Final Basis of Design Report
Lincoln Park/Milwaukee River Channel Sediments Site
Phase II Feasibility Study/Remedial Design
Milwaukee Estuary Area of Concern, Milwaukee, Wisconsin

Great Lakes Architect-Engineer Services
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Prepared for

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
BOD	Basis of Design
BMP	Best Management Practices
bss	Below Sediment Surface
BUI	Beneficial Use Impairment
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CKD	Cement Kiln Dust
COC	Contaminant of Concern
CWA	Clean Water Act
cy	Cubic Yard
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
EA	EA Engineering, Science, and Technology, Inc.
EPA	U.S. Environmental Protection Agency
ft	Feet/Foot
ft^2	Square Feet/Foot
FS	Feasibility Study
GLNPO	Great Lakes National Program Office
gpm	gallon(s) per minute
HEC-RAS	Hydrologic Engineering Centers River Analysis System
in.	Inch(es)
kg	Kilogram
lbs	Pounds
LIDAR	Light Detection and Ranging
LNAPL	Light Non-Aqueous Phase Liquid
mg/kg	milligram(s) per kilogram
NAPL	Non-Aqueous Phase Liquid
NPDES	National Pollutant Discharge Elimination System
NR	Natural Resources

NRCS	Natural Resource Conservation Service
NRT	Natural Resource Technology
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCT	Project Coordination Team
PE	Professional Engineer
ppm	part per million
RA	Remedial Action
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
STN	STN Environmental JV
SVOC	Semivolatile Organic Compound
TCAC	Technical and Citizens Advisory Committee
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TSS	Total Suspended Sediments
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USGS	U.S. Geological Survey
VE	Value Engineering
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollution Discharge Elimination System

1. INTRODUCTION

EA Engineering, Science, and Technology, Inc. (EA) has prepared this Final Basis of Design Report for Task Order 0005 under U.S. Environmental Protection Agency (EPA) Great Lakes National Program Office (GLNPO) Great Lakes Architect-Engineer Services Contract No. EP-R5-11-10.

The purpose of this Final Basis of Design (BOD) Report is to present the drawings and specifications that will be used to translate the selected remedy for the Lincoln Park/Milwaukee River Channel Sediments Site Phase II into a remedy that will be constructed during the remedial action (RA). Based on evaluations of the site conditions and potential alternatives and costs, the EPA GLNPO and the Wisconsin Department of Natural Resources (WDNR), in consultation with Milwaukee County Parks, selected a remedy for the Site that includes removal and offsite disposal of sediments contaminated with polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and non-aqueous phase liquid (NAPL) (EA 2013b).

This Final BOD Report includes the design assumptions and parameters, including (1) waste characterization; (2) pre-treating requirements; (3) volume and types of each medium requiring treatment; (4) treatment schemes (including all media and byproducts), rates, and required qualities of waste streams (i.e., input and output rates, influent and effluent qualities, potential air emissions, and so forth); (5) performance standards; (6) long-term performance monitoring, and operations and maintenance (O&M) requirements; (7) compliance with pertinent codes and standards; (8) technical factors of importance to the design and construction including use of currently accepted environmental control measures, constructability of the design, and use of currently acceptable construction practices and techniques.

In addition to the discussion presented in the text, this Report is supported by documents provided in the following appendixes:

- **Appendix A** presents the engineering drawings.
- **Appendix B** presents the technical specifications.
- **Appendix C** presents the engineering calculations supporting the design.
- **Appendix D** presents the hydraulic model.
- **Appendix E** presents the construction schedule.
- **Appendix F** presents the cost estimate.

The major components of the selected remedy include the following:

- Permitting of construction activities.

- Mobilization and site support services (such as field offices, sediment dewatering pad, wastewater treatment pad and system, decontamination pads, access roads, temporary fencing, security, power, storage, etc.) within the areas that are available to the Contractor.

- Installing temporary cofferdams and dewatering cofferdam areas.
- Excavating 35,240 cubic yards (cy) of contaminated sediment from eight deposits.
- Hydraulic dredging of 572 cy of contaminated sediment from two deposits.
- Sediment dewatering, including combination of *in-situ*, solidification amendments and/or dewatering pad, as necessary.
- Transport and disposal of contaminated sediment to Subtitle C and Subtitle D landfills based on contaminant concentrations.
- Treating contaminated water and discharge with energy dissipation to Milwaukee River.
- Habitat restoration.
- Site restoration and demobilization.

1.1 SITE DESCRIPTION

The Lincoln Park area was originally occupied by an oxbow of the Milwaukee River. The area was excavated in the 1930s to create a new, straighter main channel for the Milwaukee River, leaving the former main channel as the east and west oxbows. The site contains sediments that were transported from Lincoln Creek and the Milwaukee River (STN Environmental JV [STN], 2009). The Estabrook Dam located at the southern extent of the site was built on a limestone outcrop in the late 1930s to aid navigation and to maintain a pool of water above the dam for boating, swimming and fishing. The dam is currently owned and operated by Milwaukee County. The bottom draw design of the dam, and periodic opening and closing of the dam has allowed the sediment to dewater, resulting in some compaction of the sediment upstream within the impoundment (WDNR 2005).

The site is located within the cities of Milwaukee, Wisconsin, and Glendale, Wisconsin; and the land is owned by Milwaukee County Parks and multiple private landowners. Figure 1 shows the boundaries of the site, which is within the Milwaukee Estuary Area of Concern (AOC) between the railroad bridge north of the oxbow area, downstream to the Estabrook Park Dam including the east oxbow. The site is divided into Sub-Zone 3b and Zones 4 through 7. Zones 1, 2, and the remainder of Zone 3 have been remediated as part of Phase I and consisted of containment, dry excavation and off-site disposal (CH2M HILL 2012). Additionally, a small area adjacent to Blatz Pavilion was remediated prior to the Phase I remediation. The zones for the site (listed from upstream to downstream) (Figure 2) consist of the following deposits of contaminated sediments:

- **Zone 7:** Consists of Deposits 7-1, 7-2, 7-3, and 7-4; and is located in the Milwaukee River between the eastern and western oxbows. The western limit of Deposit 7-2 is the sheet pile wall left in place after the Phase I remediation (CH2M HILL 2012). A small

deposit of PAHs was found on the west side of the eastern island, but these detections were not considered indicative of larger deposits of sediments containing PCBs or PAHs requiring remediation (EA 2013b). Zone 7 is located in the City of Glendale, Wisconsin and the land is owned by Milwaukee County Parks.

- **Sub-Zone 3:** Consists of Deposit 3b-1 and is located at the southern outflow of the west oxbow into the Milwaukee River. The western limit of Deposit 3b-1 is approximately the junction of the oxbow channel with the main channel of the Milwaukee River. Zone 3b-1 is located in the City of Glendale, Wisconsin and the adjacent upland is owned by Milwaukee County Parks.

- **Zone 4:** Consists of Deposits 4-1, 4-2, and 4-3; and is located downstream of Deposit 3b-1 after the bend in the Milwaukee River. Zone 4 is located in the City of Glendale, Wisconsin. Deposits 4-1 and 4-2 occupy land owned by Milwaukee County Parks. Deposit 4-3 occupies land owned by multiple private landowners adjacent to residences and the State of Wisconsin adjacent to the I-43 Bridge and on-ramp.

- **Zone 5:** Consists of Deposit 5-1 and is located upstream of the Estabrook Park Dam spillway. Deposit 5-1 is located in both the Cities of Milwaukee and Glendale, Wisconsin and the land is owned by multiple commercial entities.

The Estabrook Park Dam forms the downstream boundary of the Lincoln Park/Milwaukee River site, and backs up water approximately 2.5 mi to a point 0.3 mi upstream of Silver Spring Road on the Milwaukee River, creating a 103-acre impoundment. The Estabrook Park Dam was built on a limestone outcrop in the river channel and has a hydraulic height of 8 ft and maximum storage of 700 acre-ft. The Estabrook Park Dam, which is owned and operated by Milwaukee County, was historically kept open during the winter and closed in the summer. The water pool behind the Estabrook Park Dam also has historically been lowered in anticipation of high flows. The bottom draw design of the Estabrook Park Dam and periodic opening and closing of the dam has caused some compaction of sediment within the impoundment due to dewatering/wetting cycles.

Inspections by WDNR have identified the need for significant repair work on the Estabrook Park Dam and fixed crest spillway. WDNR issued a Repair or Abandon Order to Milwaukee County on 28 July 2009. The order establishes deadlines for Milwaukee County to meet, which are related to outstanding maintenance and repair requirements. The order also gives Milwaukee County the option to decide whether to abandon the dam. The decision for repair or abandonment is the responsibility of Milwaukee County, the owner of the dam. The dam will remain open until it is repaired or abandoned.

1.2 PHYSICAL SITE CHARACTERISTICS

The regional geology of the site is dominated by the effects of multiple glacial advances and retreats. Coarse-grained (sand and gravel) glacial outwash deposits predominate along the Milwaukee River, which occupies the course of a former glacial outwash channel. Surface and

near-surface deposits outside the area immediately along the Milwaukee River tend to be dominantly fine-grained (silt and clay) glacial till deposits (STN 2009).

The individual deposits identified as targets for remediation (Figure 2) are described in detail below, in order from upstream to downstream within the site, and details of the deposits are presented in Table 1 (CH2M HILL 2011a; EA 2013b).

Most deposits have a large proportion of fine grained material, with a site-wide average of 58 percent for the fraction of fines, and an average of 14 percent for coarse sand and gravel. Percent moisture averages 28 percent across the site.

1.2.1 Zone 7

Deposit 7-1: Deposit 7-1 is located at the northern end of the east oxbow. The sediment that composes this deposit is approximately 70 percent fines, with fine and medium sand, and less than 5 percent coarser material (Table 1).

Deposit 7-2: Deposit 7-2 is located at the northern end of the west oxbow, extending from the North Bridge area southeast, along the bar on the western side of the adjacent island. The sediment that composes this deposit is approximately 65 percent fines, with fine and medium sand, and less than 10 percent coarser material (Table 1).

Deposit 7-3: Deposit 7-3 is located on the western bank of the main channel, adjacent to the island defined by the western oxbow confluences. The sediment that composes this deposit is approximately 70 percent fines, with fine and medium sand, and 7 percent coarser material (Table 1).

Deposit 7-4: Deposit 7-4 is located at the southern end of the eastern oxbow. The sediment that composes this deposit is approximately 75 percent fines, with fine and medium sand, and 4 percent coarser material (Table 1).

1.2.2 Zone 3

Deposit 3b-1: Deposit 3b-1 is located at the southern outflow of the west oxbow, near the South Bridge. The sediment that composes this deposit is a mix of fine to medium sand and fines (silt and clay), with approximately 9 percent coarse sand and gravel (Table 1).

1.2.3 Zone 4

Deposit 4-1: Deposit 4-1 is located along the northern bank at the bend in the river. The sediment that composes this deposit is mostly fines, with fine and medium sand, and less than 3 percent coarser material (Table 1).

Deposit 4-2: Deposit 4-2 is located along the northern bank just east of Deposit 4-1. The grain size of sediment in this deposit was not analyzed, but is assumed to be similar to that of Deposit 4-1 based on deposit location and setting.

Deposit 4-3: Deposit 4-3 is located along the southern bank, under the I-43 bridge over the river. The sediment that composes this deposit is more than 70 percent coarse sand and gravel, with some finer sand and fines (Table 1).

1.2.4 Zone 5

Deposit 5-1: Deposit 5-1 is located along the southern bank, just upstream of the Estabrook Park Dam fixed crest spillway. The sediment that composes this deposit is approximately 70 percent fines, with fine and medium sand, and less than 3 percent coarser material (Table 1).

Table 1 – Summary of Sediment Deposits

Sediment Deposit Name	Chemicals of Concern	Maximum Detected Concentrations (mg/kg)		Geotechnical Information				
		PCBs	PAHs	Core Sediment Recovery (%)[a]	Fraction of Coarse Sand and Gravel (%)	Fraction of Fine and Medium Sand (%)	Fraction of Fines (%)	Moisture[b] (%)
Deposit 7-1	PCBs, PAHs	3.0	105	70	5	26	70	13
Deposit 7-2	PCBs, PAHs, NAPL	162	247	71	10	25	65	27
Deposit 7-3	PCBs, PAHs	8.1	44	71	7	23	69	38
Deposit 7-4	PCBs, PAHs	2.4	37	84	4	20	76	41
Deposit 3b-1	PCBs, PAHs, NAPL	1.6	37	81	9	43	49	27
Deposit 4-1	PCBs, PAHs	1.5	117	77	3	39	58	28
Deposit 4-2	PCBs, PAHs	1.9	33	73				19
Deposit 4-3	PCBs, PAHs	3.7	115	84	70	18	12	18
Deposit 5-1	PCBs, PAHs	230	469	60	3	28	69	45
Overall	**PCBs, PAHs, NAPL**	**230**	**469**	**75**	**21**	**32**	**47**	**27**

a) Percent recovery averages were calculated using 100% for any recovery greater than 100%. Value was calculated for all cores where both penetration (sediment depth) and core length (recovery) were available.
b) Ratio of water mass to solids mass, expressed as a percentage.

1.3 PROJECT BACKGROUND AND SITE INVESTIGATIONS

PCB contamination was initially identified in the Milwaukee River through fish tissue sampling in 1981. Contaminated sediment has been recognized to be the major contributor to use impairments within the Milwaukee Estuary AOC (Technical and Citizens Advisory Committee [TCAC] 1994). Beneficial Use Impairments (BUIs) in the AOC include fish consumption advisories, such as those in effect from Grafton to the mouth of the Milwaukee River due to

contamination from PCBs. The contaminated sediment management strategy of the Milwaukee Remedial Action Plan (RAP) identified remediation of upstream sources of contaminated sediments as a top priority.

A PCB mass balance study conducted by Baird & Associates in 1997 estimated that the Lincoln Park/Milwaukee River sediments held over 100,000 cy of sediment contaminated with an estimated 5,200 kilograms (kg) (11,500 pounds [lbs]) of PCBs (as aroclor 1242). The mass balance study determined the Lincoln Park/Milwaukee River site contribute the greatest mass loading of PCBs to the Milwaukee River and Harbor, and that remediation of contaminated sediment within this area is expected to result in long-term reduction in PCB mass transport in the Milwaukee River of up to 70 percent (Baird & Associates, 1997).

WDNR conducted a predesign study of the Lincoln Park/Milwaukee River site beginning in 2000 under a grant from EPA GLNPO. Water and sediment samples were collected on 12 dates between October 2001 and September 2003. Sediment samples were collected using a core sampler and a ponar dredge sampler. A total of 246 sediment samples were used to map the occurrence and distribution of PCBs, PAHs and metals in the impoundment sediments. Other data collected included water depth, sediment thickness, sediment total organic content, and geotechnical characteristics (WDNR 2005). The maximum historical total PCB concentration detected in the Phase II area was 62 milligram per kilogram (mg/kg) at location EST 2-14 collected in 2002. Location EST 2-14 is located on the western side of the main channel of the Milwaukee River, immediately downstream from the confluence of the west oxbow (CH2M HILL 2011).

In December 2007, the Milwaukee County Parks Department collected surface and subsurface sediment samples from four locations (SS-1 through SS-4) immediately upstream of the fixed spillway at the Estabrook Park Dam. Sampling was performed to characterize the sediments that could potentially become displaced during debris removal activities. Each sediment sample was analyzed for semivolatile organic compounds (SVOCs) and PCBs. Selected surface and subsurface samples were also analyzed for volatile organic compounds (VOCs) and Resource Conservation and Recovery Act (RCRA) metals (Himalayan Consultants, LLC [Himalayan] 2008).

From March through August 2008, approximately 4,700 cy of contaminated sediment were removed and the site backfilled to prevent additional sediment accumulation at a small area immediately adjacent to the Blatz Pavilion Lagoon (located within Zone 3) through funding from WDNR (Natural Resource Technology [NRT] 2009). The Blatz Pavilion Lagoon area is isolated from the other contaminated areas in Zones 1 through 7 and has easy public access. WDNR selected the Blatz Pavilion Lagoon site to be the first area remediated.

EPA GLNPO in partnership with WDNR and Milwaukee County Parks completed a RA and habitat restoration in the Lincoln Park Phase I area in 2012 (CH2M HILL 2012). The Phase I Remedial Design estimated 100,000 cy of contaminated sediments were present in the Phase I area, but 120,000 cy of contaminated sediments were removed during the Phase I RA. This translates to approximately 5,000 lbs of PCBs and 4,000 lbs of PAHs.

Working closely with WDNR and Milwaukee County Parks, EPA GLNPO completed a remedial investigation (RI) of the Phase II Lincoln Park area (CH2M HILL 2011). The RI sampled sediments in all portions of the site and found areas of PCBs and PAHs that need additional evaluation in a feasibility study (FS). NAPL was discovered during the Phase I RA, which commenced after the Phase II RI was completed, but not during the phase II RI which illustrates the scattered nature of the NAPL deposits.

On 15 July 2010, an intense rainfall produced approximately 5.5 inches (in.) of rainfall and was measured to exceed a 100-year storm event by the Milwaukee Metropolitan Sewer District. On 22 July 2010, an additional 4 in. of rain was received in a 1-hour duration, exceeding the 100-year equivalent of 2.93 in. of rainfall received in a 1-hour duration (Huff and Angel 1992). Both events are potential sources of sediment transport that followed the RI activities.

After completion of RI activities in July 2010, the Milwaukee County Parks Department collected surface and subsurface sediment samples from 15 locations (S-1 through S-15) immediately upstream of the fixed spillway at the Estabrook Park Dam. Sampling was performed to characterize the sediments required to be removed as part of the Estabrook Park Dam rehabilitation and sediment removal planning. Each sediment sample was collected in at least two depth intervals and analyzed for PCBs (AECOM 2010).

Planning for the FS included a field effort to collect additional chemical analytical data; bathymetric, lithologic, and sediment thickness data; and geotechnical data (EA 2013a). A key focus was delineating the extent of NAPL deposits at the site. Investigation included confirmation of past bathymetric results to determine if recent flood events have changed bottom topography since preparation of the RI. Bathymetric results were determined to be relatively similar to the RI bathymetry. Sediment sample locations are shown in Figures 3 and 4. Additionally, habitat and wetland evaluations of the site and its immediate adjacent land were conducted to define and evaluate the existing habitats and wetlands throughout the study area (EA 2013c and 2013d). Figure 5 shows the Wetland Map (EA 2013d) for the site. The findings were used in the FS to determine potential impacts associated with the proposed remedial activities and assess habitat restoration activities that could be conducted in conjunction with the remedial activities.

A FS was conducted in September 2013. The FS Report (EA 2013b) presents the RA objectives, technology screening, and alternatives development and evaluation.

1.3.1 Project Coordination Team

GLNPO brings together federal, state, tribal, local, and industry partners in an integrated, ecosystem approach to protect, maintain, and restore the chemical, biological, and physical integrity of the Great Lakes. Table 2 lists the Project Coordination Team (PCT).

Table 2 – Project Coordination Team

Entity	Role/Responsibility
Federal: EPA - GLNPO	Lead Federal Agency and Project Owner
State: WDNR	Non-Federal Sponsor
Local: Milwaukee County Parks	Non-Federal Sponsor and Property Owner

1.4 REMEDIAL ACTION OBJECTIVES

Following submittal of the FS Report (EA 2013b), GLNPO and WDNR (in consultation with Milwaukee County Parks) selected a remedial alternative consisting of dry excavation, hydraulic dredging, and disposal of sediments. The selected remedial alternative incorporates dry excavation and offsite disposal technologies similar to those used in remediation during Phase I, with the addition of limited hydraulic dredging for flexibility in removing sediments in areas that are difficult to dewater or difficult to access with dry excavation equipment. Restoration to be implemented includes wetland restoration, substrate restoration, and turf and seeding.

The purpose of the remediation project is to address the following RA objectives:

- Remove/manage sediments contributing to the following BUIs within the Milwaukee Estuary AOC:
  - Restrictions on fish and wildlife consumption
  - Degradation of fish and wildlife populations
  - Degradation of benthos
  - Restrictions on dredging activities

- Minimize potential risks to human health and the environment during remedial activities.

- Upon completion of remedial activities, restore habitat in the remediated areas.

1.4.1 Removal of Sediments Contributing to AOC BUIs

The sediment removal Remedial Action Objectives (RAOs) were selected to achieve the objective of removing/managing sediments contributing to the BUIs listed above. Remediation of sediments with contaminants of concern (COCs) concentrations exceeding the RAOs will not only help alleviate contamination within the site, but will also reduce the source of PCBs and PAHs to downstream portions of the AOC, thus, supporting removal of BUIs. Site COCs include PCBs, PAHs, and NAPL.

1.4.1.1 Polychlorinated Biphenyls

For PCBs (total PCB Aroclors), the RAO for the site is less than or equal to 1 mg/kg, equal to 1 part per million (ppm) (WDNR 2013). Where less than 1 ppm is impracticable (e.g., bedrock) a surface-weighted average concentration of less than 1 ppm will be achieved through excavation and residuals management if needed. This RAO is consistent with the RAO established in the

Phase I FS (CH2M HILL 2012) and used to guide RAs in that area. A remedial goal of 1 mg/kg total PCBs was also used during remediation of sediments adjacent to Blatz Pavilion, which is located in the Phase II area (Figure 1) (NRT 2007).

1.4.1.2 Polycyclic Aromatic Hydrocarbons

For PAHs, the RAO for the site is less than or equal to 20 mg/kg. Sediments with PAH concentrations between 20 and 40 mg/kg may not require remediation if the resulting surface-weighted average concentration is below or equal to 20 mg/kg (Figure 6) (WDNR, 2013). This is part of a flexible approach to the RAOs, as proposed in the memorandum, to allow the goals to be adapted for compatibility with the remedial techniques selected and is consistent with the PAH RAOs developed during the Phase I RA.

1.4.1.3 Non-Aqueous Phase Liquid

Given their potential to act as a source of PAHs and to produce physical impacts on sediment quality, any detection of NAPL is considered to require remediation. For NAPL, the RAO for the site is any sediment containing field-identifiable NAPL material (based on staining, odor, and Sudan IV testing if necessary).

1.4.2 Habitat Restoration

1.4.2.1 Restore Habitat Affected by Sediment Remediation Activities

Restoration will be focused on areas disturbed by the Phase II construction activities. The primary habitat RAO of the site is "*restoration of the habitat to a system that is self-sustaining, but which may be unlike pre-remedial conditions.*"

The restoration of this system may include the restoration of wetlands in their present or nearby locations, the removal of invasive species, the planting of native species, or the stabilization of bed and banks following disturbance from the RA.

Similarly, this goal encompasses the restoration or stabilization of upland or riparian areas to stable self-sustaining slopes, re-vegetation (be that in turf, forested buffer, or wetland vegetation), and restoration of aesthetic elements. This may include enhancements, such as the removal of invasive non-native vegetation and replacement with native vegetation, or elements which improve park utilization, park access, or aesthetics.

1.4.2.2 Minimize Potential for Erosion

A separate, but closely related, habitat RAO is "*the establishment of self-maintaining river and habitats with limited bank and bed erosion or aggregation*.".

The restored river reach should not be subject to any greater probability of bank erosion, bed scour, or accretion of sediments than the river is presently subject to. Closely related to this, the

channel thalweg (or deepest portion) should be maintained in approximately the same position, and be as stable in its position as it is presently.

This goal directly relates to protecting infrastructure and maintaining the present recreational uses within the limits of the existing depositional regime.

1.4.2.3 Regulatory Compatibility of Habitat

Various requirements may arise through local, state, and federal permitting requirements. Therefore, the "*restoration of habitats such that they comply with relevant requirements for natural resources permitting*" is a necessary RAO.

An important part of this regulatory compliance goal is ensuring that the 100-year floodplain elevation is not increased, that channel velocities for flood events are not increased, and that the flood impact footprint is not expanded. While flooding in the river is inevitable, the remedial action and its restoration should not increase the magnitude or frequency of flooding. These elements are discussed within the hydrology and hydraulics section 3.2.3 of this report.

Wetlands restoration is a significant component of federal and state regulatory compliance. Under wetlands restoration requirements, any impacted wetlands must be restored to their existing condition, or re-located within the project footprint. When this is accomplished, wetlands impacts are regarded as temporary, or the project is self-mitigating with no net loss of jurisdictional wetlands. Although offsite mitigation may be an option for permanent wetlands impacts that cannot be mitigated within the project footprint, this option is costly and less favorable in a regulatory context than temporary impacts to wetlands or a self-mitigating project.

1.5 HYDROLOGY

Flow of the Milwaukee River runs from north to south to the bend south of W. Hampton Avenue, and from west to east from the bend towards Estabrook Park Dam. The drainage area for the Milwaukee River upstream of the Estabrook Park Dam is approximately 696 square mi (CH2M HILL 2011). Hydrology of the Milwaukee River in the vicinity of the site has historically been controlled by the Estabrook Park Dam, which was used to raise water levels by 4–8 ft in summer months to provide navigable waters for recreation. In 2009, WDNR issued a Repair or Abandon Order to Milwaukee County based on the need for repair and maintenance work. Since that time, the dam has remained open and will remain open until a decision is made regarding repair work and the work is completed. Milwaukee County is currently seeking to prepare an Environmental Assessment under the National Environmental Policy Act evaluating alternatives for repair or abandonment of the dam. The eventual outcome of decision-making regarding the dam will heavily influence site hydrology and habitats.

Flow rates within the Milwaukee River at Lincoln Park are highly variable. U.S. Geological Survey (USGS) stream gauge (04087000) data from immediately downstream of the site indicate monthly mean flow of approximately 220–1,060 cubic feet per second (cfs). Peak discharge for the 2-year storm event is approximately 4,730 cfs; for the 100-year storm event, peak discharge

is 14,770 cfs (Walker and Krug 2003). Flows over the last 3.5 years have demonstrated a broad range of variability, with instantaneous peak flows over 18,000 cfs observed in June 2010, and flows below 60 cfs observed in October 2012. Highest flows are expected in association with spring thaw and episodic summer storm events. Flow variability has the potential to affect both the distribution of habitats and topographic features within the Milwaukee River channel and floodplain as well as the potential to affect planning of remediation techniques. Many of the point bars and side bars formed in the river channel are exposed during low flow and submerged during high flows.

The water depths in the project area are largely a function of whether Estabrook Park Dam is open or closed, and range from approximately 1 to 4 ft. Historically, the dam was operated to be opened to allow unrestricted water flow in early-October and closed in early-May through the summer months to sustain a target water elevation of 616 ft. Since July 2009, the dam has remained open due to a WDNR-issued Repair or Abandon Order to Milwaukee County requiring the dam to remain open until it is repaired or abandoned.

1.6 HABITATS

The site and associated riparian area are a combination of warm-water fishery, deciduous riparian buffer, and fringe emergent/scrub-shrub wetland habitats. These habitats exist in close proximity to mowed/turf areas within the maintained areas of Lincoln Park. Riparian buffer and upland deciduous habitats are primarily composed of early-successional and invasive species covered with sporadic larger maples and oaks in the upland portions. Silver maple, eastern cottonwood, and black willow dominate the wetland areas.

Aquatic warm-water habitats are generally shallow and dominated by soft sediments and warm water species. EA utilized WDNR's Fish Mapper utility to determine the species composition of the fishery; data were gathered in 1995, 1997, and 2010 immediately downstream of the existing dam. Round Goby, an invasive Eurasian species, was identified in 2010. Data from 1995 to 1997 include Bluegill, Blackside Darter, Bluntnose Minnow, Black Crappie, Common Carp, Golden Redhorse, Greater Redhorse, Green Sunfish, Johnny Darter, Rock Bass, Largemouth and Smallmouth Bass, Walleye, Log Perch, Pumpkinseed, Spotfin Shiner, Walleye, Stonerollers, Sand Shiner, Common Shiner, Black Bullhead, Black Darter, Rock Bass, and Common White Sucker. Although not recorded, seasonal migrations of Rainbow Trout, and Chinook and Coho Salmon may be expected in this area as well.

2. DESIGN CRITERIA

The following sections provide the Design Criteria that describe the technical parameters upon which the design is based.

2.1 CONTAMINATED MEDIA

This section discusses the contamination-impacted media at the site, as well as design and performance standards, compliance with regulations, and technical factors of importance. The media impacted by site COCs includes sediment. Site COCs may impact surface water during the RA.

2.1.1 Sediment

The RAO exceedances have been identified at nine deposits (Deposits 7-1, 7-2, 7-3, 7-4, 3b-1, 4-1, 4-2, 4-3, and 5-1) that are subject to RA due to impacts from PCBs, PAHs, and NAPL (Figures 7, 8, and 9). Two of the nine deposits (Deposits 7-2 and 5-1) have been found to contain high concentrations of PCBs that required separate handling and disposal of the sediment under the Toxic Substances Control Act (TSCA) due to PCB concentrations equal to or exceeding 50 mg/kg. Sediments containing PCB concentrations equal to or exceeding 50 mg/kg will be referred to as TSCA sediments and those containing less than 50 mg/kg will be referred to as Non-TSCA sediments throughout this report. Two of the deposits (3b-1 and 7-2) have also been found to contain NAPL. Deposits 4-1, 4-2, 4-3, and 5-1 have not been tested for NAPL. Based on photographs of Sudan IV testing (EA 2013b), NAPL was determined to be light NAPL (LNAPL).

2.1.2 Surface Water

Surface water contacting contaminated sediments has the potential to become contaminated during the RA. Therefore, water contacting contaminated sediments within cofferdams will require treatment to remove PCBs, PAHs, and LNAPL prior to discharge into the Milwaukee River. Structures, such as silt barriers, will be required during hydraulic dredging. Figure 10 shows the proposed treatment flowchart based on the requirements during the Phase I RA and is the basis for the wastewater treatment scheme discussed in Section 3.1.4. Permits discussed in Section 3.3.4 will set the final requirements.

2.2 PRE-TREATMENT REQUIREMENTS

Dry excavation work zones and sediment located under water, require pre-treatment to allow for excavation by conventional earthmoving equipment and dewatering of sediments for disposal. Pre-treatment will include cofferdams and removal of water from within the cofferdams. The cofferdams will allow for passive *in-situ* dewatering of the sediments and will allow pumping of water from the work areas to allow conventional earthmoving equipment to excavate the contaminated sediments while protecting workers.

Following excavation or hydraulic dredging, sediments must meet regulatory requirements for disposal. Requirements include moisture, material strength and toxicity characteristic leaching procedure (TCLP) limits. Sediments will undergo solidification to address these requirements as discussed further in Section 3.1.3.5.

2.2.1 Beneficial Reuse

The PCT has determined that a no beneficial reuse opportunities are feasible for the overburden or the contaminated sediments. Therefore, no pre-treatment for beneficial reuse is required.

2.3 VOLUMES AND TYPES OF MEDIA REQUIRING TREATMENT

2.3.1 Sediment

Sediments containing PCBs, PAHs, and/or LNAPL exceeding RAOs occupy approximately 5.3 acres of the site with average deposit depths ranging from 0.46 to 3.2 ft below sediment surface (bss). The total estimated volume of material for disposal during the RA is 327 cy of TSCA (excluding overburden, but including contingencies discussed in section 3.2.1) sediments, and an additional 35,485 cy of Non-TSCA (including overburden and contingencies discussed in section 3.2.1) sediments. These quantities of TSCA and Non-TSCA sediments are discussed for each deposit in Sections 2.3.1.1 through 2.3.1.4. Reuse of overburden is not feasible; therefore overburden will be disposed of with the contaminated sediments. Sediments overlaying and underlaying TSCA regulated materials will be excavated and handled separately (to the extent practicable) as Non-TSCA sediments.

2.3.1.1 Zone 7

Deposit 7-1: The maximum reported total PCB concentration in this deposit is 3 mg/kg, and the maximum reported total PAH concentration is 105 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 1,553 cy of Non-TSCA regulated materials, over an area of approximately 0.1 acre with an average depth of 3.2 ft bss.

Deposit 7-2: The maximum reported total PCB concentration in this deposit is 162 mg/kg, and the maximum reported total PAH concentration is 247 mg/kg. LNAPL was discovered in this deposit. The estimated *in-situ* volume of sediments for disposal in this deposit is 9,012 cy and 85 cy of Non-TSCA and TSCA regulated materials, respectively. The deposit covers an area of approximately 1.1 acres with an average depth of 2.2 ft bss.

Deposit 7-3: The maximum reported total PCB concentration in this deposit is 8.1 mg/kg and the maximum reported total PAH concentration is 44 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 8,596 cy of Non-TSCA regulated materials, over an area of approximately 1.1 acres with an average depth of 2.0 ft bss.

Deposit 7-4: The maximum reported total PCB concentration in this deposit is 2.4 mg/kg, and the maximum reported total PAH concentration is 37 mg/kg. The estimated *in-situ* volume of

sediments for disposal in this deposit is 4,276 cy of Non-TSCA regulated materials, over an area of approximately 0.9 acres with an average depth of 2.2 ft bss.

2.3.1.2 Zone 3

Deposit 3b-1: The maximum reported total PCB concentration in this deposit is 1.6 mg/kg and the maximum reported total PAH concentration is 37 mg/kg. LNAPL was detected in this deposit. The estimated *in-situ* volume of sediments for disposal in this deposit is 1,108 cy of Non-TSCA regulated materials, over an area of approximately 0.4 acre. Contamination extends to an average depth of 1.0 ft bss.

2.3.1.3 Zone 4

Deposit 4-1: The maximum reported total PCB concentration in this deposit is 1.5 mg/kg and the maximum reported total PAH concentration is 117 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 449 cy of Non-TSCA regulated materials, over an area of approximately 0.1 acre with an average depth of 0.86 ft bss.

Deposit 4-2: The maximum reported total PCB concentration in this deposit is 1.9 mg/kg and the maximum reported total PAH concentration is 33 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 694 cy of Non-TSCA regulated materials, over an area of approximately 0.2 acre with an average depth of 1.1 ft bss.

Deposit 4-3: The maximum reported total PCB concentration in this deposit is 3.7 mg/kg and the maximum reported total PAH concentration is 115 mg/kg. The estimated *in-situ* volume of sediments for disposal in this deposit is 309 cy of Non-TSCA regulated materials, over an area of approximately 0.1 acre with an average depth of 0.46 ft bss.

2.3.1.4 Zone 5

Deposit 5-1 – The maximum reported total PCB concentration in this deposit is 230 mg/kg and the maximum reported total PAH concentration is 469 mg/kg. The estimated in-situ volume of sediments for disposal is 9,488 cy, and 242 cy of Non-TSCA and TSCA regulated materials, respectively. The deposit covers an area of approximately 1.4 acres and with an average bottom depth of the deposit of 2.2 ft bss.

2.3.2 Water

Water requiring treatment will be generated from the following sources:

- Cofferdams: initial surface water, precipitation, in-situ sediment dewatering, storm sewers outfalls
- Hydraulic dredging: slurry water
- Dewatering pad: sediment dewatering, precipitation
- Decontamination pad: decontamination water, precipitation

- Wastewater Treatment pad: precipitation, leaks, and spills

The volume and flow rate of water requiring treatment is dependent upon the selected contractors means and methods, and weather during the RA.

2.4 LONG-TERM OPERATION AND MAINTENANCE REQUIREMENTS

Long-term O&M is not an option under the Great Lakes Legacy Act, under which this work is being performed. Therefore, this BOD does not require long-term O&M.

2.5 COMPLIANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS

2.5.1 Federal Regulations

Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 (Pub.L. 92–583, 86 Stat. 1280, enacted October 27, 1972, 16 U.S.C. §§ 1451–1464, Chapter 33) was established as a U.S. National policy to recognize the importance of and challenges to continued growth in the coastal zone. Out of this act, the Coastal Zone Management Program (CZMP) was created and administered by the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management. The program aims to protect, restore, and responsibly develop the nation's coastal zones (including the Great Lakes) to ensure the oceans and coasts remain a healthy and thriving environment.

The Wisconsin Coastal Management Program was established in 1978 under the CZMA to manage the ecological, economic, and aesthetic assets of the Great Lakes and their coastal areas. The program is administered through the Wisconsin Department of Administration, Division of Intergovernmental Relations. The Coastal Management Program provides coordination of existing state, regional, and local programs and policies that impact coastal zones. Coordination takes place through the Coastal Management Council where state and regional clearinghouse processes, and the National and Wisconsin Environmental Policy Acts are considered.

Wisconsin's coastal zone is defined as the state boundary on the waterward side to the inland boundary of counties adjacent to Lake Superior and Lake Michigan. Milwaukee County is designated as 1 of the 15 counties in the state within the coastal zone. Projects impacting the coastal zone and funded by federal agencies are subject to a federal consistency review. An applicant's consistency certification must contain the following statement: "The proposed activity complies with the policies of Wisconsin's approved Coastal Management Program and will be conducted in a manner consistent with such policies." The applicant must also provide supporting information that includes a detailed description of the project; an assessment of the probable coastal zone effects; and findings indicating that the proposed project, its associated facilities, and their effects, are consistent with Wisconsin's approved coastal management policies.

Resource Conservation and Recovery Act

The RCRA was passed in 1976 and amended by the Solid Waste Disposal Act by including provisions for hazardous waste management, under 42 U.S. Code (USC) §321 et seq. RCRA controls the management of hazardous waste from inception to ultimate disposal. RCRA applies to RAs that generate hazardous waste.

Dredged material may be subject to RCRA regulations if it contains a listed waste, or if it displays a hazardous waste characteristic, for example, by the TCLP. Sediment generated from dredging will require sampling and analysis to determine its characteristics prior to disposal. The results of this analysis will be used to determine appropriate handling, storage, and disposal requirements. Most of the sediment being dredged from within the site is not expected to be hazardous waste by TCLP sampling and analysis, based on existing TCLP data. Additional characterization sampling may be required during the RA to meet landfill requirements. If determined to be non-hazardous by TCLP, then dredged material will not have to be specifically managed as a hazardous waste. Additionally, RCRA specifically excludes sediment management under a Section 404 permit, as follows:

- 40 Code of Federal Regulations (CFR) 261.4(g). Dredged material that is not a hazardous waste. Dredged material that is subject to the requirements of a permit that has been issued under Section 404 of the Federal Water Pollution Control Act (33 USC 1344); or Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (33 USC 1413) is not a hazardous waste.

Therefore, requirements for hazardous waste and hazardous waste facilities under 40 CFR, Parts 260 through 264, do not need to be met and are not requirements for non-hazardous dredged sediment. Land disposal restrictions only apply to hazardous wastes that are intended for land disposal and are not applicable to non-hazardous sediment. Decontamination wastes, wastewater and other wastes generated from the RA may also require sampling and analysis to determine the hazardous characteristics and appropriate requirements of the waste prior to disposal.

Toxic Substances Control Act

TSCA regulates the remediation of PCB contaminated sediments under 40 CFR 761.61(b) *Performance-based Disposal or* 761.61(c) *Risk-based Disposal Approval.* Based on the Phase I RA, this site will meet the regulatory requirements for PCB remediation in 40 CFR 761.61(c). 40 CFR 761.61(c) requires any person wishing to sample, cleanup, or dispose of PCB remediation waste in a manner other than prescribed in paragraph 761.61(b), or store PCB remediation waste in a manner other than prescribed in paragraph 761.65, must apply in writing to the Regional Administrator in the region where the sampling, cleanup, disposal, or storage site is located for sampling, cleanup, and disposal. Each application must include information described in the notification required by paragraph 761.61(a)(3) of this section. EPA may request other information that it believes necessary to evaluate the application. No person may conduct cleanup activities under this paragraph prior to obtaining written approval by EPA. EPA

will issue a written decision on each application for a risk-based method for PCB remediation wastes. EPA will approve such an application if it finds that the method will not pose an unreasonable risk of injury to health or the environment.

Clean Air Act

The Clean Air Act, 40 CFR, Parts 50 through 99, is intended to protect the quality of air and to promote public health. Although airborne particulates associated with stabilization and dewatering techniques are not likely to be generated, some airborne particulates may be created if sediments dry before disposal. Therefore, best available dust suppression practices, such as spraying with clean water and covering sediment and soil stockpiles, will be used, as necessary, to control potential particulate emissions. A plan to mitigate dust during the RA will be included as part of the site management plan, and health and safety plan.

Based on discussions with the WDNR and the permits previously required for the Blatz Pavilion and Phase I RAs, no state or federal air quality permits are required for this project. It is currently WDNR's recommendation that air construction/operation permits for compliance with Natural Resources (NR) 406, 407, and 445 are inapplicable because no active treatment will be performed on the sediments that could result in air emissions.

Endangered Species Act

The Endangered Species Act of 1973, 16 USC §1531 et seq. and 15 CFR, Part 930, requires that federal agencies ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species, and will not destroy or adversely modify critical habitat.

Rivers and Harbors Act Permit

Section 10 of the Rivers and Harbors Act states that any work in or affecting navigable waters of the U.S. (commercially navigable waters) requires a permit from the U.S. Army Corps of Engineers (USACE). Such work includes dredging, channelization, excavation, filling, construction of piers, breakwaters, bulkheads, revetments, power transmission lines, aids to navigation, and sewer outfalls over commercially navigable waters.

If a Section 10 Permit is needed for the discharge of fill within navigable water, a Section 404 Permit would also be required. Both permit applications are submitted to the USACE concurrently with a Section 10/404 application.

If a Section 10 Permit is needed for excavation in navigable waters of the U.S. and there is no discharge of fill, a Section 404 permit would not be required. A Section 10 Permit application would be submitted using the same procedure as the individual Section 404 Permit application.

Clean Water Act Section 404 Permit

Section 404 of the Clean Water Act (CWA) requires permit authorization from the USACE for the discharges of dredged or fill material into Waters of the U.S. The USACE St. Paul District has issued a General Permit (GP-002-WI) for activities within Wisconsin that discharge dredged and/or fill material into waters of the U.S., according to the provisions of the U.S. CWA (40 CFR 230), Section 404. Remedial activities in the Phase II area, including dry excavation and handling of any material contaminated with TSCA-level PCBs, will be authorized under a Joint Individual 404 Permit with a separate 401 water quality certification from the state.

2.5.2 State Regulations

Under Chapter NR 353 of the Wisconsin Administrative Code, wetland restoration projects require waterway and wetland permits. Wetland Conservation projects should be designed and constructed according to the following the Wisconsin Natural Resources Conservation Service Field Office Technical Guide Standard Conservation Practices: 657 − Wetland Restoration, 638 − Water and Sediment Control, 410 − Grade Stabilization, and 378 − Pond.

Additional regulations that may apply include the following:

- Waterway and Wetland Permits: Grading (Wisconsin Statute Section 30.19 and Chapter NR 341 Wisconsin Administrative Code)
- Wetland Restoration Permits (Wisconsin Statute Section Various, Chapter NR 353 Wisconsin Administrative Code)
- Wisconsin Floodplain Management Program (Wisconsin Statute Section 87.30 (1) and NR 116, Wisconsin Administrative Code)
- Stormwater Erosion Control (NR 216, Wisconsin Administrative Code)
- Wisconsin Statute Section 283, Pollution Discharge Elimination.

WDNR Waterways Permit

WDNR individual permits will be required for the installation of water flow control structures, sediment removal, placement of material within the river, and any onshore activities within adjacent wetlands. The permit will be granted by WDNR under statutes that may include the following (listed in numerical order):

- Wisconsin Statute Section 30.20(2), Removal of Material From Beds of Navigable Waters
- Wisconsin Statute Section 30.12(3m), Structures and Deposits in Navigable Waters
- Wisconsin Statute Section 30.19 Enlargement and Protection of Waterways
- Wisconsin Statute Section 281.15, Water Quality Standards
- Wisconsin Statute Section 281.36, Wetlands; Compensatory Mitigation

- Wisconsin Statute Section 1.11, Governmental Consideration of Environmental Impact
- U.S. CWA Section 401, State Certification.

The application for WDNR permits for Chapter 30 compliance will require an Alternatives Analysis to assess ways to minimize adverse impacts to wetlands under NR 103, Water Quality Standards for Wetlands.

Conditions of this permit will likely include erosion control measures, specifications for installation of the flow control structures and for implementation of the excavation, limitations on the area and timeframe of wetland disturbances, and wetland restoration requirements. Under this permit, it will likely be necessary to implement erosion control measures to minimize erosion into the river, in accordance with WDNR's Stormwater Construction Technical Standards (WDNR 2013b).

2.5.3 Local Requirements

2.5.3.1 Milwaukee County Permits

Construction/Right-of-Entry Permit

A permit from the Milwaukee County Department of Parks, Recreation and Culture will be required for access of construction equipment to Lincoln Park and the Milwaukee River.

2.5.3.2 City of Milwaukee

Stormwater Permit

The City of Milwaukee will need to be consulted regarding the need for a stormwater permit from the City, under Chapter 120 of the City of Milwaukee Ordinance, Stormwater Management Regulations. During planning for the Phase I remediation, the City indicated that a City permit was not necessary in addition to the state permits. The Contractor is required to consult with the City of Milwaukee to determine the need for this permit for Phase II.

Temporary Noise Variance

If work hours are needed between 10 PM and 7 AM, a temporary noise variance must be obtained from the City of Milwaukee, under Chapter 80-66 of the Milwaukee Code of Ordinances to allow for 24-hour operation of the site.

Floodplain Fill Permits

For any construction activities occurring within the boundaries of the City of Milwaukee, including temporary water diversions and changes to the bed and banks of the Milwaukee River, Floodplain Fill Permits will be required to comply with floodplain management ordinances. Floodplain easements or other appropriate legal arrangements may be required from all adversely

affected property owners and notify local units of government before the amendment can be approved by the common council.

2.5.3.3 City of Glendale

Stormwater Permit

A permit for stormwater management may be required under Title 6, Chapter 5 of the City of Glendale Code of Ordinances, Stormwater Management System. During planning for the Phase I remediation, the City indicated that a City permit was not necessary in addition to the state permits. The Contractor is required to consult with the City of Glendale to determine the need for this permit for Phase II.

Temporary Noise Variance

If work hours are needed between 10 pm and 7 am, a temporary noise variance must be obtained from the City of Glendale, under Title 11, Chapter 2 of the City of Glendale Code of Ordinances to allow for 24 hour operation at the site.

Notice for Construction Near or On Lakes, Streams, or Wetlands

For any construction activity occurring within the boundaries of the City of Glendale, a Notice for Construction Near or on Lakes, Streams or Wetlands will be required.

Floodplain Development Permits

For any construction activities occurring within the boundaries of the City of Glendale, including temporary water diversions and changes to the bed and banks of the Milwaukee River, Floodplain Development Permits will be required to comply with floodplain management ordinances.

2.6 TECHNICAL FACTORS OF IMPORTANCE

2.6.1 Use of Currently-Accepted Environmental Control Measures

During construction, significant quantities of earthmoving activities will be conducted. Before excavation operations, erosion controls will be placed to minimize soil erosion from the disturbed areas that may adversely affect construction operations, damage adjacent property, or cause offsite migration of sediment. The layout of the erosion controls is shown on Drawings C-201, C-202, C-204, and C-206 (Appendix A). During construction, water will be applied as needed to minimize dust.

Hydraulic dredging and dewatering of cofferdam areas and sediments will require treatment and management of large quantities of water prior to discharge back into the Milwaukee River.

Energy dissipaters will be used to minimize disturbance of sediment within the Milwaukee River while discharging the water back to the waterway.

Hydraulic dredging will be conducted at Deposits 7-4 and 4-3. Silt barriers will be used to control the suspended, contaminated sediments; thereby, minimizing their downstream transport.

2.6.2 Biddability, Operability, and Constructability

Biddability, operability, constructability, environmental, and claims prevention are being considered during the design process. Biddability, operability, constructability, environmental, and claims preventions reviews were conducted, by EA, on the pre-final design submittal. The review did not identify any changes needed to be incorporated into the design.

2.6.3 Use of Currently Accepted Construction Practices and Techniques

The RA will require a combination of earthwork, cofferdams, dewatering, dredging, water treatment, sediment and erosion control, and transportation and disposal components that are to be combined using standard construction equipment and methods. Earthwork can be accomplished with typical earth moving equipment. Cofferdams, dewatering, dredging, and water treatment equipment and materials are common work elements with equipment and materials readily available. Transportation equipment and materials will require covered and sealed truck beds that are common and readily available. Multiple landfills are available for disposal of the sediments. Best management practices (BMPs) will be used for sediment and erosion control.

2.6.4 Green and Sustainable Remediation

Green and sustainable products and practices have been reviewed for their incorporation into the BOD to the extent possible. Potential green and sustainable practices reviewed include:

- Hydraulic mulch for use in establishing vegetation on the riparian and upland areas is manufactured with 100 percent recycled wood fibers. Hydraulic mulch is a BMP for dust emissions and erosion control.

- Materials that include renewable resources and/or recycled materials were evaluated for inclusion in the specifications.

- BMPs for Clean Fuel and Emission Technologies, and Excavation and Surface Restoration were evaluated.

- Topsoil stockpiles will reduce fuel and water consumption by being covered with plastic sheeting. The plastic sheeting eliminates the need for water trucks to spray the stockpiles to control dust.

- Trees will be removed only when necessary in consultation with and approval by Milwaukee County Parks and those removed will be reused as woody debris for habitat restoration as recommended in the Value Engineering (VE) Study (USACE 2013).

- Local material providers were included to the extent possible.

- Procedures to minimize the volume of sediment for disposal. Minimizing the sediment disposal volume will reduce the overall amount of fuel used for transporting wastes for disposal. Procedures include additional pre-removal sediment sampling to minimize disposal volumes. In addition, procedures were developed to minimize the volume of TSCA sediment which would require additional fuel for longer transportation.

- Phase I RA used Calciment® to solidify sediments for disposal. The design evaluated the possibility of using cement kiln dust (CKD) or fly ash. Using these materials would save space in existing landfills. The VE Study (USACE 2013) recommended against using fly ash, but recommended crushed corn cobs as a solidification agent. The specifications do not allow materials that will increase temperature and volatilization of PCBs and PAHs. Therefore, fly ash and CKD are not allowed materials. The specifications allow Calciment® or crushed corn cobs to be used for solidification.

- Restoration with native grasses and low/no mowing species along streambank and buffer areas. This will promote habitat and reduce long-term fuel use due to mowing.

2.6.5 O&M Provisions of Significant Influence on Design Approach

The main considerations for O&M requirements are:

- Bank Stabilization: Bank stabilization practices are subject to multiple destructive influences, including freeze-thaw cycling, ice scour, scour from high flows, undercutting, human disturbance, and debris. The deposits are located in sediment deposition areas and are not located at characteristically unstable locations. Deposits excavated along banks will be either backfilled to the extent required for stabilization, are currently hard armored, or excavation depth is insignificant and stabilization is not needed. Therefore, no O&M requirements are proposed for bank stabilization.

- Habitat: No long-term O&M requirements are proposed for habitat installations. A two year maintenance period will be completed under this RA to control invasive species in areas with vegetation planted, and to replant any plantings that die during the maintenance period.

3. BASIS OF DESIGN

The BOD provides a description of the analyses conducted to select the design approach. The following sections provide discussion on the design assumptions, the RA contracting strategy, permitting requirements, and identification of easement and access requirements.

3.1 JUSTIFICATION OF DESIGN APROACH AND ASSUMPTIONS

The following sections provide justification of the design approach and assumptions. The sections are divided into major elements of the design. In general, the design approach and assumptions were formulated as a basis to estimate approach, feasibility, schedule, and cost for completion of the RA.

The engineering drawings and technical specifications do not require specific sizes of equipment, and will generally leave means and methods for achieving RAOs up to the pre-qualified GLNPO Contractors within the constraints of the Contract Documents (engineering drawings, technical specifications, and EPA Contract). This approach allows flexibility to the Contractor for optimization of their technical approach to provide best value to the Government. It is assumed the EPA Contract with the Contractor will specify the time period required for construction. A submittal list has been developed that summarizes the submittals required to be submitted by the Contractor to the Owner for approval (Appendix B, Technical Specification 01 33 00).

3.1.1 Monitoring and Sampling

Sample collection and analysis is required by the Contractor as summarized below. Details on the sampling required can be found in technical specification 01 35 45.00 10 - Chemical Data Quality Control (Appendix B). If requirements for sampling and/or monitoring for turbidity during dredging and excavation operations are required, they will be listed in the Chapter 30 permit.

- Pre- and post-construction testing of access road, dewatering pad, wastewater treatment pad, and decontamination pad subgrade to evaluate if contaminated materials migrated to the subgrade.

- Sediment pre-removal testing to delineate removal limits and TSCA vs. Non-TSCA sediment areas within deposits and characterize for disposal.

- Wastewater discharge sampling to meet permit requirements and verify treatment system removes contaminants prior to discharge.

3.1.2 Staging Area and Temporary Infrastructure

A single staging area (e.g., dewatering pad, wastewater treatment facilities, equipment storage, etc.) will be constructed in the park directly west of Deposit 7-3. In addition, temporary infrastructure (e.g., access roads, decontamination areas, construction entrances, fences, etc.) will

be constructed at the staging area and each deposit (for dry excavation) prior to initiating sediment removal activities (Appendix A).

Limited area is available near the site for a construction staging area due to floodplain regulations and limited property access. The available staging area is shown on the Drawings (Appendix A), assuming Milwaukee County issues a construction/right-of-entry permit. A potential staging area layout is shown on Drawing C-201 (Appendix A) to evaluate the available area to determine if sufficient area is available for the design approach. The potential staging area is the basis for the BOD cost estimate, and includes a topsoil stockpile, wastewater treatment pad, dewatering pad (including a separate area for TSCA sediments), decontamination pad, and construction entrance. An area for field offices and a mobile laboratory has been made available on North Milwaukee River Parkway north of the site as was done in the Phase I RA.

The top 6 in. of topsoil at the staging area and access roads will be stripped and stockpiled prior to construction of temporary access roads, decontamination pads, dewatering pads, and water treatment pads.

The layout of the dewatering pad presented in the drawings was evaluated to determine if sufficient area is available for dewatering sediments that may not dewater in place (Appendix A). The dewatering pad shown provides approximately 80,000 ft^2 for storage and dewatering of the contaminated sediments. Assuming that the sediments can be placed to a depth of 3 ft during the dewatering process, the dewatering pad offers approximately 9,000 cy of operating volume. Assuming an average of 2,000 cy of excavation per day from the contaminated sediment zones, the pad would allow for approximately 5 days of dewatering time. The excavation rate and dewatering time required will be heavily dependent upon the sediment properties after each zone is dewatered. During this design, it was assumed that a 5-day dewatering time will be sufficient and that the sediment dewatering on the dewatering pad will not be a limiting factor in the project schedule.

