UNCOVERED.

COIR MAT TYPICAL DETAIL



COMPOST FILTER SOCK TYPICAL DETAIL



DETAIL NOTES:
1. REFER TO NOTES ON SHEET P1 FOR PLANTING SOIL MIXTURE, STONE MIXTURE, 1/2" CRUSHED STONE, BOULDERS, COMPOST, AND TEMPORARY STRAW MULCH DESCRIPTIONS.

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BUFFALO COLOR PENINSULA RIPARIAN HABITAT RESTORATION

RESTORATION DETAILS

PREPARED BY:
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DWG.NO:
P12

SCALE: AS NOTED

CONTRACT NO.

APPENDIX C. DATASHEET USED FOR FIELD DATA COLLECTION

BUFFALO COLOR PENINSULA RIPARIAN RESTORATION PROJECT									
Date:		Time:		Weather:					
Field Crew:									
Plot Number:			Map Coordinates:						
Shoreline Stability: (Scale: 1-10)		<input type="checkbox"/> Unstable 1-2		<input type="checkbox"/> Moderately Unstable 3-5		<input type="checkbox"/> Moderately Stable 6-8		<input type="checkbox"/> Stable 9-10	
Signs of Erosion:		<input type="checkbox"/> Exposed Roots		<input type="checkbox"/> Undercutting		<input type="checkbox"/> Gullies		<input type="checkbox"/> Other:	
Additional Site Challenges:									
Plant Community :									
Plant Species Rooted within the Plot (scientific names)				Native (N) or Invasive (I)?	Plant Species Rooted within the Plot (scientific names)				Native (N) or Invasive (I)?
Total Areal Percent Cover of All Plant Species Together:									
Areal Percent Cover of All Invasive Plant Species Together:									
Do invasive plant species appear to be interfering with native ecosystem function?						<input type="checkbox"/> Yes		<input type="checkbox"/> No	
Photo Number:									
Site Condition Comments:									

APPENDIX D. PHOTOGRAPHS FROM STUDY AREA PLOTS 1-10

Plot 1
Pre-construction



Post-construction



Plot 2
Pre-construction



Post-construction



Plot 3
Pre-construction



Post-construction



Plot 4

Pre-construction



Post-construction



Plot 5
Pre-construction



Post-construction



Plot 6
Pre-construction



Post-construction



Plot 7
Pre-construction



Post-construction



Plot 8
Pre-construction



Post-construction



Plot 9
Pre-construction



Post-construction



Plot 10
Pre-construction



Post-construction