3.1.3 Sediment Removal and Disposal

The BOD consists of a combination of dry excavation (Deposits 7-1, 7-2, 7-3, 7-4 [northern portion], 3b-1, 4-1, 4-2, and 5-1) and hydraulic dredging (Deposits 7-4 [southern portion] and 4-3) methods for removal of contaminated sediments from the Milwaukee River (Appendix A). The PCT selected these methods from the FS because they provide the most cost effective approach to achieving the RAOs within other constraints such as schedule. Dry excavation consists of cofferdams, dewatering, and excavation to remove sediments from the waterway. Hydraulic dredging consists of sediment dispersion control and hydraulic dredging to remove sediments from the waterway.

Following removal from the waterway, sediments will be dewatered and solidified as needed to meet landfill liquid, strength, and disposal requirements prior to transportation and offsite disposal. Sampling to verify the material is not a characteristic hazardous waste will be needed prior to transportation for disposal.

3.1.3.1 Sediment Characterization

In order to minimize disposal quantities and construction time, the PCT desires sediment samples to be collected and analyzed prior to excavation or dredging to better define the limits of contaminated sediment and TSCA contaminated sediments, and minimize contractor chasing of contaminated sediments. Sampling for Non-TSCA sediments will be collected on a 50 or 25-ft grid and TSCA sediments will be collected on a 12.5-ft grid. Samples will be collected at multiple depths to determine horizontal and vertical limits for excavation. The grid sizes were determined during weekly conference calls with EA and the PCT based on balancing time and cost for sampling versus excavation and disposal costs. Characterization sampling for disposal will be conducted prior to transportation at intervals required by the landfills.

Based on previous TCLP sampling of the Phase II sediments, (EA 2013a) the sediment is not anticipated to be a characteristic hazardous waste. The sediment is not a listed hazardous waste because specific documentation of the release of a listed waste to the sediments is not available (CH2M HILL 2011b).

3.1.3.2 TSCA and Non-TSCA Approach

The zone of material with TSCA sediments will be excavated separately from other contaminated material to the extent practical. For example, TSCA material was located at Deposit 7-2 at a depth of 2–3 ft. The overburden material, from 0 to 2 ft, will be excavated to the extent practical without excavating into the TSCA zone. Material greater than 3 feet will be excavated separately from the 2 to 3 ft depth. The overburden material will be handled and disposed of at a Subtitle D Landfill.

Material required to be disposed of in a TSCA landfill will be handled and disposed of separately from other less contaminated material.

3.1.3.3 Dry Excavation

3.1.3.3.1 Cofferdams

The locations of cofferdams were selected to allow dewatering of excavation areas and allow the Milwaukee River water to bypass the cofferdams while providing reasonable space to allow for potential contamination chasing. Hydraulic modeling (Appendix D) has been conducted to ensure compliance with Federal, State, and Local floodplain regulations; and is pending Local regulatory approval.

The cost and basis for estimating the cofferdams and dewatering rate assumes that Zones 3 and 7 have sediment with adequate thickness and strength to support sheet pile. The remaining zones are assumed to have insufficient sediment thickness to support sheet pile and, therefore, will utilize sand bags, portadams, or other cofferdam systems. The public has requested water bladders not be used. Therefore, the specifications prohibit the use of water bladders.

Cofferdams will be constructed of super sack sand bags, portable A-frame dam system, sheet pile or other similar methods with the Contractor submitting Professional Engineer (PE) sealed engineering drawings of their selected method for approval during construction.

Cofferdam 1

Cofferdam 1 will allow simultaneous dewatering and excavation of Deposit 3b-1 (Appendix A, Drawing C-202). This configuration will direct river flow through the main channel.

Cofferdam 2

Cofferdam 2 will allow simultaneous dewatering and excavation of Deposits 7-1, 7-2, 7-3, and 7-4 (northern portion) (Appendix A, Drawing C-202). This configuration will direct river flows through the east oxbow.

Cofferdam 3

Cofferdam 3 will allow simultaneous dewatering and excavation of Deposits 4-1 and 4-2 (Appendix A, Drawing C-204). For Deposits 4-1 and 4-2, the riverbank will be cleared and grubbed to create site access and access roads (Appendix A). This configuration will direct river flow through the main channel.

Cofferdam 4

Cofferdam 4 will allow simultaneous dewatering and excavation of Deposit 5-1 (Appendix A, Drawing C-206). The south riverbank adjacent to Deposit 5-1 will be cleared and grubbed to provide site access. An existing road/path running along the south riverbank will be upgraded to an access road, and a new access road will be constructed to provide access from Deposit 5-1 to West Deluxe Parkway (assuming EPA/Milwaukee County gains private landowner approval for this action). This configuration will direct river flows through the Estabrook Park Dam.

3.1.3.3.2 Cofferdam Dewatering

Approximate work area dewatering times are shown in the engineering calculations (Appendix B, Table 4) and construction schedule (Appendix E), and are based on a dewatering rate of 600 gal per minute (gpm) for an average of 1 ft of water within the active cofferdam work areas.

The design incorporates an alternate payment item and specifications that allow excavation at Deposits 4-1 and 4-2 without the use of cofferdams, with prior approval of the OWNER. These deposits are near the bank and are high in elevation relative to low water conditions. If the Milwaukee River flows are low during the RA, it may be feasible and cost beneficial to excavate these deposits from the bank with environmental buckets and silt barriers instead of installing cofferdams.

3.1.3.3.3 Sediment Excavation

Removal of the contaminated sediment will be accomplished using standard excavating equipment in the dry after construction of the staging area, temporary infrastructure, and dewatering of cofferdams. To access the deposits with dry excavation equipment, access ramps and temporary in-river roads will be constructed with wood mats or other similar construction methods.

Prior to transport from the deposits to the dewatering pad at the staging area, sediments will be evaluated relative to the landfill disposal requirements. If sediments were deemed to be sufficiently dewatered, they will be processed at the excavation area and direct loaded for transport to the landfill. Materials that have not sufficiently dewatered will be transported to the dewatering pad, in covered and water tight equipment, for additional dewatering.

Cofferdam materials that contacted contaminated sediments will be allowed to be decontaminated in place prior to removal, or moved to a central decontamination area either onsite or offsite. Decontamination in place may be accomplished by using pressure washers to spray contaminated sediments from the cofferdam into a sump.

Following excavation, sampling of the sediment in the excavated areas will be conducted to confirm that contaminant concentrations in the remaining sediments are below RAOs prior to habitat restoration and removal of the cofferdams.

3.1.3.4 Hydraulic Dredging

Work will proceed from upstream to downstream to minimize the amount of contaminated sediments re-suspended during dredging that could potentially re-contaminate already-dredged areas. Due to the relatively small quantities of material to be hydraulically dredged and available land access, hydraulic dredging of Deposits 7-4 (southern portion) and 4-3 will be conducted using a vacuum truck, high solids pump, or specialty dredge with using silt barriers for sediment control. Sediments dredged will be transported to the staging/dewatering area by truck. Dredging of Deposit 7-4 may be conducted while cofferdam 2 is in place to provide access.

Following dredging, confirmation sampling of the sediment in the excavated areas will be conducted to confirm that contaminant concentrations in the remaining sediments are below RAOs prior to habitat restoration and removal of the silt barrier. If needed and approved by the PCT, the specifications require the Contractor to place a residual cover.

3.1.3.5 Sediment Dewatering and Solidification

Sediments deemed insufficiently dewatered at the excavation area will be placed on a dewatering pad (at the staging area) and allowed to dewater until the water content is acceptably low to solidify prior to transportation and disposal. The relatively small quantity of slurry material from hydraulic dredging could be dewatered by pumping into geotubes located on the dewatering area, pumping directly on the dewatering pad, or mechanical means.

Separate areas for TSCA and Non-TSCA material will be required on the dewatering pad. Following dewatering, or following excavation if the water content is acceptably low, solidification of the sediments by addition of amendments will still likely be required to meet the disposal facility's strength requirements and minimize leaching of LNAPL. Amendments are discussed in Section 2.6.4. The sediment will be mechanically mixed either in the excavation area or at a staging/dewatering area. The size of the staging/dewatering area will depend on several factors that include the volume of sediment to be removed, sediment amendment cure time, rate of removal versus rate of loading and transport to offsite disposal facilities, required frequency of waste confirmation sampling, and overall project schedule. Water collected from the dewatering pad will be pumped to the treatment plant.

3.1.3.6 Offsite Disposal

Trucks used to transport contaminated materials offsite will be water tight and covered, and tires and exteriors decontaminated after loading and before leaving the site. Sediments may be characterized for disposal before excavation and transportation, and will be disposed of at either a facility licensed to accept TSCA waste, or a Subtitle C or Subtitle D landfill, depending on sampling results. Based on the Phase I RA, TSCA waste is anticipated to be taken to a Subtitle C landfill based on proximity of locations of Subtitle C landfills and landfills licensed to accept TSCA waste.

After completing the project, the staging area and temporary infrastructure materials will be transported by truck to an offsite facility for disposal. Specifications allow reuse of these materials if they are decontaminated and WDNR approves of their reuse in writing.

EA has coordinated haul routes with the PCT. Allowable haul routes are shown in the technical specifications (Appendix B, Section 02 61 00 – Removal and Disposal of Contaminated Sediments).

3.1.3.6.1 TSCA Waste Disposal

TSCA waste can be disposed of at a Subtitle C landfill facility and must be transported in accordance with 49 CFR Parts 171 through 180. The nearest Subtitle C facility, Heritage Environmental Services, LLC is located in Roachdale, Indiana. Specific requirements for transporting and disposal of TSCA waste at this landfill include:

- Copy of EPA Authorization letter approving the TSCA application or Work Plan under either 40 CFR 761.61(a) and/or (c).
- Copy of the TSCA application or Work Plan submitted to EPA for the approval.
- Existing investigatory analytical data.

- Waste must have minimum 1,000 lbs/ft^2 shear strength or 2,000 lbs/ft^2 unconfined compressive.

- RCRA waste characterization sampling.

- The waste materials must meet land disposal restrictions without treatment.

- Generators shipping PCB waste for disposal in an Indiana landfill are required to inform the Indiana Department of Environmental Management.

Solidification of waste is required to minimize leaching of LNAPL material and to meet strength requirements for the landfill. This design assumes the Phase II sediments will passively dewater similar to the Phase I sediments and that up to a 10 percent addition of a solidification agent is required, based on the Phase I RA (CH2M HILL 2012).

3.1.3.6.2 Non-TSCA Waste Disposal

Sediments that are not required to be disposed of in accordance with TSCA regulations will likely be disposed of at a local Subtitle D Landfill. There are multiple Subtitle D Landfills located in close proximity to the Site. General requirements for disposal at a Subtitle D Landfill include RCRA waste disposal characterization sampling.

3.1.3.7 Interstate 43 Bridge and On-Ramp

Dredging may be conducted under the Interstate 43 Bridge and on-ramp and dredging equipment may be temporarily placed on the on-ramp. Wisconsin Department of Transportation (WisDOT) requires a permit for work conducted within WisDOT right-of-ways. Discussions with WisDOT indicate dredging activities will have a minimum setback requirement from the I-43 Bridge footings at deposit 4-3. It is anticipated that dredging equipment will be allowed on the ramp during non-peak traffic hours and the limited dredging depth will not create a safety issue for the bridge foundations. However, the dredging setback required by WisDOT may result in leaving some or all of the contaminated sediment within the WisDOT right-of-way. If the Contractor wants to place any equipment on the on-ramp, the Contractor will be required to coordinate the work with WisDOT and obtain a permit if required.

3.1.3.8 County Bridge

Excavation will be conducted under the North Milwaukee River Parkway Bridge located within Deposit 7-2. Information regarding the bridge will be provided to Contractors.

3.1.3.9 Estabrook Park Dam Spillway

EA will evaluate the Estabrook Park Dam Spillway repair plans and schedule as they become available, and work with Milwaukee County Parks to determine any additional project constraints to be included in the drawings and specifications. At this time, it is anticipated that

hand excavation, or mechanical excavation with by an owner approved operator having a minimum of 10 years of experience operating similar type of equipment will be required within 25 ft of the spillway in order to prevent damaging the spillway.

The VE Study (USACE 2013) identified a potential dam safety issue relating to the effect of dewatering upstream of the spillway; thereby, reversing the normal head differential on the spillway. EA evaluated the remedial design conditions at the spillway and a structural engineering evaluation (AECOM 2010b) performed on the spillway. The structural engineering evaluation concluded the spillway is structurally adequate under normal pool conditions. Cofferdam configuration 4 maximum elevation is approximately the water elevation in the Milwaukee River for a water flow of 1,060 cfs while the cofferdam is in place. The resulting water depth, during a 1,060 cfs flow, on the downstream edge of the spillway is approximately 2 ft. Any flow exceeding 1,060 cfs will overtop the cofferdam and restore normal pool conditions. It is EA's judgment that the loads affecting the spillway during the RA due to reversing head differential is insignificant for the structurally sound spillway.

3.1.4 Wastewater Treatment

Potential contaminants requiring treatment prior to discharge include PCBs, LNAPL, PAHs, and total suspended sediments (TSS). Once a cofferdam is installed and sediments have been disturbed, all water accumulated within the cofferdam must be treated prior to discharge. Water that flows into the cofferdam during a flood event and flows out will not be captured and treated. Treatment varies based on factors shown on Figure 10. Potential sources of water accumulated within the limits of work are discussed in Section 2.3.2.

3.1.4.1 TSS and Visible Sheen Treatment

Treatment components to reduce TSS only would likely include pumps, piping, and bag filters. If visible sheen is present, the water would be pumped to an oil/water separator prior to discharge. This design (Figure 10) assumes initial cofferdam dewatering to within 12 in. above contaminated sediment will require treatment for TSS and visible sheen only.

3.1.4.2 PCB, LNAPL and Visible Sheen, PAH, and TSS Treatment

All water, except the initial cofferdam dewatering to within 12 in. of the sediment, is assumed to require treatment for PCBs, LNAPL and visible sheen, PAHs, and TSS (Figure 10). Treatment components to reduce PCBs, LNAPL and visible sheen, PAHs and TSS will likely include frac tanks, oil water separation, bag filters, granular activated carbon treatment systems, effluent frac tanks, and discharge pumps. Water accumulated within the limits of work will be pumped to the frac tanks for storage and initial solids removal. Where necessary, effluent from the frac tank will be pumped into an oil/water separator to remove LNAPL. Effluent from the oil/water separator will be pumped through bag filters for additional solids removal and through granular activated carbon vessels for treatment of remaining organic compounds. Finally, the treated water will flow into effluent holding tanks that will provide capacity for a small volume of treated water. Water will be held in these tanks as needed, particularly during the initial testing

of the treatment system, while awaiting sampling results confirming that the treatment meets the permit requirements for discharge back to the river. Regular sampling will be conducted to verify that the requirements for discharge are met.

The treatment plant capacity required was estimated based on anticipated sequencing of work discussed in Section 3.2.4, balance of available staging area for treatment equipment, and allowable construction time. It is assumed all four cofferdam areas will be installed sequentially. Assuming 1 ft of water over these areas would require treatment, the water would be pumped utilizing multiple pumps capable of providing a total of 600 gpm for initial dewatering, as well as dewatering after storm events. The first cofferdam installed would be dewatered at the 600 gpm rate until the initial dewatering is completed. After a cofferdam area is dewatered, a 50 gpm pump will remain in that cofferdam to continue dewatering the sediments, the remaining pumping capacity would be moved to the next cofferdam for initial dewatering and so on until each area is dewatered.

Following initial cofferdam dewatering, it was assumed the 600 gpm water treatment plant will be sufficient to dewater the work areas and maintain dry working areas as sediments passively dewater with slight leaks from the cofferdams. Treatment systems were assumed to be comprised of eight influent frac tanks, two oil/water separators, two bag filter systems, two activated carbon units, and eight effluent frac tanks.

3.1.5 Habitat Restoration

Key boundaries have been established for restoration relating to the RA. These form the basic assumptions which establish the scope and extents of this work. They include:

- The restoration boundary will only include the areas of disturbance from the RA.
- The timeframe for restoration and construction shall be coordinated to occur shortly following remediation in each area to help minimize the cost, effort, and difficulty of implementation.
- Restoration must account for the downstream dam, highway infrastructure, existing revetments, utilities, and other facilities. Modification of these facilities for the purpose of restoration will not be included.

These boundaries preclude a widespread watershed or river reach restoration.

There are multiple compatible techniques which will support the habitat RAOs at the site. Each of these techniques can be implemented individually, or in combination, as appropriate, in each area impacted by the remediation construction to support these goals. These techniques occur in varying combinations at each remediation zone, due to the nature the river facet position and nature of the banks, and existing vegetation and land uses. The key techniques are outlined below and shown on the Drawings in Appendix A.

3.1.5.1 Benthic/Substrate Restoration

Options for restoration of the river bottom substrate and benthic habitat include the placement of substrates suitable for benthic utilization. The substrate mix has been selected to be 4–8 in. rounded cobbles, which have documented success in substrate restoration efforts throughout the Great Lakes region. These cobbles have limited utilization by sea lamprey; and good utilization by native species for purposes of spawning, foraging, and nursery substrates. The configuration of these substrates may mimic point bars, side bars, or other river facet features. These materials not only contribute to the restoration of stable river bed geometry, but contribute to the formation of stable flow regimes as discussed later in this section. Depending on the size and distribution of these materials, these materials also may increase the utilization of river substrates by targeted species of concern within the river. These materials, while typically immobile for most flow conditions, would be expected to have some movement in larger flow events. They are not intended to resist these large altering flow events, but rather to be free to form facets and other features within the river, or scour surficial deposition, renewing the habitat.

In addition to these stone substrates, woody substrates have been selected in the nearshore shallows region of the Milwaukee River in the form of small and medium-sized woody debris incorporated with stone substrates. These cellulosic materials are essential for benthic macroinvertebrate colonization, as well as herpetofauna utilization. These materials are intended as a temporary bridge between the installation of the RA and the natural deposition of woody debris which occurs only with time.

Benthic/substrate restoration can be effective and highly implementable following sediment removal. The restoration of benthic habitats is most effective when they are restored in accordance to the existing deposition and aggregation zones, without creating obstructions which may destabilize the river bed and banks. Placed and sized correctly, benthic substrate restoration is an effective restoration alternative which removes much of the uncertainty and instability associated with a natural substrate recovery.

For the restoration sites described in the remedial design, a mixture of gravel and cobble between 4 and 8 in. was selected. Larger sized materials are utilized for stability of structures, but also have beneficial use for substrate enhancement. These are used in conjunction with installed boulder clusters, or anchor or pinning rocks in other structures.

Woody debris structures are also selected to provide diversity in benthic substrate as well as flow diversity. These structures will differ from the existing floating woody debris in that they will be anchored close to the channel banks, in shallow submerged locations. These structures are designed to not contribute to the collection of floatable debris or as obstructions to boating. These structures are proposed to be installed only in specific portions of the bed and bank which are hydraulically compatible with their placement, and in conjunction with substrate restoration. Coupled with boulder clusters, these features can provide reliably available fish habitat while also enhancing recreational access and aesthetics, and improving recreational fishing utility of the river.

Habitat restoration is proposed to occur following remedial activities, utilizing the same footprint and flow diversion measures.

3.1.5.2 Design of Restoration Materials

Hydrologic Engineering Centers River Analysis System (HEC-RAS) analysis was utilized to determine typical channel velocity profiles for the restoration areas. EA utilized HEC-RAS to evaluate channel average velocity and water surface elevation for given flow events, including typical channel base flows. EA identified the following relevant sections and associated data for them in Table 3:

Table 3 – Restoration Design Basis Summary

Section/Zone	Maximum Modeled Velocity, ft/sec	2-Year Storm Elevation, Ft	Typical Base Flow Elevation Range
8.141/ Zones 3 and 7	1.98	617.80	611-613' +/- 0.5'
8.003 / Zones 3 and 7	1.72	617.75	611-613' +/- 0.5'
7.934 / Zones 3 and 7	1.45	617.73	611-613' +/- 0.5'
7.876 / Zones 3 and 7	1.46	617.71	611-613' +/- 0.5'
7.5 / Zone 4	4.27	617.36	610-612' +/- 0.5'
6.9 / Zone 5	5.50	615.48	*dependent on dam

Typical base flow elevations were determined using flow data from the USGS gauge 04087000 for the Milwaukee River in Milwaukee, Wisconsin. On average, 400 cfs of base flow is observed throughout the year. As habitat elevations are highly impacted by the management of the downstream dam, utilizing base flow elevations provides a conservative estimate of flow elevations and availability of the channel bed to habitat. As Zone 5 is directly adjacent to the dam, even minor channel blockages can impact river elevation, and dam board elevations and ice can dramatically impact Zone 5. As a result of this, no habitat restoration is proposed within Zone 5 except for restoration of wetlands to existing grade.

Three main stone sizing equations analyzed the transport of stabilization materials, utilizing the HEC-RAS data. These include the Isbash Curve (Natural Resources Conservation Service [NRCS] 2007), USACE Hydraulic Design of Flood Control Channel, Publication Number: EM 1110-2-1601 (USACE 1994), and HEC-23 Design Guideline 8, Design of Riprap at Piers. Each of these equations has special applicability for each restoration practice as described in the subsequent sections. Additionally, in the evaluation of the bank, bioengineering and related channel stability, the paper "Stability Thresholds and Performance Standards for Flexible Lining Materials in Channel and Slope Restoration Applications," (ERDC TN-EMRRP-EBA-13, July 2012) was consulted.

For substrate restoration, river facets have the greatest probability of replicating the one-dimensional flow characteristic of the HEC-RAS model due to the lack of complexity of the shape of the cross section. Additionally, they are also less likely to encounter obstructed flow conditions from debris jams or other channel protrusions. Therefore, an un-factored output of

the model was utilized with Isbash (NRCS 2007) methodologies. Velocity is used as an entrainment factor yielding the following distribution:

Riffle Substrate Size (Inches)	Allowable Velocity for Design Discharge (ft/sec)
4	7.1
5	8.0
6	8.7
7	9.4
8	10.1
9	10.7
10	11.3
11	11.8
12	12.4
15	13.8

As can be observed in the above data, channel velocities in the restoration areas do not approach the minimum values for the distribution (the maximum observed modeled velocity in the restoration areas is 5.5 ft/sec); therefore, the 4–8 in. substrates proposed are anticipated to be stable, with the exception of severe ice scour and related obstructed flow events. Even with this, the proximity to the near shore and the formation of border ice may provide a fair degree of surface protection to these substrate restoration areas.

$$D_{50} = \frac{0.692(KU)^2}{2g(S_S - 1)}$$

Pinning stones for log and woody debris structures, as well as boulder cluster stone require an obstructed flow analysis for sizing. Structure stone was sized using HEC-23 methodology for riprap protection using obstructed flow. In the equation used at left, U is the design velocity, D is the design stone size median diameter, g is the gravitational constant, and S is the specific gravity of the stone utilized. K is a safety factor applied to the sizing equation to account for flow disturbances and other factors which may increase channel shear. Factors between 1.2 and 1.75 were utilized along with a peak velocity of 5.5 ft/sec. Using this distribution of safety factors, an acceptable structure stone size range of 7.24 in. minimum D50 was calculated. Because this stone size is significantly smaller than the size of logs that would be pinned, it can assume any stone larger than this will also be acceptable.

As structures are areas of flow convergence, these regions may experience secondary flows and associated shear stresses in excess of the peak average channel shear stress. Therefore, structure stone must be uniformly sized to resist transport throughout the reach, and for the sake of constructability, all HEC-RAS data were evaluated for peak velocity. The following sizing for structure stone was utilized based on these calculations, as well as the minimum sizes anticipated through experience and log sizes:

	A Axis (Long)	B Axis (Intermediate)	C Axis (Short)
Minimum Size, ft	2.0	1.5	1.0
Maximum Size, ft	4.0	3.0	2.0

The maximum sizes may be exceeded so long as machinery onsite are able to maneuver them.

3.1.5.3 Wetland Restoration

Wetland restoration is proposed in the project to mitigate for temporary impacts to jurisdictional wetlands which occur as part of the RAs and support disturbance onsite. Wetland restoration areas are depicted in the Engineering Drawings as occurring in impacted areas. No offsite mitigation is proposed. Wetland restoration includes the restoration of the impact areas to grades compatible with the proposed wetland type, and installing a robust native vegetation to ensure their stability is maintained, as well at the restoration of the impacted functions and values.

3.1.5.4 Bank, Riparian, and Upland Restoration

The restoration of bank, riparian, and upland areas is paired with remedial techniques to improve bank stability, decrease erosion potential, and improve overall habitat quality. The restoration includes grading the banks to appropriate stable angles, installation of bank armoring and woody debris structures, and planting riparian vegetation or turf grasses in order to regain a pre-existing or desired land usage.

Typical bank grading and restoration are handled through the grading depicted in the dredging, and planting plans associated with those areas.

3.1.6 Site Restoration

Upon completion of the RAOs, access roads, decontamination pads, dewatering pads, and wastewater treatment pads will be characterized for disposal and disposed of at either a Subtitle C or D facility. It is assumed the materials will be Non-TSCA or not a characteristic hazardous waste, and will be disposed of at a Subtitle D landfill. Following disposal of these facilities, the subgrade will be sampled for PCBs and PAHs and data compared to preconstruction concentrations. If PCBs and PAHs are found to have migrated to the subgrade, additional excavation, disposal and backfill will be required to return the upland areas to pre-construction conditions.

Following removal of temporary site infrastructure, topsoil removed prior to the RA will be replaced, and the area will be seeded and mulched to minimize erosion. Park trails used during the RA will be demolished and reconstructed. Fences, and erosion and sediment controls will be removed upon successful re-vegetation of the disturbed areas in accordance with the Wisconsin Pollution Discharge Elimination System (WPDES) Stormwater Discharge Permit. Supplemental watering is required to help ensure vegetation growth is successful to allow removal of fencing in spring 2015. See the construction schedule provided in Appendix E and technical specification 32 90 00 – Planting.

3.2 CALCULATIONS, SUPPORTING ASSUMPTIONS, AND REFERENCES

3.2.1 Sediment Volumes

It is important to note that, for purposes of the BOD, volumes of sediment requiring handling and disposal were estimated based on the contaminated sediment and overburden volumes presented in the conceptual site model with the addition of contingency (EA 2013b). As noted in sediment remediation guidance (Palermo et al. 2008), numerous factors make it necessary to consider contingencies on volume for environmental dredging of sediments. Contingencies applied in this BOD have been limited to known factors that may increase the volume of target sediment requiring excavation and removal. Calculations of the sediment volumes are based on existing analytical data and including contingencies are presented in Appendix C. The resulting quantities reflect the best estimate of the volume of contaminated sediments at the deposits. Actual construction quantities will also vary due to excavating by grids and collection of additional data during construction. These include:

- **Core recovery:** Contingency associated with the average percent recovery for sediment cores in each deposit. When the core extracted from the sediment is less than the depth the core was advanced, there is the possibility that sediments were compressed, lost, or not captured. This introduces uncertainty as to the exact depth and concentration of chemicals. A contingency equal to the inverse of the average core recovery was applied on a deposit-specific basis in order to estimate the percentage of core depth that was not recovered.

- **Overdredge:** Dredging and excavation are subject to limitations in precision associated with the size and type of equipment; unavoidable differences in geometry of implementable cut lines and the shape of sediment deposits; and the need to dredge an area more than once to deal with debris, obstacles, or residuals. All of these factors require inclusion of volume adjustments for overdredging, especially in the case of hydraulic dredging. A 25 percent dredge prism was applied to deposit volumes for scenarios involving hydraulic dredging to account for overdredging based on knowledge of the configuration of deposits and limitations of expected equipment.

- **Spatial extent of contamination:** The studies upon which the BOD is based provide the best available information for estimating volumes and making decisions. However, factors such as small scale variability and the changing nature of river sediments cause uncertainty as to the exact extent of elevated chemical concentrations. Field duplicates at the site indicate that small scale variability is a factor affecting the ability to accurately predict the extent of sediment deposits. The Phase I RA (with similar available design information) encountered a volume increase of approximately 20 percent between the design phase and final construction quantities, with small scale variability and changing river conditions among the suspected causes. Therefore, a contingency of 20 percent has been applied to sediment volumes to account for uncertainties in chemical distribution.

3.2.2 Sediment Disposal Quantities

Based on geotechnical data, anticipated *in-situ* and dewatered sediment moisture levels, and addition of up to 10 percent of a solidification agent as required in the Phase I (CH2M HILL 2012), sediment disposal densities for material removed by dry excavation and hydraulic dredging have been estimated as shown in Appendix C. These densities are used with the sediment volumes discussed above to estimate the tonnage of sediments for disposal. Actual sediment disposal weights will be measured at the landfill during the RA.

3.2.3 Hydraulic Modeling

3.2.3.1 HEC-RAS Model Development

EA used the HEC-RAS model of the Milwaukee River to design the maximum elevation of the cofferdams and estimate their temporary effect on the 100-year flood plain. The HEC-RAS model utilized (MilwaukeerivEncroahStudy032707) was downloaded from the WDNR Surface Water Data Viewer on 2 August 2013. This model was last updated in 2007. It is a steady flow model of approximately 16 mi of the Milwaukee River and includes data for the 10-year, 50-year, 100-year, and 500-year recurrence interval flood flows. The 50- and 500-year peak flow data were not used for this analysis. Cross sections were not geo-referenced in the HEC-RAS model; therefore, a geodatabase of the HEC-RAS cross sections was obtained from Southeastern Wisconsin Regional Planning Commission on 15 August 2013. The geodatabase included 2-dimensional lines which indicate the geographic location of each cross section.

The existing model was revised to include additional cross sections encompassing the proposed cofferdam locations. Light detection and Ranging (LIDAR) and bathymetric data (bathymetric data obtained in 2010) were used to add eight new cross sections to the model to create the revised model. One cross section was deleted because one of the new cross sections overlapped it. The eight new cross sections and the deleted cross section are shown on the HEC-RAS Cross Sections Figure (Appendix D). It is important to note that the new cross section locations near the downstream end of the oxbows depict a narrower river than the cross sections included in the existing model. The LIDAR and bathymetric data are in the Wisconsin South State Plane coordinate system, NAD 83 horizontal datum, and NGVD 29 vertical datum, and area shown in Figure C-202 (Appendix A).

The revised model with additional cross sections is considered to be more accurate than the existing model to establish the baseline for comparison to determine the effects of the cofferdams on the flood elevation. Changes to the 100-year flood elevation between the existing and revised models are shown in the HEC-RAS Output Table (Appendix D) and show a maximum elevation difference of 0.38 ft. The 100-year flood elevation is estimated to be higher in the revised model due to the additional cross sections as discussed above.

Temporary Floodplain Impacts During Construction

To estimate the temporary flood impacts during construction four cofferdams were entered into the revised model. Cofferdam 1 includes a cofferdam around Deposit 3B-1. Cofferdam 2 includes cofferdams on the main channel and west oxbow around Deposit 7 to direct flow through the east oxbow. Cofferdam 3 includes a cofferdam around Deposits 4-1 and 4-2. Cofferdam 4 includes a cofferdam around Deposit 5-1.

Review of the USGS gage data (USGS 04087000) of the Milwaukee River approximately 1,200 feet downstream of the site indicates that mean monthly discharge for the period of record from 1914 to 2012 varies from a low of 217 cfs in August to a high of 1,060 cfs in March. The Cofferdam heights were set at 0.1 ft above the modeled water surface elevation associated with the maximum mean monthly discharge flow of 1,060 cfs. The four cofferdams are shown on the HEC-RAS Cross Sections Figures (Appendix D).

The cofferdams were modeled by adding an obstruction into the model cross sections which reflect the proposed locations and maximum elevations of the cofferdams, and ineffective flow areas into the cross sections which reflect the proposed dry excavation areas. The revised model was run with all cofferdams being in place during a 100-year flood event.

Permanent Floodplain Impacts

The final restoration design was used to create a new HEC-RAS model including the proposed conditions to measure the impact on the 100 year floodplain after construction is complete. Modeling results are discussed in the next section.

3.2.3.2 HEC-RAS Modeling Results

Temporary Floodplain Impacts During Construction

Using the revised model outputs as the baseline 100-year flood elevation, the installation of the cofferdam walls will have temporary impacts to the 100-year floodplain elevation. The following conclusions discuss results for all four cofferdams in place simultaneously since it is the preferred configuration and the most conservative scenario.

In general, the installation of the cofferdams will cause a maximum temporary increase up to 0.22 ft in certain locations in the project area when compared to the revised model. In most locations, the increased elevation only affects portions of the park. However, the model and current topography indicate that one structure, located at 5200 North Milwaukee River Parkway, would be affected by the temporary increase in flood elevation that could occur during high flow events (Appendix D). EA developed a flood contingency plan that was submitted with the floodplain development permit application to the City of Milwaukee. The model cross section at river station 8.229 (Appendix D, Table 1 and Figure D-5) transects the potentially affected structure. The modeled water elevation at this river station during the 100-year flow is approximately 623.6. The floodplain contingency plan identifies this elevation and requires

flood protection to this elevation plus approximately six inches of freeboard. See Appendix B, Technical Specification 31 23 19 – Dewatering. The floodplain contingency plan includes the construction of a sand bag dike around the property with a minimum crest and tie in height of 624.1. The flood protection dike will not result in a significant increase to the current modeled flood elevations and the six inches of freeboard provides adequate protection for any increase. The contractor will be required to follow the Flood Contingency Plan or obtain a new floodplain development permit.

Table 4 shows the maximum cofferdam elevations that the specifications allow. The table also shows the modeled water surface elevations during the 1,060 cfs, 2-year and 100-year events. The maximum allowed cofferdam crest heights provide approximately 0.1 ft of freeboard for the 1,060 cfs maximum mean monthly discharge. The 2-year event is anticipated to overtop the cofferdams by approximately 3–4 ft and flood the dry excavation areas. It is expected that any flow greater than 1,060 cfs will overtop the cofferdams.

Table 4 – Maximum Cofferdam Elevations

River Station	Cofferdam Maximum Elevation[b] (ft)	Water Elevation (1,060 cfs) (ft)	Water Elevation (2-year flow) (ft)	Water Elevation (100-year flow) (ft)
8.2 (Cofferdam 2)	616.5	[a]	618.36	623.70
8.1411 (Cofferdam 2)	616.5	[a]	618.14	623.61
8.1 (Cofferdam 2)	616.5	616.20	618.34	623.66
7.85 (Cofferdam 2)	616.5	614.13	618.17	623.57
7.8 (Cofferdam 1)	614.1	613.90	617.89	623.37
7.7 (Cofferdam 1)	614.1	613.83	617.77	623.18
7.5 (Cofferdam 3)	613.8	613.71	617.56	622.85
7.4 (Cofferdam 3)	613.8	613.52	617.23	622.41
6.9 (Cofferdam 4)	612.0	611.91	615.58	620.49
6.829 (Cofferdam 4)	612.0	611.40	615.37	620.40

a) The Right Split Reach was removed from the 1,060 cfs model to divert all flow through the east oxbow.
b) The datum is listed in Appendix B, Technical Specification 01 70 00.

The 100-year flood elevation for cross sections throughout the project site is shown in HEC-RAS Output Table (Appendix D, Table 1). The resulting areas temporarily impacted by the estimated increase shown from the revised model and the cofferdam increase are shown on the HEC-RAS Cross Sections Figures (Appendix D). Appendix D also shows the one structure that would be affected by the temporary increase in flood elevation that could occur during high flow events.

Permanent Floodplain Impacts

The remedial design includes excavation of sediment, substrate restoration/enhancement, shoreline stabilization, and wetland restoration activities that all could have an impact on the floodplain. The remedial design activities will result in a net removal of material from the river in the project area. Many removal areas will not be refilled which will leave a larger river cross

section than existing conditions. Furthermore, in areas where impacted wetlands are restored, stream banks are stabilized, or substrate restoration is required; the remedial design requires that the final grades of these enhancements match the existing contours in the river. The final restoration design layout was modeled and shows that the final restoration design will result in a "no net rise" throughout the project area. The final design modeling results are shown in (Appendix D, Table 1).

3.2.4 Deposit Sequencing

Contaminated sediment removal sequencing must be conducted in a manner to reduce the likelihood of resuspension of contaminated sediments, meet floodplain requirements and schedule constraints. Final sequencing can be modified by the Contractor during the RA with EPA approval. This BOD is based on the following sequencing of installation of cofferdams and deposits removal:

- Zone 7 (cofferdam 2) and Deposit 7-4 southern portion dredging
- Deposit 5-1 (cofferdam 4)
- Deposits 4-1 and 4-2 (cofferdam 3)
- Zone 3 (cofferdam 1)
- Deposit 4-3 dredging

Additional details of the sequencing are provided in the Construction Schedule (Appendix E). It is assumed that the four cofferdams will be in-place during hydraulic dredging.

3.2.5 Phased Construction Approach

Specifications will not require specific sizes of equipment, and will generally leave means and methods for achieving RAOs up to the pre-qualified GLNPO Contractors within the constraints of the Contract Documents (engineering drawings, technical specifications and EPA Contract). It is assumed the EPA Contract with the Contractors will specify the time period required for construction, and that the Contractor pool is qualified to determine the sizes of equipment needed to complete the RA in accordance with the Contract Documents.

3.3 OTHER DESIGN CONSIDERATIONS

Construction activities can have a negative effect on the environment if engineering controls are not established. Appropriate measures will be implemented during construction to minimize impacts from the sediment runoff, dust, and water treatment discharge.

3.3.1 Public Health and Safety

Much of the project area is located in an active public park. Therefore, access control to the construction areas is important to protect the public. As part of the initial preparatory work at each deposit, a temporary chain link fence will be installed to limit unauthorized access to the area. In addition, a security guard will be required at each independent work area 24 hours/day.

3.3.2 Worker Health and Safety

The Contractor will be required to develop a site safety and health plan that specifies the means and methods used to ensure worker safety during the RA in accordance with applicable Occupational Safety and Health Administration regulations.

3.3.3 Remedial Design Contracting Strategy

It is EAs understanding that the EPA will contract construction oversight of engineering services separate from construction services during implementation of this RA. Therefore, it is important to define the roles and responsibilities for the engineering and construction services to be performed during the RA. Additionally, it is important to define the level of authority for the PCT and Engineer with regard to oversight of the Contractor, and review/approval of submittals.

It is also EAs understanding that EPA will award construction services to a pre-qualified Contractor based on the final design. Therefore, the specifications do not contain minimum Contractor qualification requirements. The specifications are mainly performance based to allow for maximum flexibility in the technical approach by the selected Contractor. The Contractor will be selected based on a "best value" determination by EPA with consideration given to the Contractor's technical approach submitted with bids. The final design has been developed with the following understanding the authorities, roles, and responsibilities of the EPA, Contractor, and Engineer during the RA.

EPA:

- Contract Management between EPA and Engineer, and EPA and Contractor
- Coordinates PCT reviews and comments
- Reviews Engineer recommendations on Contractor submittals and makes final determination
- Project owner
- Schedule and hold project meetings

GLAES:

- Review Contractor submittals and make recommendations to EPA for approval, modification or rejection
- Provide onsite Resident Engineer(s) and/or Construction Manager to compare actual work with drawings and specifications
- Provide daily field reports to EPA
- Attend project meetings and provide project updates

GLNPOC:

- Obtain remaining permits

- Provide and manage electronic project record database
- Additional preconstruction delineation and confirmatory sampling and analysis
- Surveying and quantity measurements
- Construction site work
- Provide additional job trailer for Engineer and PCT
- Record Documents
- Attend project meetings and provide project updates

Due to the uncertainties in the exact limits of contaminated sediment, the RA construction work is well-suited for a mix of lump sum and unit price bid items. Well defined and quantified work items will be fixed price and others will be unit price. EA has prepared the drawings and technical specifications to be included in EPAs Contract and bidding documents. Specifications will define the measurement and payment for specific items of work.

Specifications require construction to be surveyed and measurements made in a computer-aided design software package for fixed unit price items during construction such that payment quantities reflect actual work quantities. The final quantities are anticipated to be different from the design quantities.

EPA has determined Phase II construction will be completed as one Contract and the specifications should be optimized for remediation of all Phase II requirements. Therefore, the design was not separated to allow for construction to be phased based on available funding.

3.3.4 Permits

Multiple permits are required prior to beginning the RA. EA will submit the permit applications listed in Section 3.3.4.1. As part of the individual permit process, the applicants are required to have a pre-application meeting with WDNR. EA held the pre-application meeting on 31 January 2014. The PCT will provide the TSCA Application listed in Section 3.3.4.2. The selected RA contractor will submit applications for other required permits listed in Section 3.3.4.3.

3.3.4.1 EA Submitted Permit Applications

Wetlands and waterways are regulated by the USACE; the WDNR; and by local counties, cities, and villages. Permits are required from USACE and WDNR for the excavating or placement of any material in low areas, wetlands, and Waters of the U.S.

The CWA, Section 404 establishes a program that regulates the discharge of dredged and fill material into waters of the U.S., including wetlands. Responsibility for administering and enforcing Section 404 is shared by the USACE and EPA. USACE administers the day-to-day program, including individual permit decisions and jurisdictional determinations; develops policy and guidance; and enforces Section 404 provisions. Under the CWA, Section 401 water quality certifications, States and Tribes can review and approve, condition, or deny all Federal permits or licenses that may result in a discharge to State or Tribal waters, including wetlands. The major Federal licenses and permits subject to Section 401 are Section 402 and 404 permits.

The USACE is also responsible for CWA, Section 10 permit requirements to prevent unauthorized obstruction or alteration of any navigable water in the U.S.

The individual permits discussed above are processed simultaneously as one package from multiple permit applications (WDNR Chapter 30 Permit application) submitted to the USACE and WDNR. Wisconsin implements a three-tier system of authorization based on the projected level of environmental impact: Exemptions, General Permit, and Individual Permit. Projects requiring authorization under Section 10, Section 404, and Section 401 are typically permitted under a joint agency General Permit, as long as the project poses minimal adverse effect to the wetlands and waterways. For activities where no Exemption or General Permit is available, a more detailed Individual Permit application is required. Individual Permits require a 30-day comment period of which people are notified by a newspaper, website notice, and mailing to interested parties. During the comment period, an informational hearing may be requested. WDNR staff conducts the informational hearing to gather observations and facts from others to consider in addition to its own data in making to decision.

EA will submit the following permit applications required to support the proposed project:

- **Dredging Individual Permit:** For projects that involve removal of any material from lake or streambed (muck, sand, gravel, silt, organic material, etc.).

- **Wetland Disturbance Individual Permit:** For projects that involve excavating or placement of any material in low areas or wetlands. A Pre-application Meeting with a Water Management Specialist from WDNR is required before applying for an Individual Permit. This meeting will help the applicant design an approvable project and complete the application. It is recommended that a USACE representative is included in the Pre-application Meeting.

- **Streambank Erosion Control Individual Permit:** Permits will generally be required to place or repair any streambank structures (i.e., fiber logs, rock riprap, seawalls, etc.).

- **Miscellaneous Structure Individual Permit:** For projects that involve placement of a structure or any other materials on the bed of a public waterway require a permit.

- **Carriage and/or Interstitial Water from Dredging Operations General Permit:** Permit is applicable to dredging operations that discharge carriage and/or interstitial water. Carriage water is defined as the water portion of slurry that is pumped from the dredging site to the disposal site. Interstitial water is squeezed out of the interstices when sediment is dewatered.

- **Floodplain Development and Fill Permits:** EA has worked with WNDR, the City of Milwaukee and The City of Glendale to complete the process to obtain floodplain development and fill permits from the cities. EA developed a flood contingency plan designed to protect the structures at the one property (located in City of Milwaukee) that

modeling has indicated the temporary increase floodplain due to work conducted during the RA will impact structures. See Section 3.2.3 for additional information. The flood contingency plan will be submitted with the City of Milwaukee permit application and the Contractor will be required to comply with the flood contingency plan and permit, or obtain their own permit. Both Cities have indicated the permit process does not require City Council approval and the permits would be issued before the construction is set to begin.

- **Milwaukee County Construction/Right-of-Entry Permit:** EA will work with Milwaukee County to obtain the Construction/Right-of-Entry Permit to allow use of their property for staging and access.

- **WisDOT Application/Permit to Work on Highway Right-of-Way:** EA will apply for this permit to cover in-river dredging activities within the WisDOT Right-of-Way for I-43 at deposit 4-3.

- **Coastal Management Program and Consistency Certification:** EA will submit required applications to initiate the federal consistency review.

The individual permits listed above will be submitted as one complete package to WDNR and USACE for approval. The general permit application, floodplain development and fill permit application and right-of-entry permit applications will be submitted separately.

3.3.4.2 PCT Provided Permits

The PCT will provide the following permits to the selected Contractor:

- TSCA Application

3.3.4.3 Contractor Submitted Permit Applications

Other permits that must be submitted and obtained by the Contractor prior to the RA include:

- WPDES Construction Site Stormwater Runoff General Permit
- Notice for Construction Near or On Lakes, Streams, or Wetlands
- Local Stormwater Permits
- Temporary Noise Variance
- Utility Connection Permits (Field Offices)
- WisDOT Application/Permit to Work on Highway Right-of-Way: Contractor will be required to obtain this permit if their technical approach includes utilizing WisDOT structures

3.3.5 Identification of Easement and Access Requirements

Sediment removal and habitat restoration activities will be conducted at the Site. The portions of the RA that will remove contaminated sediment from private property within the river and do not require easements and/or access on private property are summarized below based on the landowners (GIS 2013) as shown in Figures 11 through 13:

- Excavation or Dredging on Private Property:
  - Parcel 612: 612 W Rock Pl; Glendale, WI 53209
  - Parcel 616: 616 W Rock Pl; Glendale, WI 53209
  - Parcel 620: 620 W Rock Pl; Glendale, WI 53209
  - Parcel 624: 624 W Rock Pl; Glendale, WI 53209
  - Parcel 630: 630 W Rock Pl; Glendale, WI 53209
  - Parcel 700: 700 W Rock Pl; Glendale, WI 53209
  - Parcel 706: 706 W Rock Pl; Glendale, WI 53209
  - Parcel 712: 720 W Rock Pl; Glendale, WI 53209
  - Parcel 720: 720 W Rock Pl; Glendale, WI 53209
  - Parcel 4700: M R I Partners, 24 Greenway Plaza Suite 1850; Houston, TX 77046
  - Parcel 4650: Barnabas Building Properties, L.L.C.; 4650 N Prt Washington Rd, Glendale, WI 53212
  - Parcel 400: Wheaton Franciscan Services, Inc., 26w171 Roosevelt Rd, Wheaton, IL 60187.

The portions of the RA that may require easements and/or access are summarized below based on the landowners (GIS 2013) as shown in Figures 10 - 13:

- Wisconsin Department of Transportation
- Milwaukee County Parks (right-of-entry)
- Site Access or Upland Property Use on Private Property:
  - Parcel 4700: M R I Partners, 24 Greenway Plaza Suite 1850; Houston, TX 77046
  - Parcel 4650: Barnabas Building Properties, LLC.; 4650 N Prt Washington Rd, Glendale, WI 53212
  - Parcel 400: Wheaton Franciscan Services, Inc., 26w171 Roosevelt Rd, Wheaton, IL 60187

For this design, EA assumes that EPA has acquired or will acquire access agreements from private land owners and Milwaukee County Parks, or else EPA has determined that access agreements are not necessary.

4. DRAWINGS AND SPECIFICATIONS

This section identifies the drawings and specifications that have been prepared for this Report.

4.1 DRAWINGS AND SCHEMATICS

Below is a listing of drawings that are included in the final design and are provided in Appendix A.

- G-001 Title Sheet
- G-002 Abbreviations, General Notes, Legend and Drawing Index
- C-101 Site Sheet Index
- C-102 Zones 3 And 7 Existing Conditions
- C-103 Zone 4 Existing Conditions
- C-104 Zone 5 Existing Conditions
- C-201 Available Staging Areas And Temporary Facilities
- C-202 Zones 3 And 7 Sediment Removal Plan
- C-203 Zones 3 And 7 Sediment Removal Cross Sections
- C-204 Zone 4 Sediment Removal Plan
- C-205 Zone 4 Sediment Removal Cross Sections
- C-206 Zone 5 Sediment Removal Plan
- C-207 Zone 5 Sediment Removal Cross Sections
- C-301 Zones 3 And 7 Restoration Plan
- C-302 Zone 4 Restoration Plan
- C-303 Zone 5 Restoration Plan
- C-304 Restoration and Backfill Cross Sections
- C-305 Restoration and Backfill Cross Sections 2
- C-501 Details 1
- C-502 Details 2
- C-503 Details 3
- C-504 Details 4

4.2 OUTLINE OF GENERAL SPECIFICATIONS

Below is a listing of technical specifications that are included in the final design and are provided in Appendix B.

Division 1 – General Requirements

- 01 10 00 Summary
- 01 20 00 Price and Payment Procedures
- 01 30 00 Administrative Requirements
- 01 31 13 Project Coordination

- 01 33 00 Submittal Procedures
- 01 35 45.00 10 Chemical Data Quality Control
- 01 40 00 Quality Requirements
- 01 50 00 Temporary Facilities and Controls
- 01 70 00 Execution and Closeout Requirements
- 01 72 00 Decontamination of Personnel and Equipment

Division 2 – Existing Conditions

- 02 56 13 Waste Containment Geomembrane
- 02 61 00 Removal and Disposal of Contaminated Sediments

Division 31 – Earthwork

- 31 10 00 Site Clearing
- 31 23 19 Dewatering
- 31 23 23 Fill

Division 32 – Exterior Improvements

- 32 01 90 Maintenance of Planting
- 32 12 16 Asphalt Paving
- 32 90 00 Planting

5. VALUE ENGINEERING STUDY

A VE Study (USACE 2013) was completed on the preliminary design by the USACE in November 2013. This section documents the VE Study recommendations selected for implementation by the Project Coordination Team (PCT) and EA's method for their incorporation into the Lincoln Park Phase II design. The following is a brief synopsis of the recommendations as listed in the VE study and incorporation method/action items based upon the 5 December 2013 discussion between EA and the PCT:

- P-2, Alternative Disposal Locations – The PCT coordinated with the USACE/Port of Milwaukee Dredged Material Disposal Facility to determine if this alternative is feasible. This alternative was determined to be infeasible by the PCT.

- P-8, Divert all water with piping or partial diversion with pumping to the west oxbow – This alternative is not feasible and will not be incorporated into the design.

- P-11, Reuse the removed trees for slope stabilization and habitat – PCT requested implementation of this recommendation. Design specifications require minimizing trees removed during construction. Any trees required to be removed must be salvaged and stockpiled for reuse as root wads. Measurement and Payment assumes the trees removed will meet the material requirements specified and the quantity. If the materials and quantity are not sufficient, a change order will likely be required to construct the root wads.

- P-12, Alternative materials for the steel sheet pile and/or techniques for cofferdaming – The design does not specify materials or techniques for cofferdaming. The selected contractor must determine this and provide Professional Engineer sealed design for the cofferdam prior to construction.

- P-18, 21, 23, Evaluate the size and design of the dewatering and WW treatment pad – The design does not specify the size and design of the dewatering pad, WW treatment pad or the decontamination pad. A typical design is shown on the drawings for these facilities that would be approved during construction. The contractor may change the design if it is equivalent in the protection to the environment. Also, the design requires the contractor to determine the size of the pads to meet all contract document requirements including schedule. It is anticipated that the schedule will be very aggressive and the contractor will need flexibility to meet the contract document requirements.

- P-19, 20, Alternative methods of handling material/offload directly to trucks – The design allows for dewatering of sediments at a dewatering pad (sized and designed by contractor) and/or direct loading and disposal.

- P-28, Multiple work shifts, 24/7 – The PCT strongly desires the work be performed 24-

hours a day 7-days a week, but does not want to require this schedule unless it is required to meet the project schedule. EPA has indicated the Request for Task Order Proposal (RFTOP) will identify the PCT desire for in-river work to be completed 24/7 to minimize risk of flooding and duration of project while providing the best value to the Owner. Contractor is required to propose their work schedule in their proposal and follow their schedule during construction.

- P-30, Consider alternate additive materials for drying material such as (no fly ash), corncob, Portland cement type I, Portland Cement – EA has listed Calciment® and ground corncobs as approve solidification amendments. Conversations with PCT and TSCA regulators eliminated materials that would increase temperature during mixing and therefore increase volatilization of contaminants. Therefore, cement, lime, etc., are not allowed. Calciment® was successfully used in Phase I without a dewatering pad (i.e. direct loading for disposal). Cement also has a longer cure time than Calciment® and would therefore not likely meet the project objective of direct loading for disposal. Discussions with the USACE VE study team indicated successful past use of ground corncobs as solidification agents on sediment disposal projects. Corncobs are a renewable resource and therefore, a "green" alternative. Strength data is not available for sediment solidified with corncobs, but past experience proves the sediment is "stackable."

- C-4, Determine an acceptable range of contamination that could be used for beneficial reuse, BMPs – PCT has determined that a beneficial reuse is not feasible. This comment is not incorporated into the design.

- C-7, Divert all water to the east oxbow vs. phasing isolations – EA evaluated this alternative as discussed in the preliminary design. The hydraulic model indicated the additional temporary rise in the 100 year floodplain was approximately 0.07 feet. EA and PCT believe this additional increase is minor and EA is working with State and Local floodplain administrators to obtain permits for this approach.

- C-15, Design team considers the times of high flow periods when determining construction sequencing and scheduling to minimize water level increases – EA does not have control of the time of construction period.

- C-16, Complete just confirmation sampling since the Analytical Cost = Excavation Cost – This comment doesn't address the intent of the analytical cost benefit of reducing sediment transportation and disposal costs. Also, the PCT has directed EA to require pre-removal analytical testing to minimize re-excavation of grids based on confirmation sampling.

- C-17, Increase public awareness about the project – PCT is completing this task.

- C-22, Design team must consider the dam safety issue relating to the effect of dewatering upstream of the spillway – EA has considered this issue and it is discussed in the Final

Design report.

- C-26, Evaluate construction sequencing to maximize production efficiency and decrease cost – EA has and continues to perform these tasks.

- C-29, Lessons learned from past projects relating to landfill requirements – EA has addressed this in the design report and the specifications require the contractor to meet all landfill requirements.

- C-31, Weather impact on construction activities, specifically trucking – Specifications address spreading of contamination, transportation in accordance with regulations and storage of liquids in water tight containers.

- C-32, Write contract to cover NAPL treatment and existence and unknown locations – Specifications require contractor to remove and dispose of contaminated sediments at known and unknown locations based on analytical testing to be conducted by contractor.

6. FINAL REMEDIAL ACTION SCHEDULE

The PCT has notified EA that construction activities will be completed in the 2014 construction season and directed EA to base the design on the assumption that the RA will be completed in 2014. EA's estimate of the construction schedule is provided in Appendix E, but the design is based upon completing the RA in 2014 except for final vegetation establishment. The basis for the main RA work items relating to project schedule are:

- 300 ft/day sheet pile cofferdam installation and 360 ft/day removal. 300 ft/day of portadam cofferdam installation and 600 ft/day removal. Assumes 3 crews for cofferdams installation and removal.

- 600 gpm dewatering of work areas and 5 additional days for passive in-situ sediment dewatering prior to additional delineation and survey.

- Two excavation crews each excavating 1,000 cy/day.

- 100 cy/day of hydraulic dredging.

- One day turn-around time on analysis from an on-site laboratory.

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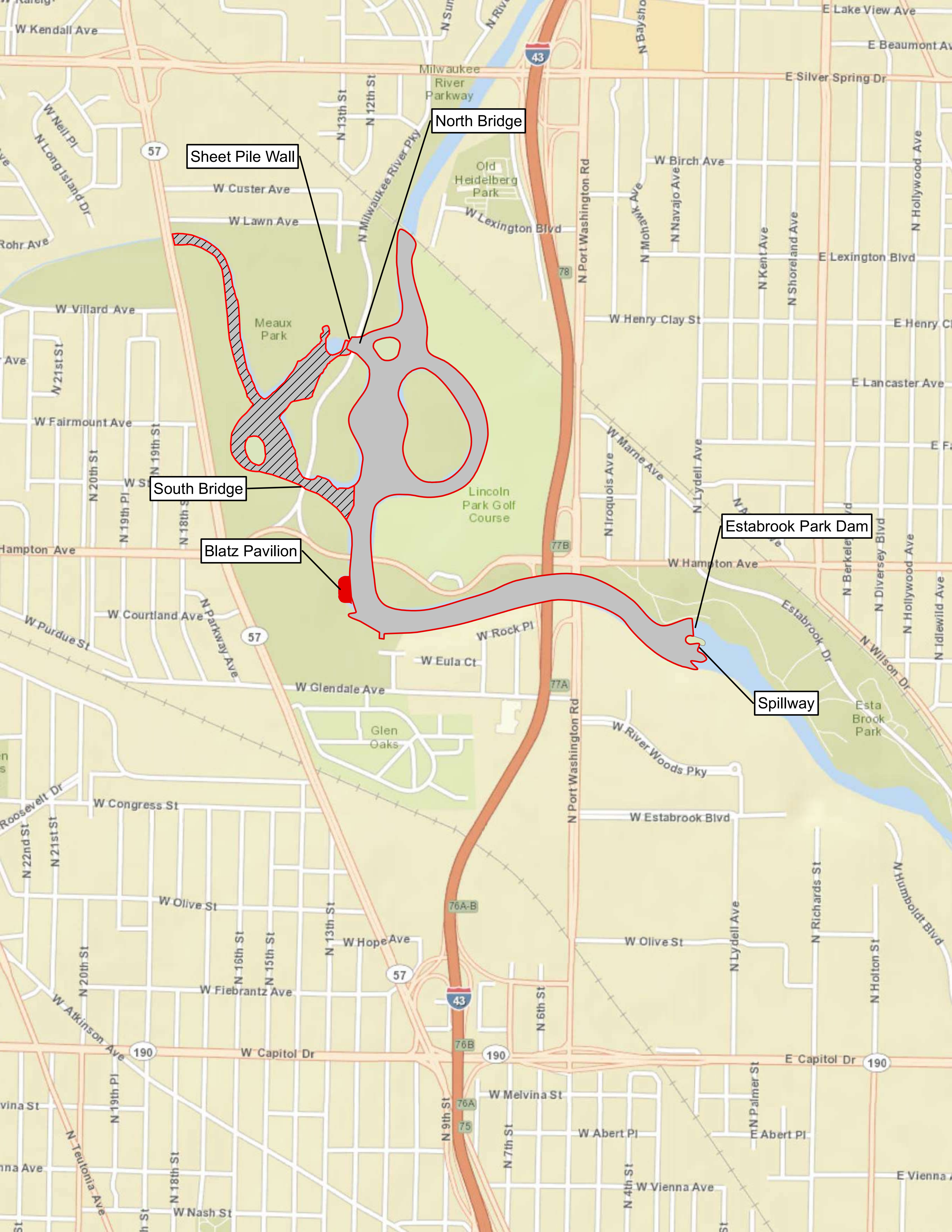
Figures



North Bridge
Sheet Pile Wall
South Bridge
Blatz Pavilion
Estabrook Park Dam
Spillway
Milwaukee River Parkway
Old Heidelberg Park
Meaux Park
Lincoln Park Golf Course
Glen Oaks
Esta Brook Park
W Kendall Ave
W Custer Ave
W Lawn Ave
W Villard Ave
W Fairmount Ave
Hampton Ave
W Hampton Ave
W Courtland Ave
W Purdue St
W Glendale Ave
W Eula Ct
W Rock Pl
W Lexington Blvd
E Lexington Blvd
W Henry Clay St
W Birch Ave
E Lake View Ave
E Beaumont Ave
E Silver Spring Dr
E Lancaster Ave
W River Woods Pky
W Estabrook Blvd
W Congress St
W Olive St
W Hope Ave
W Fiebrantz Ave
W Capitol Dr
E Capitol Dr
W Melvina St
W Abert Pl
E Abert Pl
W Vienna Ave
W Nash St
N Port Washington Rd
N Milwaukee River Pky
N 13th St
N 12th St
N Parkway Ave
N Lydell Ave
N Wilson Dr
Estabrook Dr
W Marne Ave
W Atkinson Ave
N Teutonia Ave
N Humboldt Blvd
N Richards St
N Holton St
N Palmer St
W Neil Pl
N Long Island Dr
Rohr Ave
Roosevelt Dr
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N Mohawk Ave
N Navajo Ave
N Kent Ave
N Shoreland Ave
N Hollywood Ave
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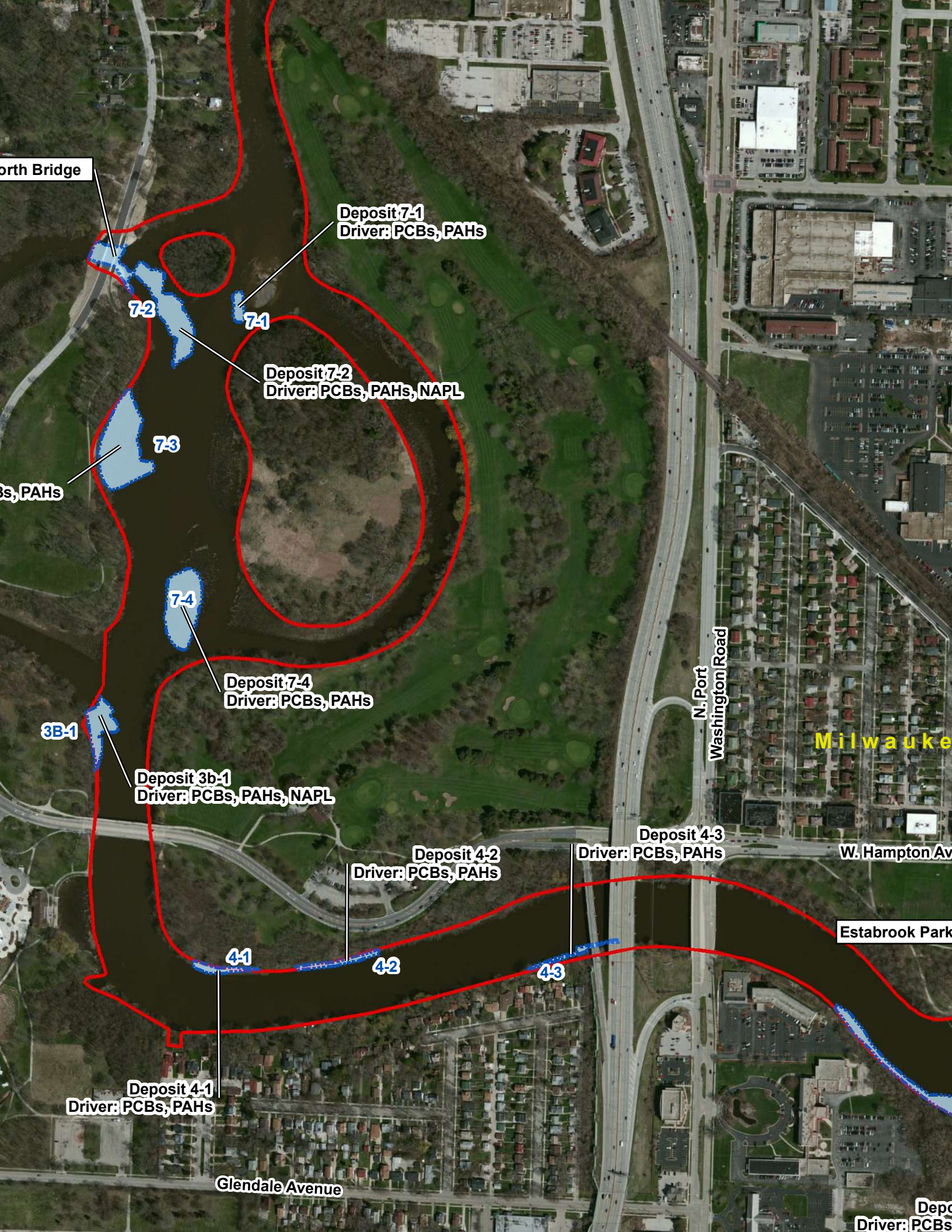
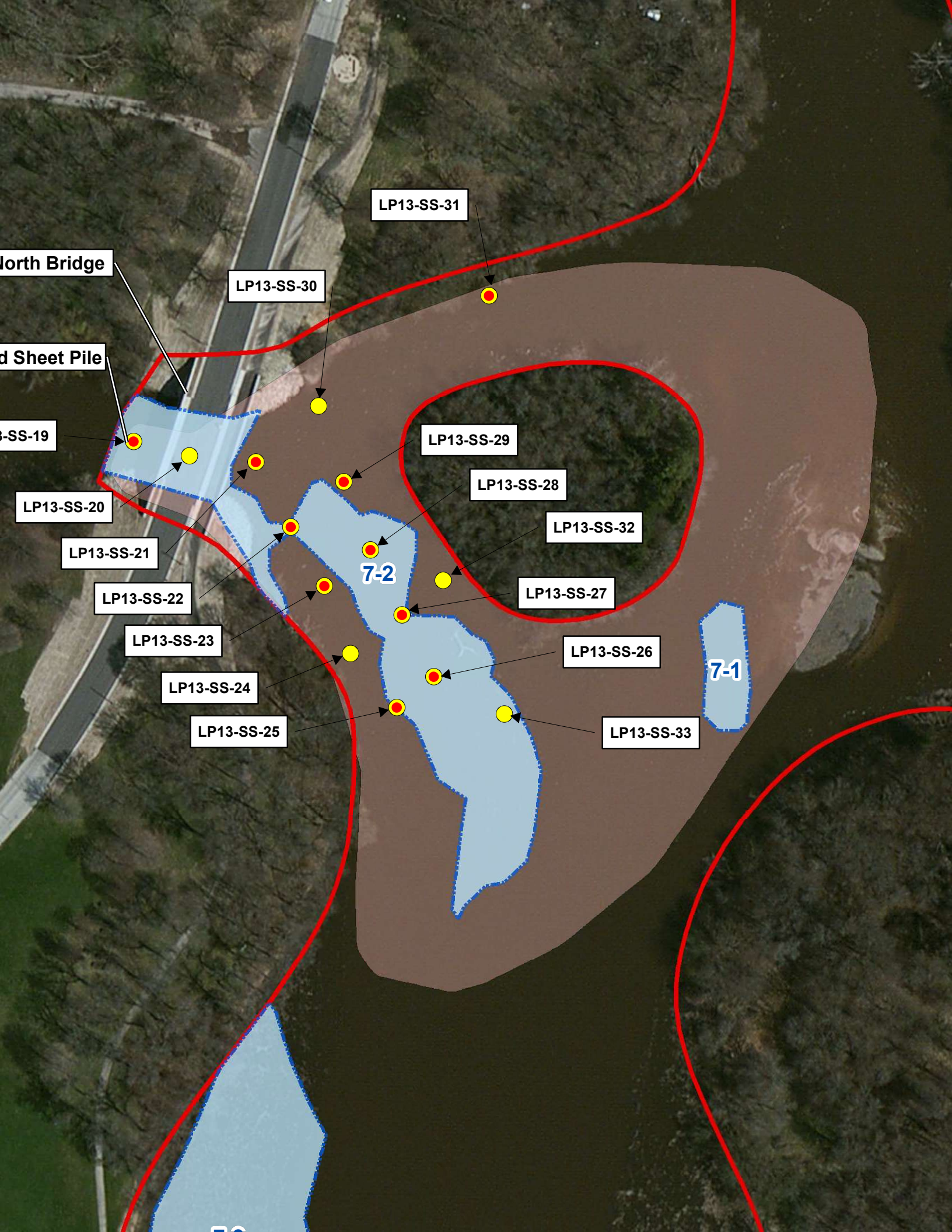
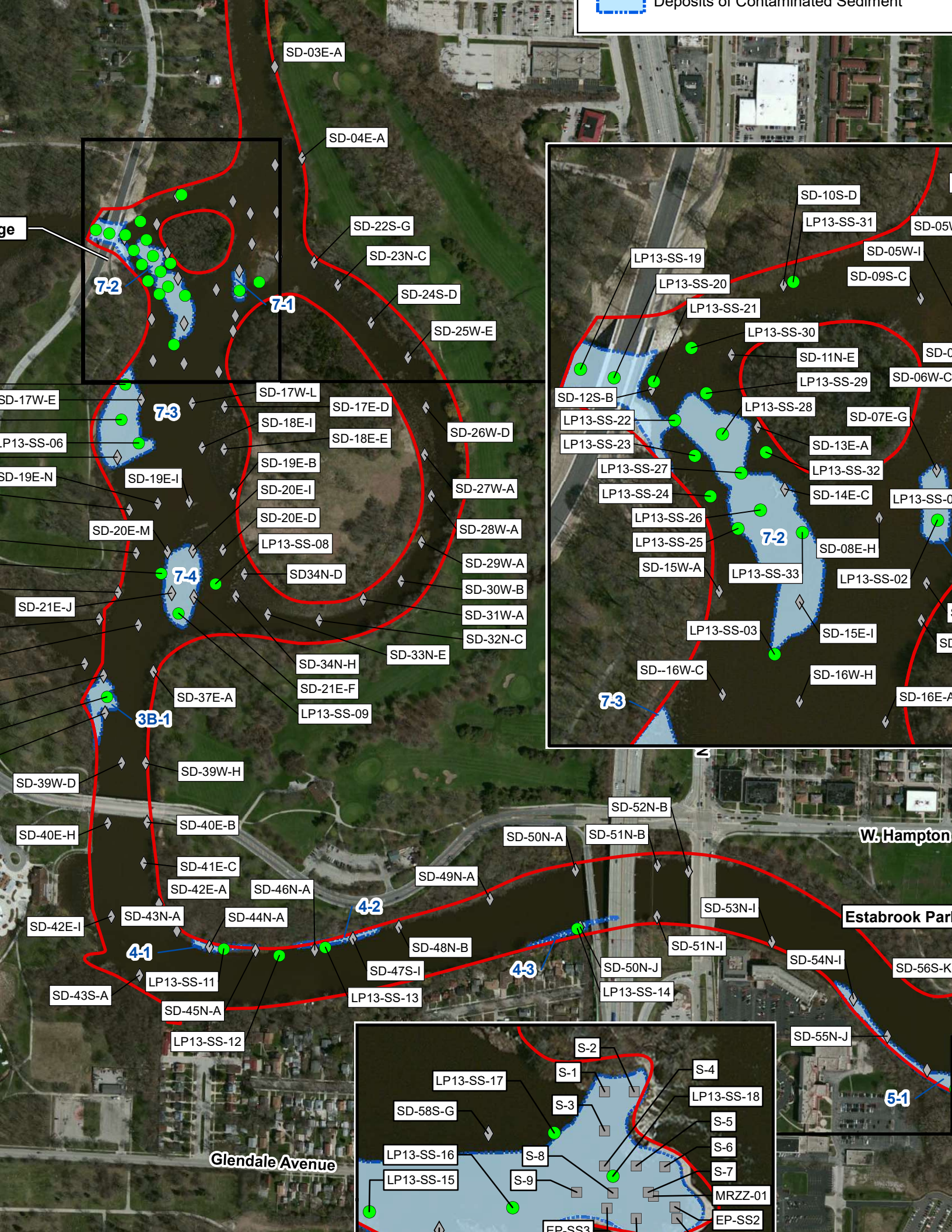
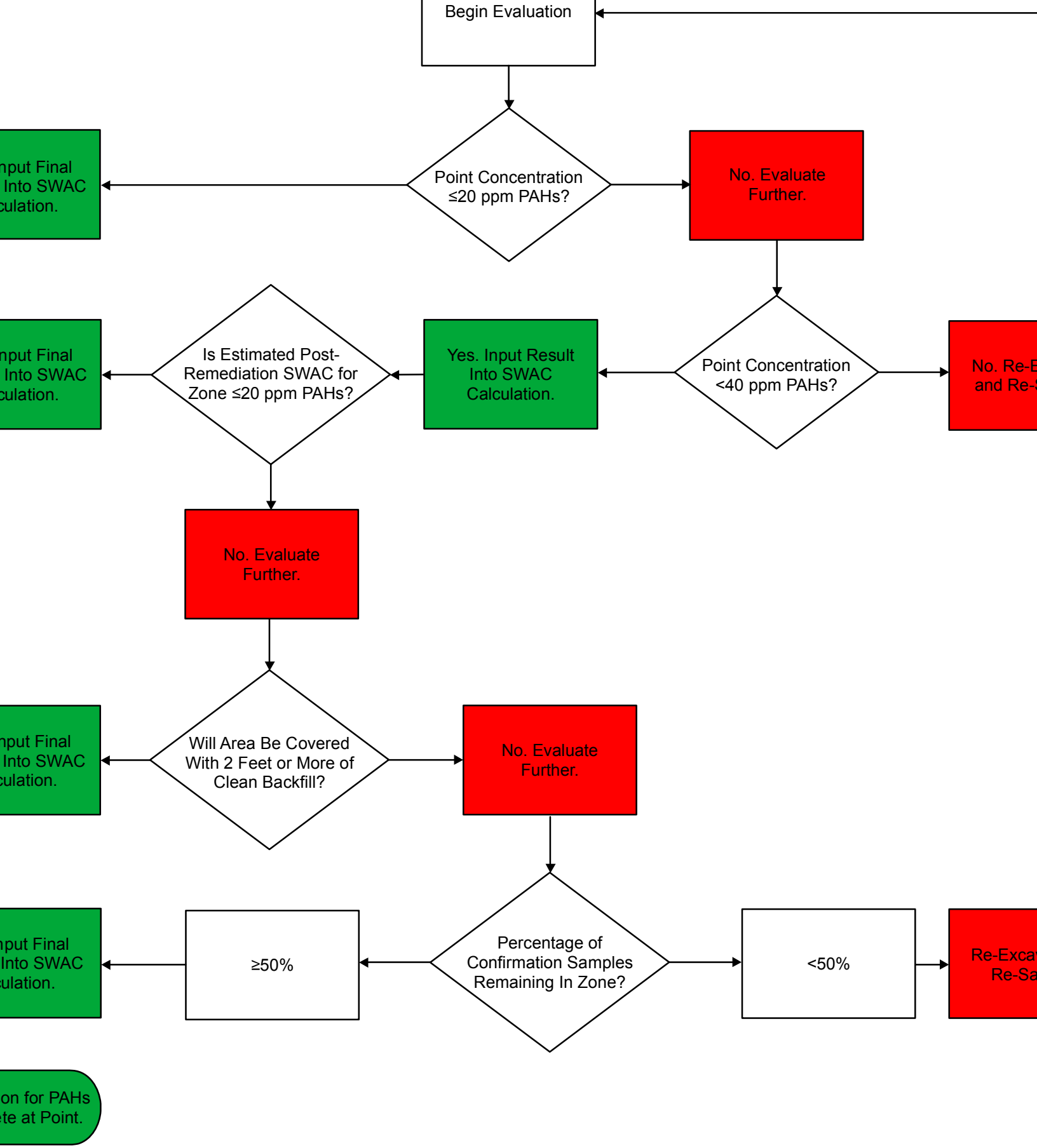

orth Bridge
Deposit 7-1
Driver: PCBs, PAHs
7-2
7-1
Deposit 7-2
Driver: PCBs, PAHs, NAPL
7-3
Bs, PAHs
7-4
Deposit 7-4
Driver: PCBs, PAHs
3B-1
Deposit 3b-1
Driver: PCBs, PAHs, NAPL
N. Port Washington Road
Milwauke
Deposit 4-3
Driver: PCBs, PAHs
W. Hampton Av
Deposit 4-2
Driver: PCBs, PAHs
Estabrook Park
4-1
4-2
4-3
Deposit 4-1
Driver: PCBs, PAHs
Glendale Avenue


LP13-SS-31
North Bridge
LP13-SS-30
d Sheet Pile
-SS-19
LP13-SS-29
LP13-SS-28
LP13-SS-20
LP13-SS-32
LP13-SS-21
7-2
LP13-SS-22
LP13-SS-27
LP13-SS-23
LP13-SS-26
7-1
LP13-SS-24
LP13-SS-25
LP13-SS-33


Deposits of Contaminated Sediment
SD-03E-A
SD-04E-A
SD-22S-G
SD-23N-C
SD-24S-D
SD-25W-E
7-1
7-2
SD-17W-E
SD-17W-L
SD-17E-D
7-3
SD-18E-I
SD-18E-E
SD-26W-D
LP13-SS-06
SD-19E-B
SD-19E-N
SD-19E-I
SD-20E-I
SD-27W-A
SD-20E-D
SD-20E-M
SD-28W-A
LP13-SS-08
SD-29W-A
7-4
SD34N-D
SD-30W-B
SD-21E-J
SD-31W-A
SD-32N-C
SD-33N-E
SD-34N-H
SD-21E-F
SD-37E-A
LP13-SS-09
3B-1
SD-39W-H
SD-39W-D
SD-40E-B
SD-40E-H
SD-41E-C
SD-42E-A
SD-46N-A
SD-49N-A
SD-42E-I
SD-43N-A
SD-44N-A
4-2
SD-48N-B
4-1
SD-47S-I
LP13-SS-11
SD-43S-A
LP13-SS-13
SD-45N-A
LP13-SS-12
Glendale Avenue
SD-10S-D
LP13-SS-31
SD-05W-I
LP13-SS-19
SD-09S-C
LP13-SS-20
LP13-SS-21
LP13-SS-30
SD-11N-E
SD-06W-C
LP13-SS-29
SD-12S-B
LP13-SS-28
SD-07E-G
LP13-SS-22
SD-13E-A
LP13-SS-23
LP13-SS-32
LP13-SS-27
SD-14E-C
LP13-SS-24
LP13-SS-26
7-2
SD-08E-H
LP13-SS-25
SD-15W-A
LP13-SS-33
LP13-SS-02
LP13-SS-03
SD-15E-I
SD--16W-C
SD-16W-H
7-3
SD-16E-A
SD-52N-B
SD-50N-A
SD-51N-B
W. Hampton
SD-53N-I
Estabrook Park
SD-51N-I
SD-54N-I
SD-56S-K
4-3
SD-50N-J
LP13-SS-14
SD-55N-J
5-1
S-2
S-1
S-4
LP13-SS-17
LP13-SS-18
S-3
SD-58S-G
S-5
S-6
LP13-SS-16
S-8
S-7
LP13-SS-15
S-9
MRZZ-01
EP-SS2
EP-SS3


Wetland 7
Wetland 7
dp-14
dp-13
Wetland 7
Milwaukee
Wetland 8
dp-12
dp-11
dp-10
Wetland 7
N. Port Washington Rd
Wetland 4
W. Hampton Ave
dp-5
dp-6
dp-4
Wetland 2
Wetland 3
dp-3
Wetland 4
Milwaukee River
Wetland 1
dp-2
dp-9
dp-1
Wetland 1



Key to diagram boxes

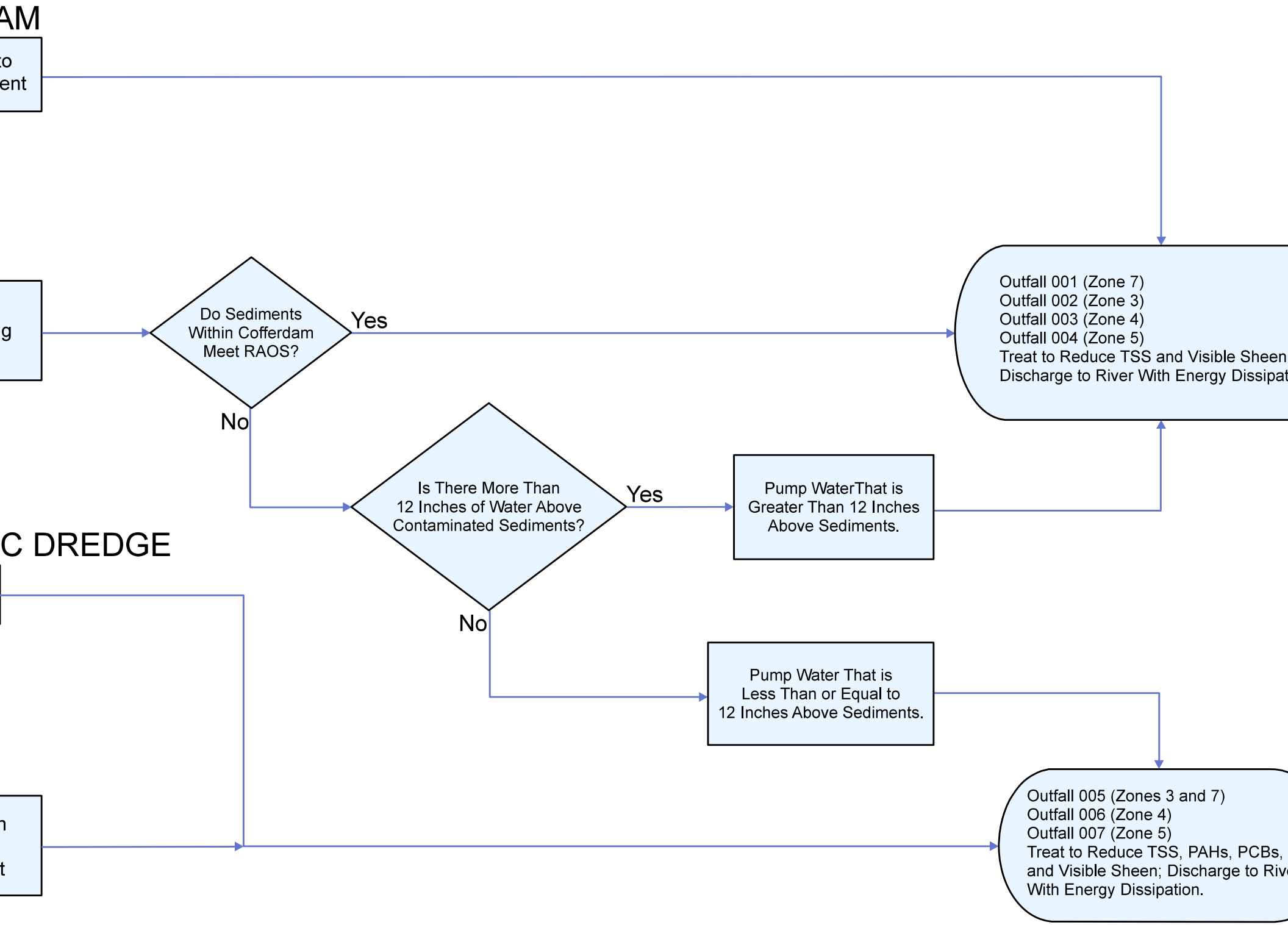
= Positive result in the process, continue forward.

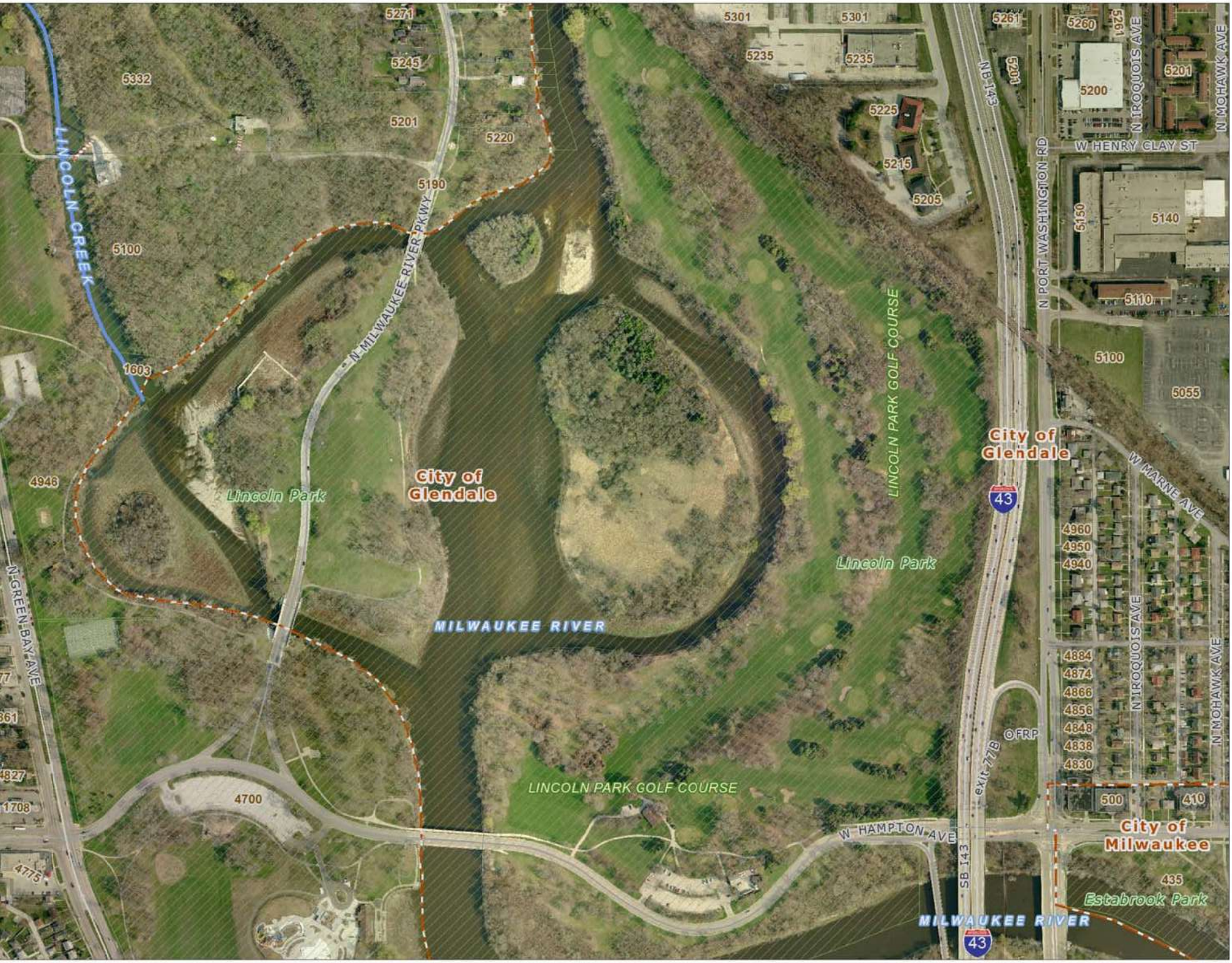
= Negative result in the process, additional action ne


Maximum Total PCB Concentration: Co
Deposits of Contaminated Sediment
Project Boundary
*Depth interval of maximum concentration below sediment surface denoted within parenthesis.
orth Bridge
SD-07E-G
-2.8 ft)
(2-3 ft)
(2-3 ft)
-15E-I
-0.5 ft)
.5-3 ft)
17W-E
(2-3 ft)
18W-B
7-2
7-1
SD-23N-C
LP13-SS-02 (2-3 ft)
7-3
SD-20E-I
7-4
SD-35W-A
SD-36N-C
SD-21E-F
SD-21E-J
3B-1
LP13-SS-10 (0-1 ft)
MRZZ-01
LP13-SS-16 (0-0.5 ft)
S-7
S-12
S-10
S-14
EP-SS4
N. Port Washington Road
Milwauke
W. Hampton Av
SD-46N-A
SD-47S-I
SD-50N-J
4-1
4-2
4-3
Estabrook Park
SD-56S-A
SD-55N-J
SD-44N-A
LP13-SS-11 (0-2 ft)
LP13-SS-15 (0-2 ft)
Glendale Avenue


Maximum Total PAH Concentration: 20
Maximum Total PAH Concentration: Co
Deposits of Contaminated Sediment
Project Boundary
*Depth interval of maximum concentration below sediment surface denoted within parenthesis.
ge
-3.6 ft)
, 2-3 ft)
(2-3 ft)
-0.5 ft)
(2-3 ft)
(2-3 ft)
-18W-B
-0.5 ft)
-36S-B
-38W-B
LP13-SS-02 (2-3 ft)
7-2
7-1
SD-14E-C
SD-17W-E
SD-15E-I
7-3
SD-17E-D
7-4
SD-30W-B
LP13-SS-09 (2-3 ft)
SD-37E-I
LP13-SS-10 (0-1 ft)
3B-1
LP13-SS-16
(0-2.8 ft)
LP13-SS-15
(0-2.9 ft)
5-1
EP-SS
Milwaukee
W. Hampton Avenue
SD-47S-I
LP13-SS-14 (0-0.5)
Estabrook Park
4-1
4-2
4-3
SD-45N-A
SD-50N-J
SD-54N-I
5-1
Glendale Avenue
Washington Road


parenthesis. Cores without labels
NAPL Detection.
0 (1.3-1.9 ft)
LP13-SS-22 (0.8-1.1 ft)
7-2
7-1
7-3
7-4
3-SS-10 (1-1.6 ft)
3B-1


AM
to
ent
g
Do Sediments
Within Cofferdam
Meet RAOS?
Yes
No
Outfall 001 (Zone 7)
Outfall 002 (Zone 3)
Outfall 003 (Zone 4)
Outfall 004 (Zone 5)
Treat to Reduce TSS and Visible Sheen
Discharge to River With Energy Dissipat
Is There More Than
12 Inches of Water Above
Contaminated Sediments?
Yes
No
Pump WaterThat is
Greater Than 12 Inches
Above Sediments.
C DREDGE
Pump Water That is
Less Than or Equal to
12 Inches Above Sediments.
n
t
Outfall 005 (Zones 3 and 7)
Outfall 006 (Zone 4)
Outfall 007 (Zone 5)
Treat to Reduce TSS, PAHs, PCBs,
and Visible Sheen; Discharge to Riv
With Energy Dissipation.



1 : 4,900

408 817 Feet

DISCLAIMER: This map is a user generated static output from the Milwaukee County Land Information Office Interactive Mapping Service website.The contents herein are

Notes

Zone 3 and 7 Lan

County Bo
Highways
Street Ce
Railroad 8
Water 8k
Rivers 8k
Airport 8k
Landmark
County Pa
Municipal
Tax Parce
AERIAL P
Red:
Green:
Blue:

1:1,767

147 295 Feet

DISCLAIMER: This map is a user generated static output from the Milwaukee County Land Information Office Interactive Mapping Service website.The contents herein are

Notes

Zone 4 Landowner

County Bo
Highways
Street Ce
Railroad 8
Water 8k
Rivers 8k
Airport 8k
Landmark
County Pa
Municipal
Tax Parce
AERIAL P
Red:
Green:
Blue:

1:3,264

272 544 Feet

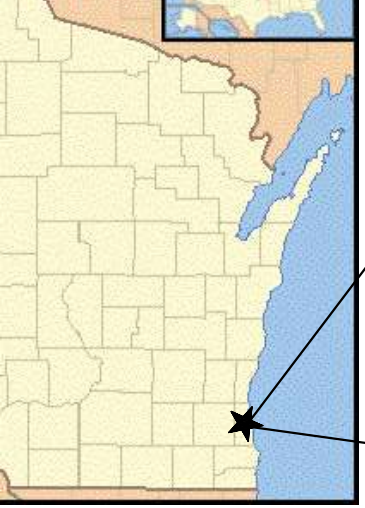
DISCLAIMER: This map is a user generated static output from the Milwaukee County Land Information Office Interactive Mapping Service website.The contents herein are

Notes

Deposit 5-1 Lando

Appendix A

Engineering Drawings



TATE MAP
NOT TO SCALE

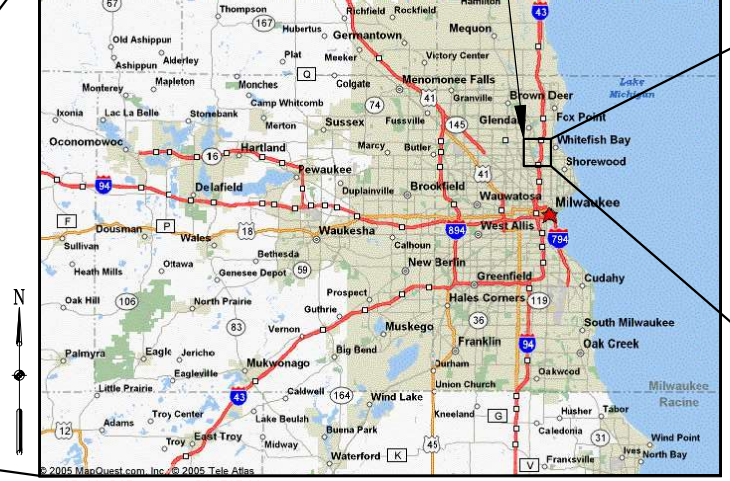


IMAGE SOURCE: WWW.MAPQUEST.COM

LOCAL AREA MAP
NOT TO SCALE

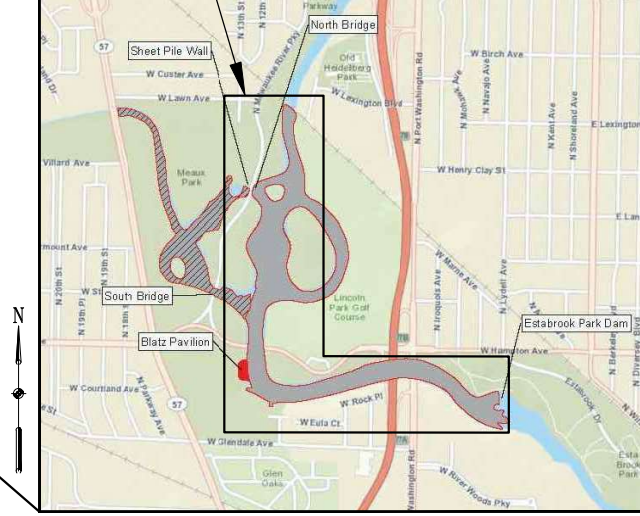


IMAGE SOURCE: WWW.MAPQUEST.COM

VICINITY MAP
NOT TO SCALE

REMEDIAL DESIGN

OLN PARK/MILWAUKEE RIVER CHANN SEDIMENTS SITE PHASE II

MILWAUKEE COUNTY, WISCONSIN

PREPARED FOR

U.S. ENVIRONMENTAL PROTECTION AGENCY

ONS SHOWN ARE APPROXIMATE AND ARE
SE 1 DOCUMENTS, UTILITY ONE-CALLS,

OR TO SIZE AND LAYOUT. ALTERNATE BUT
HNICAL SPECIFICATION 01 50 00 -

CAL CUTS AND STEEP SLOPES IN SOME
EFLECT THE ANTICIPATED EXTENT OF
S RESPONSIBLE FOR THE STABILITY OF ALL
K, AND TO PROVIDE APPROPRIATE
TURES FOR CUT SLOPES AS NEEDED TO
UGHING INTO EXCAVATION, OR SETTLEMENT
IONAL SEDIMENT OR SOIL SLOUGHING INTO
E APPROVED EXCAVATION PLAN WILL BE
ENT.

G-001	1	TITLE SHEET
G-002	2	ABBREVIATIONS, GENERAL NOTES, LEGEND AND DRAWING INDEX
C-101	3	SITE SHEET INDEX
C-102	4	ZONES 3 AND 7 EXISTING CONDITIONS
C-103	5	ZONE 4 EXISTING CONDITIONS
C-104	6	ZONE 5 EXISTING CONDITIONS
C-201	7	AVAILABLE STAGING AREAS AND TEMPORARY FACILITIES
C-202	8	ZONES 3 AND 7 SEDIMENT REMOVAL PLAN
C-203	9	ZONES 3 AND 7 SEDIMENT REMOVAL CROSS SECTIONS
C-204	10	ZONE 4 SEDIMENT REMOVAL PLAN
C-205	11	ZONE 4 SEDIMENT REMOVAL CROSS SECTIONS
C-206	12	ZONE 5 SEDIMENT REMOVAL PLAN
C-207	13	ZONE 5 SEDIMENT REMOVAL CROSS SECTIONS
C-301	14	ZONES 3 AND 7 RESTORATION PLAN
C-302	15	ZONE 4 RESTORATION PLAN
C-303	16	ZONE 5 RESTORATION PLAN
C-304	17	RESTORATION AND BACKFILL CROSS SECTIONS
C-305	18	RESTORATION AND BACKFILL CROSS SECTIONS 2
C-501	19	DETAILS 1
C-502	20	DETAILS 2
C-503	21	DETAILS 3
C-504	22	DETAILS 4

OTES:

THE USGS WWW.VIEWER.NATIONALMAP.GOV/VIEWER.

TAINED FROM MILWAUKEE COUNTY LAND INFORMATION OFFICE'S
milwaukee.gov/LandInformationProgr23113/LIOInteractiveMapping.htm,
ATE 1983 ZONE: WISCONSIN SOUTH ZONE AND VERTICAL DATUM IS

OF SURVEY DONE BY EA IN FEBRUARY AND MAY 2013 AND
EY DONE IN FEBRUARY THROUGH APRIL 2010 BY CH2M HILL.
ATE 1983 ZONE: WISCONSIN SOUTH ZONE AND VERTICAL DATUM IS

MAPS OBTAINED FROM WISCONSIN DIGGERS HOTLINE AUGUST 2013.

CATIONS, AND NAPL LOCATIONS ARE ESTIMATED BASED ON AN EXISTING

ELINEATION DONE BY EA IN SEPTEMBER 2013.

D INSURANCE RATE MAP PROVIDED BY FEMA. MAP NUMBER
NTAL DATUM IS STATE PLANE COORDINATE 1983 ZONE: WISCONSIN
9.

SED ON WWW.MAPS.MILWAUKEECOUNTY.ORG DOWNLOADABLE GIS DATA

CH2M HILL RECORD DRAWINGS.

OLOGY, INC.

NCY

PIPE

929

ATION SYSTEM

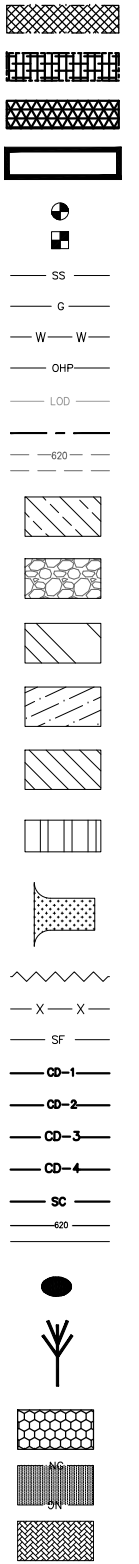
LEGEND:

DETAIL NUMBER

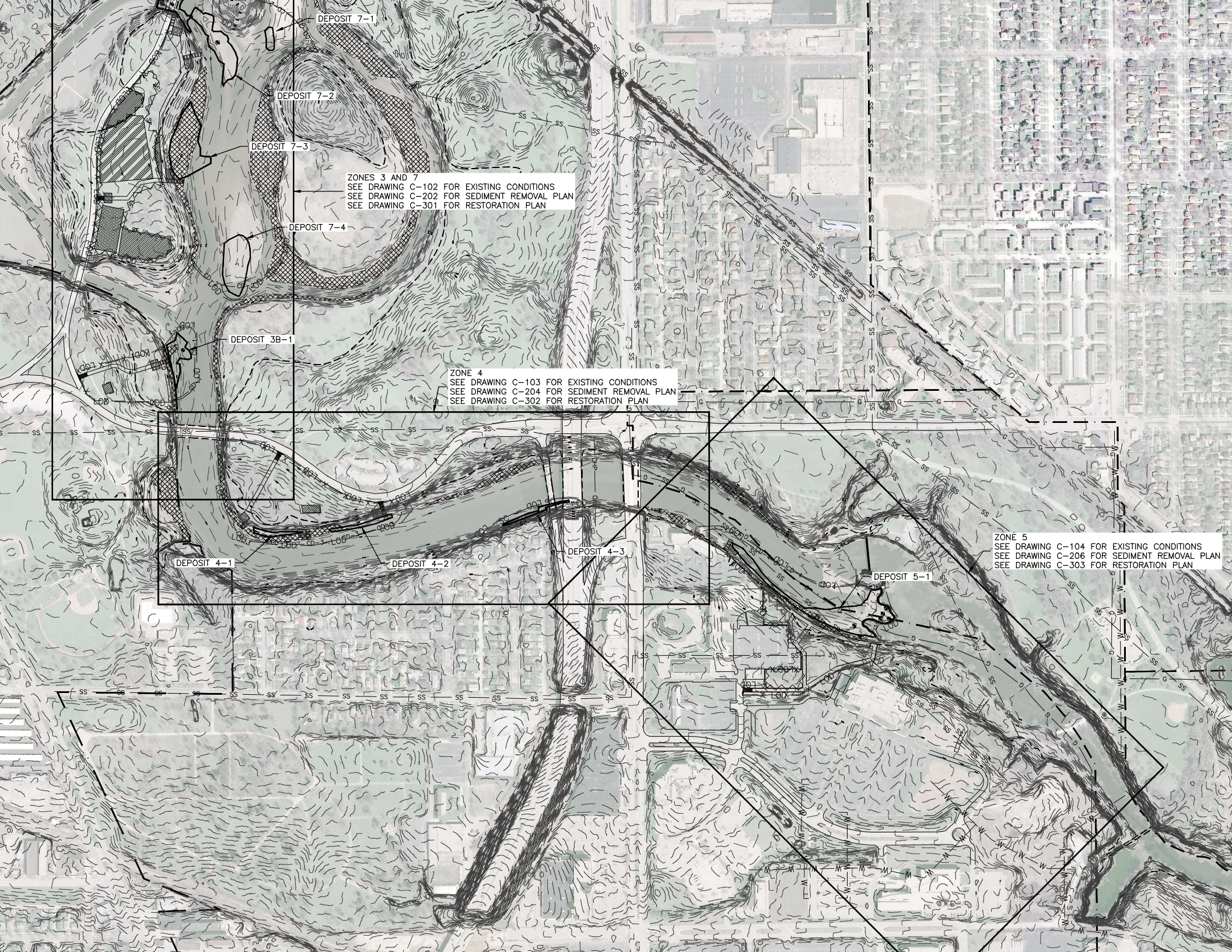
DRAWING NUMBER OF DETAIL

NOTES:

1. "A" INDICATES THAT A SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS DRAWN ON THE SAME SHEET.
2. IF THE SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS REFERENCED ON MULTIPLE SHEETS, ALL SHEETS ARE REFERENCED WITHIN THE DETAIL BUBBLE.



SCRUB-SHRUB/E
FORESTED WETLA
INTERMITTENT STR
SEDIMENT REMOV
APPROXIMATE NA
APPROXIMATE TSC
APPROXIMATE SE
APPROXIMATE GA
APPROXIMATE WA
OVERHEAD POWE
LIMITS OF DISTUR
CENTERLINE OF F
EXISTING CONTOU
TOPSOIL STOCKPI
DECONTAMINATION
DEWATERING PAD
WASTEWATER TRE
MOBILE EQUIPME
ACCESS RAMP
CONSTRUCTION E
AVAILABLE STAGIN
TEMPORARY CHAI
SILT FENCE
COFFERDAM 1
COFFERDAM 2
COFFERDAM 3
COFFERDAM 4
SILT CURTAIN
PROPOSED CONT
BOULDER RESTOR
ROOT WAD
SUBSTRATE REST
NATIVE GRASS HY
NO MOW/LOW GR

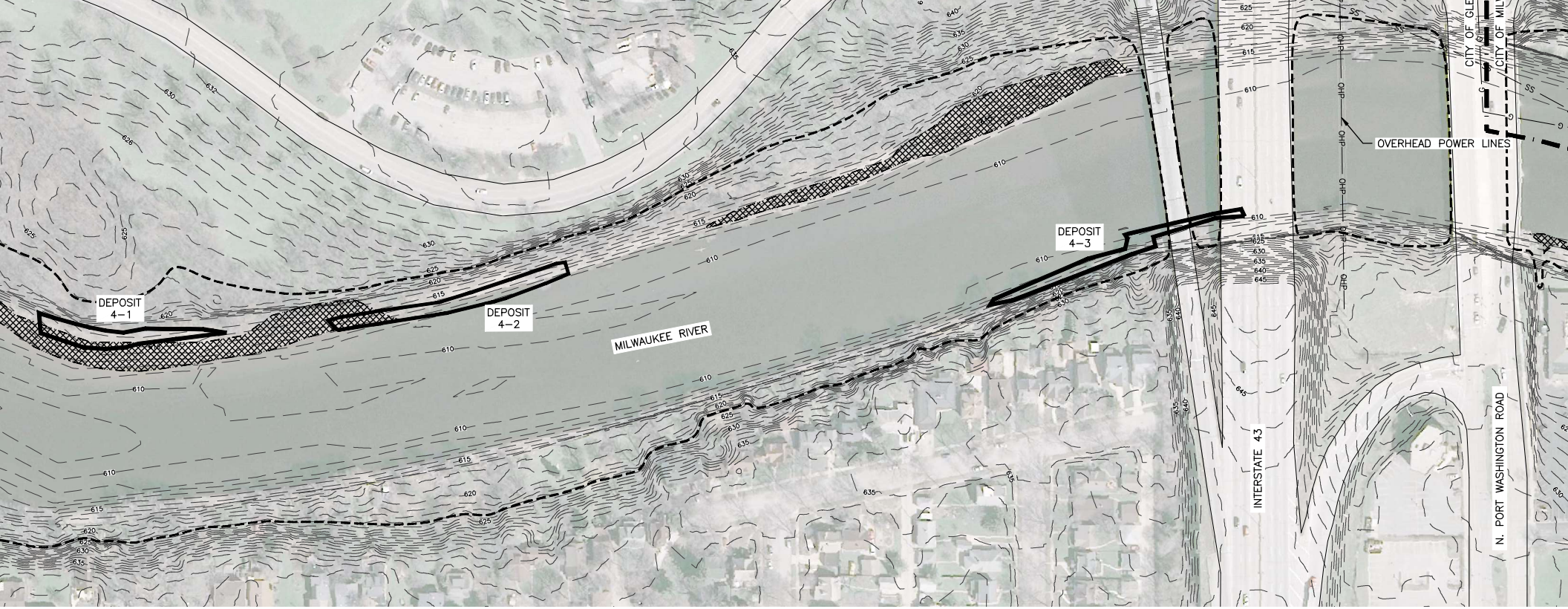

DEPOSIT 7-1
DEPOSIT 7-2
DEPOSIT 7-3
ZONES 3 AND 7
SEE DRAWING C-102 FOR EXISTING CONDITIONS
SEE DRAWING C-202 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-301 FOR RESTORATION PLAN
DEPOSIT 7-4
DEPOSIT 3B-1
ZONE 4
SEE DRAWING C-103 FOR EXISTING CONDITIONS
SEE DRAWING C-204 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-302 FOR RESTORATION PLAN
DEPOSIT 4-1
DEPOSIT 4-2
DEPOSIT 4-3
DEPOSIT 5-1
ZONE 5
SEE DRAWING C-104 FOR EXISTING CONDITIONS
SEE DRAWING C-206 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-303 FOR RESTORATION PLAN

N

ZONES 3 AND 7 EXISTING CONDITIONS

100 50 0 100 200

GRAPHIC SCALE IN FEET



N

ZONE 4 EXISTING CONDITIONS

100 50 0 100 200

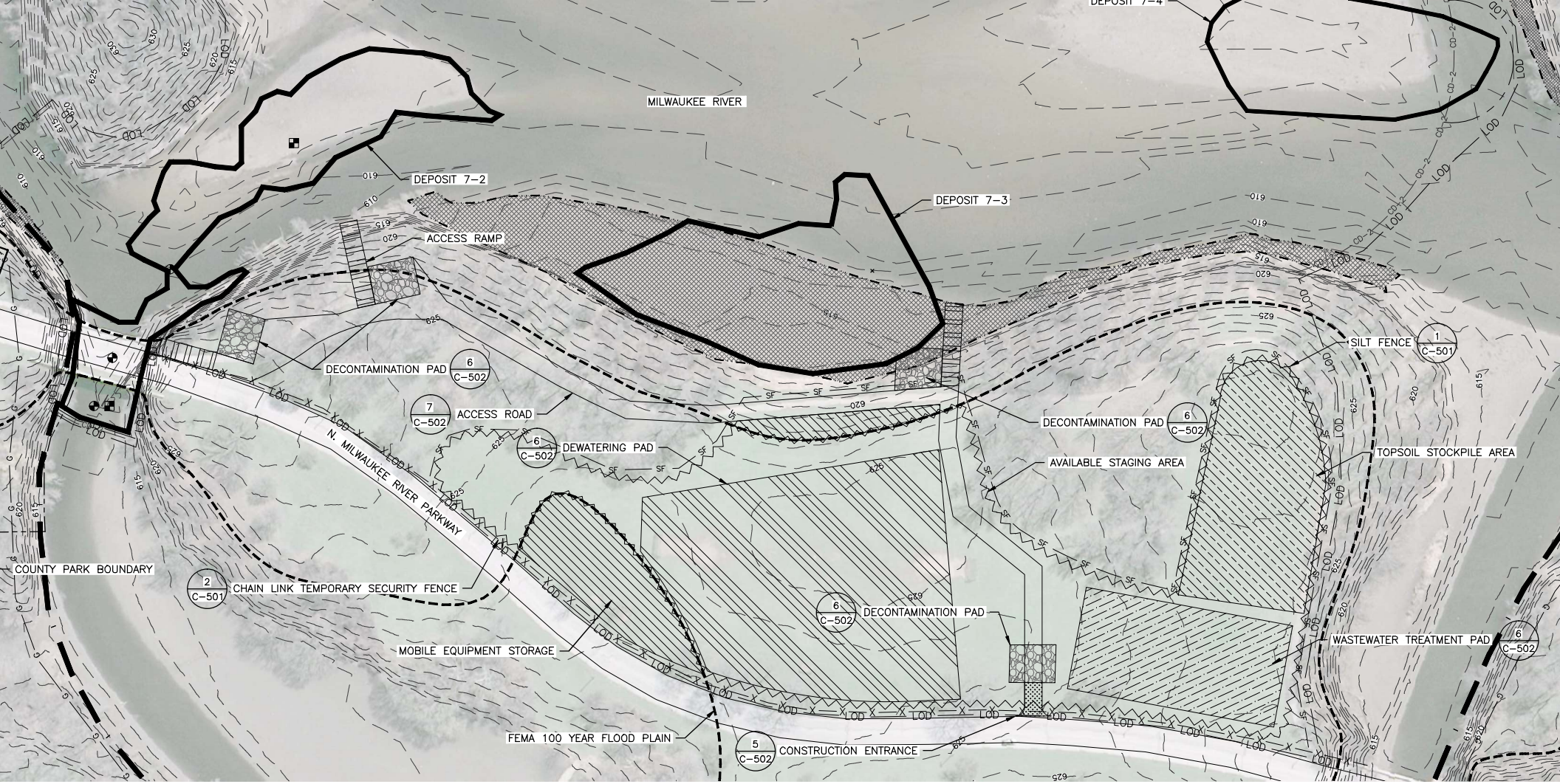
GRAPHIC SCALE IN FEET

N

ZONE 5 EXISTING CONDITIONS

100 50 0 100 200

GRAPHIC SCALE IN FEET

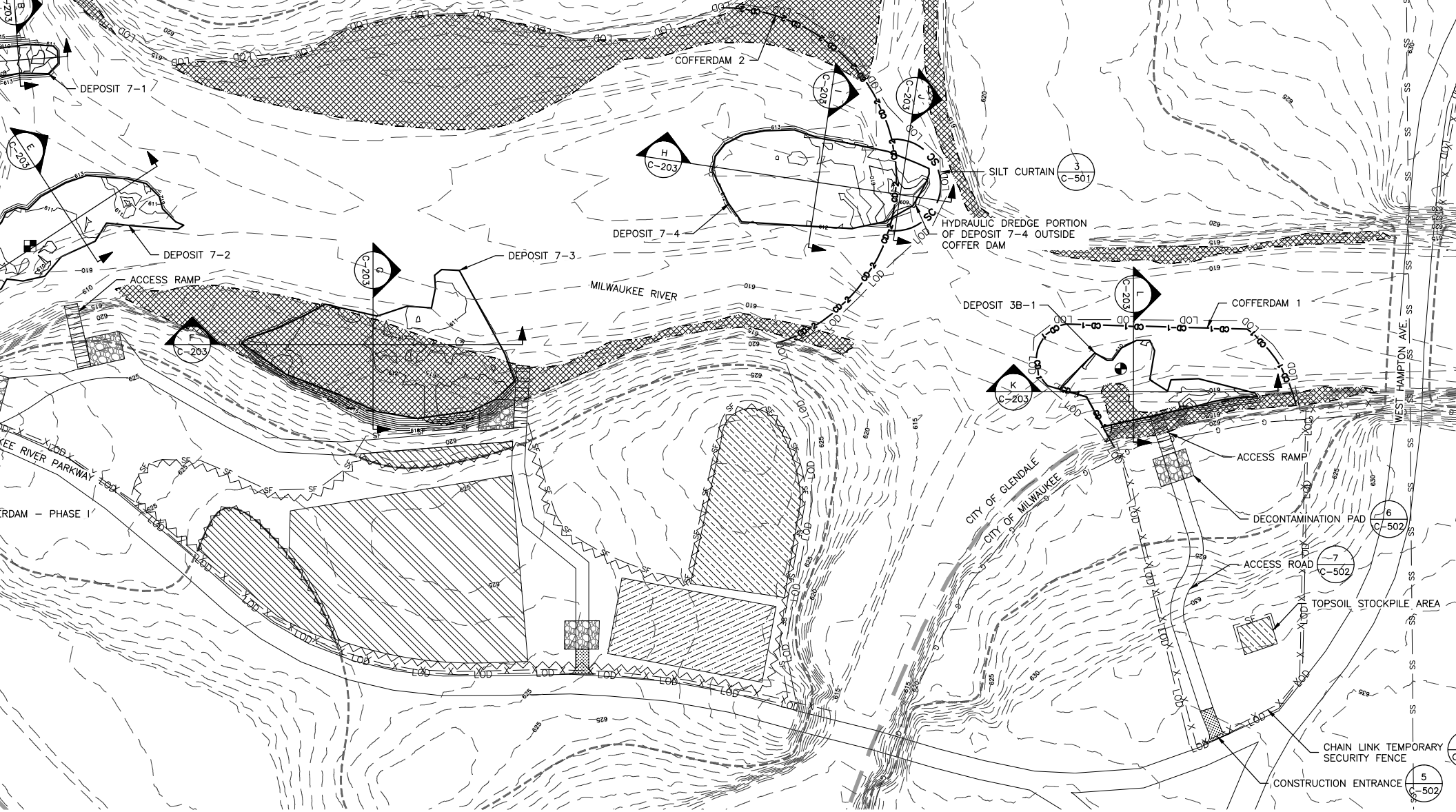


AVAILABLE STAGING AREAS AND TEMPORARY FACILITIES

N

80 40 0 80 160

GRAPHIC SCALE IN FEET

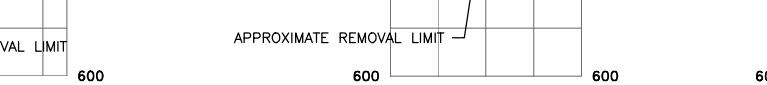


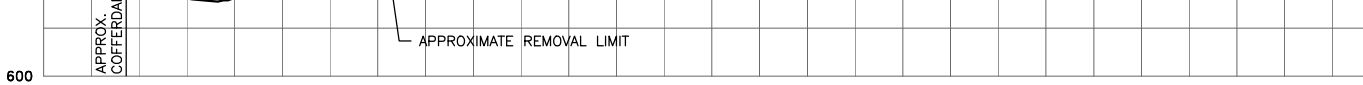
N

ZONES 3 AND 7 SEDIMENT REMOVAL PLAN

100 50 0 100 200

GRAPHIC SCALE IN FEET





CTION

40 80
IN FEET
10 20
IN FEET

B C-202 DEPOSIT 7-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

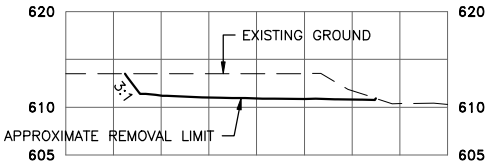
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

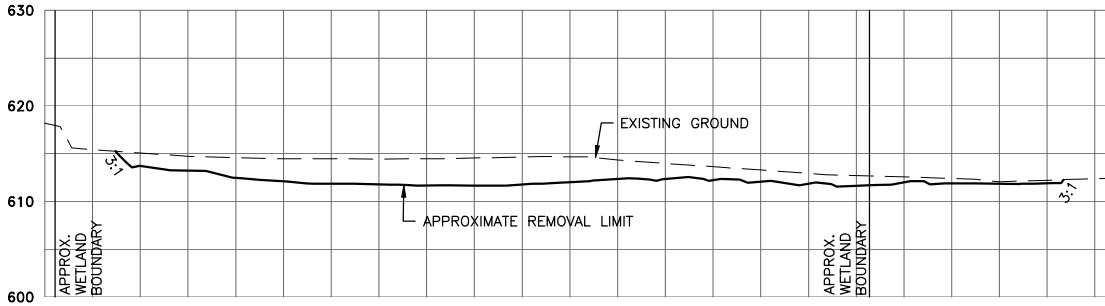
C C-202 DEPOSIT 7-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

ON AND SUPPORT STRUCTURES UNKNOWN
FIELD VERIFY





CTION

40 80
IN FEET
10 20
IN FEET

E C-202 DEPOSIT 7-2 - CROSS SECTION

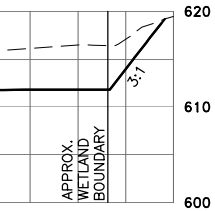
HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

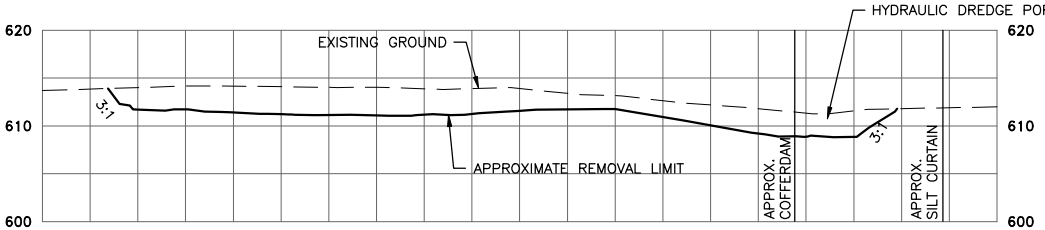
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

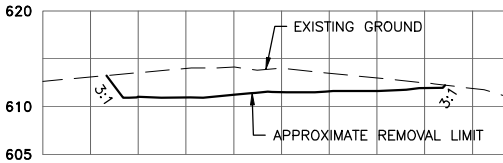
F C-202 DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET







SECTION

40 80
ALE IN FEET
10 20
ALE IN FEET

H C-202 DEPOSIT 7-4 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

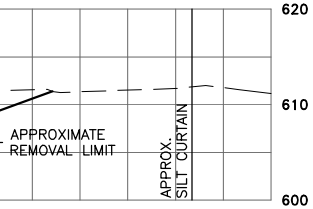
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

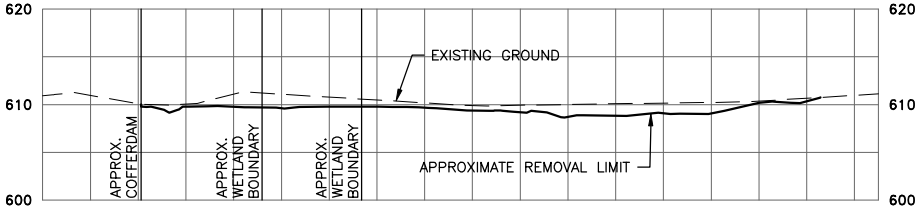
I C-202 DEPOSIT 7-4 - CROSS SECTION

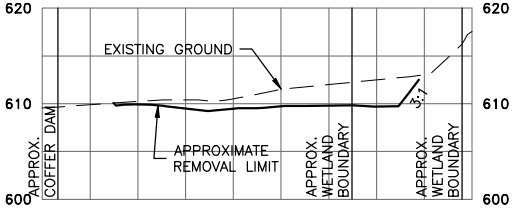
HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

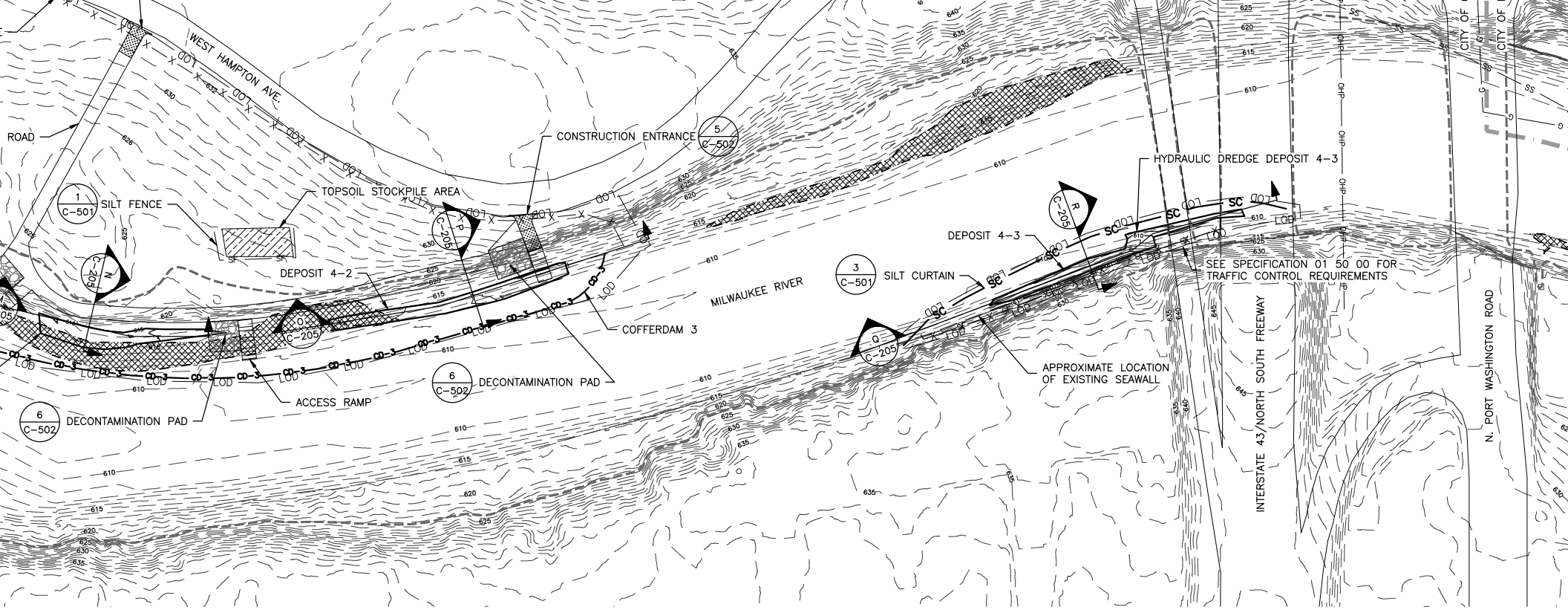
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

EXISTING GROUND







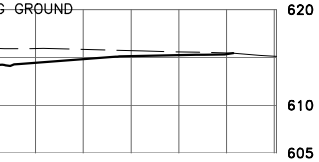


N

ZONE 4 SEDIMENT REMOVAL PLAN

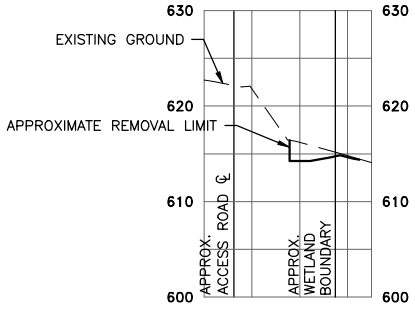
100 50 0 100 200

GRAPHIC SCALE IN FEET



SS SECTION

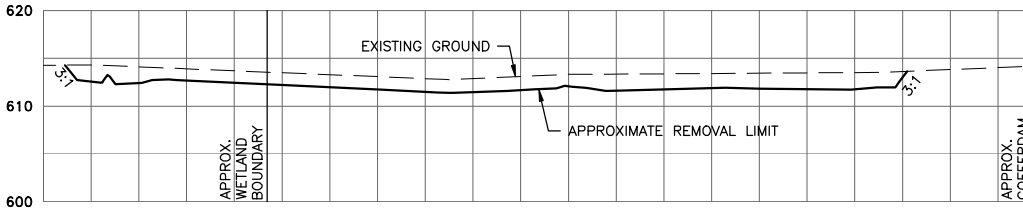
0 40 80
APHIC SCALE IN FEET
0 10 20
APHIC SCALE IN FEET



N
C-204
DEPOSIT 4-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80
GRAPHIC SCALE IN FEET

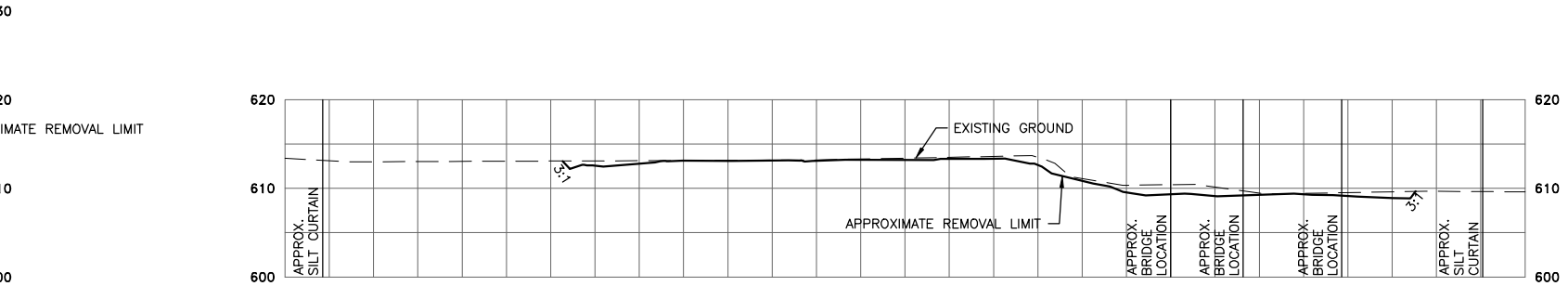
VERTICAL SCALE: 10 5 0 10 20
GRAPHIC SCALE IN FEET



O
C-204
DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80
GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20
GRAPHIC SCALE IN FEET



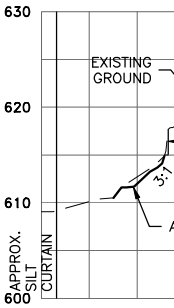
CTION

40 80
N FEET
10 20
N FEET

Q
C-204
DEPOSIT 4-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80
GRAPHIC SCALE IN FEET

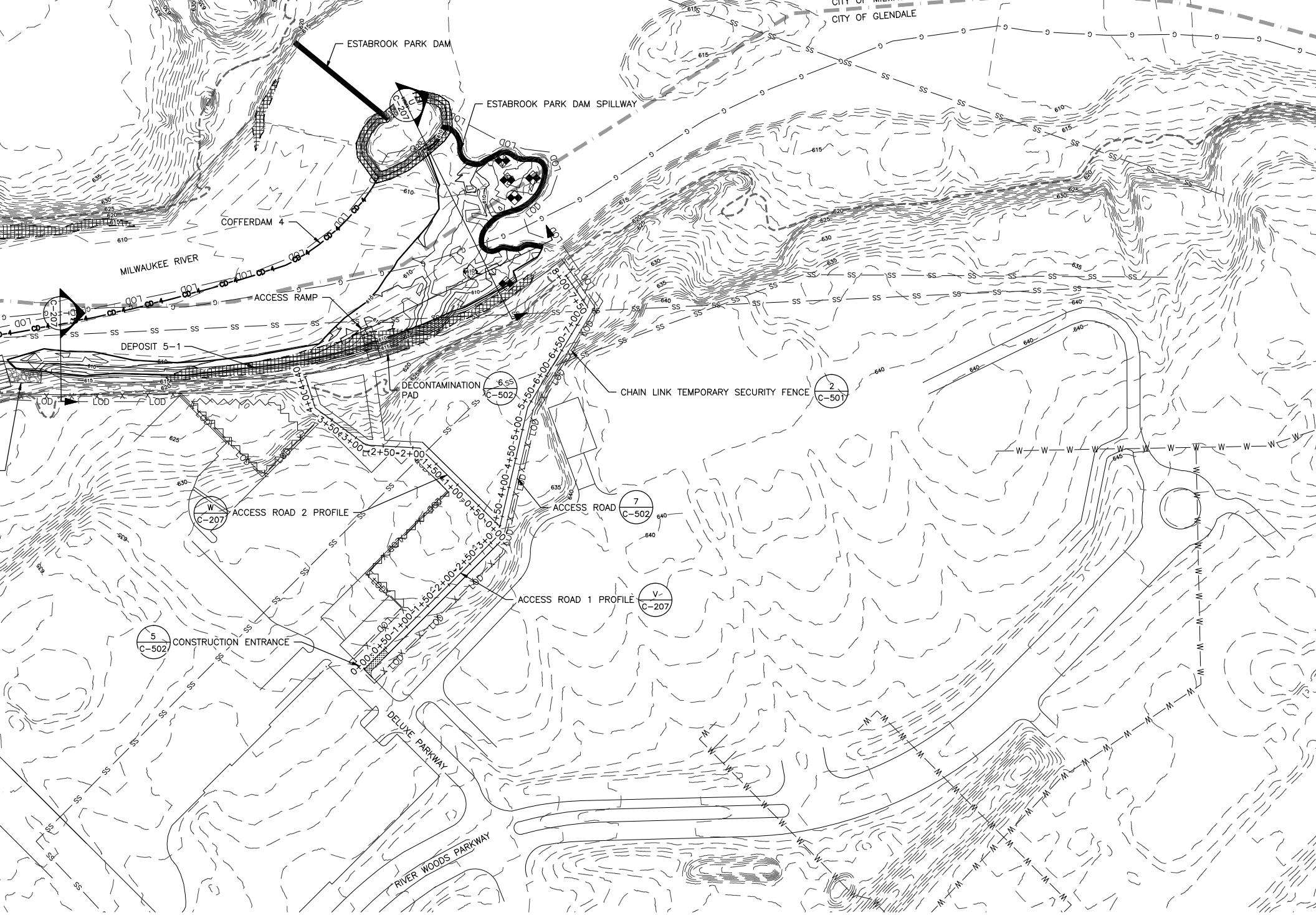
VERTICAL SCALE: 10 5 0 10 20
GRAPHIC SCALE IN FEET



R
C-204
DEPOSIT 4-3 - CRO

HORIZONTAL SCALE: 40 20
G

VERTICAL SCALE: 10 5
G



ZONE 5 SEDIMENT REMOVAL PLAN

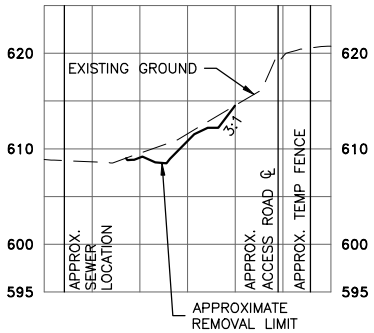
100 50 0 100 200

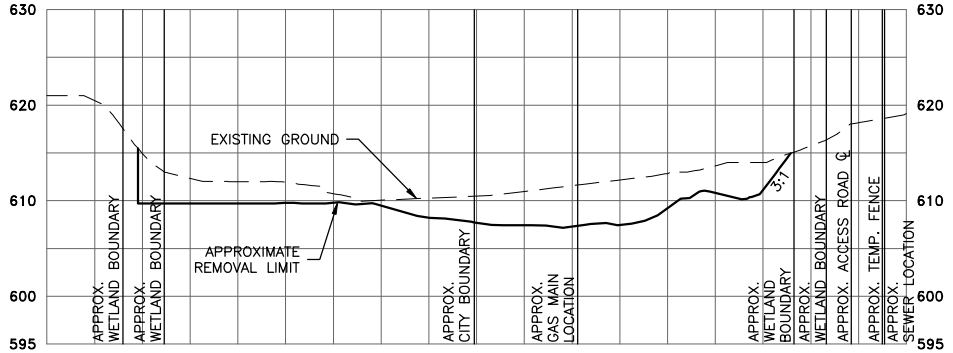
GRAPHIC SCALE IN FEET

S C-206 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET





T C-206 DEPOSIT 5-1 - CROSS SECTION

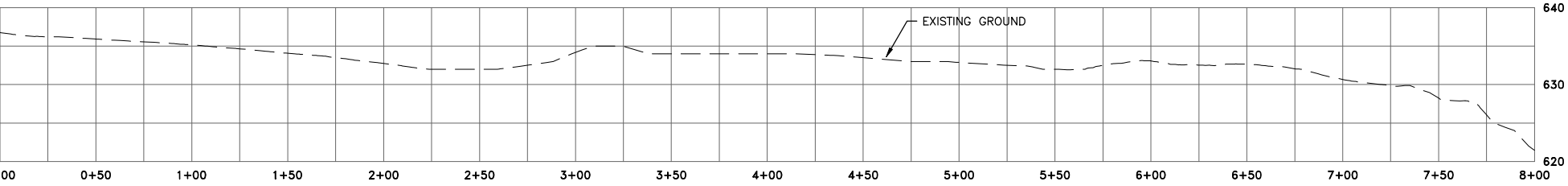
HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

U C-206 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

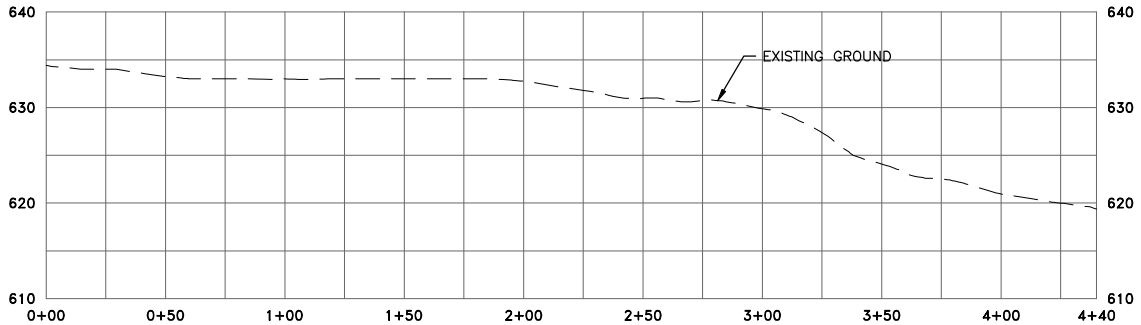
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

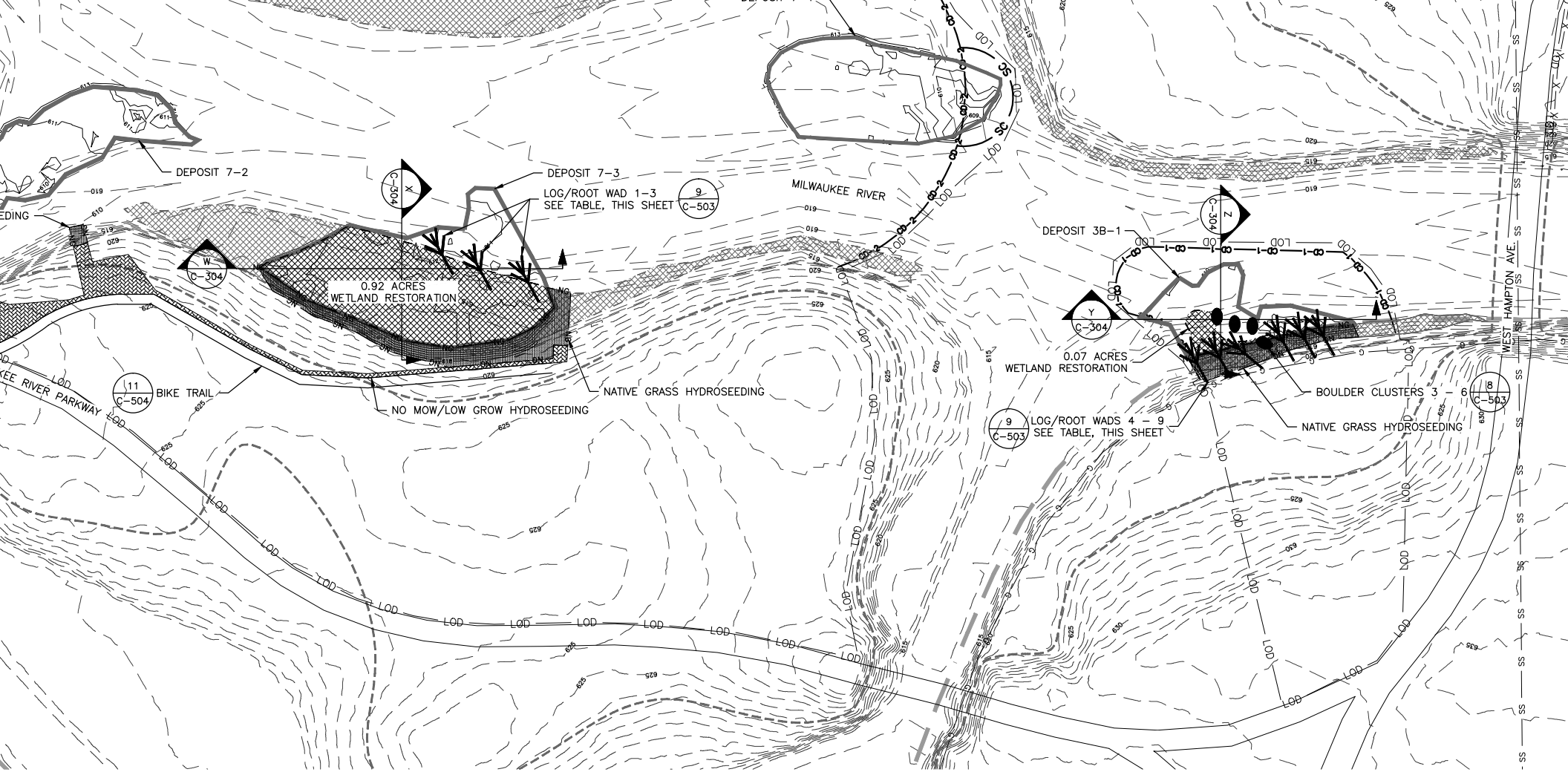


V C-206 ACCESS 1 ROAD PROFILE

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET





ZONES 3 AND 7 RESTORATION PLAN

N

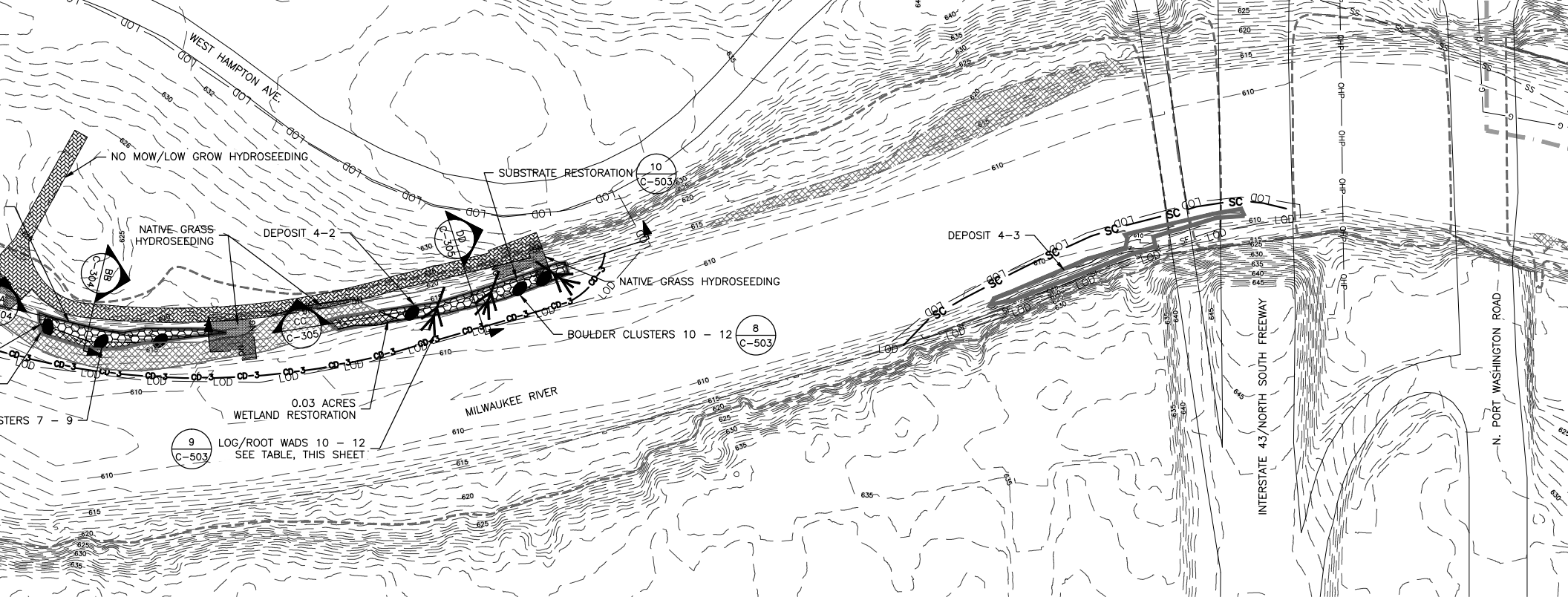
100 50 0 100 200

GRAPHIC SCALE IN FEET

/ROOT WAD TABLE				
	POSITION B	BANK ANGLE C	POSITION D	ANCHOR LENGTH E
'	611'–612'	40–60	613'	>10'
'	611'–612'	40–60	613'	>10'
'	611'–612'	40–60	613'	>10'
'	612'	60–90	613'–614'	>10'

EDING SCHEDULE	
ON	ACRES
	0.99
	1.44
YDROSEEDING	0.35

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.



N

ZONE 4 RESTORATION PLAN

100 50 0 100 200

GRAPHIC SCALE IN FEET

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.

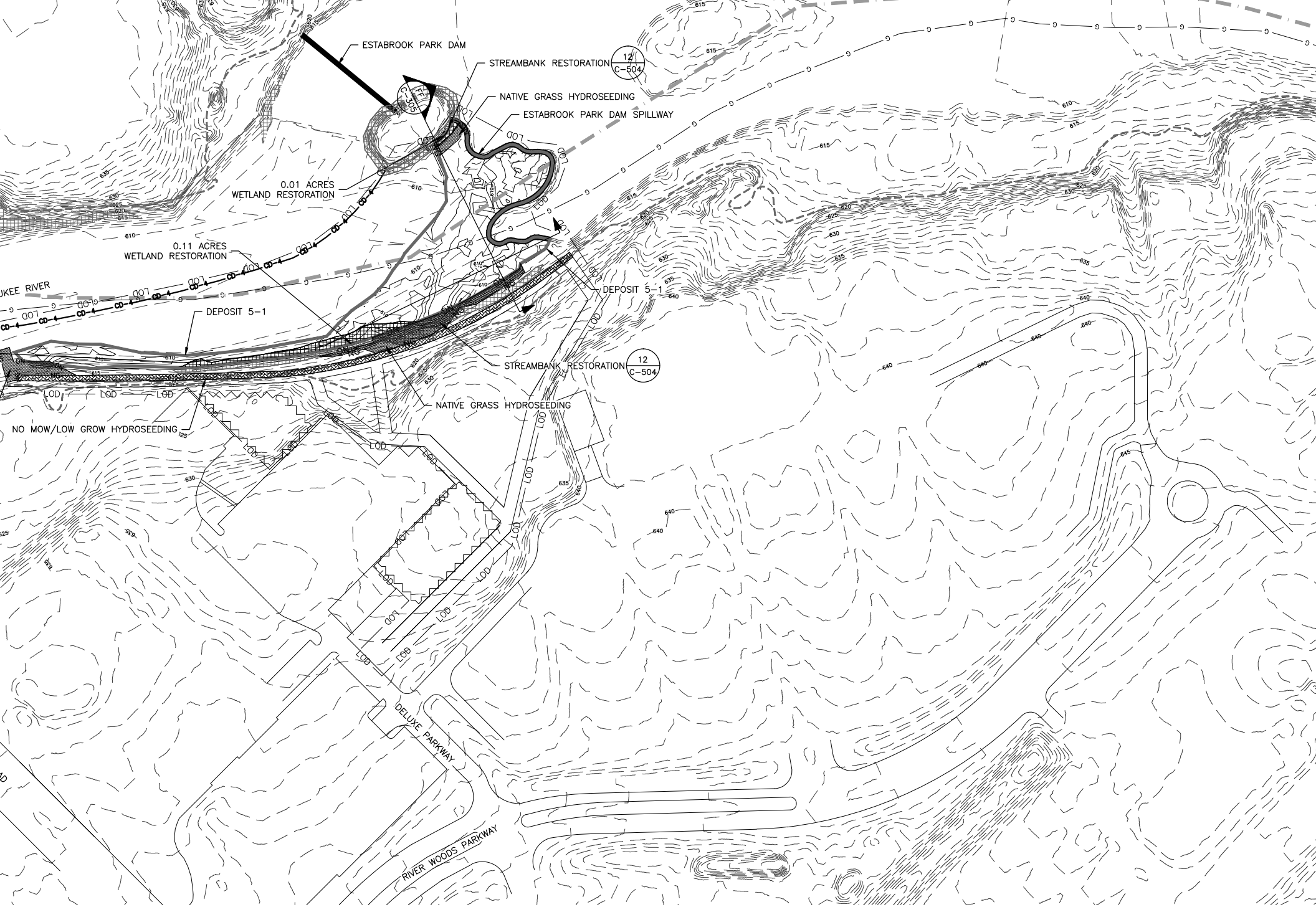
OG/ROOT WAD TABLE

M TH	POSITION B	BANK ANGLE C	POSITION D	ANCHOR LENGTH E
20'	610'	60–120	612'	>10'

SEEDING SCHEDULE

PTION	ACRES
	0.06
G	0.22
HYDROSEEDING	0.49

AS SHALL BE HYDROSEEDED FOR TURFGRASS IN CTION 32 90 00 – PLANTING.
ARE BASED ON TEMPORARY FACILITY LOCATIONS GS. CONTRACTOR SHALL HYDROSEED ADDITIONAL ES IN TEMPORARY FACILITIES.



/SEEDING SCHEDULE	
IPTION	ACRES
	0.12
NG	0.36
S HYDROSEEDING	0.23

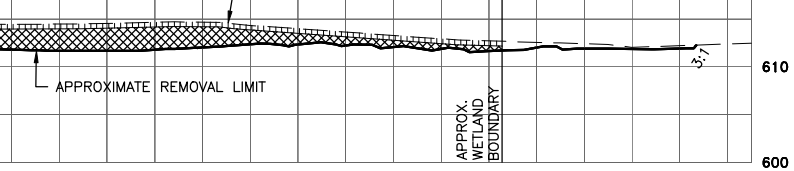
ZONE 5 RESTORATION PLAN

N

100 50 0 100 200

GRAPHIC SCALE IN FEET

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.

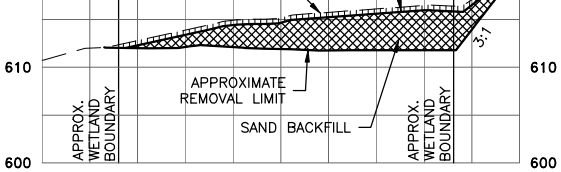


DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

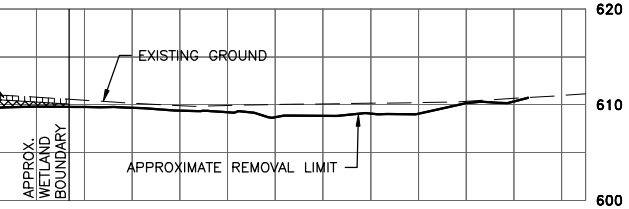


DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVA
WITHIN EXISTING/
IMPORTED TOPSO

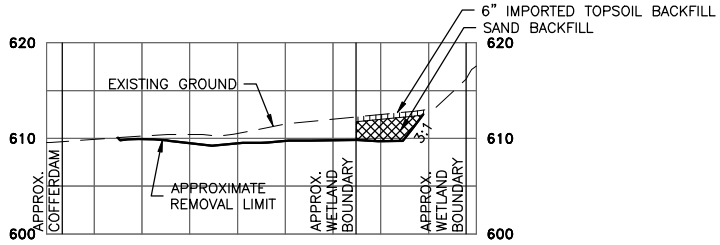


POSIT 3B-1 - CROSS SECTION

TAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

CAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

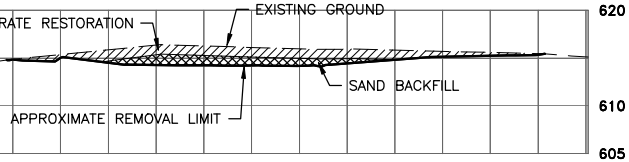


DEPOSIT 3B-1 - CROSS SECTION

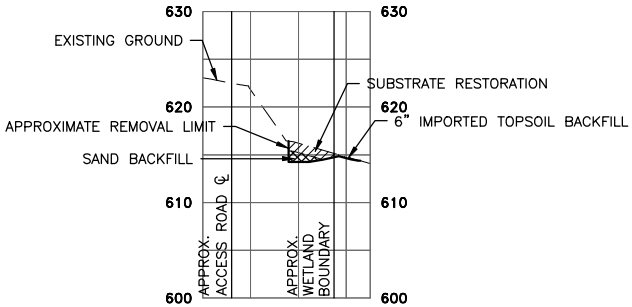
HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

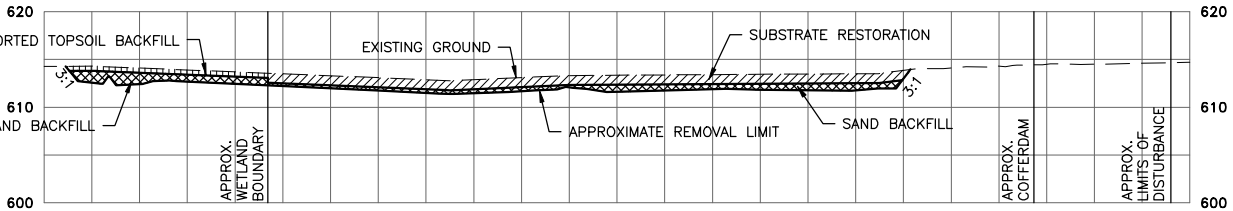
NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6
WITHIN EXISTING/FINAL GROUND. BACKFILL W
IMPORTED TOPSOIL TO EXISTING/FINAL GROU



DEPOSIT 4-1 - CROSS SECTION



NOTES:
1. BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.
2. BACKFILL WETLAND AREAS WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.



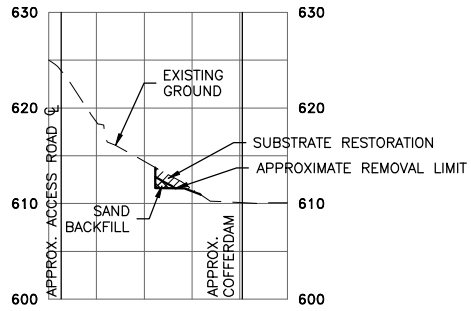
CC C-302

DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTES:
1. BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.
2. BACKFILL WETLAND AREAS WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.



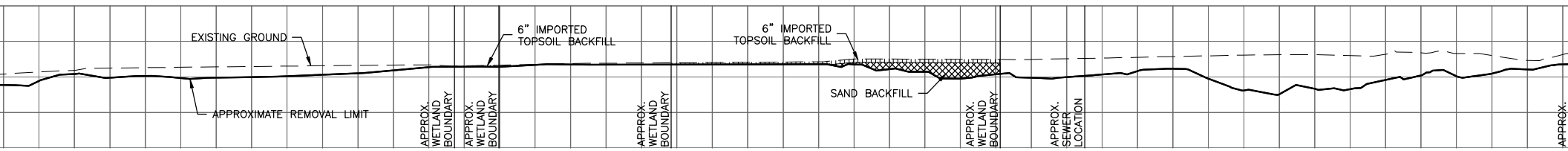
DD C-302

DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EX
INCHES WITH
OUTSIDE WET
SUBSTRATE R
GROUND OU



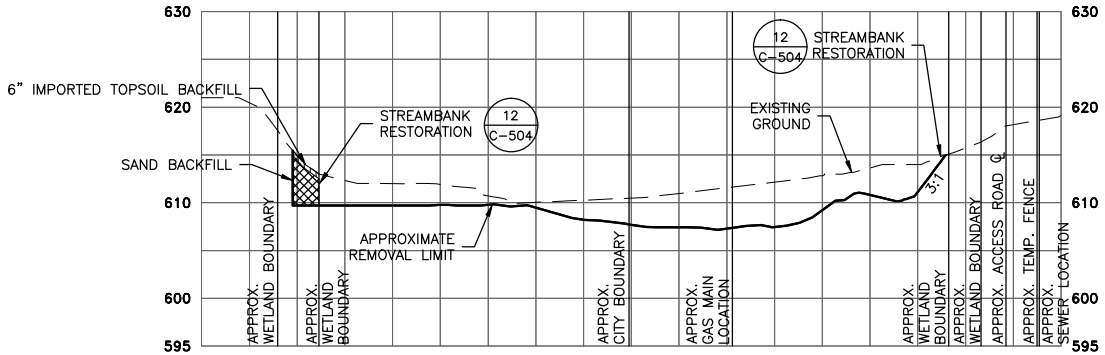
EE C-303

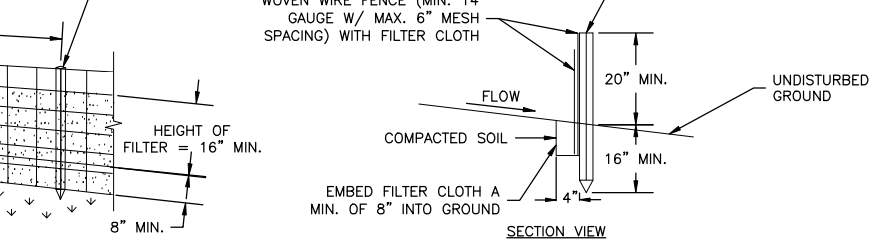
DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.





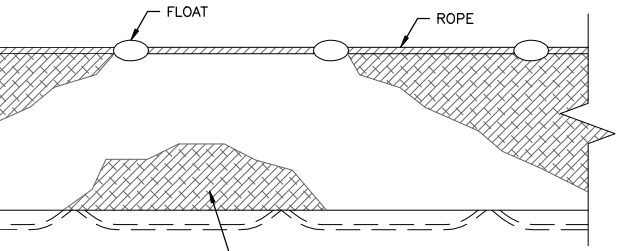
SECTION VIEW

ECURELY TO FENCE
OSTS SHALL BE
RDWOOD WITH A
SQUARE INCHES.

SECURELY TO
Y 24" AT TOP, MID
E WOVEN WIRE, 14

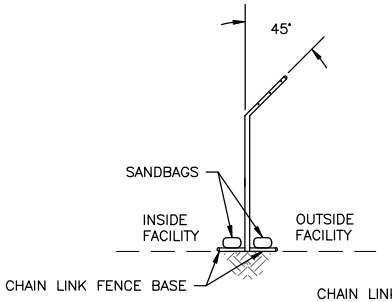
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. ANY TORN SILT FENCE CLOTH SECTIONS SHALL BE REPLACED BY THE CONTRACTOR IMMEDIATELY.

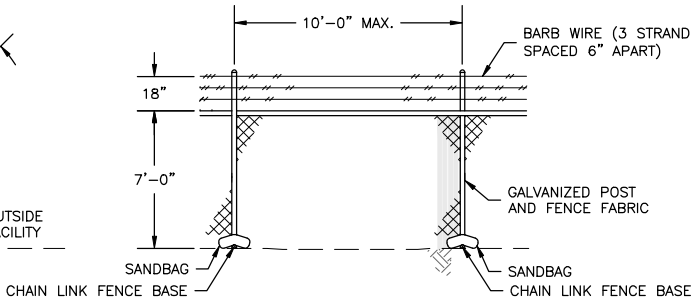
PORARY SILT FENCE DETAIL



CURTAIN DETAIL

NOTE:
THE TOP SHALL BE WITHIN 6 INCHES FROM THE WATER SURFACE AND THE BOTTOM OF SILT FENCE SHALL BE MAINTAINED TO PREVENT CONTACT WITH SEDIMENT AND CAUSE RE-SUSPENSION.

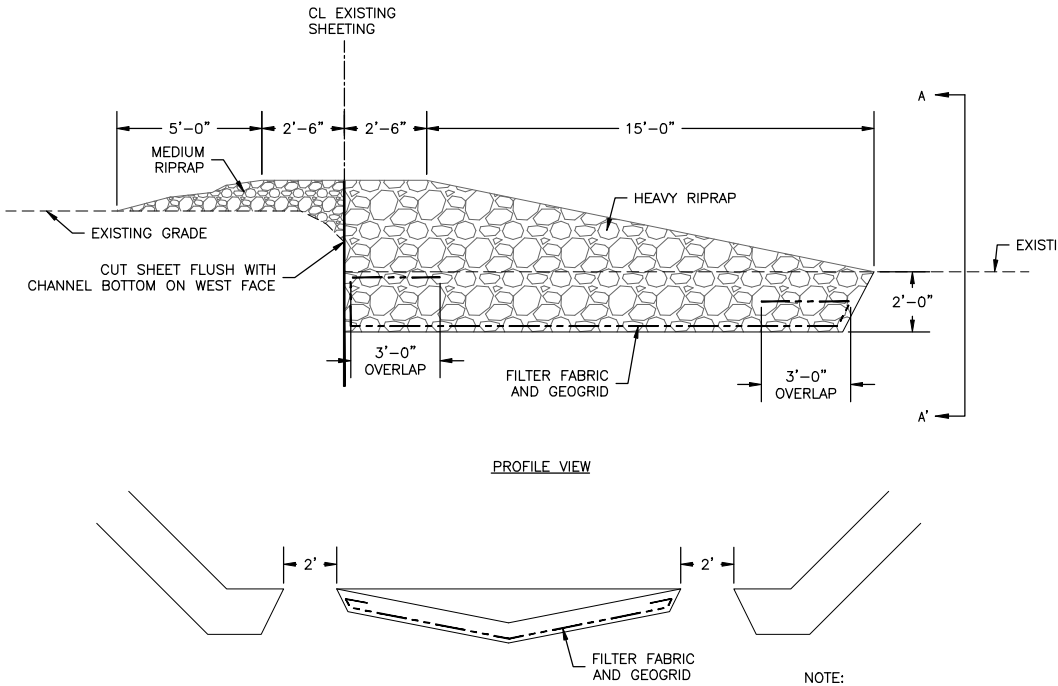




CHAIN LINK TEMPORARY SECURITY FENCE DETAIL

2 C-201 NTS

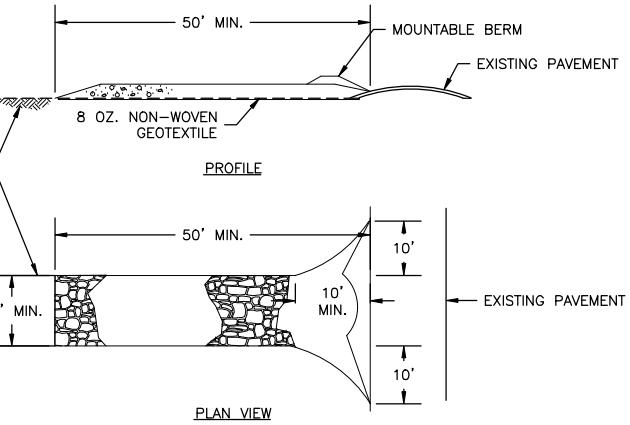
C-202
C-204
C-206



NOTE:
SLOPE NORTH AND SOUTH ENDS TO TIE IN WITH BANK TOE TO MAINTAIN DEEPEST PORTION OF THIS DETAIL IN THE CENTER OF THE CHANNEL.

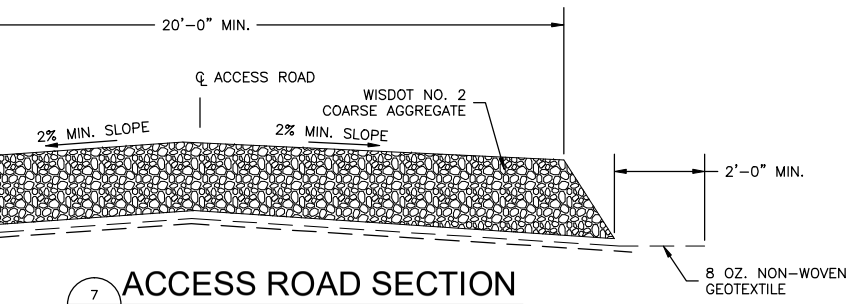
EXISTING PHASE I SHEET PILE DETAIL

4 C-102 NTS



IZED CONSTRUCTION ENTRANCE

NOTE:
ENTRANCE SHALL BE AS SHOWN OR AS APPROVED BY OWNER.

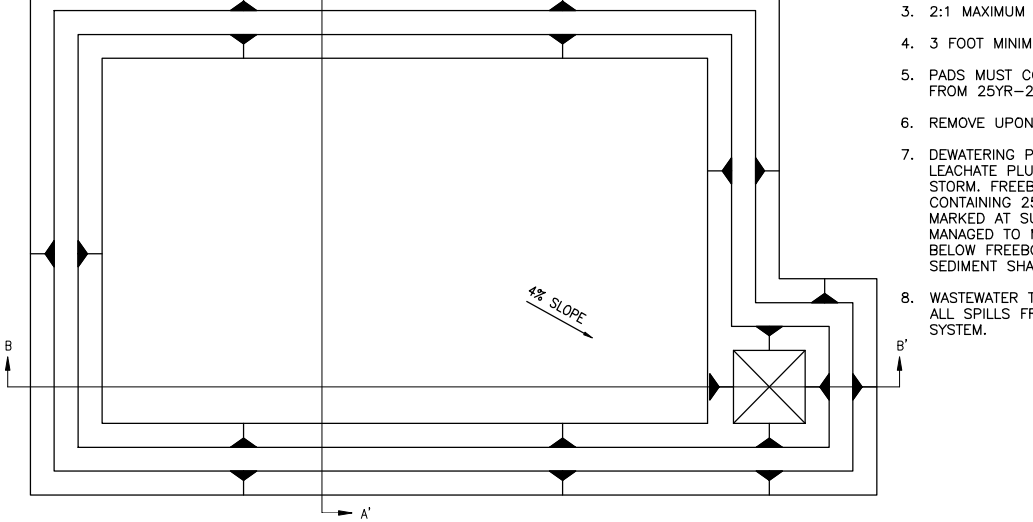


ACCESS ROAD SECTION

7 / C-201 NTS

C-202
C-204
C-206

NOTES:
1. EXISTING PARK TRAILS MAY BE UTILIZED INSTEAD OF BUILDING AN ACCESS ROAD WITH PRIOR APPROVAL OF OWNER. ANY PARK TRAILS UTILIZED MUST BE REMOVED AND RECONSTRUCTED AT COMPLETION OF PROJECT.
2. ACCESS ROAD SHALL BE AS SHOWN OR AS APPROVED BY OWNER.

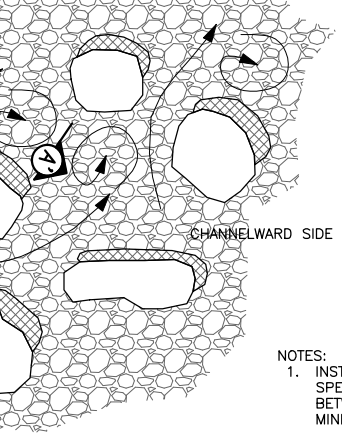


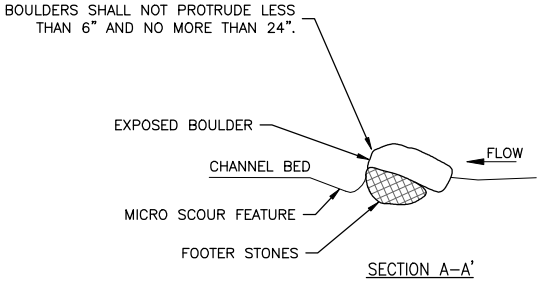
1. 3. 2:1 MAXIMUM
4. 3 FOOT MINIM
5. PADS MUST C FROM 25YR-2
6. REMOVE UPON
7. DEWATERING P LEACHATE PLU STORM. FREEB CONTAINING 2 MARKED AT SU MANAGED TO BELOW FREEBO SEDIMENT SHA
8. WASTEWATER T ALL SPILLS FR SYSTEM.

DECONTAMINATION PAD , DEWATERING PAD, AND WATER TREATMENT PAD - TYPICAL DETAIL

6 / C-201 NTS

C-202
C-204
C-206



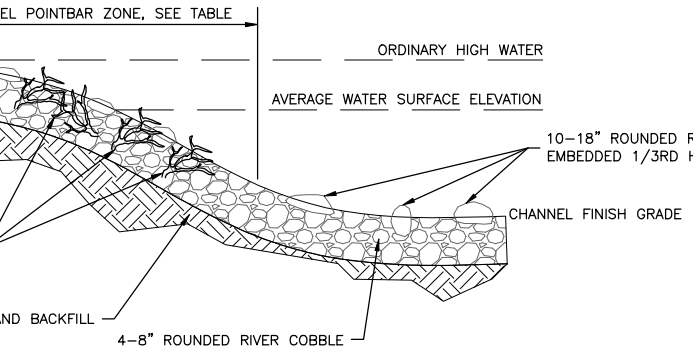


SECTION A–A'

NOTES:
1. INSTALL BOULDERS AT SIZE SPECIFIED. MAXIMUM SPACING BETWEEN BOULDERS IS 5 FEET, MINIMUM 2 FEET.
2. MUST BE FIELD–FIT. CONFIGURATION VARIES. MINIMUM 6 BOULDERS PER CLUSTER.
3. COORDINATE ACTUAL LOCATIONS/ ELEVATIONS WITH OWNER.

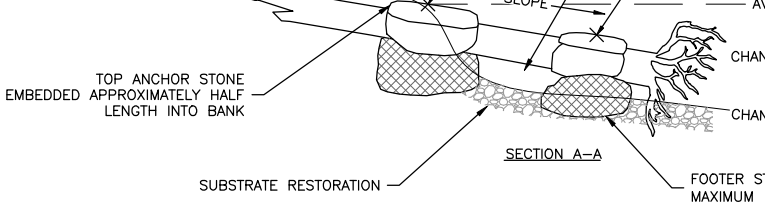
OULDER CLUSTER PLACEMENT

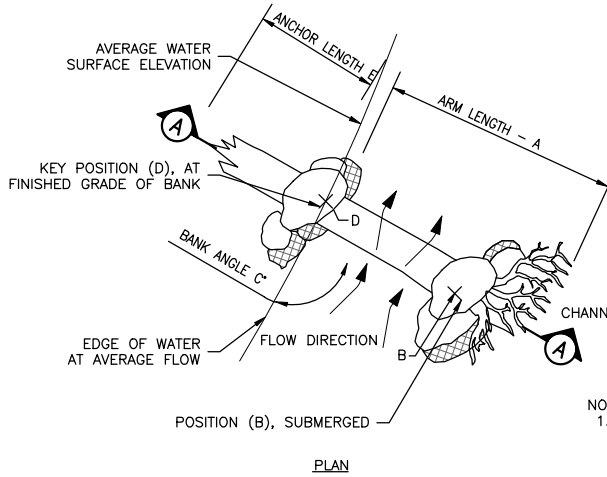
S



NOTES:
1. CHANNEL FINISH GRADE SHALL BE AS SHOWN ON CROSS SECTIONS AND C–203, C–205, C–207, C–304, AND C–305.
2. LIMITS OF SUBSTRATE RESTORATION SHALL BE AS SHOWN ON DRAWINGS C–302, C–304, AND C–305.

TABLE A: POINTBAR ELEVATION BY ZONES	
ZONE	ELEVATION RANGE
ZONES 3 & 7	PRACTICE NOT PROPOSED
ZONE 4	ELEVATION 610–612'
ZONE 5	PRACTICE NOT PROPOSED





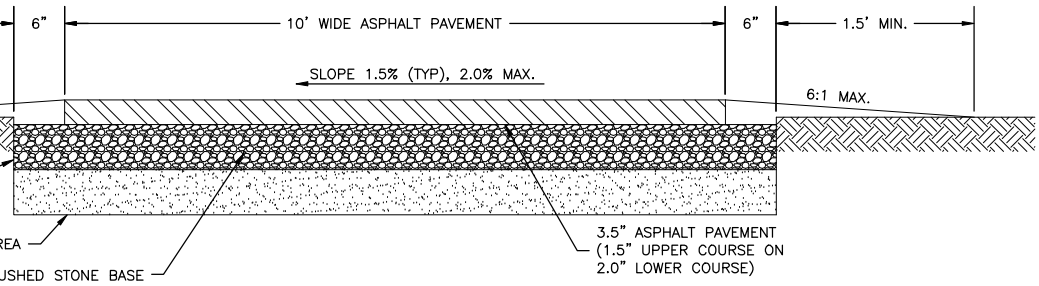
PLAN

2

LOG/ROOT WAD DETAIL

9 / C–301 NTS

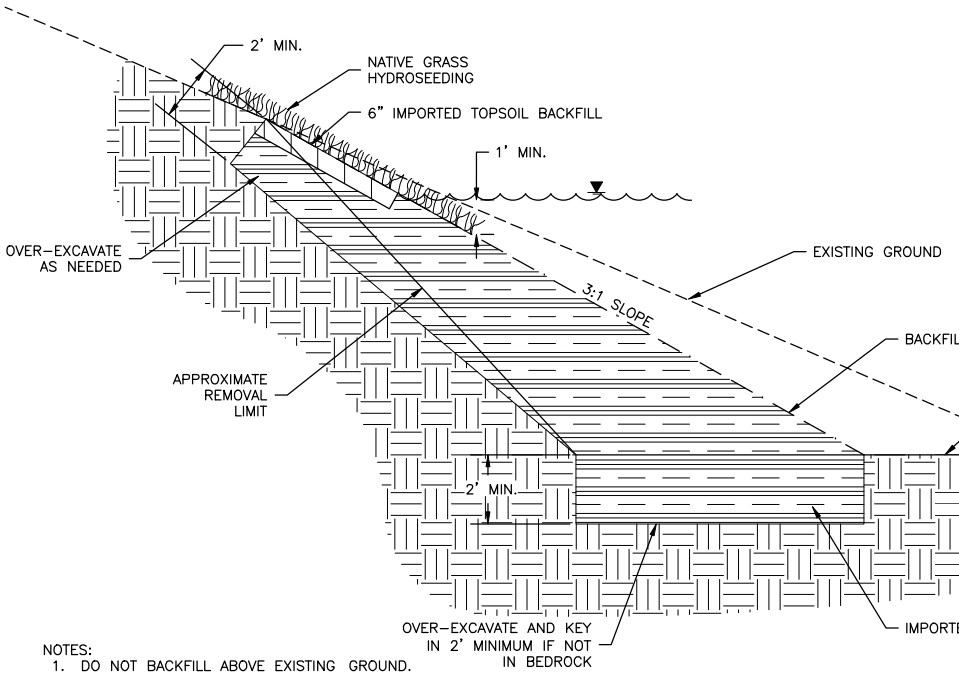
C–302



NOTES:
1. PROVIDE CLEAR ZONE WITH NO VERTICAL OBSTRUCTION WITHIN 3' FROM EDGE OF TRAIL UNLESS SHOWN OTHERWISE ON THE PLAN.
2. UNDERCUT ONLY WHERE DIRECTED BY OWNER.
3. CROSS SLOPE OF PAVEMENT SHALL BE TO LOW SIDE OF TOPOGRAPHY.

TYPICAL BIKE TRAIL SECTION ON GRADE

NTS



NOTES:
1. DO NOT BACKFILL ABOVE EXISTING GROUND.
2. OWNER MAY REDUCE OVER-EXCAVATION REQUIREMENTS.

12
C-305

STREAMBANK RESTORATION D

NTS

Appendix B

Technical Specifications

Final Remedial Design
Technical Specifications
Lincoln Park/Milwaukee River Channel Sediments Site
Phase II
Milwaukee Estuary Area of Concern, Milwaukee, Wisconsin

Great Lakes Architect-Engineer Services
Contract: EP-R5-11-10
Task Order: 0005

Prepared for

U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Prepared by

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Revision: 00
EA Project No. 62561.05

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1.2 SUBMITTALS

A. Daily Reports

B. CONTRACTOR Obtained Permits. Submit at schedule approved by OWNER.

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1.3 PROJECT DESCRIPTION

A. This Specification section provides a general description of the Work. The CONTRACTOR shall refer to the appropriate detailed Specification sections for project specifics.

B. Work for the Project includes a Remedial Action (RA) to remove contaminated sediments in the Milwaukee River and incidental related Work to achieve the RAOs.

C. Known locations of contaminated sediment (including non-aqueous phase liquid [NAPL] and Toxic Substance Control Act [TSCA] sediments) are shown on the Drawings. CONTRACTOR shall be prepared to remediate and manage contaminated sediments at areas not shown on Drawings.

D. Available Record Documents from the Estabrook Park Dam Spillway and North Milwaukee River Parkway Bridge will be provided upon request.

1.4 REMEDIAL ACTION OBJECTIVES

A. The purpose of the RA is to address the following RAOs:
   1. Remove/manage sediments within the Milwaukee Estuary Area of Concern (AOC).
      a. Polychlorinated Biphenyls (PCBs)
         1) The RAO for PCBs at the Site is to remove sediments with concentrations greater than or equal to 1 milligram per kilogram (mg/kg) (1 part per million [ppm]) total PCBs.
            a) Where less than 1 ppm is impracticable (e.g., bedrock), a surface-weighted average concentration (SWAC) of less than 1 ppm will be achieved through excavation and residuals management if needed. Written approval must be provided by OWNER.
      b. Polycyclic Aromatic Hydrocarbons (PAHs)
         1) The RAO for PAHs at the Site is to remove sediments with concentrations greater than or equal to 20 mg/kg total PAHs.
            a) Sediments with total PAH concentrations between 20 and 40 mg/kg may not require remediation, if the resulting SWAC is below 20 mg/kg and OWNER has provided written approval.
      c. Non-Aqueous Phase Liquid (NAPL)
         1) The RAO for NAPL at the Site is to remove any sediment containing field-identifiable NAPL material (based on staining, odor, and Sudan IV testing if necessary).
   2. SWAC will be based on deposit areas.
   3. Minimize potential risks to human health and the environment during remedial activities.
   4. Restore habitat in the areas disturbed during the RA.

1.5 DEFINITIONS

A. Definitions of contractual or associated parties, referenced herein on the Drawings and in the specifications, are listed below:
   1. OWNER—The U.S. Environmental Protection Agency (EPA).
   2. PROJECT COORDINATION TEAM (PCT) – EPA with project agreement with the State of Wisconsin Department of Natural Resources, and Milwaukee County.
   3. ENGINEER—OWNER's on-site representative.
   4. CONTRACTOR—A person, company or organization who has contracted with OWNER and is directly responsible for performance of the Work referenced in the specifications, drawings, or as included herein.
   5. SUBCONTRACTOR—A person, company or organization who has contracted with the CONTRACTOR for the purpose of supplying services, materials, assemblies, or other

items as required to perform the Work referenced in the specifications, drawings, or as included herein.

1.6 ENGINEER'S AUTHORITY

A. ENGINEER does not have contractual authority between the OWNER and CONTRACTOR.

B. ENGINEER will review submittals and make recommendations to OWNER for approval, rejection, or approval as noted.

C. ENGINEER will observe CONTRACTOR's field activities and report activity to OWNER.

1.7 WORK BY OWNER OR OTHERS

A. Work by others on the Estabrook Dam Spillway repair may coincide with Work required by this Contract. Work shall be coordinated with others to prevent schedule delays and conflicts.

B. Coordinate Work with utility owners..

1.8 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limit use of Site and premises to areas shown on the Drawings. Additional area may be available with prior approval of landowner and OWNER.

B. Maximum limits of disturbance (LOD) are shown on the Drawings. CONTRACTOR shall not disturb areas within LOD unless necessary.

1.9 WORK SEQUENCE

A. Construct Work in phases to minimize construction schedule and floodplain impacts. CONTRACTOR may propose an alternate Work sequence subject to OWNER and regulatory approval.

1.10 PERMITS

A. OWNER will provide the following documents/permits:
   1. 40 Code of Federal Regulations (CFR) 761.61(c) TSCA Approval
   2. Dredging Individual Permit
   3. Wetland Disturbance Individual Permit
   4. Streambank Erosion Control Individual Permit
   5. Miscellaneous Structure Individual Permit
   6. Carriage and/or Interstitial Water from Dredging Operations General Permit
   7. City of Glendale Floodplain Development Permit
   8. City of Milwaukee Floodplain Fill Permit
   9. Milwaukee County Construction/Right-of-Entry Permit
   10. Wisconsin Department of Transportation (WisDOT) Permit to Work on Highway Right-of-Way. Permit will cover in river dredging activities only.
   11. Coastal Zone Federal Consistency Certification

B. CONTRACTOR shall obtain all additional permits necessary for construction of Work including, but not limited to, the following. If any of the permits listed below are determined by the CONTRACTOR to not be needed, the CONTRACTOR shall provide written documentation from the permitting authority that they are not needed.
   1. WPDES Construction Site Stormwater Runoff General Permit
   2. Notice for Construction Near or On Lakes, Streams, or Wetlands
   3. Local Stormwater Permits
   4. Temporary Noise Variances from City of Glendale and Milwaukee
   5. Utility connections to field offices
   6. WisDOT Permit to Work on Highway Right-of-Way. Permit is required to utilize WisDOT I-43 on-ramp, if CONTRACTOR'S technical approach involves using the on-ramp or other WisDOT structures.

C. CONTRACTOR shall comply with and execute requirements in all permits.

D. CONTRACTOR and SUBCONTRACTORS shall sign an affidavit attesting to the fact that they understand and will comply with all final permit requirements and TSCA application.

1.11 SUPERINTENDENT

A. CONTRACTOR shall provide an on-site representative hereafter referred to as the CONTRACTOR superintendent. The CONTRACTOR'S superintendent is responsible for implementation of the RA consistent with the Contract Documents, design drawings, and specifications. The CONTRACTOR'S superintendent has the following responsibilities and authority:
   1. The CONTRACTOR'S superintendent or approved alternate shall be onsite whenever Work is in progress. If the CONTRACTOR'S superintendent must be absent when Work is in progress, he/she shall notify the OWNER in advance and arrange for or appoint an alternate acceptable to the OWNER.
   2. Maintain and enforce safety regulations and emergency procedures required by the CONTRACTOR'S Site Safety and Health Plan (SSHP).
   3. Represent the CONTRACTOR onsite.
   4. Make decisions concerning CONTRACTOR'S Work including sequencing and quality of Work.
   5. Answer questions from ENGINEER and OWNER representatives.
   6. Attend weekly progress meetings, provide updated schedule and cost information at the request of OWNER.
   7. Receive and inspect materials and supervise the Work of the CONTRACTOR personnel.
   8. Order additional manpower, equipment, materials, and other resources, if necessary, to meet schedules and complete the Work as described herein.

1.12 HEALTH AND SAFETY OFFICER

A. CONTRACTOR shall provide a full time, on-site representative, hereafter referred to as the health and safety officer (HSO), with authority to maintain and enforce safety regulations and emergency procedures contained herein and the CONTRACTOR'S SSHP, answer questions from ENGINEER and OWNER representatives, provide written documentation of activities to OWNER as requested by the OWNER, and attend weekly progress meetings. The HSO is

an employee of the CONTRACTOR and reports to the CONTRACTOR superintendent. The CONTRACTOR superintendent may also act as the HSO with approval of the OWNER.

B. The CONTRACTOR'S HSO or approved alternate shall be on site whenever Work is in progress. If the CONTRACTOR'S HSO must be absent when Work is in progress, he/she shall notify the OWNER in advance and arrange for or appoint an alternate acceptable to the OWNER. The CONTRACTOR shall perform health and safety responsibilities in accordance with the submitted SSHP.

1.13 QUALITY CONTROL OFFICER

A. CONTRACTOR shall provide a full time, on-site representative, hereafter referred to as the quality control officer (QCO), with authority to ensure Work is conducted in compliance with the Contract Documents, and attend weekly progress meetings. The QCO is an employee of the CONTRACTOR and reports to the CONTRACTOR superintendent. The CONTRACTOR superintendent or HSO shall not act as the QCO.

B. The Quality Control Officer shall ensure that all chemistry related objectives including responsibilities for Data Quality Objective (DQO) definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained.

C. The QCO has the following responsibilities and authority to include, but not be limited to:
   1. Review all submittals for compliance with Contract Documents prior to submittal.
   2. Inspect completed Work and/or Work in progress to determine whether the Work meets specifications and plan requirements.
   3. Monitor overall construction performance with regard to technical quality and compliance with design and specification requirements.
   4. Note and report on Work that does not meet requirements.
   5. Educate workers on the required standards and Contract Documents.
   6. Provide update at weekly progress meetings on quality control measures being implemented.

D. CONTRACTOR shall discuss quality control issues and concerns in daily reports and in the next weekly meeting or sooner if CONTRACTOR believes they are time critical.

1.14 WORK SCHEDULE

A. The CONTRACTOR shall complete Work in accordance with OWNER approved work schedule.

1.15 ORDER OF PRECEDENCE

A. In the event of a conflict in the execution of Work, the following order of precedence shall apply.
   1. Technical Specifications
   2. Drawing Details
   3. Drawing Sections or Elevations
   4. Drawing Plan Views

1.16 GREEN AND SUSTAINABLE REMEDIATION

A. Green and sustainable materials and practices shall be utilized to the extent practicable that they provide a reasonable value to the OWNER and meet Contract Documents.

1.17 DAILY REPORTS

A. CONTRACTOR shall submit a CONTRACTOR daily report to OWNER via project website no later than 12:00 noon on the day following the date of the report. Reporting shall commence upon mobilization to the site and continue through CONTRACTOR demobilization.

B. Report shall:
   1. Discuss what Work related to a specific pay item was performed. CONTRACTOR
   2. Include sampling data in accordance with Section 01 35 45.00 10 – Chemical Data Quality Control.
   3. Discuss QCO actions and inspections, issues identified, corrective action taken to resolve issue and prevent reoccurrence in the future.
   4. Identify all issues and concerns with construction and existing conditions.
   5. Be signed by the Superintendent, HSO and QCO.

C. CONTRACTOR shall discuss those issues and concerns in the next weekly meeting or sooner if CONTRACTOR believes they are time critical.

D. Submit photographs in accordance with Section 01 70 00 – Execution and Closeout Requirements on at least a weekly basis.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 SITE SAFETY AND HEALTH PLAN

A. Shall be submitted within 14 days after Notice of Award.

B. This document shall meet:
   1. contract document requirements, and
   2. EPA Remedial Design / Remedial Action Handbook (540/R-95/059) requirements for Health and Safety Plan, but follow the most recent versions of guidance documents.

END OF SECTION

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals

B. Schedule of Supplies and Services

C. Application for Payment

D. Unit Prices

E. Schedule of Supplies and Services Items

1.2 SUBMITTALS

A. Revised Schedule of Supplies and Services

B. Applications for Payment

1.3 SCHEDULE OF SUPPLIES AND SERVICES

A. Revise schedule to list approved Change Orders with each Application for Payment.

1.4 APPLICATION FOR PAYMENT

A. Submit electronic file to Project website of each Application for Payment on form approved by OWNER.

B. Content and Format: Use Schedule of Values for listing items in Application for Payment.

C. Submit updated construction schedule and progress report with each Application for Payment.

D. Payment Period: Submit at intervals stipulated in the Agreement or as directed by OWNER.

E. Submit submittals with transmittal letter as specified in Section 01 33 00 - Submittal Procedures.

F. Substantiating Data: When OWNER requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
   1. Current construction photographs specified in Section 01 33 00 - Submittal Procedures.
   2. Record Documents as specified in Section 01 70 00 - Execution and Closeout Requirements, for review by OWNER, which will be returned to CONTRACTOR.
   3. Construction Progress Schedule, revised and current as specified in Section 01 32 16 – Construction Progress Schedule.
   4. Survey data and calculations of quantities.
   5. Geotechnical data.
   6. SUBCONTRACTOR invoices or vendor invoices.

7. Overdue submittals.

1.5 CHANGE PROCEDURES

A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in CONTRACTOR'S employ or SUBCONTRACTORS of changes to the Work.

B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise OWNER of any error, inconsistency, omission, or apparent discrepancy.

C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with OWNER; establish procedures for handling queries and clarifications.
   1. Use OWNER approved form for requesting interpretations.
   2. OWNER may respond with a direct answer on the Request for Interpretation form.

D. The OWNER may issue a Change Order to the CONTRACTOR, including a detailed description of proposed change with supplementary or revised quantities, Drawings, and specifications, and a change in Contract Time for executing the change. CONTRACTOR will prepare and submit estimate within 30 days. OWNER will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

E. CONTRACTOR may propose changes by submitting a request for change to OWNER, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation.

F. Correlation of CONTRACTOR Submittals:
   1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
   2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
   3. Promptly enter changes in Record Documents.

1.6 UNIT PRICES

A. Unit Quantities: Quantities and measurements indicated on Schedule of Supplies and Services are for Contract purposes only. Actual quantities of work done in accordance with Contract Documents shall determine payment.

B. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services, and incidentals; erection, application, or installation of item of the Work; overhead; and profit.

C. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities verified by ENGINEER multiplied by unit sum/price for Work incorporated in or made necessary by the Work.

D. Measurement of Quantities:
   1. Weigh Scales: Inspected, tested, and certified by applicable State weights and measures department within past year.
   2. Measurement by Volume: Measured by cubic dimension using survey data and a computer-aided design software package.
   3. Measurement by Area: Measured by square dimension using survey data and a computer-aided design software package.
   4. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
   5. Lump Sum: Measured by percent complete of Work completed.
   6. Daily or Hourly: Measured by onsite time, of Work conducted in accordance with Contract Documents, documented in daily reports and verified by ENGINEER.
   7. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.7 SCHEDULE OF SUPPLIES AND SERVICES ITEMS

A. Planning Documents
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for development of planning documents. The Work shall include, but not be limited to, development, submittal, revisions, and obtaining final OWNER approval of all planning documents, including, but not limited to: Sampling and Analysis Plan, Field Sampling Plan, Quality Assurance Project Plan, Construction Quality Assurance Plan, Maintenance Plan, and other documents required by contract documents and OWNER prior to initiating Work including Site Safety and Health Plan.
   2. Measurement and Payment
      a. Item No. 1 Planning Documents will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

B. Mobilization
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for mobilization. The Work shall include, but not be limited to, obtaining of all permits; moving onto the site of all equipment; temporary buildings, and other construction facilities; on-site lab; utilities; project website, shop drawing preparation; temporary stormwater pollution prevention; construction/installation plans; construction quality control plans; submittals, field offices and requirements. Mobilization costs shall also include providing personal protective equipment (PPE) to all site personnel.
   2. Measurement and Payment
      a. Item No. 2 Mobilization will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents

C. Clearing
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of clearing the project area as needed and required in the Specifications. The Work shall include, but not be limited to, the following: clearing, tree and stump

removal, stripping and stockpiling of topsoil, and stockpiling of tree materials for log/root wads.

2. Measurement and Payment
    a. Item No. 3 Clearing will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

D. Access Roads
1. Description
    a. This item consists of all materials, labor, and equipment to complete Work activities for installing, maintaining, removal and loading for disposal, pre- and post-construction sampling and analysis of temporary access roads subgrade in accordance with the Contract Documents.
2. Measurement and Payment
    a. Item No. 4 Access roads will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

E. Dewatering Pad
1. Description
    a. This item consists of all materials, labor, and equipment to complete Work activities for installation, removal and loading for disposal, pre- and post- construction sampling and analysis of subgrade, water handling and transfer, and other incidental items required for the dewatering pad in accordance with the Contract Documents.
2. Measurement and Payment
    a. Item No. 5 Dewatering Pad will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents

F. Decontamination Pads
1. Description
    a. This item consists of all materials, labor, and equipment to complete Work activities for decontamination pads installation, removal and loading for disposal, pre- and post- sampling of the subgrade in accordance with the Contract Documents.
2. Measurement and Payment
    a. Item No. 6 Decontamination Pads will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

G. Wastewater Treatment Pad
1. Description
    a. This item consists of all materials, labor, and equipment to complete Work activities for wastewater treatment pad installation, removal and loading for disposal, pre- and post- sampling of the subgrade in accordance with the Contract Documents.
2. Measurement and Payment
    a. Item No. 7 Wastewater Treatment Pad will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

H. Wastewater Treatment System
1. Description
    a. This item consists of all materials, labor, and equipment to complete Work activities for installation, operation, maintenance, expendables, storage, analytical testing and

all permit requirements for the wastewater treatment system as required in the Contract Documents.

2. Measurement and Payment
   a. Item No. 8 Wastewater Treatment System will be measured on a daily basis of operation and payment made at the Contract fixed unit price proposal in accordance with the Contract Documents.

I. Sediment Sample Collection
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for grid layout, expendables, labor, sample collection and preservation of sediment to delineate excavation limits, and confirmation that the remedial action objectives have been met, as required in the Contract Documents.
   2. Measurement and Payment
      a. Item No. 9 Sediment Sample Collection will be measured on a daily basis of operation (days of actual sample collection) and payment made at the Contract fixed unit price proposal in accordance with the Contract Documents.

J. Sediment Sample Analysis
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for on-site laboratory analysis and reporting of sediment analysis for delineation of excavation limits and confirmation in accordance with Contract Documents.
   2. Measurement and Payment
      a. Item No. 10 Sediment Sample Analysis will be measured on a daily basis of operation (actual days that samples are analyzed on-site) and payment made at the Contract fixed unit price proposal in accordance with the Contract Documents.

K. Cofferdam 1
   1. Description
      a. This item consists of all design, materials, labor, work, and equipment to complete Work activities for installing, repair, correction, adjustment or reconstruction, removal, disposal, floodplain management, and decontaminating Cofferdam 1 in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 11 Cofferdam 1 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

L. Cofferdam 2
   1. Description
      a. This item consists of all design, materials, labor, work, and equipment to complete Work activities for installing, repair, correction, adjustment or reconstruction, removal, disposal, floodplain management, and decontaminating Cofferdam 2 in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 12 Cofferdam 2 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

M. Cofferdam 3
   1. Description
      a. This item consists of all design, materials, labor, work, and equipment to complete Work activities for installing, repair, correction, adjustment or reconstruction, removal, disposal, floodplain management, and decontaminating Cofferdam 3 in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 13 Cofferdam 3 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

N. Cofferdam 4
   1. Description
      a. This item consists of all design, materials, labor, work, and equipment to complete Work activities for installing, repair, correction, adjustment or reconstruction, removal, disposal, floodplain management, and decontaminating Cofferdam 4 in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 14 Cofferdam 4 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

O. Dewatering - Cofferdam 1
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for dewatering the Work area and sediments, and transferring water to wastewater treatment system from Cofferdam 1 in accordance with the Contract Documents.
      b. Water overtopping of cofferdams installed to the maximum elevations allowed by the Contract Documents are excluded from this item. In the event this occurs, it will be treated as a Force Majeure flooding event and OWNER will negotiate a contract modification with CONTRACTOR.
   2. Measurement and Payment
      a. Item No. 15 Dewatering - Cofferdam 1 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

P. Dewatering - Cofferdam 2
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for dewatering the Work area and sediments, and transferring water to wastewater treatment system from Cofferdam 2 in accordance with the Contract Documents.
      b. Water overtopping of cofferdams installed to the maximum elevations allowed by the Contract Documents are excluded from this item. In the event this occurs, it will be treated as a Force Majeure flooding event and OWNER will negotiate a contract modification with CONTRACTOR.
   2. Measurement and Payment
      a. Item No. 16 Dewatering - Cofferdam 2 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

Q. Dewatering - Cofferdam 3
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for dewatering the Work area and sediments, and transferring water to wastewater treatment system from Cofferdam 3 in accordance with the Contract Documents.
      b. Water overtopping of cofferdams installed to the maximum elevations allowed by the Contract Documents are excluded from this item. In the event this occurs, it will be treated as a Force Majeure flooding event and OWNER will negotiate a contract modification with CONTRACTOR.
   2. Measurement and Payment
      a. Item No. 17 Dewatering - Cofferdam 1 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

R. Dewatering - Cofferdam 4
   1. Description
      a. This item consists of all materials, labor, and equipment to complete Work activities for dewatering the Work area and sediments, and transferring water to wastewater treatment system from Cofferdam 4 in accordance with the Contract Documents.
      b. Water overtopping of cofferdams installed to the maximum elevations allowed by the Contract Documents are excluded from this item. In the event this occurs, it will be treated as a Force Majeure flooding event and OWNER will negotiate a contract modification with CONTRACTOR.
   2. Measurement and Payment
      a. Item No. 18 Dewatering - Cofferdam 1 will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

S. Sediment Excavation
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of excavating sediment to the limits authorized by the OWNER based on sampling results, hauling to dewatering pad, access ramps, and all-weather mats in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 19 Sediment Excavation will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

T. Hydraulic Dredging
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of hydraulic dredging sediment to the limits authorized by the OWNER based on sampling results, dewatering dredged sediments, and hauling to dewatering pad in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 20 Hydraulic Dredging will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

U. Solidification
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of providing solidification agent, mixing and handling sediment required to be solidified to meet landfill requirements in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 21 Solidification will be measured on the weight basis of solidification agent used in accordance with the Contract Documents. Solidification agent not used shall not be measured for payment.

V. Transportation and Disposal – Solid Waste
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of loading, transporting, manifesting and disposal of Non-TSCA sediments, debris, decontamination pads, dewatering pad, wastewater treatment pad, access roads and other waste required to be disposed of to the Subtitle D Landfill in accordance with the Contract Documents. This item excludes disposal of cofferdams.
   2. Measurement and Payment
      a. Item No. 22 Transportation and Disposal – Solid Waste will be measured on a weight basis as determined by the approved landfill's scale and payment made at the Contract fixed unit price proposal in accordance with the Contract Documents.

W. Transportation and Disposal – TSCA Waste
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of loading, transporting, manifesting and disposal of TSCA sediments, debris, decontamination pads, dewatering pad, wastewater treatment pad, access roads, and other waste required to be disposed of to the Subtitle C or TSCA-approved landfill in accordance with the Contract Documents. This item excludes disposal of cofferdams.
   2. Measurement and Payment
      a. Item No. 23 Transportation and Disposal – TSCA Waste will be measured on a weight basis as determined by the approved landfill's scale and payment made at the Contract fixed unit price proposal in accordance with the Contract Documents.

X. Sand Backfill
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of backfilling wetland, substrate restoration, and residual cover (if needed) areas with sand in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 24 Sand Backfill will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

Y. Imported Clay Backfill
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of backfilling excavated streambank areas with imported clay in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 25 Imported Clay Backfill will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

Z. Imported Topsoil Backfill
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of backfilling wetland excavation and other areas with imported topsoil in accordance with the Contract Documents. This item excludes the replacement of stripped topsoil.
   2. Measurement and Payment
      a. Item No. 26 Imported Topsoil Backfill will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

AA. Substrate Restoration
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work including preparation of surfaces, supplying, loading, hauling, placing, and for all materials, labor, equipment, tools, and incidentals necessary to install substrate restoration in accordance with the Contract Documents.
   2. Measurement and Payment
      a. Item No. 27 Substrate Restoration will be measured on a square yard basis and payment made at the Contract unit price proposal in accordance with the Contract Documents.

BB. Log/Root Wads
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of installing log/root wads in accordance with the Contract Documents including furnishing anchor rocks, hauling, stockpiling, excavation, grading, backfill and compaction, removal of excess material, cutting and/or trimming Log/Root Wad logs to appropriate size, placement of Log/Root Wad logs and anchor rocks, and tamping.
   2. Measurement and Payment
      a. Item No. 28 Log/Root Wads will be measured on a per each basis and payment made at the Contract unit price proposal in accordance with the Contract Documents.

CC. Boulder Clusters
   1. Description
      a. This item consists of all materials, labor, and equipment necessary to complete the Work of installing boulder clusters including all excavation, furnished stone, fill, and

disposal of excess material necessary to complete the Work of each boulder cluster in accordance with Contract Documents.

2. Measurement and Payment
   a. Item No. 29 Boulder Clusters will be measured on a per each basis and payment made at the Contract unit price proposal in accordance with the Contract Documents.

DD. Wetland Planting
1. Description
   a. This item consists of all materials, labor, and equipment necessary to complete the Work of planting in wetlands that were disturbed (during execution of the Work), including wetland trees, and hydroseeding native grass in accordance with the Contract Documents.
2. Measurement and Payment
   a. Item No. 30 Wetland Planting will be measured on an acre basis as determined by survey and calculated in a computer-aided design software package and payment made at the Contract unit price proposal in accordance with the Contract Documents.

EE. Paving Restoration
1. Description
   a. This item consists of all materials, labor, and equipment necessary to complete the Work of demolition, loading for disposal, and rebuilding of existing county park trails that were used during construction activities in accordance with the Contract Documents.
2. Measurement and Payment
   a. Item No. 31 Paving Restoration will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

FF. Site Restoration
1. Description
   a. This item consists of all materials, labor, and equipment necessary to complete the Work of restoring areas disturbed during the remedial action in accordance with the Contract Documents. The Work shall include, but not be limited to, replacement of stockpiled topsoil, turf grass hydroseeding, native grass hydroseeding on banks, no mow low grow hydroseeding, mulching, watering, planting of upland trees, and incidentals to complete the Work in accordance with the Contract Documents.
2. Measurement and Payment
   a. Item No. 32 Site Restoration will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

GG. Security Guards
1. Description
   a. This item consists of all materials, labor, and equipment necessary to provide Security Guards at the Site in accordance with the Contract Documents.
2. Measurement and Payment
   a. Item No. 33 Security Guards will be measured on an hourly (labor hours) basis of on-site time and payment made at the Contract unit price proposal in accordance with the Contract Documents.

HH. Security Fence
1. Description
   a. This item consists of all materials, labor, and equipment necessary to complete the Work of installing and maintaining the temporary security fence in accordance with the Contract Documents.
2. Measurement and Payment
   a. Item No. 34 Security Fence will be measured on a linear foot basis and payment made at the Contract unit price proposal in accordance with the Contract Documents.

II. Demobilization
1. Description
   a. This item consists of all materials, labor, and equipment to complete Work activities for demobilization. The Work shall include, but not be limited to, removing all equipment, materials, temporary buildings, other construction facilities, temporary utilities, temporary fencing, temporary storm water pollution prevention, and field offices.
2. Measurement and Payment
   a. Item No. 35 Demobilization will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

JJ. Record Documents
1. Description
   a. This item consists of all materials, labor, and equipment to complete Work activities for development of the construction record documents. The Work shall include, but not be limited to, development, submittal, revisions, and obtaining final OWNER approval of the Record Documents.
2. Measurement and Payment
   a. Item No. 36 Record Documents will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

KK. Maintenance Period
1. Description
   a. This item consists of all materials, labor, and equipment to complete Work activities for re-planting vegetation, control of weeds and invasive species in accordance with the Contract Documents and Maintenance Plan approved by OWNER.
2. Measurement and Payment
   a. Item No. 37 Maintenance Period will be measured on a lump sum basis and payment made at the Contract lump sum price proposal in accordance with the Contract Documents.

LL. Floodplain Contingency Plan Implementation
1. Description
   a. This item consists of all materials, labor, and equipment necessary to complete the Work described in the Floodplain Contingency Plan, Floodplain Development Permit and Floodplain Fill Permit.

2. Measurement and Payment
    a. Item No. 38 Floodplain Contingency Plan Implementation will be measured on a lump sum basis and payment made to the Contract lump sum price proposal in accordance with the Contract Documents.

MM. Bonds
1. Description
    a. This item consists of all materials, labor, and equipment necessary to obtain bonding and surety in accordance with the Contract Documents.
2. Measurement and Payment
    a. Item No. 39 Bonds will be measured on a lump sum basis and payment made to the Contract lump sum price proposal in accordance with the Contract Documents.

1.8 OPTIONAL SCHEDULE OF SUPPLIES AND SERVICES ITEMS

A. Deposits 4-1 and 4-2 Sediment Excavation from Bank
1. Description
    a. This item consists of all materials, labor, and equipment necessary to complete the Work of excavating sediment to the limits authorized by the OWNER based on sampling results, hauling to dewatering pad, silt barrier, in accordance with the Contract Documents without installation and dewatering of Cofferdam 3. If executed by the OWNER, this optional item will replace the quantity for item 19, and measurement will not be made for items 13 and 17.
2. Measurement and Payment
    a. Item No. 19a Optional Item – Deposits 4-1 and 4-2 Sediment Excavation from Bank will be measured on the basis of each in-place cubic yard as determined by survey and calculated in a computer-aided design software package at the Contract fixed unit price proposal in accordance with the Contract Documents.

B. Winterization Contingency Plan Implementation
1. Description
    a. This item consists of all materials, labor, and equipment necessary to complete the Work described in the CONTRACTOR's Winterization Contingency Plan approved by the OWNER.
2. Measurement and Payment
    a. Item No. 40 Winterization Contingency Plan Implementation will be measured on a lump sum basis and payment made to the Contract lump sum price proposal in accordance with the Contract Documents.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Submittals

B. Pre-Construction meeting

C. Progress meetings

D. Pre-Installation meetings

E. Project Website

1.2 SUBMITTALS

A. Meeting minutes

1.3 PRE-CONSTRUCTION MEETING

A. OWNER will schedule and preside over meeting after Notice of Award.

B. Attendance Required: ENGINEER, OWNER, PCT, major SUBCONTRACTORS, and CONTRACTOR'S superintendent, CONTRACTOR'S project manager, CONTRACTOR'S QCO, CONTRACTOR'S HSO and other CONTRACTOR'S personnel requested by OWNER.

C. Minimum Agenda:
1. Submission of executed bonds and insurance certificates
2. Distribution of Contract Documents
3. Review permit requirements and conditions
4. Submission of CONTRACTOR'S affidavit of permit requirements
5. Submission of list of SUBCONTRACTORS, list of products, schedule of values, and Progress Schedule
6. Designation of personnel representing parties in Contract, and ENGINEER
7. Communication procedures
8. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures
9. Scheduling
10. Critical Work sequencing
11. Scheduling activities of sample collection and analysis
12. Temporary utilities provided by CONTRACTOR
13. Security and housekeeping procedures
14. Schedules
15. Procedures for maintaining record documents

D. CONTRACTOR: Record minutes and distribute draft minutes to participants within two days after meeting, to ENGINEER, OWNER, and those affected by decisions made. ENGINEER, and OWNER will provide required changes to minutes and CONTRACTOR shall submit final minutes to project website.

1.4 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at weekly intervals.

B. CONTRACTOR shall make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.

C. Attendance Required: CONTRACTOR'S superintendent, CONTRACTOR'S Quality Control Officer, major SUBCONTRACTORS, CONTRACTOR and suppliers, and ENGINEER**,** OWNER**,** and additional personnel as appropriate to agenda topics for each meeting.

D. Minimum Agenda:
1. Review minutes of previous meetings
2. Health and Safety
3. Review of Work progress
4. Review of daily reports
5. Review of quality control actions and issues
6. Field observations, problems, and decisions
7. Identification of problems impeding planned progress
8. Review of submittal schedule and status of submittals
9. Review of off-Site fabrication and delivery schedules
10. Maintenance of Progress Schedule
11. Corrective measures to regain projected schedules
12. Planned progress during succeeding Work period
13. Coordination of projected progress
14. Maintenance of quality and Work standards
15. Effect of proposed changes on Progress Schedule and coordination
16. Other business relating to Work

E. CONTRACTOR: Record minutes and distribute draft minutes to participants within two days after meeting, to ENGINEER, OWNER, and those affected by decisions made. ENGINEER, and OWNER will provide required changes to minutes and CONTRACTOR shall submit final minutes to project website.

1.5 PRE-INSTALLATION MEETINGS

A. When required in individual Specification Sections, convene pre-installation meetings before starting Work of specific Section.

B. Require attendance of parties directly affecting, or affected by, Work of specific Section.

C. Notify OWNER and ENGINEER two days in advance of meeting date.

D. Prepare agenda and preside over meeting:
1. Review conditions of installation, preparation, and installation procedures.

2. Review coordination with related Work.

E. CONTRACTOR: Record minutes and distribute draft minutes to participants within two days after meeting, to ENGINEER, OWNER, and those affected by decisions made. ENGINEER, and OWNER will provide required changes to minutes and CONTRACTOR shall submit final minutes to project website.

1.6 PROJECT WEBSITE

A. CONTRACTOR shall provide and maintain a project website available for the OWNER, PCT and ENGINEER to access through the internet.

B. CONTRACTOR shall provide three temporary usernames and passwords for use by OWNER and PCT, and one temporary username and password for use by ENGINEER. Provide usernames and passwords through vegetation establishment period, and approval of Final Remedial Action Report.

C. Project website shall allow confidential business information to be visible only to OWNER and CONTRACTOR.

D. CONTRACTOR shall assign levels of access to each user as directed by OWNER.

E. CONTRACTOR shall provide training to OWNER and ENGINEER upon request by OWNER.

F. Project Website shall:
1. Serve as document repository and project schedule tracking for all submittals and documents required by the contract documents.
2. Document required and actual dates posted to project website of CONTRACTOR submittals and documents.
3. Document dates and status of OWNER reviews, approvals or rejections.
4. Identify actions required within the approval Work flow process and the party responsible for the next step.
5. Email transmittal forms to OWNER and ENGINEER upon CONTRACTOR posting of submittals, requests for information, and other documents to the project website.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01 31 13 - PROJECT COORDINATION

GENERAL

1.1 SECTION INCLUDES

A. Coordination of Work

1.2 COORDINATION AND PROJECT CONDITIONS

A. Coordinate submittals, and Work of various sections of Contract Documents to ensure efficient and orderly sequence of installation (within the schedule allowed by the Contract Documents) of interdependent construction elements.

B. Coordinate space requirements for Work required by Contract Documents.

C. Coordinate completion and clean-up of Work of separate sections in preparation for substantial and final completion inspections.

D. Coordination Meetings: In addition to other meetings specified in Section 01 30 00, hold coordination meetings with personnel and SUBCONTRACTORS to ensure coordination of Work.

E. Coordinate Work on and around bridges with the Wisconsin Department of Transportation.

F. Coordinate Work for contaminated Deposits 4-1 and 4-2 with OWNER prior to installing dewatering system for this area. If water levels in the Milwaukee River are low and Work can be conducted from the bank, OWNER may elect to execute the optional schedule of supplies and services item for removal of contaminated sediments from the bank.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 Complete Work in accordance with Contract Documents.

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Definitions

B. Submittals

C. Submittal Procedures

D. Product Data

E. Use of Electronic CAD Files of Project Drawings

F. Shop Drawings

G. Test Reports

H. Certificate

I. Construction Photographs

J. CONTRACTOR Review

K. ENGINEER Review

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require ENGINEER'S and OWNER'S responsive action. Unless noted otherwise, submittals shall be classified as Action Submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require ENGINEER'S and OWNER'S responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTALS

A. Submittal Register

1.4 SUBMITTAL PROCEDURES

A. OWNER has provided a draft submittal list as Attachment A to aid in CONTRACTOR'S development of the submittal register. Additional submittals may be required to comply with Contract Documents.

B. With the first submittal or 30 days after Notice of Award (whichever is sooner), submit a CONTRACTOR'S submittal register, by Specification section number, all submittals required and approximate date the submittal will be forwarded. Submittal register shall

identify additional submittals required by other plans as discussed in Section 01 31 13 – Project Coordination and contract documents.

C. CONTRACTOR'S submittal register shall be similar to USACE ER 415-1-10, Engineering Form 4288, or equivalent as approved by OWNER. http://www.publications.usace.army.mil/Portals/76/Publications/EngineerRegulations/ER_415-1-10.pdf

D. Transmit each submittal with OWNER accepted form.

E. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.

F. Identify: Project, CONTRACTOR, SUBCONTRACTOR and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.

G. Apply CONTRACTOR'S stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

H. Schedule submittals to expedite Project, and post electronic submittals as PDF electronic files to Project website. Coordinate submission of related items.

I. For each submittal for review, allow 15 days excluding delivery time to and from CONTRACTOR.

J. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

K. Allow space on submittals for CONTRACTOR, ENGINEER and OWNER review stamps.

L. When revised for resubmission, identify changes made since previous submission.

M. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.

N. Submittals not requested will not be recognized nor processed.

O. Incomplete Submittals: ENGINEER will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of ENGINEER.

1.5 PRODUCT DATA

A. Submit to ENGINEER for review for assessing conformance with information given and design concept expressed in Contract Documents.

B. Post electronic submittals as PDF electronic files to Project website.

C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 USE OF ELECTRONIC CAD FILES OF PROJECT DRAWINGS

A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings, Record Drawings, and to determine coordinates for grid layout and estimated depths/locations for sampling for the Project. Use for other Projects or purposes is not allowed.

B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
   1. Use of files is solely at receiver's risk. ENGINEER does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify ENGINEER of discrepancy and use information in hard-copy Drawings and Specifications.
   2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
   3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
   4. Receiver shall not hold ENGINEER responsible for data or file cleanup required to make files usable; nor for error or malfunction in translation, interpretation, or use of this electronic information.
   5. Receiver shall understand that even though ENGINEER has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
   6. Receiver shall not hold ENGINEER responsible for such viruses or their consequences; and shall hold ENGINEER harmless against costs, losses, or damage caused by presence of computer virus in files or media.

1.7 SHOP DRAWINGS

A. Shop Drawings: Action Submittal: Submit to ENGINEER for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a Professional Engineer licensed in the State of Wisconsin responsible for designing components shown on Shop Drawings.

1. Include signed and sealed calculations to support design.
2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Post electronic submittals as PDF electronic files to Project website.

E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.8 TEST REPORTS

A. Informational Submittal: Submit reports for ENGINEER'S knowledge as representative or for OWNER.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.9 CERTIFICATES

A. Informational Submittal: Submit certification by manufacturer, installation/application SUBCONTRACTOR, or CONTRACTOR to ENGINEER, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Provide documentation of Buy American Act requirements for materials, if required in Contract Documents.

1.10 CONTRACTOR REVIEW

A. Review for compliance with Contract Documents and approve submittals before transmitting to OWNER.

B. Contractor: Responsible for:
1. Determination and verification of materials including manufacturer's catalog numbers
2. Determination and verification of field measurements and field construction criteria
3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents
4. Determination of accuracy and completeness of dimensions and quantities
5. Confirmation and coordination of dimensions and field conditions at Site
6. Construction means, techniques, sequences, and procedures
7. Safety precautions
8. Coordination and performance of Work of all trades

C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.

D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from OWNER.

1.11 OWNER REVIEW

A. Do not make "mass submittals" to OWNER. "Mass submittals" are defined as six or more submittals or items in one day, or 15 or more submittals or items in one week. If "mass submittals" are received, OWNER'S review time may be delayed as necessary to perform proper review. OWNER will review "mass submittals" based on priority determined by OWNER after consultation with ENGINEER and CONTRACTOR.

B. Informational submittals and other similar data are for OWNER'S information, do not require OWNER'S responsive action, and will not be reviewed or returned with comment.

C. ENGINEER will review submittals, and provide recommendations and comments to OWNER comparing submittals to Contract Documents.

D. Submittals made by CONTRACTOR that are not required by Contract Documents may be returned without action.

E. Submittal approval does not authorize changes to Contract requirements unless accompanied by Contract Modification from OWNER.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

ATTACHMENT A – Draft Submittal List

ITEM:	SUBMITTAL:	SPECIFICATION:
1	Daily Reports	01 10 00
2	Permits	01 10 00
3	Site Safety and Health Plan	01 10 00
4	Revised Schedule of Supplies and Services	01 20 00
5	Applications for Payment	01 20 00
6	Meeting Minutes	01 30 00
7	Submittal Register	01 33 00
8	Sampling and Analysis Plan	01 35 45.00 10
9	Qualifications	01 35 45.00 10
10	Sample Location Survey Coordinates	01 35 45.00 10
11	Analysis Results	01 35 45.00 10
12	Chemical Data Daily Report	01 35 45.00 10
13	Report Labeling: contract number, project name and location	01 35 45.00 10
14	Construction Quality Assurance Plan	01 40 00
15	Traffic Control Plans	01 50 00
16	Methods and materials for erosion and dust control.	01 50 00
17	Erosion Control and Stormwater Management Plans	01 50 00
18	Copy of Water Resources Application for Project Permits	01 50 00
19	Construction Photographs	01 70 00
20	Substantial Completion Certificate and Inspection Request	01 70 00
21	Substantial Completion Punch List	01 70 00
22	Final Completion Certificate and Inspection Request	01 70 00
23	Record Documents	01 70 00
24	Material Labels and Data Sheets	02 56 13
25	Shop Drawings	02 56 13
26	Test Reports	02 56 13
27	Cross Sections and Test Reports	02 61 00
28	Copy of Landfill PCB Notification	02 61 00
29	Transporter Certifications	02 61 00
30	Certificates of Disposal and Disposal Weigh Tickets	02 61 00
31	Locations for storage of contaminated materials	02 61 00
32	Test Reports	02 61 00
33	Surveys	02 61 00
34	Removal Limits Plan	02 61 00
35	Contingency Plan	02 61 00
36	Boundaries of Work	31 10 00
37	Dewatering System Design	31 23 19
38	Shop Drawings	31 23 19
39	Product Data	31 23 19
40	Operation and Maintenance Plan	31 23 19
41	Records and Reports	31 23 19
42	Imported Topsoil Test Results and Recommendations	31 23 23
43	Amendment Materials and Rates	31 23 23
44	Amended Topsoil Test Results	31 23 23

ITEM:	SUBMITTAL:	SPECIFICATION:
45	Product Data	31 23 23
46	Materials Source	31 23 23
47	Imported Topsoil Sample Prior to Amending	31 23 23
48	Imported Topsoil Sample After Amending	31 23 23
49	Imported Clay Sample and Geotechnical Testing Results	31 23 23
50	Material Samples or Data Sheets	31 23 23
51	Surveys	31 23 23
52	Material Labels / Data Sheets	32 01 90
53	Material Safety Data Sheets (MSDS)	32 01 90
54	Seed Certification and Manufacturer	32 01 90
55	State of WI Licenses	32 01 90
56	Inspector Qualifications and Licenses	32 01 90
57	Maintenance Plan	32 01 90
58	Comprehensive Reports	32 01 90
59	Material Labels and Data Sheets	32 12 16
60	Material Labels and Data Sheets	32 90 00
61	Material Safety Data Sheets (MSDS)	32 90 00
62	Seed Certification and Manufacturer	32 90 00
63	State of WI Licenses	32 90 00

SECTION 01 35 45.00 10 - CHEMICAL DATA QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
   1. Submittals
   2. Data Quality Objectives (DQOs)
   3. Data Validation
   4. Analysis Methods
   5. Sampling, Analysis, and Measurement
   6. Qualifications

1.2 SUBMITTALS

A. Sampling and Analysis Plan

B. Qualifications: Environmental Sampler and Project Chemist.

C. Sample location survey coordinates. Coordinates shall be submitted in .csv file format to project website with sampling identification number, horizontal and vertical coordinates.

D. Analysis results:
   1. Soil
   2. Sediment
   3. Water
   4. Field Screening
   5. Manifesting

E. Chemical Data Daily Report

F. Each report shall be labeled with the contract number, project name and location.

1.3 DATA QUALITY OBJECTIVES

A. Sample acquisition, chemical analysis and chemical parameter measurements shall be performed so that the resulting data meet and support data use requirements. The chemical data shall be acquired, documented, verified, and reported to ensure that the specified precision, accuracy, representativeness, comparability, completeness, and sensitivity requirements are achieved.

1.4 DATA VALIDATION

A. CONTRACTOR shall perform 100 percent Tier I and 20 percent Tier II data validation on post-construction and post-removal chemical data, as specified in the Great Lakes Legacy Act (GLLA) Data Reporting Standard (Version 1.0, March 2010).

1.5 QUALITY ASSURANCE AND QUALITY CONTROL

A. Matrix Spike/Matrix Spike Duplicates - shall be sampled and analyzed at a rate of 10 percent of samples collected on a daily basis.

B. Field Duplicates – shall be a separate sample collection and analyzed at a rate of 10 percent of samples collected on a daily basis.

1.6 ANALYSIS METHODS

A. Oil and Grease - EPA SW 846 Method 5520

B. Polychlorinated Biphenyls (PCBs) – EPA SW 846 Method 8082

C. Polycyclic Aromatic Hydrocarbons (PAHs) – EPA SW 846 Method 8270 SIM

D. Non-Aqueous Phase Liquid (NAPL) – Sudan IV

E. Total Suspended Solids (TSS) – EPA SW 846 Method SM2540D

F. Soil and Sediment extraction method – SW 846 Method 3500B/3540C or 3500B/3550B Or OWNER approved equivalents.

G. Reporting limits shall be no greater than ½ of the RAOs listed in Section 01 10 00 – Summary.

1.7 SAMPLING, ANALYSIS AND MEASUREMENT

A. All sampling locations shall be surveyed in accordance with Section 01 70 00 – Execution and Closeout Requirements.

B. Soil Samples
1. Subgrade soil samples shall be collected and analyzed at either an on-site or off-site laboratory according to the following table:

Location	Pre-Construction Frequency	Post-Construction Frequency	Analytical List
Access Roads and Construction Entrances	1 five-point composite for up to each 500 linear feet	1 five-point composite for up to each 500 linear feet	Oil and Grease, PAHs, PCBs
Dewatering Pad and Wastewater Treatment Pad	1 five-point composite for up to each 10,000 square feet	1 five-point composite for up to each 10,000 square feet	Oil and Grease, PAHs, PCBs
Decontamination Pad	1 five-point composite per decontamination pad	1 five-point composite per decontamination pad	Oil and Grease, PAHs, PCBs

C. Sediment Samples
1. Sediment sampling design and grid dimensions shall be optimized by CONTRACTOR to minimize sample collection times, number of samples analyzed, and quantity of sediment removed. Grid dimensions shall not be greater than the sizes listed in the following table, without prior approval from OWNER:

Deposit	Maximum Non-TSCA Grid Size	Maximum TSCA Grid Size
7-1, 7-2, 7-3, 7-4, 5-1	50 foot	12.5 foot
4-1, 4-2, 4-3	25 foot	12.5 foot

2. Sediment samples shall be collected and preserved to a minimum of 2 feet below removal grade limits as shown on Drawings, unless bedrock is encountered.
3. Special sampling measures may be required to comply with WisDOT Permit to Work on Highway Right-of-Way.
4. A continuous perimeter of grids is required around each deposit to show the RAOs have been achieved. Samples from each perimeter grid shall be analyzed from sediment surface to approximately 2 feet below removal grade limits in adjacent grids.
5. If new TSCA sediment locations are found, the grid shall be reduced to 12.5 feet and additional samples shall be collected and analyzed.
6. Sediment samples shall be collected and analyzed at an on-site laboratory according to the following table.

Location	Pre-Removal Frequency		Post-Removal Frequency	Analytical List
	Horizontal	Vertical		
Previous and New TSCA Sample Locations	Discrete sample per grid	Collect and preserve in 1 foot increments. Test increments as needed to delineate bottom and top of TSCA Sediments (TSCA Excavation Limits).	Discrete sample per grid from 0 – 6 inches and hand core to refusal. Hand core shall be analyzed if 0 - 6 inch sample doesn't meet confirmation requirements.	PCBs, PAHs, Sudan IV
Deposits	Discrete sample per grid (excavation and hydraulic dredging will be treated as separate areas at deposits bifurcated by cofferdams)	Collect and preserve in 1 foot increments. Test increments as needed to delineate bottom of Contaminated Sediments (Excavation Limits).	Discrete sample per grid from 0 – 6 inches and hand core to refusal (excavation and hydraulic dredging will be treated as separate areas at deposits bifurcated by cofferdams). Hand core shall be analyzed if 0 – 6 inch sample doesn't meet confirmation requirements.	PAHs, PCBs, Sudan IV
Deposits	As required by landfills	as required by landfills	NA	As required by landfills

D. Water Samples
1. Water samples shall be collected and analyzed at an on-site laboratory according to the following table:

Location	Sampling Frequency	Analytical List
Wastewater Treatment Plant Discharge	Per permit requirements	PAHs, PCBs, and any additional Permit Requirements

E. Manifesting Samples
   1. Material shipping manifesting shall be in accordance with 40 CFR 261, 40 CFR 262, 40 CFR 268, 49 CFR 172, and 49 CFR 178. Additional manifesting samples shall be collected and analyzed to meet landfill disposal requirements.

F. Field Screening
   1. Field screening shall include flame ionization detector or other proposed methods approved by OWNER for measuring worker exposures to the site contaminants at frequencies identified in the Site Safety and Health Plan (SSHP).

1.8 QUALIFICATIONS

A. Project Chemist
   1. As a minimum, the CONTRACTOR'S Senior Chemist shall have: a B.S. degree in Chemistry; 5 years of experience related to investigations, studies, design and remedial actions at HTRW sites; 5 field seasons experience in calibrating and operating various field monitoring devices; and 5 years of experience in the operation of an HTRW commercial laboratory with standard analytical chemistry methods common for analyzing soil, water, air and other materials for chemical contamination assessment, including data for hazardous waste manifesting. The project chemist shall ensure that all chemistry related goals of the program are attained. The project chemist shall be onsite during all sampling events and shall also be available for consultation with Government personnel.

B. Environmental Sampler
   1. As a minimum, the CONTRACTOR's Environmental Sampler shall have: a degree in Chemistry, Environmental Science, Engineering, Geology, Hydrology, or a related field; 2 years of experience in the development and preparation of SAPs; 5 years of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; 5 years of experience in operation of field screening equipment (e.g. PID, FID, infrared spectrometer, immunoassay, etc.); and 5 field seasons of experience with the particular field screening techniques for use on this project. The Environmental Sampler shall collect all onsite samples and perform all field screening tests. The Environmental Sampler shall review the sampling results, and provide recommendations for the CONTRACTOR's sampling program. The Environmental Sampler shall be onsite during excavation and stockpiling operations involving contaminated soil or soil to be checked for contamination.

PART 2 PRODUCTS

2.1 ANALYTICAL TESTING LABORATORIES

A. On-Site laboratory is required to analyze pre-removal and confirmation samples to expedite sediment removal activities. On-site laboratory shall analyze samples without causing delay in excavation work with one-day turnaround time after sample collection.

B. Laboratories shall be certified under National Environmental Laboratory Accreditation Program (NELAP).

PART 3 EXECUTION

3.1 SAMPLING AND ANALYSIS PLAN

A. Submit within 21 days after Notice of Award.

B. Includes Field Sampling Plan and Quality Assurance Project Plan.

C. This document shall meet:
   1. contract document requirements, and
      a. EPA Remedial Design / Remedial Action Handbook (540/R-95/059) requirements, but follow the most recent versions of guidance documents, or
      b. Uniform Federal Policy for Quality Assurance Project Plans (EPA QA/G-5).

3.2 PREPARATION

A. Pre-Installation Meeting
   1. Schedule and hold a pre-installation meeting prior to collection of any samples.
   2. Attendance required: OWNER, ENGINEER, Quality Control Officer, Superintendent, CONTRACTOR'S environmental sampling personnel, on-site laboratory manager.
   3. Review approved plans and procedures for sampling and analysis.
   4. Additional requirements listed in Section 01 30 00 – Administrative Requirements.
   5. A list of definable features that involve chemical measurements shall be agreed upon. At a minimum, each matrix (soil, water, air, containerized wastes, TSCA wastes, instrumental chemical parameter measurement, etc.) shall be a definable work feature.
   6. Management of the chemical data quality system including project DQO, project submittals, chemical data documentation, chemical data assessment, required sampling and analysis protocols, and minimum data reporting requirements shall be agreed upon.

3.3 GENERAL REQUIREMENTS

A. Execute sampling and analysis in accordance with contract documents, SSHP and OWNER approved SAP.

B. Survey sampling locations.

C. Sample collection shall not begin until OWNER has approved SAP.

3.4 CHEMICAL DATA DAILY REPORT

A. Results from samples analyzed and validated in accordance with this Section shall be submitted with the Daily Report within 24 hours of sample analysis, and no later than 48 hours after sample collection in accordance with Section 01 10 00 – Summary.

B. Sediment removal shall not begin until OWNER approves of the removal limits based on the data submitted in the Daily Report.

3.5 NOTIFICATION OF NON-COMPLIANCE

A. The OWNER will notify the CONTRACTOR of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice.

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals

B. Quality Control

C. Tolerances

D. References

E. Labeling

1.2 SUBMITTALS

A. Construction Quality Assurance Plan

1.3 QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.

B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform Work using persons qualified to produce required and specified quality.

D. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

E. CONTRACTOR'S Quality Control Officer shall maintain oversight of Work being performed and ensure Work is implemented in accordance with Contract Documents as discussed in Section 01 10 00.

1.4 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from OWNER before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.5 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards; comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current as of date for receiving Bids except where specific date is established by code.

C. When requirements of indicated reference standards conflict with Contract Documents, request clarification from OWNER before proceeding.

D. Neither contractual relationships, duties, or responsibilities of parties in Contract; nor those of ENGINEER shall be altered from Contract Documents by mention or inference in reference documents.

1.6 LABELING

A. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
   1. Model number
   2. Serial number
   3. Performance characteristics

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION QUALITY ASSURANCE PLAN

A. Submit within 30 days after Notice of Award.

B. This document shall meet:
   1. contract document requirements, and
   2. EPA Remedial Design / Remedial Action Handbook (540/R-95/059) requirements, but follow the most recent versions of guidance documents.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary

B. Submittals
   1. Traffic Control Plan
   2. Methods and materials for erosion and dust control
   3. Erosion Control and Stormwater Management Plans
   4. Copy of Water Resources Application for Project Permits

C. Temporary Utilities:
   1. Temporary electricity
   2. Temporary lighting for construction purposes
   3. Communication services
   4. Temporary sanitary facilities

D. Construction Facilities:
   1. Field offices and sheds
   2. Vehicular access
   3. Parking
   4. Progress cleaning and waste removal
   5. Project identification
   6. Traffic regulation
   7. Fire-prevention facilities

E. Temporary Controls:
   1. Enclosures and fencing
   2. Security
   3. Water control
   4. Dust control
   5. Erosion and sediment control
   6. Noise control
   7. Pest and Rodent control
   8. Pollution control

F. Removal of utilities, facilities, and controls

1.2 SUMMARY

A. Temporary facilities shown on Drawings are for illustration purposes only. CONTRACTOR shall determine the temporary facilities required to execute the Work in addition to those required by the contract documents. CONTRACTOR shall determine if a dewatering pad is needed. Layout and size shall be determined by CONTRACTOR as discussed in paragraph 1.8.D of this Section, within the Limits of Disturbance shown on the Drawings, and floodplain restrictions in permits. Design shall be in accordance with contract documents, which allow for alternate but equivalent designs.

1.3 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from utility source as needed for construction operation and Field Offices.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain lighting for construction operations to continue at Work schedule in approved by OWNER.

B. Maintain lighting and provide routine repairs.

1.5 COMMUNICATION SERVICES

A. Telephone Service: Provide, maintain, and pay for telephone service to field offices at time of Project mobilization and until completion of Work.

B. Internet Service: Provide, maintain, and pay for broadband Internet service to field offices at time of Project mobilization. The CONTRACTOR shall provide separate 802.11g/n wireless routers at each field office. Internet access bandwidth shall be a minimum of 3 megabits per second (Mbs) download and 1 Mbs upload. The internet bandwidth must not be shared with any onsite CONTRACTORS.

1.6 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of Project mobilization.

1.7 FIELD OFFICES AND SHEDS

A. Available areas are within the Limits of Disturbance as shown on the Drawings or areas designated for Field Offices. These areas may be used for field offices and for storage as shown on the Drawings.

B. Field Office: Weather-tight, with lighting; electrical outlets; restroom; heating, cooling and ventilating equipment; and equipped with sturdy furniture including conference table, filing cabinets, and desks.

C. Locate field offices and sheds at a maximum practical distance from existing homes.

D. Do not use permanent facilities for field offices or for storage.

E. Construction: Portable or mobile buildings, or buildings constructed with floors raised aboveground, securely fixed to foundations with steps and landings at entrance doors.
   1. Construction: Structurally sound, secure, weather-tight enclosures for office and storage spaces. Maintain during progress of Work; remove enclosures when no longer needed.
   2. Thermal Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
   3. Exterior Materials: Weather-resistant.
   4. Interior Materials in Field Offices: Sheet-type materials for walls and ceilings, prefinished or painted; resilient floors and bases.

5. Lighting for Field Offices: 50 ft-C at desktop height; exterior lighting at entrance doors.
6. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

F. Environmental Control:
   1. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.
   2. Storage Spaces: Heating and ventilating as needed to maintain products according to Contract Documents; lighting for maintenance and inspection of products.

G. ENGINEER Field Offices:
   1. Provide separate field office for use by ENGINEER, with separate entrance doors with new locks and two keys. The ENGINEER shall hold all keys to the interior and exterior doors. CONTRACTOR shall not possess any keys to the ENGINEER'S office.
   2. Building Area: Minimum 60 × 12 feet.
   3. Windows: Minimum of three with a minimum total area of 10 percent of floor area, with operable sash and insect screens. Locate windows to provide views of construction area.
   4. Electrical Distribution Panel: Two circuits minimum, 110-volt, 60-Hz service.
   5. Minimum of four 110-volt duplex convenience outlets, one on each wall.
   6. Communication Services: As specified in this Section and also provide a conference phone.
   7. Sanitary Facilities: A private washroom that includes a toilet and vent fan, with non-potable or potable water supplied for flushing and washing and secure exterior waste tank to prevent floatation during flood event. All plumbing shall be installed in accordance with local codes. Wastewater from the trailer shall be collected in tanks and hauled off-facility for disposal in accordance with applicable health and local regulations, along with wastewater from the temporary toilet facilities.
   8. Drinking Water: Supply bottled water as needed.
   9. Field Office Furnishings:
      a. One desk 54 × 30 inches, with three drawers
      b. Four standard size desks or equivalent
      c. Five desk chairs with rollers
      d. One metal, double-door storage cabinet under table
      e. Plan rack to hold working Drawings, Shop Drawings, and Record Documents
      f. One tackboard 36 × 30 inches
      g. One dry erase whiteboard affixed to wall, 48 x 72 inches
      h. One wastebasket for each desk and table
      i. Two sets of book shelves, free standing, 12-inches deep, minimum 36-inches wide, minimum 60-inches tall, with at least 4 shelves each
      j. Twelve chairs for conference room and visitor use
      k. A table suitable for seating 12 persons in a conference
      l. The equivalent of two four-drawer filing cabinets, and two two-drawer filing cabinets
      m. One microwave oven, one 18-cubic-foot-capacity refrigerator with a freezer, and one coffee maker
      n. One copier and one color printer (11 inch × 17 inch capabilities)
      o. One color scanner (11 inch × 17 inch capabilities) with a minimum of 200 × 200 dots per inch resolution
      p. Plan rack to hold working drawings, shop drawings, and record documents

H. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and inspection of products to suit requirements in Section 01 60 00 - Product Requirements.

I. Preparation: Fill and grade Sites for temporary structures sloped for drainage away from buildings.

J. Installation:
   1. Install field office spaces ready for occupancy prior to or at mobilization.
   2. Employee Residential Occupancy: Not allowed.

K. Maintenance and Cleaning:
   1. Weekly janitorial services for field offices; periodic cleaning and maintenance for sheds and storage areas.
   2. Maintain walks free of mud, water, snow, and the like.

L. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas to same or better condition as original condition.

1.8 VEHICULAR ACCESS

A. Strip topsoil under access roads in accordance with Section 31 10 00 – Site Clearing.

B. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes.

C. Construct stabilized construction entrances at each intersection of access roads and public roads.
   1. Use WisDOT No. 2 Coarse Aggregate, or reclaimed or recycled concrete equivalent.
   2. Not less than 12 inches compacted thickness, unless approved by OWNER.
   3. Surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.

D. Locate access roads, access ramps and other Work as indicated on Drawings. CONTRACTOR may re-locate access roads, access ramps and other Work with OWNER, and Project Coordination Team (PCT) approval. New locations must be approved by Milwaukee County Parks and State of Wisconsin Archeologist prior to review by OWNER, and shall minimize the disturbed areas of the project.

E. Construct temporary bridges (over non-navigable waterways) and culverts to span low areas and allow unimpeded drainage.

F. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.

G. Provide unimpeded access for emergency vehicles. Maintain 20-foot wide driveways with turning space between and around combustible materials.

H. Provide and maintain access to fire hydrants and control valves free of obstructions.

I. Maintain construction entrances in a condition that will prevent tracking or flowing of sediment and materials onto adjacent public roads. This may require periodic topdressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment or materials spilled, dropped, washed, or tracked onto roads must be removed immediately.

J. Periodic inspection and required maintenance shall be provided after each rain and other times when stone voids have been filled with soil or sediment.

K. Maintain access roads and construction entrances throughout Work.

L. The CONTRACTOR must keep public roads in the construction area clean and promptly remove all tracked dirt.

1.9 PARKING

A. Provide temporary surface parking areas to accommodate construction personnel only if parking available on the Milwaukee River Parkway is inadequate and approved by OWNER and Milwaukee County.

B. Locate as approved by OWNER.

C. If Site space is not adequate, provide additional off-Site parking.

D. Use North Milwaukee River Parkway for parking.

E. Parking will not be allowed on grassed or soft areas. Parking shall be on paved surfaces.

F. Use of existing parking facilities used by construction personnel is not permitted without prior written permission from OWNER.

G. Do not allow heavy vehicles or construction equipment in parking areas.

H. Permanent Pavements and Parking Facilities:
   1. Avoid traffic loading beyond paving design capacity. Tracked vehicles are not allowed.

I. Maintenance:
   1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice, and the like.
   2. Maintain existing and permanent paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.

J. Removal, Repair:
   1. Remove temporary materials and construction before Substantial Completion.
   2. Remove underground Work and compacted materials to depth of 2 feet; fill and grade Site as indicated.
   3. Repair existing facilities damaged by use, to original condition.

K. Mud from Site vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.

1.11 PROJECT IDENTIFICATION

A. Project Identification Sign:
   1. Two, 32-square feet area, bottom 6 feet aboveground.
   2. Content:
      a. Project number, title, logo, and name of OWNER.
      b. Title and logo of PCT.
      c. Titles and logo of ENGINEER.
      d. Name and logo of Prime CONTRACTOR.
   3. Graphic Design, Colors, and Style of Lettering: Approved by OWNER.

B. Design sign and structure to withstand 60-mph wind velocity.

C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

D. Installation:
   1. Install Project identification signs at project mobilization.
   2. Erect at locations approved by OWNER.
   3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
   4. Install sign surface plumb and level, with butt joints. Anchor securely.
   5. Paint exposed surfaces of sign, supports, and framing.

E. Maintenance: Maintain clean signs and supports; repair deterioration and damage.

F. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.12 TRAFFIC REGULATION

A. Comply with all regulations and means and methods approved in Traffic Control Plan.

B. Submit traffic control plan identifying routes and features used to control traffic.

C. Closing of North Milwaukee River Parkway may be allowed if needed by CONTRACTOR and approved by OWNER and Milwaukee County.

D. Coordinate partial closure of Interstate 43 south bound on-ramp from West Hampton Ave with Wisconsin Department of Transportation (WisDOT) for use with hydraulic dredging of deposit 4-3. Comply with WisDOT requirements for use of on-ramp.

E. Signs, Signals, and Devices:
   1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
   2. Traffic Control Signals: As approved by local jurisdictions.

3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
4. Flag Person Equipment: As required by authorities having jurisdiction.

F. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

G. Haul Routes:
1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
2. Obtain OWNER approval for haul routes on City or County roads.
3. Provide drawings indicating haul routes designated by authorities having jurisdiction for use by construction traffic.
4. Confine construction traffic to designated haul routes.
5. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.
6. As described in Section 02 61 00 – Removal and Disposal of Contaminated Sediments.

H. Traffic Signs and Signals:
1. Provide signs at approaches to Site and on-Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under CONTRACTOR'S control and areas affected by CONTRACTOR'S operations.
3. Relocate signs and signals as Work progresses, to maintain effective traffic control.

1.13 OAK LEAF TRAIL

A. Oak Leaf Trail will be closed during the execution of Work, except during maintenance period.

B. CONTRACTOR shall provide signage for temporary rerouting of trail.

1.14 FIRE-PREVENTION FACILITIES

A. Prohibit smoking within buildings and field offices. Designate area on-Site where smoking is permitted. Provide approved ashtrays in designated smoking areas. Trash shall be disposed of in accordance with all laws, regulations, and codes.

B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10-pound capacity, 4A-60B: C UL rating.
1. Provide minimum of one fire extinguisher in every field office, construction trailer, and storage shed.

1.15 ENCLOSURES AND FENCING

A. Construction: temporary commercial-grade chain-link fence.

B. Provide 6-foot high fence around construction Site; equip with vehicular and pedestrian gates with locks.

1.16 SECURITY

A. Security Program:
   1. Prevent theft, vandalism, and unauthorized entry into Work site.
   2. Initiate program at Project mobilization.
   3. Maintain program throughout construction period until directed by OWNER.

B. Entry Control:
   1. Restrict entrance of persons and vehicles to Project Site.
   2. Allow entrance only to authorized persons with proper identification.
   3. Maintain log of workers and visitors and make available to OWNER on request.

C. Security Service:
   1. Employ uniformed guard service to provide guards on Site 24 hours per day 7 days per week.
   2. Separate areas of Work may require separate uniformed guards.
   3. OWNER may reduce security guard requirements during construction.

1.17 WATER CONTROL

A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.

B. Protect Site from puddles or running water.

1.18 DUST CONTROL

A. Execute Work by methods that minimize raising dust from construction operations.

B. Provide positive means to prevent airborne dust from dispersing into atmosphere.

1.19 EROSION AND SEDIMENT CONTROL

A. Submit Erosion Control and Stormwater Management Plans (ECSMPs) and copy of Water Resources Application for Project Permits (WRAPP) (equivalent of Notice of Intent) submitted to the State of Wisconsin for General Permit Wisconsin Pollutant Discharge Elimination System (WPDES) Permit No. WI-S067831-4 to the OWNER after notice to proceed, but prior to the commencement of Work. The ECSMP shall meet the requirements of the State of Wisconsin General Permit for stormwater discharges from construction sites. Maintain an approved copy of the ECSMPs at the construction on-site office and continually update, as regulations require, to reflect current site conditions. Include within the ECSMPs:
   1. Information required by Wisconsin Department of Natural Resources (WDNR). Requirements can be located at: http://dnr.wi.gov/topic/stormwater/construction/erosion_control.html#2
   2. Select applicable best management practices from EPA 832-R-92-005 and WDNR Technical Standards.
   3. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize surface area of bare soil exposed at one time.

C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.

F. Cover topsoil stockpiles with plastic sheeting to prevent contact with rainfall. Secure plastic sheeting with ballast as needed to hold plastic sheeting in place and prevent damage from wind.

G. Comply with Erosion Control and Stormwater Management Plans and WPDES Permit No. WI-S067831-4.

1.20 NOISE CONTROL

A. Comply with requirements of Noise Variances obtained by CONTRACTOR. See Section 01 10 00 – Summary.

1.21 PEST AND RODENT CONTROL

A. Provide methods, means, and facilities to prevent rodents and pests from accessing or invading premises.

1.22 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced or disturbed by construction operations.

1.23 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials before Final Construction Inspection.

B. A 10 foot wide section of Deposit 5-1 Access Road shall remain in place after completion of the Work.

C. Clean and repair damage caused by installation or use of temporary Work.

D. Restore areas disturbed during construction to original condition.

E. Do not remove fence and erosion and sediment controls until authorized by OWNER.

PART 2 PRODUCTS

2.1 PLASTIC SHEETING

A. A temporary chemically resistant impermeable geomembrane cover with minimum thickness of 10 mils, free of holes or other damage.

PART 3 EXECUTION

3.1 PREPARATION

A. Pre-Installation Meeting
   1. Schedule and hold a pre-installation meeting with Milwaukee County prior to installing the field offices.
   2. Identify and flag locations of all ground to be disturbed.
   3. Identify location of tie-downs and obtain Milwaukee County approval of locations.
   4. Additional requirements listed in Section 01 30 00 – Administrative Requirements.

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals

B. Field Engineering

C. Construction Photographs

D. Closeout Procedures

E. Project Record Documents

F. Examination

G. Preparation

H. Execution

I. Protecting Installed Construction

J. Final Cleaning

1.2 SUBMITTALS

A. Construction Photographs

B. Substantial completion certificate and inspection request

C. Substantial completion punch list

D. Final completion certificate and inspection request

E. Record Documents

1.3 FIELD ENGINEERING

A. Employ Land Surveyor or Professional Engineer registered in State of Wisconsin and acceptable to OWNER to complete topographic surveys to be used as the basis for measurement of payment quantities for fixed unit price items and sampling point surveys.
   1. Surveys shall be conducted via field survey grid method for Work conducted in accordance with the Contract Documents. Points shall include all slope features and perimeter of Work being surveyed. A maximum size 25-foot × 25-foot grid, shall be used and the tolerance shall be 0.1-foot or less. In addition to the maximum grid, each removal grid shall be surveyed for mid-point and corners at a minimum.
   2. Cofferdams shall be surveyed a minimum of every 5 foot at the maximum elevation.

3. Surveys shall be based on the horizontal datum of 1983 Wisconsin State Plane Coordinate System South Zone, and the Vertical Datum of National Geodetic Vertical Datum (NGVD) 1929.

B. Employ Computer-Aided Design Technician experienced in quantifying earthwork volumes based on survey data.

C. Control datum for survey is indicated on Drawings.

D. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

E. Maintain complete and accurate log of control and survey Work as Work progresses.

F. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.

G. Promptly report to ONWER and ENGINEER loss or destruction of reference point or relocation required because of changes in grades or other reasons.

H. Submit survey data to OWNER within two days of field collection.

1.4 CONSTRUCTION PHOTOGRAPHS

A. Provide photographs of Site and construction throughout progress of Work produced by an experienced photographer acceptable to OWNER.

B. Take photographs and video as evidence of existing Project conditions prior to initiating on-site Work as follows:
1. Field office area, access roads, construction entrances, staging area(s), excavation areas, dredging, cofferdams, critical activities, and all Work areas.

C. Progress Photographs. Digital color photographs shall be used to document progress of the Work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before Work begins. After work has been started, activities at each Work location shall be photographically recorded weekly indicating relative progress of Work, 1 day prior to each progress meeting. Photographs shall include:
1. Soil removal and sampling.
2. Dewatering operations.
3. Unanticipated events such as spills and the discovery of additional contaminated material.
4. Contaminated material/water storage, handling, treatment, and transport.
5. Site or task-specific employee respiratory and personal protection.
6. Fill placement and grading.
7. Post-construction photographs. After completion of Work at each site, take a minimum of four views of each excavation site.

D. Digital Images: Deliver complete set of digital image electronic files on CD-ROM to OWNER with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.

1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 20.0 megapixels, and image resolution of not less than 1600 by 1200 pixels.
2. Date and Time: Include date and time in filename for each image.

1.5 CLOSEOUT PROCEDURES

A. Substantial and Final Completion as discussed in this Section excludes the Maintenance Period. Maintenance Period completion requirements are discussed in Section 32 01 90 – Maintenance of Planting.

B. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
   1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
   2. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
   3. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
   4. Perform final cleaning according to this Section.

C. Substantial Completion Inspection:
   1. When CONTRACTOR considers Work to be substantially complete, submit to OWNER:
      a. Written certificate that Work, or designated portion, is substantially complete.
      b. List of items to be completed or corrected (initial punch list).
   2. Within 10 days after receipt of request for Substantial Completion, ENGINEER and OWNER will make inspection to determine whether Work or designated portion is substantially complete.
   3. Should OWNER determine that Work is not substantially complete:
      a. OWNER will promptly notify CONTRACTOR in writing, stating reasons for its opinion.
      b. CONTRACTOR shall remedy deficiencies in Work and send second written request for Substantial Completion to OWNER.
      c. ENGINEER and OWNER will reinspect Work.
      d. Redo and Inspection of Deficient Work: Repeated until Work passes OWNER'S inspection.
   4. When OWNER finds that Work is substantially complete, OWNER will:
      a. Prepare Certificate of Substantial Completion, accompanied by CONTRACTOR'S list of items to be completed or corrected as verified and amended by ENGINEER and OWNER (final punch list).
      b. Submit Certificate to OWNER and CONTRACTOR for their written acceptance of responsibilities assigned to them in Certificate.

   5. After Work is substantially complete, CONTRACTOR shall:
      a. Allow OWNER occupancy of Project under provisions stated in Certificate of Substantial Completion.
      b. Complete Work listed for completion or correction within time period stipulated.

D. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
   1. The Vegetation Establishment Period shall be complete and approved by the OWNER as discussed in Section 32 90 00 – Planting prior to the CONTRACTOR submitting request for final inspection.
   2. When CONTRACTOR considers Work to be complete, submit written certification that:
      a. Contract Documents have been reviewed.
      b. Work has been examined for compliance with Contract Documents.
      c. Work has been completed according to Contract Documents.
      d. Work is completed and ready for final inspection.
   3. Submittals: Submit following:
      a. Final punch list indicating all items have been completed or corrected.
      b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
      c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
      d. Accounting statement for final changes to Contract Sum.
      e. CONTRACTOR'S affidavit of payment of debts and claims.
      f. CONTRACTOR affidavit of release of liens.
      g. Consent of surety to final payment.
   4. Perform final cleaning for CONTRACTOR-soiled areas according to this Section.

E. Final Completion Inspection:
   1. Within 5 days after receipt of request for final inspection, ENGINEER and OWNER will make inspection to determine whether Work or designated portion is complete.
   2. Should OWNER consider Work to be incomplete or defective:
      a. OWNER will promptly notify CONTRACTOR in writing, listing incomplete or defective Work.
      b. CONTRACTOR shall remedy stated deficiencies and send second written request to OWNER that Work is complete.
      c. ENGINEER and OWNER will reinspect Work.
      d. Redo and Inspection of Deficient Work: Repeated until Work passes OWNER’S inspection.

1.6 PROJECT RECORD DOCUMENTS

A. Final Project Record Documents shall be signed and sealed by a Professional Engineer licensed in the State of Wisconsin.

B. Maintain on Site one set of the following record documents; record actual revisions to the Work:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change Orders and other modifications to the Contract
   5. Reviewed Shop Drawings, product data, and Samples
   6. Manufacturer's instruction for assembly, installation, and adjusting

C. Ensure entries are complete and accurate, enabling future reference by OWNER.

D. Store record documents separate from documents used for construction.

E. Record information concurrent with construction progress, not less than weekly.

F. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
   1. Manufacturer's name and product model and number
   2. Product substitutions or alternates used
   3. Changes made by Addenda and modifications

G. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
   1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
   2. Identify actual excavation and final grades and limits.
   3. Include locations of concealed elements of the Work.
   4. Identify and locate existing buried or concealed items encountered during Project.
   5. Measured horizontal and vertical locations of any underground utilities and appurtenances encountered, referenced to permanent surface improvements.
   6. Field changes of dimension and detail.
   7. Details not on original Drawings.
   8. Scale drawings showing limits of each excavation, limits of contamination, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.

H. A Remedial Action Report (RAR) shall be prepared and submitted in draft to OWNER. CONTRACTOR shall submit a Final RAR that addresses all of OWNER and PCT comments. The report shall be labeled with the contract number, project name, location, date, name of CONTRACTOR, and the OWNER. The RAR shall include the following information as a minimum
   1. A cover letter signed by a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.
   2. A narrative report including, but not limited to, the following:
      a. Site conditions, and cleanup criteria;
      b. Excavation logs;
      c. Field screening readings;
      d. Quantity of materials removed from each area of contamination;
      e. Quantity of water/product removed during dewatering;
      f. Sampling locations and sampling methods;
      g. Sample collection data such as time of collection and method of preservation;
      h. Sample chain-of-custody forms; and
      i. Source of backfill.
      j. Copies of all chemical and physical test results.
      k. Copies of all manifests and land disposal restriction notifications.
      l. Copies of all certifications of final disposal signed by the responsible disposal facility official.
      m. Waste profile sheets.
      n. Executive summary.
      o. Project description.
      p. Chronology of events.

q. Description of the Quality Assurance/Quality Control (QA/QC) procedures followed
r. Description of construction activities
s. Final inspection documentation
t. Certification that the remedy is operational and functional
u. Summary of project costs

I. Submit marked-up paper copy documents to OWNER before Substantial Completion.

J. Submit PDF electronic files of final documents to OWNER prior to final application of payment (excluding maintenance period payments).

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual Specification Sections.

D. Verify that utility services are available with correct characteristics and in correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

3.3 EXECUTION

A. Do not disturb Phase 1 RA areas, existing riprap and sheet pile.

B. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.

C. When manufacturer's installation instructions conflict with Contract Documents, request clarification from OWNER before proceeding.

D. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
   1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.

F. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period.

G. Field Engineering: After each survey, CONTRACTOR shall submit report to OWNER indicating observations and results of survey and indicate compliance or non-compliance with Contract Documents. CONTRACTOR's independent surveyor shall provide interpretation of survey. Include the following:
   1. Date issued
   2. Project title and number
   3. Names of field personnel
   4. Date and time of survey
   5. Identification of product and specifications section
   6. Location at the site
   7. Description of survey (excavation, final grade, etc.)
   8. Electronic survey data in .csv format
   9. 3 dimensional lines of slope/grade changes, (AutoCAD)
   10. Surveyor estimated Work quantities
   11. Comparison from actual Work to designed Work

3.4 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual Specification Sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

F. Prohibit traffic from landscaped areas.

3.5 FINAL CLEANING

A. Execute final cleaning prior to final Project assessment.

B. Clean Site; sweep paved areas, rake clean landscaped surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from Site.

END OF SECTION

SECTION 01 72 00 – DECONTAMINATION OF PERSONNEL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. Decontamination of personnel and equipment.

1.2 DECONTAMINATION FACILITIES

A. Locate in accordance with Section 01 50 00 – Temporary Facilities and Controls.

1.3 GENERAL

A. CONTRACTOR shall collect, contain, and transport all water generated during decontamination activities to the wastewater treatment system for treatment prior to discharge.

B. All personnel shall be decontaminated before leaving the site, as specified in the Site Safety and Health Plan. “Leaving the site” is defined as leaving the exclusion zone and entering the contamination reduction zone. Decontamination shall be required prior to breaks, when picking up tools, equipment, or materials in the support zone, or any other activities where the potential exists for contaminant transfer.

C. Equipment shall be cleaned and decontaminated prior to use onsite, and prior to leaving the site.

D. Equipment shall be cleaned of all dirt/mud before entering public roadways.

PART 2 PRODUCTS

2.1 GENERAL

A. The CONTRACTOR shall furnish all equipment and supplies necessary for the decontamination process such as clean water supply tank, non-phosphate detergent, a mobile steam cleaner or hot water high pressure washer, buckets, brushes, etc, as required.

B. The CONTRACTOR shall furnish sealable United States Department of Transportation (U.S. DOT)-approved containers (55-gallon drums) having watertight lids stored in a containment area as required, or poly tank for the storage of decontamination water.

C. Tanks or drums shall be stored in a lined containment area or on a containment pad.

D. The CONTRACTOR shall supply all required labeling materials.

E. The CONTRACTOR shall provide all protective clothing and the equipment necessary for its own personnel to comply with the decontamination procedures as specified in the Site Safety and Health Plan.

PART 3 EXECUTION

3.1 PREPARATION

A. Install access roads in accordance with Section 01 50 00 – Temporary Facilities and Controls.

B. Strip topsoil under decontamination pads in accordance with Section 31 10 00 – Site Clearing.

3.2 PERSONAL HYGIENE AND DECONTAMINATION

A. Personnel entering the Exclusion or Contamination Reduction Zones (CRZ) or otherwise exposed to hazardous chemical vapors, gases, liquids, or contaminated solids must decontaminate themselves and their equipment prior to exiting the CRZ and entering the support zone. Consult Chapter 10.0 of NIOSH 85-115 when preparing decontamination procedures. Submit a detailed discussion of personal hygiene and decontamination facilities and procedures to be followed by site workers as part of the Site Safety and Health Plan. Train employees in the procedures and enforce the procedures throughout site operations.

3.3 EQUIPMENT DECONTAMINATION

A. The vehicles and equipment used in the exclusion zone (EZ) shall be decontaminated in the CRZ prior to leaving the site. Construct decontamination pads, which meet the site decontamination needs for all vehicles and larger equipment decontamination. Construct the pad to capture decontamination water, including overspray, and allow for collection and removal of the decontamination water using sumps, dikes and ditches as required.

B. Wheels shall be cleaned to remove sediment prior to entrance onto public roads. When washing is required, it shall be done on a wash pad or decontamination pad.

3.4 PROCEDURES

A. Procedures for equipment decontamination must be developed and utilized to prevent the spread of contamination into the safety zone (SZ) and offsite areas. These procedures must address disposal of contaminated products and spent materials used on the site, including containers, fluids, oils, etc. Assume any item taken into the EZ is to be contaminated, and perform an inspection and decontaminate. Vehicles, equipment, and materials must be cleaned and decontaminated prior to leaving the site. Handle construction material in such a way as to minimize the potential for contaminants being spread and/or carried offsite. Prior to exiting the site, vehicles and equipment must be monitored to ensure the adequacy of decontamination.

B. Off-site decontamination of some materials may be required if frozen conditions are encountered. OWNER may approve of off-site decontamination if frozen conditions are encountered, and CONTRACTOR submits decontamination plan and procedures for off-site decontamination.

END OF SECTION

SECTION 02 56 13 – WASTE CONTAINMENT GEOMEMBRANE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Geomembrane requirements for decontamination pads, wastewater treatment pads, and dewatering pad (if needed).

1.2 SUBMITTALS

A. Material labels and data sheets

B. Shop Drawings
   1. As-Built Drawings of the geomembrane installation shall be prepared. These drawings shall include panel numbers, seam numbers, location of repairs, destructive seam samples, and penetrations.

C. Test Reports
   1. Non-Destructive Field Seam Continuity Testing
   2. Destructive Field Seam Testing
   3. Destructive Seam Test Repairs
   4. Tests

1.3 QUALIFICATIONS

A. Manufacturer: Manufacturer shall have produced the proposed geomembrane sheets for at least five completed projects having a total minimum area of 10 million square feet.

B. Fabricator: The fabricator is responsible for seaming geomembrane sheets into panels. Fabricator shall have fabricated the proposed geomembrane panels for at least five completed similar projects.

C. Installer: The installer is responsible for field handling, deploying, seaming, anchoring, and field Quality Control (QC) testing of the geomembrane. The installer shall have installed the proposed geomembrane material for at least five completed similar projects using the same type of seaming equipment and geomembrane thickness specified for this project.

1.4 DELIVERY, STORAGE AND HANDLING

A. Delivery
   1. The QC inspector shall be present during delivery and unloading of the geomembrane. Each geomembrane roll/panel shall be labeled with the manufacturer's name, product identification number, roll/panel number, and roll dimensions.

B. Storage
   1. Temporary storage at the project site shall be on a level surface, free of sharp objects where water cannot accumulate. The geomembrane shall be protected from puncture, abrasion, excessive heat or cold, material degradation, or other damaging circumstances.

Storage shall not result in crushing the core of roll goods or flattening of the rolls. Rolls shall not be stored more than two high. Palleted materials shall be stored on level surfaces and shall not be stacked on top of one another. Ultraviolet sensitive materials (i.e., polyvinyl chloride) shall be covered with a sacrificial opaque and waterproof covering or placed in a temporary shelter. Damaged geomembrane shall be removed from the site and replaced with geomembrane that meets the specified requirements.

C. Handling
   1. Rolls/panels shall not be dragged, lifted by one end, or dropped. A pipe or solid bar, of sufficient strength to support the full weight of a roll without significant bending, shall be used for all handling activities. The diameter of the pipe or solid bar shall be small enough to be easily inserted through the core of the roll. Chains shall be used to link the ends of the pipe or bar to the ends of a spreader bar. The spreader bar shall be wide enough to prevent the chains from rubbing against the ends of the roll. Alternatively, a stinger bar protruding from the end of a forklift or other equipment may be used. The stinger bar shall be at least three-fourths the length of the core and also must be capable of supporting the full weight of the roll without significant bending. If recommended by the manufacturer, a sling handling method utilizing appropriate loading straps may be used.

1.5 AMBIENT CONDITIONS

A. Geomembrane shall not be deployed or field-seamed in the presence of excess moisture (i.e., rain, fog, dew), in areas of ponded water, or in the presence of excess wind. Unless authorized by the OWNER, no placement or seaming shall be attempted at ambient temperatures below 32 degrees F or above 104 degrees F. Ambient temperature shall be measured at a height no greater than 6 inches above the ground or geomembrane surface. Tests shall be conducted in accordance with paragraph Destructive Field Seam Testing.

PART 2 PRODUCTS

2.1 MATERIALS

A. Geomembrane sheets shall be unreinforced and manufactured as wide as possible to minimize factory and field seams. Geomembrane sheets shall be uniform in color, thickness, and surface texture. The sheets shall be free of and resistant to fungal or bacterial attack and free of cuts, abrasions, holes, blisters, contaminants and other imperfections.

B. Geomembrane materials and seams shall meet the requirements listed in Tables 1 – 4.

TABLE 1 - SMOOTH HDPE GEOMEMBRANE PROPERTIES			
PROPERTY	TEST VALUE	MQC TESTING FREQUENCY (MIN.)	TEST METHOD
Thickness (min ave)	40 mils	per roll	ASTM D5199
Lowest individual of 10 values	-10 percent	per roll	ASTM D5199
Density (min)	0.940 g/cc	per 200,000 lb	ASTM D1505
Tensile Properties(1)(min ave)		per 20,000 lb	ASTM D638 Type IV
yield stress	84 lb/in		
break stress	152 lb/in		
yield elong	12 percent		
break elong	700 percent		
Tear Resistance (min ave)	28 lb	per 45,000 lb	ASTM D1004
Puncture Resistance(min ave)	72 lb	per 45,000 lb	ASTM D4833/D4833M
Stress Crack Resistance (2)	200 hr	per 200,000 lb	ASTM D5397 (Appendix)
Carbon Black Content	2.0-3.0 percent	per 20,000 lb	ASTM D1603 (3)
Carbon Black Dispersion	Note (4)	per 45,000 lb	ASTM D5596
Oxidative Induction Time (OIT)(min ave)(5)		per 200,000 lb	
-Std OIT	100 min		ASTM D3895
-High Pres OIT	400 min		ASTM D5885
Oven Aging at 85 deg C 185 deg F (min ave) (5), (6)		per year and change in formulation	ASTM D5721
Std OIT	55 percent at 90 days		ASTM D3895
or High Pres OIT	80 percent at 90 days		ASTM D5885
UV Resistance (min ave) (7)		per year and change in formulation	ASTM D7238
High Pres OIT(8)(9)	50 percent at 1600 hours		ASTM D5885

TABLE 2 - TEXTURED HDPE GEOMEMBRANE PROPERTIES			
PROPERTY	TEST VALUE	MQC TESTING FREQUENCY (MIN.)	TEST METHOD
Nominal Thickness	40 mils		
Thickness (min ave)	-5 percent of nominal	per roll	ASTM D5994
Lowest individual for 8 out of 10 values	-10 percent of nominal	per roll	ASTM D5994
Lowest individual of 10 values	-15 percent of nominal	per roll	ASTM D5994
Asperity Height (min ave) (10)	10 mils	every second roll	ASTM D7466 (11)
Density (min)	0.940 g/cc	per 200,000 lb	ASTM D1505
Tensile Properties(1)(min ave)		per 20,000 lb	ASTM D638Type IV
yield stress	84 lb/in		
break stress	60 lb/in		
yield elongation	12 percent		
break elongation	100 percent		
Tear Resistance (min ave)	28 lb	per 45,000 lb	ASTM D1004
Puncture Resistance(min ave)	60 lb	per 45,000 lb	ASTM D4833/D4833 M
Stress Crack Resistance (2)	200 hr	per 200,000 lb	ASTM D5397 (Appendix)
Carbon Black Content	2.0-3.0 percent	per 20,000 lb	ASTM D1603 (3)
Carbon Black Dispersion	Note (4)	per 45,000 lb	ASTM D5596
Oxidative Induction Time (OIT)(min ave)(5)		per 200,000 lb	
Std OIT	100 min		ASTM D3895
or High Pres OIT	400 min		ASTM D5885
Oven Aging at 85 deg C 185 deg F (min ave) (5), (6)		per year and change in formulation	ASTM D5721
Std OIT	55 percent at 90 days		ASTM D3895
or High Pres OIT	80 percent at 90 days		ASTM D5885
UV Resistance (min ave) (7)		per year and change in formulation	ASTM D7238
High Pres OIT(8)(9)	50 percent at 1600 hours		ASTM D5885

TABLE 3 - NOTES	
MQC	Manufacturing Quality Control
Note (1)	Minimum average machine direction and minimum average cross machine direction values shall be based on 5 test specimens in each direction. For HDPE geomembrane, yield elongation is calculated using a gauge length of 33 mm 1.3 inches. For HDPE geomembrane, break elongation is calculated using a gauge length of 50 mm 2.0 inches. For LLDPE geomembrane, break elongation is calculated using a gage length of 50 mm 2.0 inches at 50 mm/min 2 inches/min.
Note (2)	For HDPE geomembrane, the yield stress used to calculate the applied load for test method ASTM D5397 (Appendix), shall be the manufacturer's mean value. ASTM D5397 does not need to be run on LLDPE geomembrane.
Note (3)	Other methods such as ASTM D4218 or microwave methods are acceptable if an appropriate correlation to ASTM D1603 can be established.
Note (4)	Carbon black dispersion for 10 different views:- minimum 8 of 10 in Categories 1 or 2- all 10 in Categories 1,2, or 3
Note (5)	The manufacturer has the option to select either one of the OIT methods to evaluate the antioxidant content.
Note (6)	Evaluate samples at 30 and 60 days and compare with the 90 day response.
Note (7)	The condition of the test shall be a 20 hour UV cycle at 75 degrees C 167 degrees F followed by a 4 hour condensation cycle at 60 degrees C 140 degrees F.
Note (8)	The standard OIT test (ASTM D3895) shall not be used in determining UV resistance.
Note (9)	UV resistance is based on percent retained value regardless of the original HP-OIT value.
Note (10)	Textured Geomembrane Only: Of 10 readings; 8 out of 10 must be 0.18 mm 7 mil, and lowest individual reading must be 0.13 mm 5 mil.
Note (11)	Textured Geomembrane Only: Alternate the measurement side for double sided textured sheet.

TABLE 4 - HDPE SEAM PROPERTIES		
PROPERTY	TEST VALUE	TEST METHOD
Seam Shear Strength (min) (1)	80 lb/in	ASTM D6392
Seam Peel Strength (min) (1) (2)	48 lb/in	ASTM D6392
Note (1): Seam tests for peel and shear must fail in the Film Tear Bond mode. This is a failure in the ductile mode of one of the bonded sheets by tearing or breaking prior to complete separation of the bonded area. Note (2): Where applicable, both tracks of a double hot wedge seam shall be tested for peel adhesion.		

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

A. Employ geotechnical engineer to conduct testing

2.3 EQUIPMENT

A. Equipment used in performance of the Work shall be in accordance with the geomembrane manufacturer's recommendations and shall be maintained in satisfactory working condition.

PART 3 EXECUTION

3.1 PREPARATION

A. Surface preparation shall be performed in accordance with Section 31 10 00 – Site Clearing and as shown on Drawings. Rocks larger than ½-inch in diameter, and any other material which could damage the geomembrane, shall be removed from the surface to be covered with the geomembrane. Construction equipment tire or track deformations beneath the geomembrane shall not be greater than 1.0-inch in depth. Each day during placement of geomembrane, the QC Officer and installer shall inspect the surface on which geomembrane is to be placed and certify in writing that the surface is acceptable. Repairs to the subgrade shall be performed at no additional cost to the OWNER.

3.2 GEOMEMBRANE DEPLOYMENT

A. The procedures and equipment used shall not elongate, wrinkle, scratch, or otherwise damage the geomembrane, other geosynthetic layers, or the underlying subgrade. Geomembrane damaged during installation shall be replaced or repaired, at the OWNER'S discretion. Only geomembrane panels that can be anchored and seamed together the same day shall be deployed. Adequate ballast (i.e., sand bags) shall be placed on the geomembrane, without damaging the geomembrane, to prevent uplift by wind. No equipment shall be operated on the top surface of the geomembrane without permission from the OWNER. Seams shall be oriented parallel to the line of maximum slope. Where seams can only be oriented across the slope, the upper panel shall be lapped over the lower panel. The methods used to deploy and backfill over the geomembrane shall minimize wrinkles and tensile stresses in the geomembrane. The geomembrane shall have adequate slack to prevent the creation of tensile stress. The wrinkle height to width ratio for installed geomembrane shall not exceed 0.5. In addition, geomembrane wrinkles shall not exceed 6 inches in height. Wrinkles that do not meet the above criteria shall be cut out and repaired in accordance with the installer's approved QC manual.

3.3 FIELD SEAMING

A. Trial Seams: Trial seams shall be made under field conditions on strips of excess geomembrane. Trial seams shall be made each day prior to production seaming, whenever there is a change in seaming personnel or seaming equipment and at least once every four hours, by each seamer and each piece of seaming equipment used that day. Trial seam samples shall be collected and tested in accordance with ASTM D6392. One sample shall be obtained from each trial seam. This sample shall be at least 36-inches long × 12-inches wide with the seam centered lengthwise. Ten random specimens 1-inch wide shall be cut from the sample. Five seam specimens shall be field tested for shear strength and five seam specimens shall be field tested for peel adhesion using an approved quantitative tensiometer. To be acceptable, four out of five replicate test specimens shall meet seam strength requirements specified in Table 4. If the field tests fail to meet these requirements, the entire operation shall be repeated. If the additional trial seam fails, the seaming apparatus or seamer shall not be used until the deficiencies are corrected by the installer and two consecutive successful trial seams are achieved.

B. Field Seams: Panels shall be seamed in accordance with the geomembrane manufacturer's recommendations. In sumps, corners and odd-shaped geometric locations, the number of field seams shall be minimized. Seaming shall extend to the outside edge of panels. Soft

subgrades shall be compacted and approved prior to seaming. The seam area shall be free of moisture, dust, dirt, and foreign material at the time of seaming. Fish mouths in seams shall be repaired.

C. Polyethylene Seams: Polyethylene geomembranes shall be seamed by thermal fusion methods. Extrusion welding shall only be used for patching and seaming in locations where thermal fusion methods are not feasible. Seam overlaps that are to be attached using extrusion welds shall be ground prior to welding. Grinding marks shall be oriented perpendicular to the seam direction and no marks shall extend beyond the extrudate after placement. Extrusion welding shall begin within 10 minutes after grinding. Where extrusion welds are temporarily terminated long enough to cool, they shall be ground prior to applying new extrudate over the existing seam. The total depth of the grinding marks shall be no greater than 10 percent of the sheet thickness.

3.4 TESTS

A. Provide all QC samples to the QC laboratory to determine density, thickness, tensile strength at break, and elongation at break in accordance with the methods specified in Table 4. Samples not meeting the specified requirements shall result in the rejection of applicable rolls/panels. As a minimum, rolls/panels produced immediately prior to and immediately after the failed roll/panel shall be tested for the same failed parameter. Testing shall continue until a minimum of three successive rolls/panels on both sides of the original failing roll/panel pass the failed parameter.

3.5 Non-Destructive Field Seam Continuity Testing

A. Field seams shall be non-destructively tested for continuity over their full length in accordance with the installer's approved QC manual. Seam testing shall be performed as the seaming work progresses, not at the completion of field seaming. Any seams which fail shall be documented and repaired in accordance with the installer's approved QC manual.

3.6 Destructive Field Seam Testing

A. A minimum of one destructive test sample per 750 feet of field seam shall be obtained at locations determined by the QC Officer. Sample locations shall not be identified prior to seaming. Samples shall be a minimum of 12-inches wide × 42-inches long with the seam centered lengthwise. Each sample shall be cut into three equal pieces, with one piece retained by the installer, one piece given to the QC laboratory, and the remaining piece given to the Contracting Officer for QA testing and/or permanent record. Each sample shall be numbered and cross referenced to a field log which identifies:
   1. Panel number;
   2. Seam number;
   3. Date and time cut;
   4. Ambient temperature within 6 inches above the geomembrane;
   5. Seaming unit designation;
   6. Name of seamer; and
   7. Seaming apparatus temperature and pressures (where applicable). Ten 1-inch wide replicate specimens shall be cut from the installer's sample. Five specimens shall be tested for shear strength and five for peel adhesion using an approved field quantitative tensiometer. Jaw separation speed shall be in accordance with the approved QC manual. To be acceptable, four out of five replicate test specimens shall meet the seam strength

requirements specified in Table 4. If the field tests pass, five specimens shall be tested at the QC laboratory for shear strength and five for peel adhesion in accordance with the QC laboratory's approved procedures. To be acceptable, four out of five replicate test specimens shall meet the seam strength requirements specified in Table 4. If the field or laboratory tests fail, the seam shall be repaired in accordance with paragraph Destructive Seam Test Repairs. Holes for destructive seam samples shall be repaired the same day they are cut.

3.7 DEFECTS AND REPAIRS

A. Destructive Seam Test Repairs
   1. Seams that fail destructive seam testing may be overlaid with a strip of new material and seamed (cap stripped). Alternatively, the seaming path shall be retraced to an intermediate location a minimum of 10 feet on each side of the failed seam location. At each location a 12 × 18 inch minimum size seam sample shall be taken for two additional shear strength and two additional peel adhesion tests using an approved quantitative field tensiometer. If these tests pass, then the remaining seam sample portion shall be sent to the QC laboratory for five shear strength and five peel adhesion tests in accordance with the QC laboratory's approved procedures. To be acceptable, four out of five replicate test specimens must meet specified seam strength requirements. If these laboratory tests pass, then the seam shall be cap stripped or repaired using other approved methods between that location and the original failed location. If field or laboratory tests fail, the process shall be repeated. After repairs are completed, the repaired seam shall be non-destructively tested in accordance with paragraph Non-Destructive Field Seam Continuity Testing.

B. Patches
   1. Tears, holes, blisters and other defects shall be repaired with patches. Patches shall have rounded corners, be made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects. Minor localized flaws shall be repaired by spot welding or seaming as determined by the QC inspector. Repairs shall be non-destructively tested. Perform additional destructive seam tests required by OWNER or QC Officer on suspect areas.

3.8 VISUAL INSPECTION AND EVALUATION

A. Immediately prior to covering, the geomembrane, seams, and non-seam areas shall be visually inspected by the QC Officer for defects, holes, or damage due to weather conditions or construction activities. At the QC Officer’s discretion, the surface of the geomembrane shall be brushed, blown, or washed by the installer if the amount of dust, mud, or foreign material inhibits inspection or functioning of the overlying material. Each suspect location shall be non-destructively tested in accordance with paragraph Non-Destructive Field Seam Continuity Testing. Each location that fails non-destructive testing shall be repaired in accordance with paragraph Patches and non-destructively retested.

B. Geomembrane penetration details shall be in accordance with ASTM D6497 or as recommended by the geomembrane manufacturer. Factory fabricated boots shall be used wherever possible. Field seams for penetrations shall be non-destructively tested in accordance with the installer's approved QC manual. Seams that fail non-destructive testing shall be repaired in accordance with the installer's approved QC manual and non-destructively tested prior to acceptance.

3.9 PROTECTION AND BACKFILLING

A. The deployed and seamed geomembrane shall be covered with the specified material within five calendar days of acceptance. Wrinkles in the geomembrane shall be prevented from folding over during placement of cover materials. Cover soil shall not be dropped onto the geomembrane or overlying geosynthetics from a height greater than 3 feet. The soil shall be pushed out over the geomembrane or overlying geosynthetics in an upward tumbling motion. Soil shall be placed from the bottom of the slope upward. Equipment with ground pressures less than 7 psi shall be used to place the first lift over the geomembrane. Equipment placing cover materials shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding 5 mph.

END OF SECTION

SECTION 02 61 00 - REMOVAL AND DISPOSAL OF CONTAMINATED SEDIMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavation, hydraulic dredging, transportation and disposal, handling, and solidification of sediments and other wastes.

1.2 DEFINITIONS

A. TSCA Sediment: Contaminated sediment or other material containing 50 mg/kg or greater PCB as measured *in-situ*. Sediment is considered TSCA Sediment from sampling point of 50 mg/kg or greater PCBs to next sediment sampling point that is less than 50 mg/kg. This includes debris within TSCA Sediment that cannot be washed to remove adhered sediment as approved by the OWNER.

B. Non-TSCA Sediment: Contaminated sediment or other material containing less than 50 mg/kg PCBs as measured *in-situ*. This includes debris within Non-TSCA sediment areas. Non-TSCA sediments are not a listed hazardous waste and are not anticipated to be a characteristic hazardous waste. CONTRACTOR is not relieved of testing as required for disposal to meet RCRA and landfill requirements.

C. Contaminated Sediment: Sediment (including debris within contaminated sediment) that exceeds contamination concentrations listed in the Remedial Action Objectives. See Section 01 10 00 – Summary.

1.3 SUBMITTALS

A. Submit separate cross-sections of each deposit before and after removal and after backfilling, and test results within 14 calendar days of Work completion at each deposit.

B. Copy of landfill PCB notification

C. Transporter certifications

D. Certificates of disposal and disposal weigh tickets

E. Locations for storage of contaminated materials

F. Test Reports
   1. Removal Limits Sampling and Analysis
   2. Confirmation Sampling and Analysis
   3. Sampling of Stored Material
   4. Sampling Liquid

G. Surveys
   1. Pre-removal

2. Sampling location and elevations
3. Post-removal with quantity calculations

H. Plans
1. Removal Limits Plan
2. Contingency plan.

1.4 EQUIPMENT OPERATOR

A. If CONTRACTOR proposes to mechanically excavate within 25 feet of Estabrook Dam Spillway, the excavation equipment operator at Deposit 5-1 shall have a minimum experience of 10 years operating excavation equipment of similar types that are proposed by CONTRACTOR. CONTRACTOR shall attest to operators experience and qualifications. OWNER retains the right to require a different operator for Deposit 5-1.

1.5 TSCA SEDIMENT

A. TSCA Sediments shall be disposed of at a Subtitle C Landfill or landfill licensed to accept TSCA Waste and approved by OWNER.

B. TSCA Sediments shall be handled and transported in accordance with 49 CFR parts 171 through 180.

1.6 NON-TSCA SEDIMENT

A. Non-TSCA Sediments shall be disposed of at a Subtitle D Landfill.

1.7 OTHER DEBRIS AND WASTE

A. Access road, decontamination pads, dewatering pad, wastewater treatment pad(s) and other debris shall be disposed at the Solid Waste disposal facility.
1. Temporary materials used during construction may be reused by the CONTRACTOR if they are decontaminated and WDNR approves of the reuse in writing.

B. Dewatering pad materials that contacted TSCA Sediment shall be disposed of at the TSCA Waste disposal facility. Dewatering pad materials that did not contact TSCA Sediment shall be disposed of at the appropriate Solid Waste disposal facility, as approved by the OWNER.

1.8 HAUL ROUTES

A. Haul routes shall be as described in this Section unless OWNER and Milwaukee County approve of alternate haul routes in writing. All construction traffic (other than personal or light vehicles) shall utilize the sections of road listed above.

B. Traffic and vehicle loadings on West Hampton Avenue, east of North Milwaukee River Parkway, shall be limited to prevent damage to West Hampton Avenue. CONTRACTOR shall repair/reconstruct West Hampton Avenue and North Milwaukee Parkway if damage occurs during completion of the Work at no cost to the OWNER. Repairs/reconstruction shall meet Cities of Glendale and Milwaukee standards.

C. Zone 7 and Deposit 3B-1
   1. From staging area traffic shall proceed south along North Milwaukee River Parkway, then west on West Hampton Avenue, then north on North Green Bay Avenue, then east on Silver Spring Drive, then merge onto Interstate 43.

D. Deposits 4-1 and 4-2
   1. Traffic from this area heading to the dewatering pad shall proceed west on West Hampton Avenue and then north on North Milwaukee River Parkway.
   2. Traffic heading to a disposal facility that is north of the project site shall proceed west on West Hampton Avenue and follow the path listed for Zone 7 and Deposit 3B-1.
   3. Traffic heading to a disposal facility that is south of the project site shall proceed east on West Hampton Avenue and merge onto Interstate 43.

E. Deposit 4-3
   1. Minimize traffic on West Hampton road (east of North Milwaukee Parkway) and do not use North Port Washington road north of West Hampton Road.

F. Deposit 5-1
   1. Traffic from this area heading to the dewatering pad shall proceed west on West River Woods Parkway, then north on North Port Washington Road, then west on West Hampton Avenue and then north on North Milwaukee River Parkway.
   2. Traffic heading to a disposal facility that is south of the project site shall proceed west on West River Woods Parkway, then north on North Port Washington Road, then west on West Hampton Avenue and merge onto Interstate 43.
   3. Traffic heading to a disposal facility that is south of the project site shall proceed west on West River Woods Parkway, then north on North Port Washington Road, then west on West Hampton Avenue and merge onto Interstate 43.

PART 2 PRODUCTS

2.1 SPILL RESPONSE MATERIALS

A. Provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, adsorbent booms and pads, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

2.2 MATS

A. Provide new all-weather timber mats to accommodate equipment access to excavation areas in-river.

B. Or approved equal.

2.3 SOLIDIFICATION AMENDMENTS

A. Calciment®

B. Ground corn cobs

C. Amendment materials and addition rates shall not increase the temperature of sediment such that volatilization of contaminants occurs.

D. Or approved equal.

2.4 STORAGE AND TRANSPORTATION EQUIPMENT

A. All materials and equipment used to store contaminated or potentially contaminated materials shall be water-tight.

PART 3 EXECUTION

3.1 CONTINGENCY PLAN

A. Shall be submitted within 30 days after Notice of Award.

B. This document shall meet:
   1. contract document requirements, and
   2. EPA Remedial Design / Remedial Action Handbook (540/R-95/059) requirements, but follow the most recent versions of guidance documents.

3.2 PREPARATION

A. Coordinate Work on and around Interstate 43 bridge/on-ramp with the Wisconsin Department of Transportation (WisDOT) as required in Section 01 31 13.

B. Coordinate limits for hydraulic dredging removal at deposit 4-3 with OWNER based on sampling and analysis results and permit requirements. Permits may not allow dredging near structural members of the bridge and on-ramp. Contamination concentration and volumes may not require removal near structural members. Risk to bridge and environmental risk will be re-evaluated during construction based on sampling and analysis results. CONTRACTOR shall allow sufficient time in schedule for OWNER to evaluate risk and determine required removal limits prior to CONTRACTOR initiating hydraulic dredging at this deposit.

C. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.
   2. Locate and mark utilities on bridges and river crossings.

D. Protect utilities indicated to remain from damage. CONTRACTOR is responsible for all repairs to damaged utilities and all associated reparations at no cost to the OWNER.

E. Protect Phase I work, Deposit 4-3 seawall and Estabrook Dam Spillway.

F. Protect plant life, lawns, and other features remaining as portion of final landscaping.

G. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic except as proposed by CONTRACTOR and approved by OWNER.

H. Install access roads in accordance with Section 01 50 00 – Temporary Facilities and Controls.

I. Install decontamination pads in accordance with Section 01 72 00 – Decontamination of Personnel and Equipment.

J. Install dewatering pad, wastewater treatment pad and treatment system.
   1. Dewatering pad shall be constructed to allow stockpiling and dewatering of sediments while segregating TSCA and Non-TSCA sediments. Dewatering pad shall collect leachate from sediment and rainfall from 25-yr, 24-hr storm event with a minimum of 6 inches of freeboard.

K. Identify required lines, levels, contours, and datum.

L. Install dewatering systems and dewater dry excavation areas in accordance with Section 31 23 19 prior to sampling and survey. Dewater sediments *in-situ* as much as possible while maintaining project schedule.

M. Install silt barriers for hydraulic dredging areas in accordance with this Section.

N. Layout grids and conduct sampling in accordance with Section 01 35 45.00 10 to determine excavation limits prior to beginning excavation.

O. Install mats in-river as needed to access deposits with removal and disposal equipment.

P. Obtain OWNER approval of excavation depths/elevations based on sample results in accordance with Section 01 35 45.00 10.

Q. Submit Removal Limits Plan (per grid) with limits of removal and provide all supporting slope stability analysis and temporary shoring calculations.

R. General sequence of sampling, approvals, removal and confirmation sampling are listed at the end of this Section in Attachment A.

S. If TSCA sediments are not located in areas indicated on Drawings, notify OWNER prior to excavating that area. Do not proceed in these areas until OWNER has provided written authorization to proceed.

T. Submit, at least fifteen days before shipping PCB waste, a notification to the receiving landfills in accordance with 40 CFR 761.61(a)(5)(i)(B)(2)(iv) as stated below:
   1. The generator must provide written notice, including the quantity to be shipped and highest concentration of PCBs (using extraction EPA Method 3500B/3540C or Method 3500B/3550B followed by chemical analysis using EPA Method 8082 in SW-846 or methods validated under subpart Q of this part) at least 15 days before the first shipment of bulk PCB remediation waste from each cleanup site by the generator, to each off-site facility where the waste is destined for an area not subject to a TSCA PCB Disposal Approval.

3.3 SURVEYS

A. Surveys shall be performed immediately prior to (existing grade) and after removal of contaminated material to determine the volume of contaminated material removed.

B. Surveys shall also be performed immediately after backfill of excavations requiring backfill.

C. Locations of confirmation samples shall also be surveyed and shown on the drawings.

D. Surveys shall be performed in accordance with Section 01 70 00 Execution and Closeout Requirements.

E. Existing grade surveyed by CONTRACTOR shall serve as the basis for backfill final grades.

3.4 EXISTING STRUCTURES AND UTILITIES

A. No excavation shall be performed until site utilities have been field located and verified. Take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the CONTRACTOR'S operations shall be repaired at no additional cost to the OWNER. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the OWNER.

B. Complete Work at Deposit 4-3 without damaging seawall or undermining of seawall and in accordance with permits.

C. CONTRACTOR shall not damage Work installed during Phase I without written approval from OWNER.

D. Complete Work at Deposit 5-1 without damaging Estabrook Dam Spillway. Excavation Work within 25 feet of the Estabrook Dam Spillway shall be conducted by hand or by an OWNER approved equipment operator meeting the requirements in this Section.

3.5 SHORING

A. If workers must enter the excavation, it shall be evaluated, shored, sloped, or braced as required by 29 CFR 1926.

3.6 CONTAMINATED MATERIAL STORAGE

A. Inspect contaminated sediment storage and transportation equipment for leaks and attach copies of inspection reports to the daily reports.

B. Material excavated and not transported for disposal during the same day as excavation, shall be placed in sealed roll-off units or placed on the dewatering pad for later disposal.

C. Material shall not be stored within the Milwaukee River Floodplain.

D. Dewatering Pad
   1. Dewatering Pad shall be constructed to isolate stored contaminated material from the environment. Stockpiles shall be constructed to include:
   2. A high-density polyethylene liner in accordance with Section 02 56 13 – Waste Containment Geomembrane.
   3. Jersey barriers surrounding the stockpile, a minimum of 3 feet in height. Vehicle access points shall also be bermed.

4. The liner system shall be sloped to a sump to allow collection of leachate. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Storage and treatment and disposal in accordance with Section 31 23 19 - Dewatering.
5. Separate areas for TSCA and Non-TSCA sediments. TSCA and Non-TSCA sediments shall not be allowed to contact each other.

E. Roll-Off Units
1. Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. The units shall be located as approved by the OWNER. Liquid which collects inside the units shall be removed and stored for treatment in accordance with paragraph Liquid Storage.

F. Liquid Storage
1. Un-treated liquid collected from dewatering systems, hydraulic dredging, decontamination pads, dewatering pad, wastewater treatment pad, excavations and stockpiles shall be temporarily stored until the CONTRACTOR treats the liquid in accordance with permit requirements. Liquid storage containers shall be water-tight and shall be located as approved by the OWNER.

3.7 SPILLS

A. In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act, 33 U.S.C. 2701 et seq.), notify the OWNER immediately. If the spill exceeds the reporting threshold, follow the pre-established procedures as described in the Resource Conservation and Recovery Act (RCRA) Contingency Plan for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. As directed by the OWNER, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the OWNER.

B. CONTRACTOR shall comply with the Wisconsin spill law, Chapter 292.11(2) Wisconsin Statutes, which require that a person who possesses or controls a hazardous substance or who causes the discharge of a hazardous substance shall notify WDNR immediately of the discharge that is not exempted. Spill reporting requirements are contained in NR706 Wis. Admin. Code. The spill Hotline telephone number is (800-943-0003). Detailed information on spill reporting requirements is available in the Hazardous Substance Spills Reporting Requirements PUB-RR-558 fact sheet.

C. Subgrade material under decontamination pads, dewatering pad, wastewater treatment pad and access roads that is found to contain contaminants at greater concentrations post construction than pre-construction shall be removed and disposed of at no cost to the OWNER. Confirmation sampling is required after removal at the same frequency required for post-construction in accordance with Section 01 35 45.00 10 – Chemical Data Quality Control.

3.8 REMOVAL LIMITS

A. Contaminated sediments and debris shall be removed to the depth and extent as determined by CONTRACTOR and approved by OWNER based on analytical sampling and daily

reporting, in accordance with Section 01 35 45.00 10 Chemical Data Quality Control, and not more than 0.2 feet beyond the depth and extent approved by OWNER.

B. Removal shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D5434.

3.9 EXCAVATION

A. Do not interfere with 45 degree bearing splay of foundations.

B. Trim excavation. Remove loose matter.

C. Notify ENGINEER and OWNER of unexpected subsurface conditions.

D. Correct areas over excavated with sand specified in Section 31 23 23**.**

E. Remove excavated material from site and dispose of at OWNER approved licensed facility.

F. Repair or replace items indicated to remain that are damaged by CONTRACTOR.

G. Excavate contaminated sediment to the limits as authorized by OWNER based on sampling and remove from the site.

H. Excavate and handle TSCA material separately from Non-TSCA material.

I. Excavate Non-TSCA sediment separately from TSCA sediment to the extent practical to reduce the volume of TSCA sediment for disposal.

J. Do not spread contaminated sediment during excavation and loading operations.

K. Excavation shall be in accordance with OWNER approved technical proposal for deposits 4-1 and 4-2 if OWNER executes the optional bid item for these deposits.

3.10 HYDRAULIC DREDGING

A. Do not interfere with 45 degree bearing splay of foundations.

B. Notify ENGINEER and OWNER of unexpected subsurface conditions.

C. Minimize interference with the use of channels and passages.

D. Furnish, set, and maintain ranges, buoys, and markers needed to define the Work and to facilitate inspection. Establish and maintain gages in locations observable from each part of the work so that the depth may be determined. Suspend dredging when the gages or ranges cannot be seen or followed. The CONTRACTOR shall determine the survey lines, points, and elevations necessary for the setting of ranges, gages, and buoys.

E. Maintain the plant, scows, coamings, barges, pipelines, and associated equipment to meet the requirements of the Work. Perform two inspections per day of pipeline for leaks and log

results in daily report. Promptly repair leaks or breaks along pipelines. Remove dredged material placed due to leaks and breaks.

F. Provide agitation to loosen and dislodge materials for removal at the intake. Water jetting to dislodge materials for removal is not permitted, unless pre-approved by OWNER in writing.

G. Remove and separately manage debris as needed for maintaining a pumpable slurry compatible with the selected hydraulic dredging method.

H. Provide dredge pump and supplemental pumps as needed to achieve required head to efficiently convey dredged materials to site locations described in the CONTRACTOR'S technical proposal. Provide addition head capacity in selected pumps to overcome heavy slurry conditions from in-situ material high percent solids content, in addition to other standard factors for pipeline conveyance of heavy fluids.

I. Flush pipelines as needed to prevent accumulation of sediment and small debris within pipeline.

J. Hydraulically dredge contaminated sediments from Deposit 4-3 and the southern portion of Deposit 7-4 (portion south of cofferdam) to the limits as authorized by OWNER (within standard construction tolerances) based on sampling and transport to the dewatering pad for dewatering prior to transportation and disposal.

K. All Dredging equipment shall be flushed between dredging activities for TSCA and Non-TSCA sediments and managed separately. Flushing water shall be treated and discharged in accordance with Contract Documents and permits.

L. Provide floats for pipeline to allow inspection at any time. Submerging pipeline will be avoided except for special cases, and requires written approval from OWNER.

M. Avoid sharp bends in pipeline and unsupported segments of pipeline. Provide pipeline supports as required to uniformly distribute weight and avoid stress concentrations.

N. Spills from leaks, damaged pipeline, or any losses of dredged material to the surrounding environment will be removed and affected area restored at CONTRACTOR'S expense. Any use of pipeline conveyance to be detailed and described in the CONTRACTOR'S technical proposal in terms of materials used, means and methods of daily operation, management, and inspection, and contingency planning to address losses of dredged material or damage to the pipeline.

3.11 TRANSPORTATION AND DISPOSAL

A. Inspecting contaminated sediment storage and transportation equipment for leaks and forwarding copies of inspection reports to the OWNER.

B. Furnish labor, materials, and equipment necessary to store, transport, and dispose of contaminated material in accordance with Federal, State, and local requirements. Prepare and maintain waste shipment records and manifests required by the RCRA, TSCA, U.S. Federal Department of Transportation (DOT), and State transportation department.

C. Transportation
   1. Transport PCB contaminated soils in water-tight vehicles designed to carry PCB contaminated soils in accordance with Federal and State requirements. Store liquid PCBs in DOT Specification 17E containers. In addition to those requirements:
      a. Inspect and document vehicles and containers for proper operation and covering. Repair or replace damaged containers.
      b. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
      c. Perform and document decontamination procedures prior to leaving the Work site and again before leaving the disposal site.

D. Shipping Documentation
   1. 40 CFR 761. Before transporting the waste, OWNER will sign and date the manifests. CONTRACTOR shall return a signed copy to the OWNER that documents acceptance to the disposal facility, before leaving the job site. Ensure that the manifest accompanies the waste at all times. Submit transporter certification of notification to EPA of their waste activities and EPA identification numbers. Within 35 days from shipment date, the transporter shall provide a copy of the manifest signed and dated by the disposer.

E. Certificate of Disposal
   1. Submit certificate of disposal to the OWNER within 30 calendar days of the date that the disposal of the contaminated sediment and debris waste identified on the manifest was completed. Include:
      a. The identity of the disposal facility, by name, address, and EPA identification number.
      b. The identity of the waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
      c. A statement certifying the fact of disposal of the identified waste, including the date(s) of disposal, and identifying the disposal process used.
      d. A certification as defined in 40 CFR 761, Section 3.

F. Dispose of all waste at the facilities approved in the technical proposal.

3.12 FIELD QUALITY CONTROL

A. Quality Control Officer shall monitor excavations and ensure excavations do not exceed tolerances and authorized excavation limits.

3.13 PROTECTION

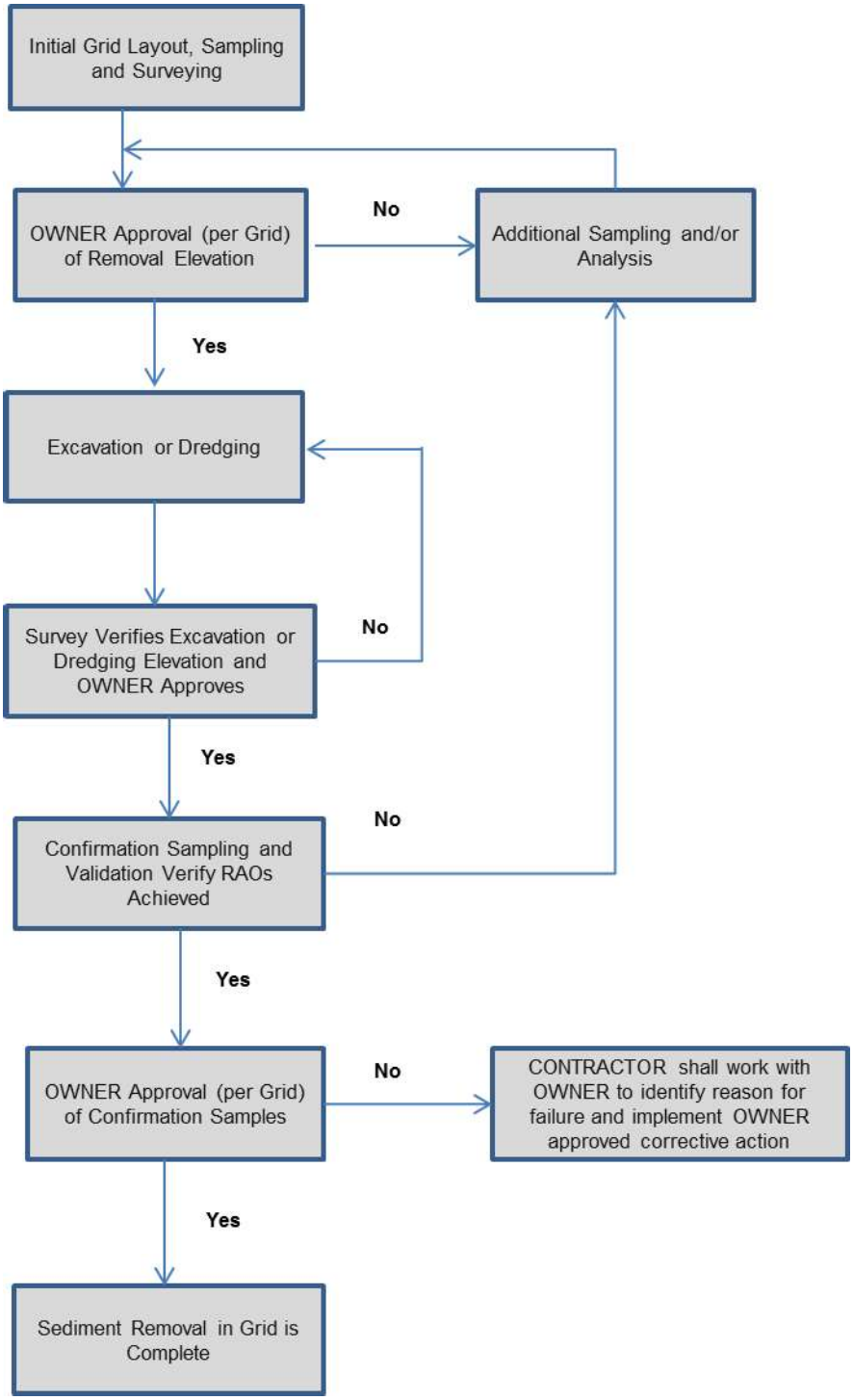
A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing conditions, and other hazards created by earth operations.

END OF SECTION

ATTACHMENT A – General Sequence



SECTION 31 10 00 - SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. SECTION INCLUDES:
   1. Clearing, topsoil stripping and stockpiling of equipment laydown areas, field offices, parking areas, staging areas, access roads, and access ramps.
   2. Removing designated asphalt paving.
   3. Removing and salvaging designated trees, shrubs, and other plant life.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Submit boundaries of equipment laydown areas, equipment laydown areas, field office areas, parking areas, staging areas, access roads and any other shoreline or upland areas needed to complete the Work.

PART 2 PRODUCTS

2.1 PLASTIC SHEETING

A. A temporary chemically resistant geomembrane cover with minimum thickness of 10 mils, free of holes or other damage to prevent precipitation from entering and minimize dust from exiting stockpiles.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.

B. Verify existing plant life designated to be removed is tagged or identified.

C. Identify salvage area for placing removed materials prior to re-use on-site.

3.2 PREPARATION

A. Call Local Utility Line Information service not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Place construction staking layout flags or stakes at limits of site clearing and approximate floodplain boundary within limits of disturbance as shown on Drawings.

C. Inspect Work areas prior to and during soil disturbance for potential archaeological items. Stop Work if potential archaeological items are found and notify OWNER. Work shall not resume until obtaining written authorization from OWNER.

D. Pre-Installation Meeting – Archeology
   1. Schedule and hold a pre-installation meeting with the WDNR Archeologist for Work conducted at Deposits 4-1, 4-2, 4-3, and 5-1.
   2. Identify and flag locations of all ground to be disturbed.
   3. Review locations of construction staking layout.
   4. Additional requirements listed in Section 01 30 00 – Administrative Requirements.
   5. Archeologist must be present during all ground disturbing activities at these Deposits.

E. Pre-Installation Meeting – Tree Removal
   1. Schedule and hold a pre-installation meeting with the Milwaukee County Parks.
   2. Identify and flag locations of all trees to be removed for review and approval by Milwaukee County Parks.
   3. Identify potential trees to be reused for log/root wads.
   4. Review locations of construction staking layout.
   5. Additional requirements listed in Section 01 30 00 – Administrative Requirements.

3.3 PROTECTION

A. Protect trees, plant growth, and other vegetation not required to be removed to complete the Work.

B. Protect bench marks, and existing structures from damage or displacement.

3.4 CLEARING

A. Clear areas required for access to site and execution of Work to minimum depth of 6 inches.

B. Remove trees and shrubs as authorized by Milwaukee County Parks during the Pre-Installation meeting. Remove stumps, main root ball, and root system to depth of 6 inches.

C. Trees removed for re-use as log/root wads shall remove the maximum amount of root ball.

D. Clear undergrowth and deadwood, without disturbing subsoil.

3.5 REMOVAL

A. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate onsite.

B. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION AND STOCKPILING

A. Excavate (in presence of WDNR Archeologist if required in paragraph 3.2.E) topsoil from access roads, staging area(s), dewatering pad, wastewater treatment pad, decontamination pads, and other Work areas to a depth of 6 inches and stockpile within the Limits of

Disturbance as shown on the Drawings without mixing with foreign materials for use in finish grading.

B. Comply with WDNR Archeologist requirements for monitoring excavation. Stop Work if directed to by WDNR Archeologist.

C. Do not excavate wet topsoil.

D. Cover stockpiles with plastic sheeting and ballast to prevent contact with stormwater and minimize dust. Maintain plastic sheeting and ballast throughout construction.

E. Do not remove topsoil from site.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Flood Contingency Plan Implementation
   2. Dewatering system
   3. System operation and maintenance
   4. Wastewater system

1.2 DEFINITIONS

A. Dewatering system includes the following:
   1. Cofferdams, removal of surface water, lowering of ground water table and intercepting horizontal water seepage to prevent groundwater from entering excavations and allow *in-situ* dewatering of material to be excavated.
   2. Transportation of water from cofferdams to wastewater treatment system.

B. Wastewater Treatment system includes the following:
   1. Containing, treating, testing, and discharging of water with energy dissipation in accordance with Contract Documents and permits.

1.3 PERFORMANCE REQUIREMENTS

A. Design, provide and operate dewatering systems to permit excavation Work to be completed on dry and stable subgrade. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment.
   1. Remove surface water.
   2. Lower water table within areas of excavation to 6 inches (or greater) below bottom of excavation limits to permit Work to be completed on dry and stable subgrade.
   3. Relieve hydrostatic pressures in confined water-bearing strata below excavation to eliminate risk of uplift or other instability of excavation.
   4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
   5. Maintain stability of excavations.
   6. Obtain maximum *in-situ* dewatering of sediments prior to excavating.
   7. Design Cofferdam to:
      a. Construct structures; and for protecting personnel and adjacent structures, roadbeds, tracks, channels, slopes, or other property (public or private) whether on or off the Rights-of-Way from water, caving soil, and other dangers.
      b. Design and construction shall provide a water tight seal from surface water to the Work zone to the extent feasible and shall be coordinated with dewatering design and plan.

B. The CONTRACTOR shall be responsible for all aspects of verifying design parameters, designing, providing, installing, operating, maintaining, and removing collection, storage, and treatment facilities as required to discharge treated waters within the treatment limits required. The treatment system shall:

1. Include effluent holding tanks designed to allow on-site testing of water quality prior to discharge.
2. Include recycle capability for retreatment of effluent not meeting the discharge requirements of this specification, as determined by on-site testing.
3. Remove PCBs, PAHs, NAPL, and TSS in accordance with permit requirements with sufficient capacity to maintain project schedule.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Dewatering system design and installation requirements sealed by Professional Engineer.

C. Shop Drawings:
1. Indicate dewatering system layout, dewatering pump locations, pipe sizes and capacities, grades, surface water control devices, valves, and water disposal method and location.
2. Indicate power system location and capacity.

D. Product Data: Submit data for each of the following:
1. Dewatering Pumps: Indicate sizes, capacities, priming method, motor characteristics.
2. Pumping equipment and maximum operating pressure for control of surface water within excavation.
3. Catalog data on all wastewater treatment system components.
4. Wastewater treatment system manufacturers operation and maintenance recommendations.

E. Operation and Maintenance plan for dewatering and wastewater treatment systems.

F. Records and reports.

1.5 RESPONSIBILITIES

A. Comply with local noise ordinances and variances in accordance with Contract Documents.

B. This is a performance specification. Except as otherwise specified or indicated, selection of equipment, materials, and methods shall be CONTRACTOR'S responsibility. The dewatering of any excavation areas and disposal of all water handled shall be in strict accordance with all local and state government rules and regulations and Contract Documents.

C. The CONTRACTOR shall be responsible for the design of the dewatering system including, but not necessarily limited to, the temporary cofferdam, required pump equipment, temporary shoring, piping, as well as any miscellaneous temporary structures required.

1.6 COORDINATION

A. Coordinate Work to permit the following construction operations to be completed on dry stable substrate.
1. Excavation for contaminated sediments specified in Section 02 61 00.
2. Substrate restoration, log/root wads, boulder clusters, and wetland planting.
3. Sand and imported topsoil backfill.

4. Imported clay backfill.

PART 2 PRODUCTS

2.1 SAND BAGS

A. Woven polypropylene sand bags filled approximately half full with sand or soil and tied at the opening.

2.2 DEWATERING SYSTEMS

A. Cofferdam materials and installation requirements shall be as designed by Professional Engineer licensed in the State of Wisconsin. Water bladders are prohibited.

B. If sheet piling is used for the cofferdam materials, sheet piling joints (interlocks) shall be sealed with a joint compound or water swelling sealant accepted by the sheet pile manufacturer. Strictly comply with sealant manufacturer recommendations for application and preservation of sealants prior to sheet pile installation.

C. Select dewatering equipment to meet specified performance requirements.

D. Pumps: Supply sufficient pumping capacity to dewater the cofferdam and meet performance requirements.

E. Piping: Watertight piping capable of being pressure tested.

F. Any sand used for construction of dewatering systems may be reused as sand backfill if the material meets the product requirements in 31 23 23 – Fill and does not contain contaminated materials.

2.3 WASTEWATER TREATMENT SYSTEMS

A. Supply sufficient materials and equipment to meet the performance requirements.

B. Provide and maintain equipment with the ability to treat NAPL contaminated water through the duration of activities that generate wastewater.

C. Any polymers, flocculants, coagulants or other additives used shall be approved by WDNR and authorized under the final permits.

PART 3 EXECUTION

3.1 EXAMINATION

A. Conduct additional borings and investigations to supplement previous subsurface investigations identified as required to complete dewatering system design.

B. Call Local Utility Line Information service not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.
2. Locate and mark utilities on bridges and river crossings.

3.2 PREPARATION

A. Pre-Installation Meeting:
   1. Schedule and hold a pre-installation meeting with the OWNER for Deposits 4-1 and 4-2.
   2. Evaluate the water level in the Milwaukee River and determine if the optional bid item to complete Work in this area from the bank is feasible.
   3. Additional requirements listed in Section 01 30 00 – Administrative Requirements.

B. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

C. Protect Phase I Work and existing riprap.

D. Protect wetlands and minimize disturbance to wetlands and other areas.

E. The CONTRACTOR is required to meet the special requirements of any environmental permits that have been issued. These special requirements as specified by local, state, and/or federal permitting agencies shall govern over this specification.

F. Before installing any portions of the dewatering system, implement the flood contingency plan in accordance with permits to ensure the structures located at 5200 North Milwaukee River Parkway are not inundated by water due to temporary impacts from the dewatering systems. Place sand bags around continuous perimeter of the structures and cover with plastic sheeting (see Section 01 50 00 – Temporary Facilities and Controls for products) to provide a water tight berm at a minimum elevation of 624.1 ft (this elevation provides approximately 6 inches of freeboard for the 100-year flood elevation based on modeling).
   1. Maximum side slopes shall be 1:1 (horizontal:vertical).
   2. Top width shall be a minimum of 2 feet.
   3. Install in accordance with these specifications, permits and USACE Sandbagging Pamphlet obtainable at: http://www.co.snohomish.wa.us/documents/Departments/Public_Works/SurfaceWaterManagement/Flooding/NWDSandbagPamphlet.pdf.

3.3 DEWATERING SYSTEM

A. Install dewatering system in accordance with design and installation requirements sealed by CONTRACTOR'S Professional Engineer.

B. Pressure test piping system in accordance with AWWA C600 and the following:
   1. Test Pressure: Not less than 200 pounds per square inch (psi) or 50 psi in excess of maximum operating pressure during dewatering, whichever is greater.
   2. Conduct hydrostatic test for at least two-hour duration.
   3. Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.
   4. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

5. Correct visible deficiencies and continue testing at same test pressure for additional 2 hours to determine leakage rate. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
6. Compute maximum allowable leakage by the following formula:

$L = (SD\sqrt{P})/C$
L = testing allowance, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during hydrostatic test, in psig
C = 148,000
When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

7. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

C. The CONTRACTOR shall install, maintain, and operate all cofferdams, channels, flumes, sumps, and all other temporary diversion and protective works needed to divert stream flow and other surface water through or around the construction site. Unless otherwise specified and/or approved, the diversion outlet shall be into the same drainage way that the water would have reached before being diverted.

D. Excavations and all other parts of the construction site shall be dewatered and kept free of standing water and muddy conditions as necessary for the proper execution of the Work. The CONTRACTOR shall furnish, install, operate, and maintain all drains, sumps, pumps, casings, well points, and all other equipment required to properly dewater the site as specified. Dewatering systems that cause a loss of soil fines from the foundation areas will not be permitted.

E. Cofferdams shall be installed to the maximum elevations shown in the table below. These elevations represent the approximate modeled water elevation for 1,060 cubic feet per second of water flow in the Milwaukee River.

Cofferdam	Cofferdam Maximum Elevation (ft)
Cofferdam 1	614.1
Cofferdam 2	616.5
Cofferdam 3	613.8
Cofferdam 4	612.0

F. Survey elevations of cofferdams and submit data to ENGINEER and OWNER within 24 hours of installing cofferdam. Immediately correct any cofferdam sections that exceed the maximum allowable elevation.

G. If sheet piling is used for cofferdams, the sheet piling material shall remain the property of

the CONTRACTOR.

3.4 WASTEWATER TREATMENT SYSTEM

A. Install, startup and troubleshoot wastewater treatment system.

B. Operate wastewater treatment system in accordance with permits, Contract Documents and manufacturer's recommendations.

C. Supply additional wastewater treatment system capacity if capacity identified in technical proposal is insufficient to maintain Work progress to complete the Work in accordance with the Contract Documents and CONTRACTOR'S approved schedule.

D. Monitor, test, and adjust the treatment system in accordance with the Operation and Maintenance Plan and Sampling and Analysis Plan, or as otherwise modified by special regulatory requirements. If there is a conflict between requirements, the more stringent requirement shall prevail. Test water in accordance with contract documents.

E. Do not discharge any water until tests results showing water is below allowable permit limits. Provide erosion control at outlet of piping to minimize erosion.

3.5 SYSTEM OPERATION AND MAINTENANCE

A. Records and Reports: The CONTRACTOR shall maintain management, operation, and maintenance records; and prepare management, operation, and maintenance reports. All records and copies of reports shall be turned over to OWNER within 5 days after contract completion.

B. Operate dewatering system continuously until Work within dewatered zone is complete.

C. Operate wastewater treatment system until all water generated has been treated and discharged in accordance with contract documents.

D. Provide 24-hour supervision of dewatering and wastewater treatment system by personnel skilled in operation, maintenance, and replacement of system components.

E. Conduct daily observation of dewatering and wastewater system and monitoring system. Make required repairs and perform scheduled maintenance.

F. Fill fuel tanks before tanks reach 25 percent capacity.

G. When dewatering system cannot control water within excavation, notify ENGINEER and OWNER and stop excavation Work.
   1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation at no additional cost to OWNER.
   2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

H. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

I. Correct unanticipated pressure conditions affecting dewatering system performance.

J. Do not discontinue dewatering operations without OWNER'S approval.

3.6 SYSTEM REMOVAL

A. Remove dewatering systems after dewatering operations are discontinued and Work within dewatered zone is completed. Do not remove dewatering systems until OWNER has approved backfill elevations and restoration.

B. Repair damage caused by dewatering or resulting from failure of systems to protect property.

C. Remove wastewater treatment system after all wastewater has been treated and RAOs have been achieved.

D. Decontaminate equipment in accordance with the CONTRACTOR'S Site Safety and Health Plan and contract documents. Containerize, sample, test, and dispose of carbon, residues, cleaning aids, decontamination liquids, and waste as specified for the contaminated soils.

END OF SECTION

SECTION 31 23 23 - FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sand backfill in wetlands and under substrate restoration
   2. Imported Topsoil backfill in wetlands
   3. Imported clay and imported topsoil backfill for Streambank restoration
   4. Substrate restoration
   5. Boulder clusters
   6. Log/Root wads
   7. Topsoil backfill from stockpiles

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Imported topsoil test results and recommendations for amendments and fertilizer program.

C. Amendment materials and rates for imported topsoil.

D. Amended imported topsoil test results.

E. Product Data:
   1. Submit fill material data and certification that materials are not contaminated.
   2. Submit compaction test results.

F. Materials Source: Submit name of commercial imported fill materials suppliers. Informational submittal.

G. Submit minimum 10 oz sample of imported topsoil proposed before and after amending. Informational submittal.

H. Submit minimum 10 oz sample of imported clay proposed and geotechnical testing results. Informational submittal.

I. Material samples or data sheets.

J. Surveys.
   1. Surveys showing final grade does not exceed existing grades as surveyed prior to removal.
   2. Post-removal survey.
   3. Sand backfill survey.
   4. Imported Clay backfill survey.
   5. Imported Topsoil backfill survey.
   6. Substrate Restoration backfill survey

1.3 DESCRIPTIONS

A. Boulder Clusters: This Work shall consist of the installation boulder cluster structures, as shown on the Contract Drawings to provide habitat value.

B. Log/Root Wad Structures consist of utilizing tree trunks with an attached root mass that were salvaged during the clearing and grubbing portion of this Contract. This structure is intended to provide habitat in the pool and provide temporary bank stabilization until proposed vegetation gets established. This structure is located as shown on the Drawings.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. All imported materials shall be certified clean by the source provider and suitable for use in the prescribed areas.

B. Imported Topsoil:
   1. Imported friable loam or silty loam; minimum 2 percent organic matter; less than 2 (dS/m or mmho/cm) soluble salts, free of subsoil, roots, grass, weeds, large stone, and foreign matter.
   2. Imported topsoil shall be amended to obtain:
      a. pH: 6 – 7.5, unless laboratory recommendations differ and OWNER approves of the laboratory recommendations.
      b. Laboratory recommendations for nitrate-nitrogen, phosphorus, and potassium.
   3. Amendments:
      a. Amendments shall be organic (compost, Milorganite®, or similar) if suitable for meeting the topsoil requirements.
      b. Amendment materials shall be suitable for their intended uses and locations.

C. Imported Clay:
   1. Soils classified as CL in accordance with ASTM D2487 plotting at or above the A-line on the plasticity chart.
   2. Clay shall contain a mixture of silt and clay-sized particles, and exhibit low to moderate plasticity. Minimum requirements for cohesive properties are plasticity index equal to or greater than 15 percent and a liquid limit greater than or equal to 40 percent in accordance with ASTM D4318. Organic-rich fine-grained sources are not permitted.
   3. Soils classified as CH in accordance with ASTM D2487 plotting at or above the A-line on the plasticity chart not to exceed plasticity index of 30 percent by ASTM D4318.
   4. Meet compaction requirements of this section.

D. Topsoil: Topsoil stripped and stockpiled in accordance with Section 31 10 00 – Site Clearing.

E. Sand: ASTM C33 Concrete Sand.

F. Substrate Restoration Material: Materials for substrate restoration shall be rounded river stone or cobble, of native geology to the Milwaukee area. Brown, gray and black colored stone are preferred; no white or blue stone colors shall be permitted. Material size distribution shall include 85 percent material measured by weight with a minimum size of 4

inches diameter and maximum size of 8 inches diameter; 15 percent of substrate material as measured by weight shall have a minimum size of 10 inches and maximum size of 18 inches. Substrate material shall be mixed with 50 lbs/cubic yard of small woody debris.

G. Small Woody Debris: Small woody debris comprising of live dormant leaves, twigs, wood chips and branches less than 4 inches in mean diameter as sourced from site clearing activities from redosier, dogwood, black willow, and sycamore trees. Non-native, invasive plant materials will not be permitted.

H. Boulders (Footer and Top Stones): Structure stones to be used for construction shall consist of angular, flat rock, and be of appropriate color (e.g., green, gray, brown/gray, dark gray, and/or dark brown in color). Stone types native to the Milwaukee County area are acceptable. No white stone will be allowed. Rounded edges are acceptable so long and rounded edges are not bearing or supporting. All stone shall be free from laminations and weak cleavages. The stone should not disintegrate significantly from the action of air, water, or in handling and placing. Stones with tool marks, drill holes, and other blasting evidence shall not be utilized in exposed locations. Concrete will not be considered as an alternative for stone. The structure stone shall have a density greater than 100 lbs/cubic foot. Stones must be approved by the OWNER prior to placement. Stones shall have the following size requirements:

	A Axis (Long) (Feet)	**B Axis (Intermediate) (Feet)**	**C Axis (Short) (Feet)**
Minimum Size	2.0	1.5	1.0
Maximum Size	4.0	3.0	2.0

Larger sized stone may be used at the discretion of the CONTRACTOR so long as the capacity to place that material exists.

Exposed portions of boulder cluster stones may be rounded so long as they are not a bearing surface for other stones.

I. Log/Root Wad logs must have root mass attached and have a minimum trunk diameter of 12 inches and a minimum log length of 20 feet. The root mass must have a minimum diameter of 4 feet. The minimum diameter of the root mass should be taken where open space accounts for less than 30 percent of the area. Salvage Log/Root Wad logs from trees removed during the clearing and grubbing portion of this contract within the permitted limit of disturbance. Large and fiberous roots being present are preferred. Logs must consist of hardwood (oaks, maples, gums, locust, hickory, etc) and may not be utility poles or be chemically treated. Pine, poplar, cottonwood, spruce and other softwood species may not be used. Logs must be intact with bark still connected; no twisted, fractured, or significantly damaged logs will be permitted. All cutting of logs must be with a saw; no ripping, bending, or breaking of logs for the purpose of trimming will be allowed. Logs must be relatively straight, or bent in such a way as to allow pinning by stones and still meeting proposed elevations and position. Root wad logs not meeting these requirements must be pre-approved by the OWNER prior to installation.
   1. Minimum dimensions for each footer stone are 2 × 1.5 × 1 feet. Pinning stones, placed on the log/root wad for anchoring, are 4 × 3 × 2 feet or larger if the CONTRACTOR has them available and is able to move them with precision.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify confirmation samples have been collected and analyzed additional excavation of contaminated sediments is not required, and OWNER has authorized backfill to proceed in the grid.

3.2 PREPARATION

A. Collect representative imported topsoil samples and analyze at the University of Wisconsin Soil Testing Laboratory (or approve equivalent) for their standard analysis and physical analysis. Test results and CONTRACTOR'S amendment materials and rates shall be submitted to OWNER for approval prior to importing any imported topsoil to the project site.

3.3 SURVEY

A. CONTRACTOR shall survey post-removal grade and each layer of fill to quantify materials for payment.

B. CONTRACTOR shall survey final grade to quantify materials for payment and verification that final grade meets Contract Documents and permit requirements.

3.4 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Place material in continuous layers as follows:
   1. Sand: Maximum 12 inches compacted depth.
   2. Topsoil: Maximum 6 inches compacted depth.
   3. Imported Topsoil: Maximum 6 inches compacted depth.
   4. Imported Clay: Maximum 6 inches compacted depth.
   5. Substrate Restoration: Maximum 12 inches compacted depth.
   6. Log/Root Wad Backfill: Maximum 6 inches compacted depth.

C. Employ placement method that does not disturb or damage other Work.

D. Maintain optimum moisture content of backfill materials to attain required compaction density.

E. Make gradual grade changes. Blend slope into level areas.

F. Remove surplus backfill materials from site.

3.5 SAND BACKFILL

A. Backfill subgrade prior to placing imported topsoil or substrate restoration as shown on drawings and listed in paragraph 3.14.

B. If approved by OWNER in writing, place 6 inches of sand backfill over contaminated sediments for residual cover.

3.6 TOPSOIL BACKFILL

A. Prior to replacement of topsoil, any high traffic areas or other areas with soil compaction from equipment shall be restored to approximate original density to prepare for vegetation establishment.

B. Replace stripped topsoil stockpile to original areas.

3.7 IMPORTED CLAY BACKFILL

A. Backfill excavated streambank areas with imported clay as shown on the typical detail on the Drawings.

B. Compact clay backfill to dense, non-yielding condition using a vibratory compaction wheel excavator attachment or equivalent kneading compaction equipment. Statically compact as need to prevent damage to constructed Work, adjacent structures, or adjacent existing conditions.

C. Provide a smooth finish surface for slopes.

3.8 IMPORTED TOPSOIL BACKFILL

A. Backfill top 6 inches of excavations in wetland areas as shown on Drawings with imported topsoil to existing grade.

B. Backfill top 6 inches of excavated streambank areas above normal high water elevations with imported topsoil in accordance with typical detail shown on Drawings.

3.9 SUBSTRATE RESTORATION

A. Substrate restoration shall be installed to a minimum thickness of 12 inches in areas as defined on the Drawings. Substrate shall be amended with small woody debris within the channel pointbar zone as detailed on the contract drawings for each excavation zone. The finish grade of substrate restoration shall be that of the final finish grading contours as defined on the Drawings, with tolerances granted as part of excavation and grading specifications. Thickness of substrate materials may be thinner in specific areas where excavation 12 inches below finished grade is not achieved; these areas will include edges and other transitional areas where the material must be feathered out to meet grades. Fill below substrate restoration shall meet the specifications herein. Substrate restoration will be completed when the CONTRACTOR has installed materials and adjacent finished grades in the areas described by the contract drawings and as approved by the OWNER.

3.10 BOULDER CLUSTERS

A. INSTALLATION
   1. The CONTRACTOR is ultimately responsible for the means and methods of installation of the structures outlined in this specification. The CONTRACTOR shall institute means

and methods as required, to meet the goals and performance criteria specifications outlined herein.

2. The Work is to be performed in the channel utilizing the dewatering systems.

B. Tolerances

1. Surface elevations of boulder clusters shall conform to the spot elevations specified on the Contract Drawings or as approved by the OWNER. Tolerances of the finished structure are as follows:

Surface Elevation:	±0.5 ft
Slope:	±0.5 %

2. Placed material not conforming to the specified tolerance limits shall be removed and replaced as directed by the OWNER at no additional cost to the OWNER.

C. Placement

1. Placements are shown for boulder clusters in the Contract Drawings. Final rock locations and orientations shall be approved by OWNER.
2. Place each footer stone as shown in the Drawings. Footer stones should be placed on stable native material or furnished fill. Footer stones should be tipped lower on their upstream side. Install footer stones at or below finished grade using the tolerances shown in the Drawings details. Place boulders upon the footer stones, varying the orientation of the stones to create diversity of appearance. A total of six footer and boulder stone groups will be placed per cluster shown on the Drawings, utilizing the tolerances, dimensions, and elevation ranges as defined on the Drawings details, as well as the proposed finished grades for each location.

3.11 LOG/ROOT WADS

A. Place the Log/Root Wad Structures prior to meeting the final grades of the channel. Log/Root Wads shall be installed at the orientation as shown on the Drawing plan views and location/elevations as shown on Drawing details. Excavation for each Log/Root Wad Structure consists of digging a trench in the existing channel as shown on the Drawings. Native bed material may be placed around the log to better position the Anchor Rock such that 33 percent of the weight is on or overhanging the log. After the Log/Root Wad log and Anchor Rocks are installed, properly backfill the excavated trench with material removed during excavation of the trench.

B. Tolerances

1. Surface elevations of log/root wads shall conform to the spot elevations specified on the Contract Drawings or as directed by the OWNER. Tolerances of the finished structure are as follows:

Surface Elevation:	±0.5 ft
Slope:	±0.5 %

2. Placed material not conforming to the specified tolerance limits shall be removed and replaced as directed by the OWNER at no additional cost to the OWNER.

3.12 FIELD QUALITY CONTROL

A. Employ a Professional Geotechnical Engineer licensed in the State of Wisconsin to perform compaction testing.
   1. Perform one material classification in accordance with ASTMs D2487 for each type of imported fill per 500 cubic yards.
   2. Perform in place compaction tests in accordance with the following:
      a. Density Tests: ASTM D2922.
      b. Moisture Tests: ASTM D3017.
   3. Frequency of Tests: 1 per 500 cubic yards of fill, per type. Minimum of one per deposit per type.

B. Perform one standard and physical analysis at soil lab in accordance with this section for each 500 cubic yards of imported topsoil after any amendments have been added.

C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

3.13 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.

B. Reshape and re-compact fills subjected to vehicular traffic.

3.14 SCHEDULE

A. Wetland Backfill:
   1. Fill Type Sand, to 6 inches below existing/finish grade, compact uniformly to 95 percent of maximum density.
   2. Fill Type Imported Topsoil, from top of sand to existing/finish grade, avoid overcompacting topsoil. Compaction testing is not required.

B. Streambank Backfill:
   1. Fill Type Imported Clay, to 6 inches below final grade as shown on typical detail on Drawings, compact uniformly to 95 percent of maximum density.
   2. Fill Type Imported Topsoil, from top of imported clay sand to final grade as shown on typical detail on Drawings, avoid overcompacting topsoil. Compaction testing is not required.

C. Substrate Restoration:
   1. Fill Type Sand, to 12 inches below existing/finish grade, compact uniformly to 95 percent of maximum density.
   2. Fill Type Substrate Restoration, from top of substrate restoration to existing/finish grade. Compaction testing is not required.

D. Log/Root Wad Backfill:
   1. Fill with material excavated for installation of the log/root wad. Compact in maximum lifts as required in this section with use of a vibratory compactor or equivalent.

END OF SECTION

SECTION 32 01 90 – MAINTENANCE OF PLANTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Maintenance Period requirements.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Material labels/data sheets.

C. Material Safety Data Sheets (MSDSs).

D. Seed
   1. Certification of seed analysis (including weed content), and germination rate.
   2. Manufacturer and origin of each seed type.

E. State of Wisconsin Department of Agriculture, Trade and Consumer Protection commercial aquatic applicator license.

F. State of Wisconsin Department of Agriculture, Trade and Consumer Protection commercial For-hire Pesticide Applicators license.

G. Inspector qualifications and licenses. Submit updates throughout maintenance period as licenses expire and are renewed.

H. Maintenance Plan.

I. Comprehensive Reports.

1.3 APPLICABILITY

A. Maintenance Period requirements do not apply to turf grass areas.

1.4 DEFINITIONS

A. Pesticide includes all of the following: herbicide, insecticide, insect growth regulator, nematicide, termiticide, molluscicide, piscicide, avicide, rodenticide, predacide, bactericide, insect repellent, animal repellent, antimicrobial, fungicide, disinfectant (antimicrobial), and sanitizer.

B. Pest includes insects, mice and other animals, waterfowl, invasive species, unwanted plants (weeds), fungi, microorganisms such as bacteria and viruses, and prions and any other pests creating a nuisance.

C. Maintenance includes the actions necessary to establish healthy, viable habitats in accordance with the Contract Documents. This includes erosion repairs, irrigation, weed and invasive

species control, pest control, non-lethal waterfowl control, inspections, replanting of vegetation, and other actions necessary during the maintenance period.

D. Healthy vegetation includes trees and shrubs that have a minimum of 75 percent of plant showing sprouting and/or leaf production; and 90 percent coverage of native and no mow low grow grassed areas with no bare spots greater than 1 square foot in area.

E. Invasive species includes:
   1. Invasive species identified in invasive species rule (Wis. Adm. Code Ch. NR 40).
   2. Species identified in permits.
   3. Terrestrial plant species shall include but are not limited to those species listed on the Wisconsin Department of Natural Resources (DNR) "Regulated Terrestrial Invasive Plants in WI" list found at: http://dnr.wi.gov/topic/Invasives/species.asp?filterBy=Terrestrial&filterVal=Y
   4. Wetland plant species shall include but are not limited to those species listed on the Wisconsin DNR "Common Wetland Invasive Plants in WI" list found at: http://dnr.wi.gov/topic/Invasives/species.asp?filterBy=Wetland&filterVal=Y
   5. Aquatic plant species shall include but are not limited to those species listed on the Wisconsin DNR "Regulated Aquatic Invasive Plants in WI" list found at: http://dnr.wi.gov/topic/Invasives/species.asp?filterBy=Aquatic&filterVal=Y

1.5 DURATION

A. Maintenance of planting in accordance with Contract Documents shall begin on the date OWNER provides written approval of completion of the Vegetation Establishment Period in accordance with Section 32 90 00 – Planting.

B. Maintenance of planting in accordance with Contract Documents shall continue for two years following date OWNER provides written approval of completion of the Vegetation Establishment Period in accordance with Section 32 90 00 – Planting.

1.6 INSPECTOR

A. Inspector shall have a valid State of Wisconsin Department of Agriculture, Trade and Consumer Protection Commercial For-hire Pesticide Applicators license and shall have a minimum of 5 years experience conducting similar Work required by this Section.

B. Inspector shall follow all Federal, State and Local laws and regulations relating to Work required by this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Tools for Manual Removal. Equipment shall include, but is not limited to hand tools; lever based tools, machetes, power pruners/trimmers, chainsaws, metal blade brush cutters, brush axes/hooks, shovels, spading forks, loppers, hedge shears and associated safety equipment as approved by the OWNER. Limited use of wood chippers and mowers may be applicable. For mechanical removal of Phragmites, heavy equipment may be utilized as approved by the OWNER in the Maintenance Plan, and all applicable federal, state and local permits.

B. Glyphosate. Glyphosate consists of aquatic glyphosate (N-(phosphonomethyl) glycine) and surfactant as recommended by the manufacturer's label and approved by the State of Wisconsin for areas adjacent to wetland and waterway areas. Its primary action is in the application to active growing foliage.

C. Imazapyr. Imazapyr consists of imazapyr and surfactant as recommended by the manufacturer's label and approved by the State of Wisconsin for use in near waterways and wetlands. Imazapyr can be absorbed by roots and has a long residual, which must be sufficiently diminished prior to replanting of the areas treated. The CONTRACTOR shall coordinate Work to ensure that planting does not occur during the concurrent use of Imazapyr.

D. Additional herbicide materials may include, but are not limited to (*indicates examples of approved Trade Name Products):
   1. Aquatic non-ionic wetting agent – Alenza 90*
   2. Pathfinder II* (marker dye shall be added)
   3. Rodeo Herbicide*
   4. Triclopyr – Garlon 3A*, Garlon 4*

E. All herbicides may be utilized for application as approved by the OWNER and appropriate for the species and area of control. Application materials, surfactants, and other materials dependent on application means of execution shall be left to the CONTRACTOR to propose in their Maintenance Plan for OWNER approval, detailed in Section 01 31 13 – Project Coordination.

F. The CONTRACTOR shall not propose the use of Neonicotinoid pesticides, and all products shall be suitable for use adjacent to wetland and aquatic resources.

2.2 ACCESSORIES

A. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil. Fertilizer containing phosphorus shall not be used unless testing results indicate phosphorus is required to support the specified vegetation. Organic fertilizers (i.e. Milorganite®, compost, etc.) shall be given preference when their application is appropriate.

B. Water: Clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of grass.

C. Trees, shrubs, seed and FGM materials in accordance with Section 32 90 00 – Planting.

D. Pesticide Accessories: The CONTRACTOR shall use manufacturer recommended wetting agent, basal oil (when appropriate), and marking dye, or equivalents, as approved by the OWNER.

PART 3 EXECUTION

3.1 MAINTENANCE PLAN

A. The maintenance plan shall detail the CONTRACTORs technical approach to completing the maintenance period Work required by the Contract Documents while providing the best value to the OWNER. CONTRACTOR shall coordinate different Work elements to achieve the project remedial action objectives.

B. The CONTRACTOR shall submit and obtain OWNER approval of a treatment plan and authorization for herbicide usage within the riparian corridor from the State of Wisconsin for the invasive species removal and control. Mapping showing the proposed limits of removal and treatment methods shall be included as part of a removal plan to be submitted to the OWNER. This plan must also address the onsite segregation and storage of materials containing invasive species materials, and the disposal plan for these materials offsite. The plan will address ongoing maintenance of the invasive species which may arise in planted and seeded areas, and spot application or otherwise selective removal for those undesirable species. The maintenance plan shall be revised to address all comments provided by the OWNER.

C. CONTRACTOR shall submit the maintenance plan within 120 calendar days after receiving Notice of Award from the OWNER, or prior to 30 days of beginning the Maintenance period; whichever is sooner. No adjustment for time or money will be made if resubmittals of the Maintenance Plan are required due to deficiencies in the plan.

D. The Maintenance Plan shall coordinate different Work items and address the technical requirements listed in the specifications, drawings and permits to ensure undesired plant species are not establishing in the Work area and the desired species are maintained and replaced. The maintenance plan shall include, but is not limited to, the following:
   1. Means and methods for pest control, watering, inspection, reporting and replacement of plantings.
   2. Site inspection forms.
   3. Vegetation maintenance log.
   4. Pesticide application forms.
   5. Inspector license, qualifications and experience.
   6. Procedure for quantifying invasive species.

3.2 PREPARATION

A. Pre-Installation Meeting
   1. Schedule and hold a pre-installation meeting with the OWNER prior to implementing the first invasive species control activities.
   2. Identify locations of invasive species control activities.
   3. Review project and regulatory requirements.
   4. Review Maintenance Plan.
   5. Additional requirements listed in Section 01 30 00 – Administrative Requirements.

3.3 MAINTENANCE INSPECTIONS

A. Shall be completed by CONTRACTOR on at least a monthly basis during the growing season (1 May – 15 October) and quarterly during non-growing season.

B. Work shall include biosecurity and equipment cleaning to limit the potential of introduction of invasive species on the project site.

C. Measures shall be taken to prevent damage to grassed areas from waterfowl.

D. Control of weeds and invasive species shall require manual removal and herbicide application, depending on the time of year, species specific protocol, and as approved by the OWNER in the Maintenance Plan.

E. CONTRACTOR shall maintain native and no mow low grow grassed areas to remove 100% of invasive species throughout maintenance period.

F. Invasive species plant material shall require removal and disposal from the treatment areas in accordance with the OWNER approved Maintenance Plan, permits, laws and regulations.

G. The OWNER may instruct the CONTRACTOR to perform invasive species control at any point during the project. Control may require manual removal or herbicide treatment, or both, depending on conditions. The CONTRACTOR shall perform the Work according to the Contract Documents, regardless of schedule or Work load. The CONTRACTOR is advised that delays to other components of the restoration project shall not be granted or allowed due to invasive species control management. The CONTRACTOR shall provide sufficient manpower to execute all aspects of invasive control Work, concurrently with the restoration, whenever necessary.

H. The CONTRACTOR shall be responsible for obtaining all necessary permits prior to initiating herbicide application.

I. Control pests as needed to maintain vegetation growth.

J. Immediately reseed areas showing bare spots.

K. Repair washouts or gullies.

L. Conduct maintenance and implement Maintenance Plan as approved by OWNER.

M. Conduct maintenance in a manner to minimize the spread of invasive species.

3.4 REPLANTING

A. Replant trees and shrubs planted by CONTRACTOR that have died or are having declining health during the maintenance period.

B. CONTRACTOR shall replant vegetation at areas:
   1. where vegetative cover is less than 95 percent. Each vegetation type shall be measured independently.
   2. with bare spots larger than 0.25 square feet. Each vegetation type shall be measured independently.

3.5 REPORTING

A. A comprehensive report shall be updated and submitted to the OWNER following each maintenance inspection. The report shall document all actions conducted by the CONTRACTOR during the maintenance period. The report shall include:
   1. Summary of inspection and maintenance logs, and pesticide applications.
   2. Summary of pest control measures and schedule of operations.

3. Map detailing location of maintenance performed.
4. Summary of correspondence.
5. Detailed discussion of Work completed during maintenance inspection and comparison to Work required to be completed during maintenance inspection.
6. Detailed discussion of Work required for the next maintenance inspection.
7. Quantify the percentage of vegetation planted by CONTRACTOR that is healthy and meets Contract Document requirements for closeout of the maintenance period.
8. Quantify the percentage of invasive species at areas vegetated by CONTRACTOR. Estimate monthly and quantify in accordance with Daubenmire Method or other OWNER approved method for maintenance period closeout.
9. Provide rainfall and irrigation during the period.
10. Provide copies of inspection and maintenance logs, and pesticide application forms in an appendix.
11. Provide photographs of each area vegetated in accordance with Section 32 90 00 – Planting for each maintenance inspection.

3.6 PROGRESS MEETINGS

A. At the OWNER's discretion, progress meetings may be required to be held on-site to review site activities and progression of maintenance activities. OWNER will notify CONTRACTOR of personnel required to attend.

3.7 MAINTENANCE PERIOD CLOSEOUT REQUIREMENTS

A. Healthy vegetation of each type of vegetation at completion of maintenance period duration.

B. Less than 5 percent invasive species at areas vegetated by CONTRACTOR at completion of maintenance period duration.

C. Final comprehensive report documenting maintenance period closeout requirements have been achieved.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Asphaltic concrete paving, lower and upper layers

B. Replace asphalt pavement removed for new Work

C. Aggregate base course

D. Permanent pavement markings

E. Signage

1.2 SUBMITTALS

A. Material labels and data sheets

1.3 QUALITY ASSURANCE

B. Perform Work in accordance with the Asphalt Institute Manual MS-4 and the State of Wisconsin Department of Transportation (WisDOT), Standard Specifications for Highway and Structure Construction.

C. Also perform Work in Accordance with the Americans with Disability Act.

D. To ensure quality control, provide copies of mix design test results for air voids and density for Type E-0.3 asphaltic concrete pavement as prepared by independent testing laboratories or by WisDOT Materials Laboratory to the OWNER.

E. If the County requests, submit samples of the asphalt concrete, binder, and aggregate for independent testing.

F. Mixing Plant shall conform to WisDOT, Standard Specifications for Highway and Structure Construction.

G. Asphalt Ticket Requirements
   1. Immediately place delivery tickets for loads delivered to the project on a clipboard on the paving machine. Alternately, place the tickets in a location on the job site which is acceptable to the County Construction Coordinator.
   2. Tickets given to the County representative after the fact will not be accepted.
   3. Each ticket shall include the following information:
      a. Name, plant number and location of the plant.
      b. Name of contractor purchasing the material.
      c. Project location.
      d. Date.
      e. Type of mixture.
      f. Maximum size of aggregate.
      g. Truck number.

h. Net weight of load. Each ticket shall have the weight stamped by an automatic type register beam platform scale or marked by a bonded weighmaster.

1.3 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Do not place asphalt upper layer when air temperature is less than 50 degrees F.

1.4 JOB CONDITIONS

A. Do not work during freezing weather or on wet or frozen subgrade or subbase. Water, if required, may be obtained from existing facilities.

B. Protect other finished Work from splatter or spray of asphalt, etc.

C. Visit site to verify existing conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials and Workmanship: Conform to following Sections of the WisDOT Standard Specification.

B. Preparation and Stone Base
1. Crushed Gravel Base Course shall conform to gradation for 1¼ inch stone as set forth in Section 305.2.2.1, except that the amount of material passing the No. 200 sieve between 7 percent and 12 percent of the Standard Specifications.

C. Bituminous concrete pavement shall conform to Sections 450, 455, 460, and 465 of the WisDOT Standard Specification.
1. Provide HMA Type E-0.3 plant-mixed asphaltic concrete mixture conforming to the approved mix design.
2. Aggregates used in the bituminous concrete pavement courses shall be crushed stone conforming of the following gradation requirements of Section 460.2.7 of the WisDOT Standard Specification:
   a. Lower Layer – WisDOT Type E-0.3, nominal 12.5 mm, and asphaltic cement with a performance graded designation of PG 58-28.
   b. Upper Layer - WisDOT Type E-0.3, nominal 9.5 mm, and asphaltic cement with a performance graded designation of PG 64-22.

3. Asphaltic concrete mixes used for surface course and binder course may contain salvaged or reclaimed asphaltic material in accordance with Subsection 460.2.5 and 460.2.6 of the WisDOT Standard Specification, except salvaged material shall be limited to 25 percent RAP for lower layer and up to 20 percent RAP for upper layer.

PART 3 EXECUTION

3.1 PREPARATION OF SUBGRADE

A. Check subgrade for soundness, outline and contour. Prepare subgrade for areas to be paved by excavating, removing existing, and scraping down bumps and irregularities to obtain smooth, even bed. Provide excavation required for gravel base and remove existing asphalt paving and base for new asphalt paving.

B. Where new paving meets existing pavement, saw-cut existing pavement and remove existing pavement minimum of 2 inches deep for application of new topping. Feather edging of topping will not be permitted. Saw-cut straight line where new pavement abuts existing.

C. Verify that compacted subgrade and soil is dry and ready to support paving loads.

D. Verify that gradients and elevations of base are correct.

E. Remove excavated and removed asphalt from site.

F. Final asphalt grade on trail to match existing elevation of manhole(s) that fall within the limits of the new asphalt trail.

3.2 PREPARATION OF BASE

A. On prepared sub-bed place crushed stone base course, blade smooth and compact.

B. On first lift of base course, apply second layer and compact. Bring to true grade with variation of not more than 3/8 inch in 10'-0" from profile and section.

3.3 THICKNESS REQUIREMENTS

A. The following thicknesses are minimums:
   1. Crushed stone base shall be 6 inches thick after compaction, over prepared subgrade, unless otherwise noted on the plan.
   2. Hot mix asphalt pavement shall be 3.5-inches thick with lower layer 2-inches thick and upper layer 1.5-inches thick.

3.4 INSTALLATION

A. Place asphaltic lower and upper layer over the base. Mix temperature shall be within the temperature range the mixture design specifies. Spread mixture mechanically as possible. Hand place from steel dump boards by means of hot shovels. Hand spread with hot rakes of suitable design.

B. Except when used for paving entrances, approaches, side road connections, and other small irregular areas, the paver shall be equipped with an approved automatic control system, capable of automatically controlling the elevation and slope of the screed in accordance with Section 450.3.1.4 of the WisDOT Standard Specification.

C. Where new pavement abuts existing pavement, construct a butt-type joint conforming to Section 450.3.2.8 of the WisDOT Standard Specification.

D. Apply a tack coat consisting of a one-part emulsified asphalt MS-2 to the lower layer prior to the construction of the upper layer. Apply the tack coat at the rate of 0.05 to 0.10 gallons per square yard. Include price in unit price bid for bituminous concrete pavement - surface.

E. Include adjustments to manholes, valve boxes, etc., in the paving Work.

3.5 COMPACTION

A. Equipment used for compaction shall be suited to produce the required results and shall be subject to the approval of OWNER. Compaction of bituminous concrete material shall conform to the requirements of Section 450.3.2.6 of the WisDOT Standard Specification.

B. Use sidewalk-type rollers in areas not accessible with standard-size equipment. Mechanical tampers will be permitted only with permission of OWNER.

C. Compact stone with mechanical equipment to meet requirements for special compaction as designated in paragraph 207.3.6.3 of the WisDOT Standard Specification.

D. Compaction of bituminous concrete shall meet requirements of Section 450.3.2.6 of the WisDOT Standard Specification. Mechanical tampers may be used only with OWNER's permission.

E. Edges of asphalt pavement shall be luted, or hand compacted.

3.6 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

3.7 CURING

A. Do not permit traffic on pavement until it has cooled and hardened; and in no case for at least 24 hours.

3.8 CLEANING

A. At completion of work, remove rubbish, debris, dirt, equipment and excess material from site. Clean adjoining surfaces that were soiled by and during course of this Work.

END OF SECTION

SECTION 32 90 00 - PLANTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fertilizing
   2. Hydroseeding
   3. Vegetation Establishment Period

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Material labels/data sheets.

C. Material Safety Data Sheets (MSDSs).

D. Seed
   1. Certification of seed analysis (including weed content), and germination rate.
   2. Manufacturer and origin of each seed type.

E. State of Wisconsin Department of Agriculture, Trade and Consumer Protection commercial aquatic applicator license.

F. State of Wisconsin Department of Agriculture, Trade and Consumer Protection commercial For-hire Pesticide Applicators license.

PART 2 PRODUCTS

2.1 MATERIALS

A. Flexible Growth Medium (FGM)
   1. Manufacturers:
      a. PROFILE Products LLC, 800-508-8681; Flexterra® HP-FGM (made with recycled wood fibers).
      b. Or approved equal.

B. Upland Tree Planting

Common Name	Scientific Name
RED ELDER	SAMBUCUS RACEMOSA
BLACK-HAW	VIBURNUM PRUNIFOLIUM
BITTERNUT HICKORY	CARYA CORDIFORMIS
KENTUCKY COFFEETREE	GYMNOCLADUS DIOICA
AMERICAN ELM, PRINCETON VARIETY	ULMUS AMERICANA
BUR OAK	QUERCUS MACROCARPA
AMERICAN BASSWOOD	TILIA AMERICANA

C. Wetland Tree Planting
   1. Equal mix of 1 to 3 gallon containerized canopy trees, understory trees, and shrubs throughout disturbed wetlands.
   2. Final selection of plant stock will be determined to some extent by availability. The species listed below represent a list of species that were identified during the wetland delineation as occurring onsite and native to the region and shall be used if available.
   3. If used, Black-Haw/Viburnum seed source must be from within 50 miles of site.

Common Name	Scientific Name	Type	Planting Rate (Stems/Acre)
SILVER MAPLE SWAMP WHITE OAK RED MAPLE BITTERNUT HICKORY	ACER SACCHARINUM QUERCUS BICOLOR ACER RUBRUM CARYA CORDIFORMIS	Trees	305
HIGHBUSH CRANBERRY COMMON ELDERBERRY RED OSIER DOGWOOD NANNYBERRY GRAY DOGWOOD	VIBURNUM OPULUS SAMBUCUS CANADENSIS CORNUS STOLONIFERA VIBURNUM LENTAGO CORNUS RACEMOSA	Shrubs	131
WOOD NETTLE JEWELWEED FALSE NETTLE	LAPORTEA CANADENSIS IMPATIENS CAPENSIS BOEHMERIA CYLINDRICA	Herbaceous	2,180

D. Native Grass
   1. Seed Suppliers:
      a. Native seed genetic sources must be from within 150 miles of the site.
      b. Shooting Star Native Seeds, 20740 County Road 33; Spring Grove, MN 55974,
      c. Or approved equal.
   2. Seed Mixture:

Seed	Seeding Rate (lbs PLS/Acre)
Big Bluestem	4.05
Fringed Brome	1.35
Blue Joint Grass	0.27
Reed Manna Grass	0.54
Indiangrass	4.05
Prairie Cord Grass	1.35
Bottlebrush Sedge	0.14
Brown Fox Sedge	0.14
Green Bulrush	0.05
Woolgrass	0.03
Softstem Bulrush	0.08
Swamp Milkweed	2.05
Flat-topped Aster	0.14
Mountain Mint	0.27
Riddell's Goldenrod	0.27
Purple Meadow Rue	0.89
Golden Alexanders	1.09

E. No mow/low grow grass:
   1. Seed Suppliers:
      a. Reinders Inc.; 13400 Watertown Plank Road; Elm Grove, WI 53122.
      b. Or approved equal.
   2. Seed Mixture: Reinder Inc., No mow/low grow seed mix, or equivalent.

Seed	Seeding Rate (lbs PLS/Acre)
Spartan Hard Fescue	90
Azay Sheep Fescue	80
Transit Annual Ryegrass	30

F. Turfgrass
   1. Seed Suppliers:
      a. Reinders Inc.; 13400 Watertown Plank Road; Elm Grove, WI 53122.
      b. Or approved equal.
   2. Seed Mixture: Reindeer, Deluxe 50 Seed Mix, or equivalent.

Seed	Seeding Rate (lbs PLS/Acre)
Kentucky Bluegrass (sod quality)	40
Newport Kentucky Bluegrass	30
Ken Blue Kentucky Bluegrass	30
Creeping Red Fescue	50
Quebec Perennial Ryegrass	30
Fiesta III Perennial Ryegrass	20

2.2 ACCESSORIES

A. Starter Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil. Fertilizer containing phosphorus shall not be used unless testing results indicate phosphorus is required to support the specified vegetation. Organic fertilizers (i.e. Milorganite®, compost, etc.) shall be given preference when their application is appropriate.

B. Water: Clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of grass. Water may be obtained from the Milwaukee River in accordance with Federal, State and Local laws and regulations and permits.

C. Pesticides: In accordance with Federal, State and Local laws and regulations and Section 32 01 90 – Maintenance of Planting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting Work.

B. Verify prepared soil base is ready to receive the Work of this section.

3.2 FERTILIZING

A. Do not apply fertilizer to wetland areas or within 50 feet of Milwaukee River.

B. Apply fertilizer at application rate and frequency recommended by testing laboratory.

C. Do not apply fertilizer at same time or with same machine used to apply seed.

D. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

3.3 WETLAND PLANTING

A. The trees and shrubs shall not be planted in a grid-like pattern, rather they shall follow a random planting scheme where all plants are installed following the overall average spacing. However, the spacing of plant material may vary from two to three feet above or below the average 10 foot spacing.

B. Herbaceous plant species will be planted intermittently between shrubs and trees as necessary to provide adequate cover.

C. Plant wetland trees and native grass in wetland areas shown on the Drawings disturbed while completing the Work.

D. Trees, shrubs and herbaceous species shall be selected and planted at appropriate locations conducive to the species.

E. Native grass seeding dates shall be as follows, unless other dates are pre-approved by OWNER:
   1. Spring seeding between May 1st thawing and June 30th, or
   2. Dormant fall seeding between October 20th and ground freezing.
   3. If possible seeding dates shall be near the mid-point of the above ranges.

3.4 UPLAND TREE PLANTING

A. Upland trees removed in accordance with Section 31 10 00 – Site Clearing shall be replaced. Tree types shall be in accordance with this Section.

B. CONTRACTOR shall obtain OWNER approval of the type of tree to be replanted at specific locations.

3.5 NATIVE GRASS PLANTING

A. In addition to wetland planting, plant native grass mix on all river banks disturbed while completing the Work.

B. Native grass seeding dates shall be as follows, unless other dates are pre-approved by OWNER:
   1. Spring seeding between May 1st and June 30th, or
   2. Dormant fall seeding between October 20th and ground freezing.
   3. If possible seeding dates shall be near the mid-point of the above ranges.

3.6 NO MOW LOW GROW GRASS PLANTING

A. Restore disturbed areas with no mow low grow at areas shown on the Drawings.

3.7 TURF GRASS PLANTING

A. All areas disturbed by the CONTRACTOR that are not restored with native grass or no mow/low grow shall be restored with turf grass.

3.8 HYDROSEEDING

A. Native grass, no mow low grow, and turf grass seeding shall be applied by hydroseeding with FGM as listed below:
   1. Native Grass – 3,500 lbs/acre
   2. No mow low grow – 3,500 lbs/acre
   3. Turf grass – 2,500 lbs/acre.

B. Apply FGM and seeded slurry with hydraulic seeder at rates specified in Part 2 of this Section.

3.9 VEGETATION ESTABLISHMENT PERIOD

A. Native grass, turf grass, and no mow low grow seeded areas shall be watered (after FGM has cured) during the first growing season (1 May – 15 October) at a minimum as follows:
   1. Water twice a day (to apply a minimum of ¼ inch per watering event) for 7 days to promote seed germination, then
   2. Water once a day (to apply a minimum of ¼ inch per watering event) for 7 days, then
   3. Water three times a week to apply a minimum of 1 inch per week for an additional 28 days.
   4. Skip the next watering event if a rain event occurs that is greater than the amount to be applied during that water event.

B. Areas compacted from equipment during watering events shall be repaired and soil density shall be reduced to approximate surrounding soil density.

C. Control growth of weeds. Apply herbicides to turf grass seeded areas. Remedy damage resulting from improper use of herbicides. Manually or mechanically remove weeds from native and no mow low grow areas or complete weed removal by other methods in these areas as approved by OWNER.

D. Control pests that may hinder vegetation establishment.

E. Measures shall be taken to prevent damage to grassed areas from waterfowl.

F. Immediately reseed and water areas showing bare spots.

G. Repair washouts or gullies.

H. Remove temporary fencing after OWNER authorizes removal.

I. Mow turf grass to 2 inches after turf grass height reaches 3 inches, and mow to maintain turf grass height from exceeding 3.5 inches.

J. Vegetation Establishment Period execution shall continue until:
   1. Minimum watering events have been completed.

2. Vegetative cover is established over 80 percent of hydroseeded areas. Each vegetation type shall be measured independently.
3. Not more than 10 percent of areas with bare spots larger than 1 square foot. Each vegetation type shall be measured independently.
4. Less than 10 percent invasive species are present at turf grass areas vegetated by CONTRACTOR.
5. Approval by Land Owners.
6. Written approval by OWNER.

END OF SECTION

Appendix C

Engineering Calculations

EPA GLAES
LINCOLN PARK PHASE II FINAL DESIGN
Appendix C, Table 1: Contingency Volume Estimate

Deposit	Total *in-situ* Volume (cy)	Contaminated Volume (cy)	Overburden Volume (cy)	TSCA Volume (cy)	Non-TSCA Volume (cy)	Core Recovery (%)	Core Contingency (%)	Horizontal Contingency (%)	Over-Dredge Prism Factor (%)	Estimated TSCA Volume (cy)	Estimated Non-TSCA Volume (cy)
Deposit 7-1	906	92	814	0	906	70%	43%	20%	0%	0	1553
Deposit 7-2	5382	2775	2607	50	5332	71%	41%	20%	0%	85	9012
Deposit 7-3	5086	2548	2538	0	5086	71%	41%	20%	0%	0	8596
Deposit 7-4 (Northern Portion	2809	595	2214	0	2809	84%	19%	20%	0%	0	4013
Deposit 7-4 (Southern Portion	147	31	116	0	147	84%	19%	20%	25%	0	263
Deposit 3b-1	748	632	116	0	748	81%	23%	20%	0%	0	1108
Deposit 4-1	288	181	107	0	288	77%	30%	20%	0%	0	449
Deposit 4-2	422	249	173	0	422	73%	37%	20%	0%	0	694
Deposit 4-3	173	83	90	0	173	84%	19%	20%	25%	0	309
Deposit 5-1	4865	3659	1206	121	4744	60%	67%	20%	0%	242	9488
Total	20,826	10,845	9,981	171	20,655					327	35,485

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EPA GLAES
LINCOLN PARK PHASE II FINAL DESIGN
Appendix C, Table 2: Dry Excavation Disposal Quantity Backup

IN-SITU CONDITION				IN-DRY HANDLING CONDITION (ADD PRECIPITATION TO THIS FOR TOTAL			POST-DEWATERED CONDITION			
				Specific Gravity of Slurry	1.78					
Specific Gravity of Solids	2.66			Specific Gravity of Solids	2.66		Specific Gravity of Solids	2.66		
Moisture Content	28.1%		Avg.	Moisture Content	43%		Moisture Content	28%		
Water Density	62.4	pcf		Water Density	62.4	pcf	Water Density	62.4	pcf	
Degree of Saturation	100%			Degree of Saturation	100%		Degree of Saturation	100%		
Moist Density	121.7	pcf		Moist Density			Moist Density	121.7	pcf	
Saturated Density	121.7	pcf		Saturated Density	110.8	pcf	Saturated Density	121.7	pcf	
Dry Density	95.0	pcf		Dry Density	77.6	pcf	Dry Density	95.1	pcf	
Submerged Density	59.3	pcf		Submerged Density			Submerged Density	59.3	pcf	
Void Ratio	0.7			Void Ratio	1.1		Void Ratio	0.7		
Porosity	0.4			Porosity	0.5		Porosity	0.4		
In-situ Volume	35240	cy		Slurry Volume	43156	cy	Post-Dewatered Volume	35208	cy	
In-situ Volume	9.51E+05	cf		Slurry Volume	1.17E+06	cf	Post-Dewatered Volume	9.51E+05	cf	
In-situ Volume	7.12E+06	gal		Slurry Volume	8.72E+06	gal	Post-Dewatered Volume	7.11E+06	gal	
Water Mass	2.5E+07	lb		Water Mass	3.9E+07	lb	Water Mass	2.5E+07	lb	
Solids Mass	9.0E+07	lb		Solids Mass	9.0E+07	lb	Solids Mass	9.0E+07	lb	
Solids Mass	4.5E+04	ton		Solids Mass	4.5E+04	ton	Solids Mass	4.5E+04	ton	
Solids Volume	5.4E+05	cf		Solids Volume	5.4E+05	cf	Solids Volume	5.4E+05	cf	
Water Volume	4.1E+05	cf		Water Volume	6.2E+05	cf	Water Volume	4.1E+05	cf	
Air Volume	0.0E+00	cf		Air Volume	0.0E+00	cf	Air Volume	0.0E+00	cf	
Voids Volume	4.1E+05	cf		Voids Volume	6.2E+05	cf	Voids Volume	4.1E+05	cf	
Total Mass	1.2E+08	lb		Total Mass	1.3E+08	lb	Total Mass	1.2E+08	lb	
Total Volume	9.5E+05	cf	Check	Total Volume	1.2E+06	cf	Total Volume	9.5E+05	cf	
Moist Density	121.7	pcf	Check	Slurry Density	110.8	pcf	Moist Density	121.7	pcf	Check
Moist Density	1.6	ton/cy					Moist Density	1.6	ton/cy	
				Volume Bulking Factor	1.2		Volume Bulking Factor	1.0		
	12698.0				19366.5			12671.3		
Percent Solids by Volume	57%			Percent Solids by Volume	47%		Percent Solids by Volume	57%		
Percent Water by Volume	43%			Percent Water by Volume	53%		Percent Water by Volume	43%		
Percent Solids by Mass	78.1%			Percent Solids by Mass	70%		Percent Solids by Mass	78.1%		
Percent Water by Mass	22%			Percent Water by Mass	30%		Percent Water by Mass	22%		

* Moist Density and Volume Bulking Factors are used in Design to estimate disposal quantities.

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LINCOLN PARK PHASE II FINAL DESIGN
Appendix C, Table 3: Hydraulic Dredging Disposal Quantity Backup

IN-SITU CONDITION				SLURRY CONDITION			POST-DEWATERED CONDITION			
				Specific Gravity of Slurry	1.11					
Specific Gravity of Solids	2.73	Volume Weighted Avg		Specific Gravity of Solids	2.73		Specific Gravity of Solids	2.73		
Moisture Content	28.6%	Volume Weighted Avg		Moisture Content	567%		Moisture Content	82%		
Water Density	62.4	pcf		Water Density	62.4	pcf	Water Density	62.4	pcf	
Degree of Saturation	100%			Degree of Saturation	100%		Degree of Saturation	100%		
Moist Density	123.0	pcf		Moist Density			Moist Density	95.8	pcf	
Saturated Density	123.0	pcf		Saturated Density	69.0	pcf	Saturated Density	95.8	pcf	
Dry Density	95.7	pcf		Dry Density	10.3	pcf	Dry Density	52.7	pcf	
Submerged Density	60.6	pcf		Submerged Density			Submerged Density	33.4	pcf	
Void Ratio	0.8			Void Ratio	15.5		Void Ratio	2.2		
Porosity	0.4			Porosity	0.9		Porosity	0.7		
In-situ Volume	572	cy		Slurry Volume	5290	cy	Post-Dewatered Volume	1039	cy	
In-situ Volume	1.54E+04	cf		Slurry Volume	1.43E+05	cf	Post-Dewatered Volume	2.80E+04	cf	
In-situ Volume	1.16E+05	gal		Slurry Volume	1.07E+06	gal	Post-Dewatered Volume	2.10E+05	gal	
Water Mass	4.2E+05	lb		Water Mass	8.4E+06	lb	Water Mass	1.2E+06	lb	
Solids Mass	1.5E+06	lb		Solids Mass	1.5E+06	lb	Solids Mass	1.5E+06	lb	
Solids Mass	7.4E+02	ton		Solids Mass	7.4E+02	ton	Solids Mass	7.4E+02	ton	
Solids Volume	8.7E+03	cf		Solids Volume	8.7E+03	cf	Solids Volume	8.7E+03	cf	
Water Volume	6.8E+03	cf		Water Volume	1.3E+05	cf	Water Volume	1.9E+04	cf	
Air Volume	0.0E+00	cf		Air Volume	0.0E+00	cf	Air Volume	0.0E+00	cf	
Voids Volume	6.8E+03	cf		Voids Volume	1.3E+05	cf	Voids Volume	1.9E+04	cf	
Total Mass	1.9E+06	lb		Total Mass	9.8E+06	lb	Total Mass	2.7E+06	lb	
Total Volume	1.5E+04	cf	Check	Total Volume	1.4E+05	cf	Total Volume	2.8E+04	cf	
Moist Density	123.0	pcf	Check	Slurry Density	69.0	pcf	Moist Density	95.8	pcf	Check
Moist Density	1.7	ton/cy					Moist Density	1.3	ton/cy	
				Volume Bulking Factor	9.2		Volume Bulking Factor	1.8		
Percent Solids by Volume	56%			Percent Solids by Volume	6%		Percent Solids by Volume	31%		
Percent Water by Volume	44%			Percent Water by Volume	94%		Percent Water by Volume	69%		
Percent Solids by Mass	77.8%			Percent Solids by Mass	15%		Percent Solids by Mass	55.0%		
Percent Water by Mass	22%			Percent Water by Mass	85%		Percent Water by Mass	45%		

* Moist Density and Volume Bulking Factors are used in Design to estimate disposal quantities.

May 2014
Revision: 00
EA Project No.: 62561.05

EPA GLAES
LINCOLN PARK PHASE II FINAL DESIGN
Appendix C, Table 4: Wastewater Treatment Capacity Evaluation

Project: Lincoln Park Phase 2

Subject: Water Treatment Capacity Evaluation

Computed by: JRB Date: 12/16/2013 Checked by: JT Date: 12/20/2013

Objective:
Evaluate water treatment plant capacity versus construction schedule constraints assuming cofferdams 2, 4, 3 and 1 are dewatered sequentially.

Assumptions:

Maximum 600 gpm pumping from cofferdam to the wastewater treatment system.
Smaller pumps (~50 gpm) are used to maintain the cofferdams after initial dewatering is completed.
Cofferdam 2 initial dewatering rate of 600 gpm.
Cofferdam 4 initial dewatering rate of 550 gpm.
Cofferdam 3 initial dewatering rate of 500 gpm.
Cofferdam 1 initial dewatering rate of 450 gpm.
An average of 1 foot of water within the cofferdams is required to be treated for Phase 2.
Minimal area is available for temporary water storage.
Water over 1 foot depth would be pumped through bag filters and discharged without going through the treatment plant. Time required to complete this is minimal.
Hydraulic dredging water production peak will not be at the same time as the initial cofferdam dewatering.
24-hr per day pumping.

Procedure:
Utilize AutoCAD to determine the area within each cofferdam. Based on the areas and 1 foot of water depth, calculate the required time to pump the bottom 1 foot of water. Insert calculated days for initial dewatering into project schedule. Increase water treatment capacity if schedule reduction is needed.

Cofferdam Areas:

Location	Total Area (sf)	Initial Dewatering Depth (ft)	Water Volume (gallons)
Cofferdam 1	54,000	1	403,920
Cofferdam 2	750,000	1	5,610,000
Cofferdam 3	66,000	1	493,680
Cofferdam 4	167,000	1	1,249,160
Totals	**1,037,000**		**7,756,760**

Location	Initial Dewatering Rate (gpm)	Initial Dewatering Time (Hrs)	Initial Dewatering Times (days)
Cofferdam 1	450	15	1
Cofferdam 2	600	156	7
Cofferdam 3	500	16	1
Cofferdam 4	550	38	2
Totals			**11**

Conclusion:
Project Schedule indicates project can be completed within clients schedule requirements with a 600 gpm capacity wastewater treatment system.

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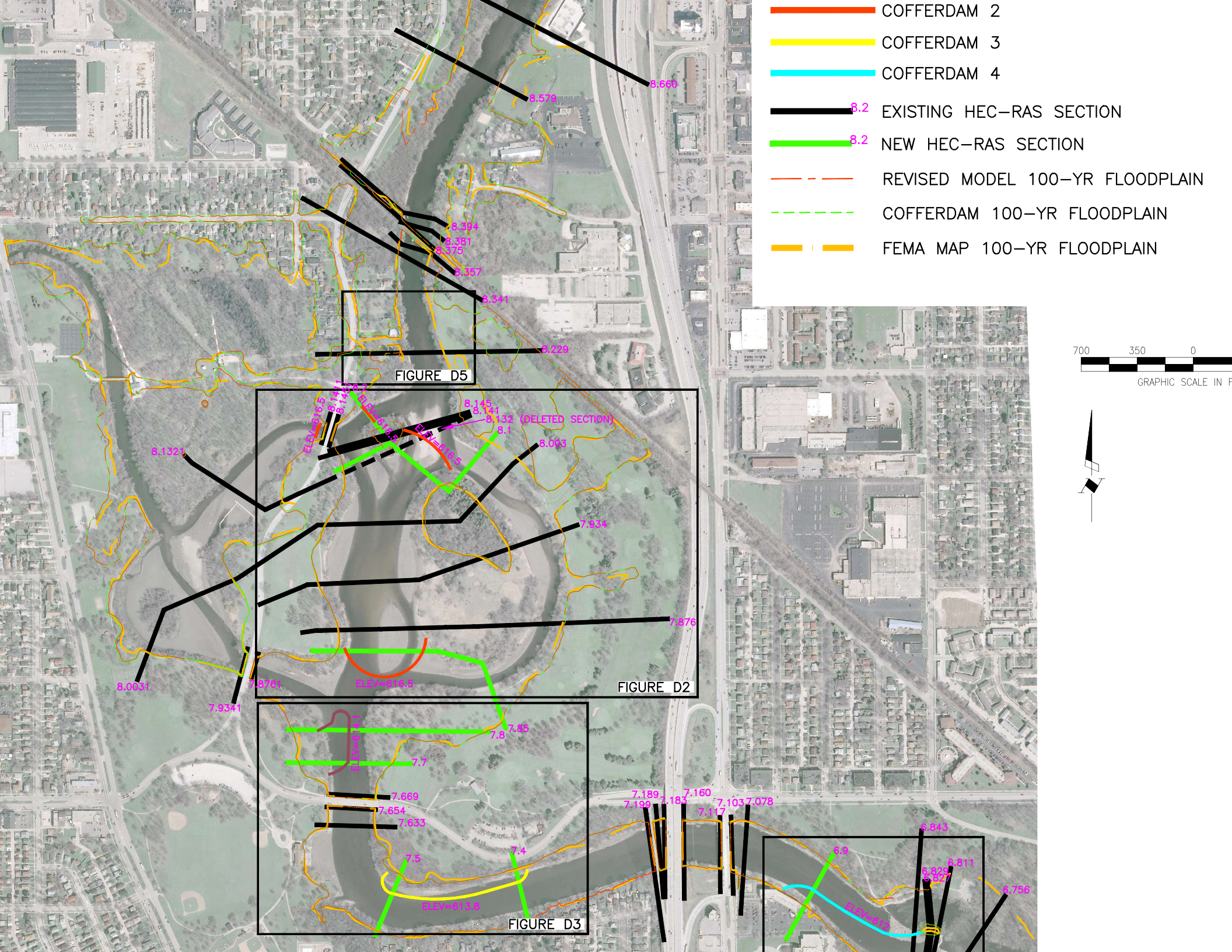
Appendix D

Hydraulic Model

10-Year		100-Year		1,060 CFS		2-Year		10-Year	100-Year		Top of Dam	1,060 CFS	2-Year	10-Year	100-Year	
Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)	Q Total (cfs)	W.S. Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)	Difference B vs A (ft)	Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)	W.S. Elev (ft)	Difference C vs B (ft)
8790	647.94	14340	650.69	1060	640.77	4670	645.16	647.94	650.69	**0**		640.77	645.16	647.94	650.69	**0.00**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	622.67	14340	625.99	1060	615.27	4670	619.6	622.78	626.1	**0.11**		616.61	619.86	622.89	626.18	**0.08**
8790	622.68	14340	626	1060	615.26	4670	619.6	622.78	626.11	**0.11**		616.61	619.85	622.89	626.19	**0.08**
8790	622.54	14340	625.87	1060	615.12	4670	619.47	622.65	625.99	**0.12**		616.57	619.74	622.76	626.06	**0.07**
8790	622.27	14340	625.55	1060	614.96	4670	619.26	622.39	625.68	**0.13**		616.53	619.56	622.51	625.76	**0.08**
8790	621.62	14340	624.81	1060	614.7	4670	618.76	621.77	624.96	**0.15**		616.44	619.11	621.92	625.06	**0.10**
8790	620.95	14340	623.96	1060	614.51	4670	618.33	621.13	624.15	**0.19**		616.39	618.75	621.32	624.27	**0.12**
8790	620.89	14340	623.91	1060	614.46	4670	618.28	621.08	624.1	**0.19**		616.38	618.71	621.27	624.23	**0.13**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	619.85	14340	622.65	1060	614.09	4670	617.68	620.19	623.03	**0.38**		616.34	618.29	620.48	623.24	**0.21**
8790	620.23	14340	623.13	1060	614.18	4670	617.9	620.53	623.47	**0.34**		616.36	618.46	620.79	623.65	**0.18**
8790	620.11	14340	623.03	1060	614.16	4670	617.82	620.43	623.38	**0.35**		616.35	618.4	620.7	623.57	**0.19**
-	-	-	-	114.56	614.14	610.1	617.83	620.48	623.53	-	**616.5**	NA*	618.36	620.74	623.7	**0.17**
1151.53	620.13	1855.11	623.12	114.56	614.13	610.1	617.8	620.44	623.47	**0.35**		NA*	618.38	620.74	623.69	**0.22**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
1151.53	620.13	1855.11	623.13	114.56	614.13	610.1	617.8	620.44	623.48	**0.35**	**616.5**	NA*	618.14	620.64	623.61	**0.13**
1151.53	620.12	1855.11	623.14	114.56	614.07	610.1	617.76	620.43	623.49	**0.35**		NA*	618.19	620.66	623.64	**0.15**
1151.53	620.11	1855.11	623.14	114.56	613.86	610.1	617.74	620.42	623.48	**0.34**		NA*	618.18	620.66	623.64	**0.16**
1151.53	620.06	1855.11	623.07	114.56	613.86	610.1	617.71	620.38	623.42	**0.35**		NA*	618.17	620.64	623.61	**0.19**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
1151.53	620.06	1855.11	623.07	114.56	613.86	610.1	617.71	620.38	623.42	**0.35**		NA*	618.17	620.64	623.61	**0.19**
7638.47	620.14	12524.89	623.14	945.44	614.12	4059.9	617.81	620.46	623.49	**0.35**		616.34	618.39	620.73	623.68	**0.19**
7638.47	620.13	12524.89	623.14	945.44	614.11	4059.9	617.8	620.45	623.49	**0.35**		616.34	618.38	620.73	623.68	**0.19**
-	-	-	-	945.44	614.05	4059.9	617.78	620.45	623.48	-	**616.5**	616.2	618.34	620.7	623.66	**0.18**
7638.47	620.09	12524.89	623.1	945.44	613.98	4059.9	617.75	620.41	623.45	**0.35**		615.82	618.32	620.67	623.63	**0.18**
7638.47	620.06	12524.89	623.09	945.44	613.94	4059.9	617.73	620.39	623.44	**0.35**		615.55	618.3	620.66	623.62	**0.18**
7638.47	620.04	12524.89	623.07	945.44	613.9	4059.9	617.71	620.38	623.43	**0.36**		615.28	618.29	620.64	623.61	**0.18**
-	-	-	-	945.44	613.86	4059.9	617.7	620.37	623.42	-	**616.5**	614.13	618.17	620.57	623.57	**0.15**
-	-	-	-	1060	613.7	4670	617.64	620.26	623.25	-	**614.1**	613.9	617.89	620.45	623.37	**0.12**
-	-	-	-	1060	613.68	4670	617.59	620.18	623.13	-	**614.1**	613.83	617.77	620.3	623.18	**0.05**
8790	619.87	14760	622.76	1060	613.67	4670	617.55	620.1	622.98	**0.22**		613.83	617.75	620.27	623.12	**0.14**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	619.83	14760	622.69	1060	613.66	4670	617.52	620.06	622.91	**0.22**		613.82	617.73	620.23	623.06	**0.15**
8790	619.78	14760	622.63	1060	613.65	4670	617.49	620.01	622.86	**0.23**		613.81	617.7	620.19	623.01	**0.15**
-	-	-	-	1060	613.55	4670	617.36	619.86	622.71	-	**613.8**	613.71	617.56	620.04	622.85	**0.14**
-	-	-	-	1060	613.38	4670	617.09	619.52	622.32	-	**613.8**	613.52	617.23	619.64	622.41	**0.09**
8790	619.06	14760	621.83	1060	613.21	4670	616.85	619.24	622.02	**0.19**		613.35	616.98	619.34	622.1	**0.08**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	618.42	14800	621.17	1060	612.59	4670	616.22	618.59	621.36	**0.19**		612.74	616.35	618.7	621.45	**0.09**
8790	618.25	14800	620.99	1060	612.49	4670	616.1	618.44	621.2	**0.21**		612.66	616.24	618.56	621.29	**0.09**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	617.99	14800	620.72	1060	612.16	4670	615.87	618.19	620.94	**0.22**		612.4	616.03	618.32	621.03	**0.09**
8790	617.9	14800	620.63	1060	612.02	4670	615.8	618.12	620.86	**0.23**		612.31	615.96	618.24	620.96	**0.10**
Bridge		Bridge		Bridge	Bridge	Bridge	Bridge	Bridge	Bridge	-		Bridge	Bridge	Bridge	Bridge	-
8790	617.85	14800	620.57	1060	611.97	4670	615.76	618.07	620.8	**0.23**		612.28	615.92	618.2	620.9	**0.10**
8790	617.84	14800	620.56	1060	611.94	4670	615.74	618.06	620.8	**0.24**		612.26	615.91	618.19	620.9	**0.10**
-	-	-	-	1060	611.63	4670	615.48	617.75	620.47	-	**612**	611.91	615.58	617.81	620.49	**0.02**
8790	617.7	14800	620.47	1060	611.49	4670	615.42	617.7	620.47	**0.00**		611.5	615.4	617.68	620.43	**-0.04**
8790	617.7	14800	620.46	1060	611.49	4670	615.41	617.7	620.46	**0.00**	**612**	611.4	615.37	617.65	620.4	**-0.06**
Mult Open		Mult Open		Mult Open	Mult Open	Mult Open	Mult Open	Mult Open	Mult Open	-		Mult Open	Mult Open	Mult Open	Mult Open	-

from the 1,060 CFS model to divert all flow through the east oxbow while the Cofferdams are installed


COFFERDAM 2
COFFERDAM 3
COFFERDAM 4
8.2 EXISTING HEC-RAS SECTION
8.2 NEW HEC-RAS SECTION
REVISED MODEL 100-YR FLOODPLAIN
COFFERDAM 100-YR FLOODPLAIN
FEMA MAP 100-YR FLOODPLAIN
700
350
0
GRAPHIC SCALE IN F
N
FIGURE D5
FIGURE D2
FIGURE D3
8.660
8.579
8.394
8.381
8.375
8.357
8.341
8.229
8.145
8.141
8.132 (DELETED SECTION)
8.1
8.003
8.1321
7.934
7.876
8.0031
7.8761
7.9341
ELEV=616.5
7.85
7.8
7.7
7.669
7.654
7.633
7.5
7.4
ELEV=613.8
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7.199
7.183
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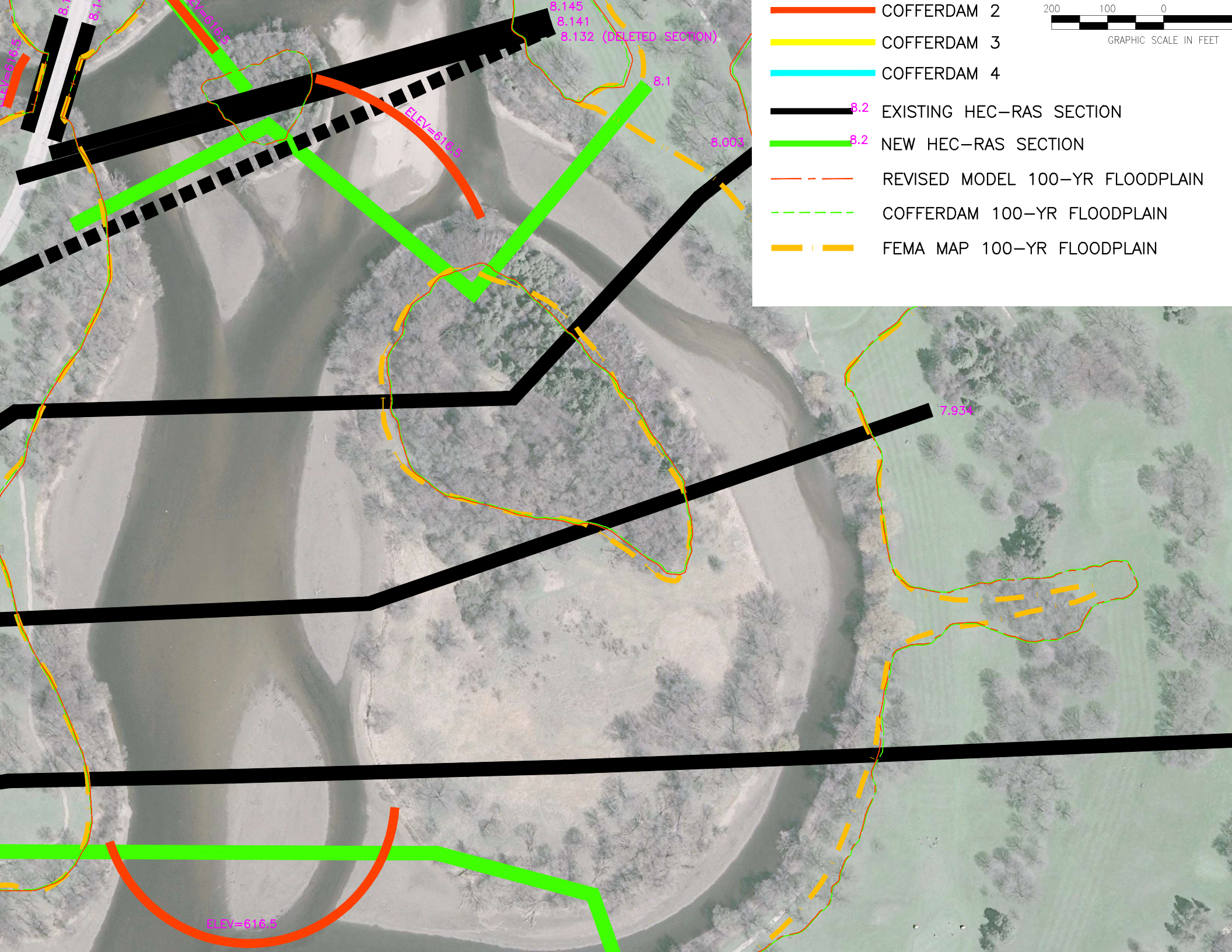
8.145
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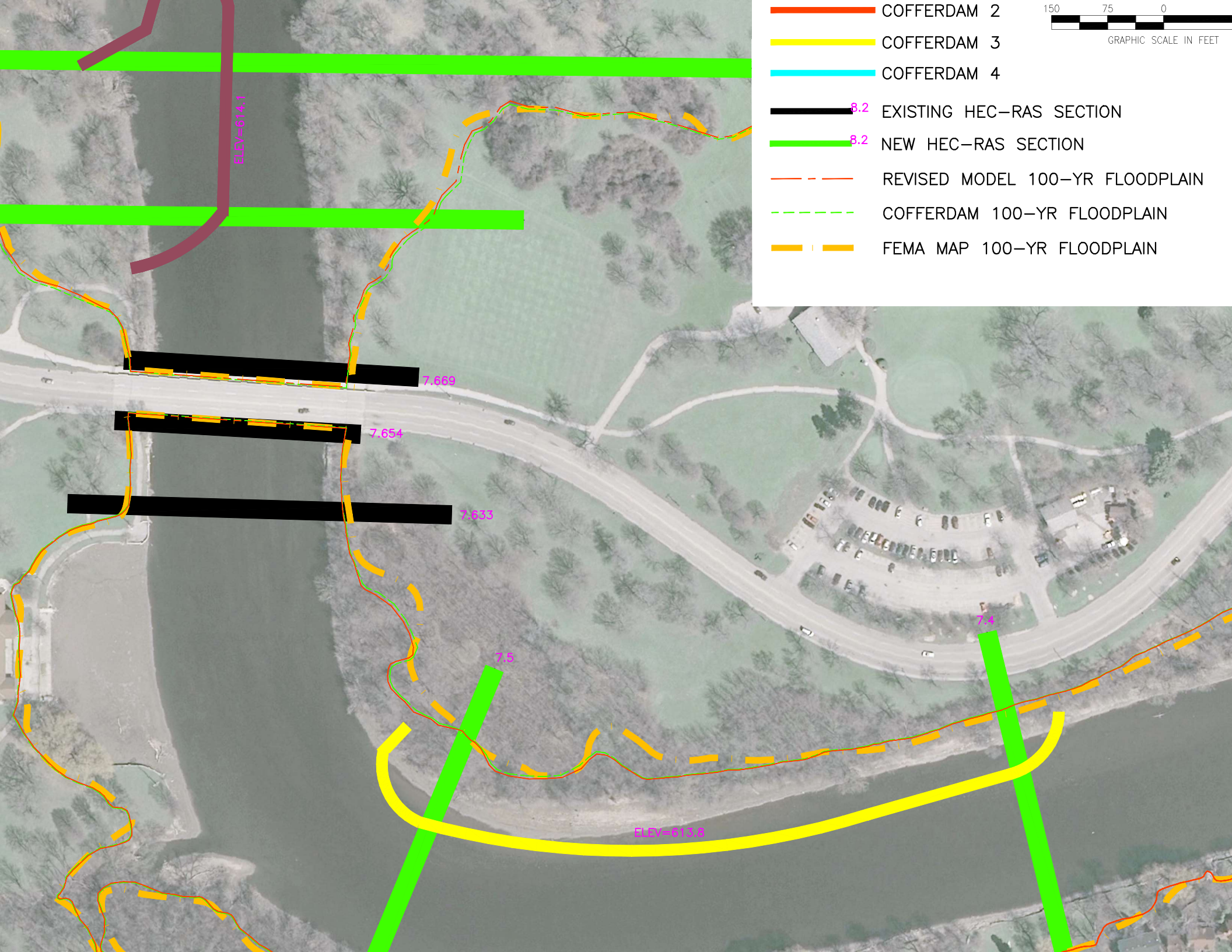
8.132 (DELETED SECTION)
8.1
8.003
7.934
ELEV=616.5
ELEV=616.5
ELEV=616.5
COFFERDAM 2
COFFERDAM 3
COFFERDAM 4
8.2 EXISTING HEC-RAS SECTION
8.2 NEW HEC-RAS SECTION
REVISED MODEL 100-YR FLOODPLAIN
COFFERDAM 100-YR FLOODPLAIN
FEMA MAP 100-YR FLOODPLAIN
200 100 0
GRAPHIC SCALE IN FEET


COFFERDAM 2
COFFERDAM 3
COFFERDAM 4
8.2 EXISTING HEC-RAS SECTION
8.2 NEW HEC-RAS SECTION
REVISED MODEL 100-YR FLOODPLAIN
COFFERDAM 100-YR FLOODPLAIN
FEMA MAP 100-YR FLOODPLAIN
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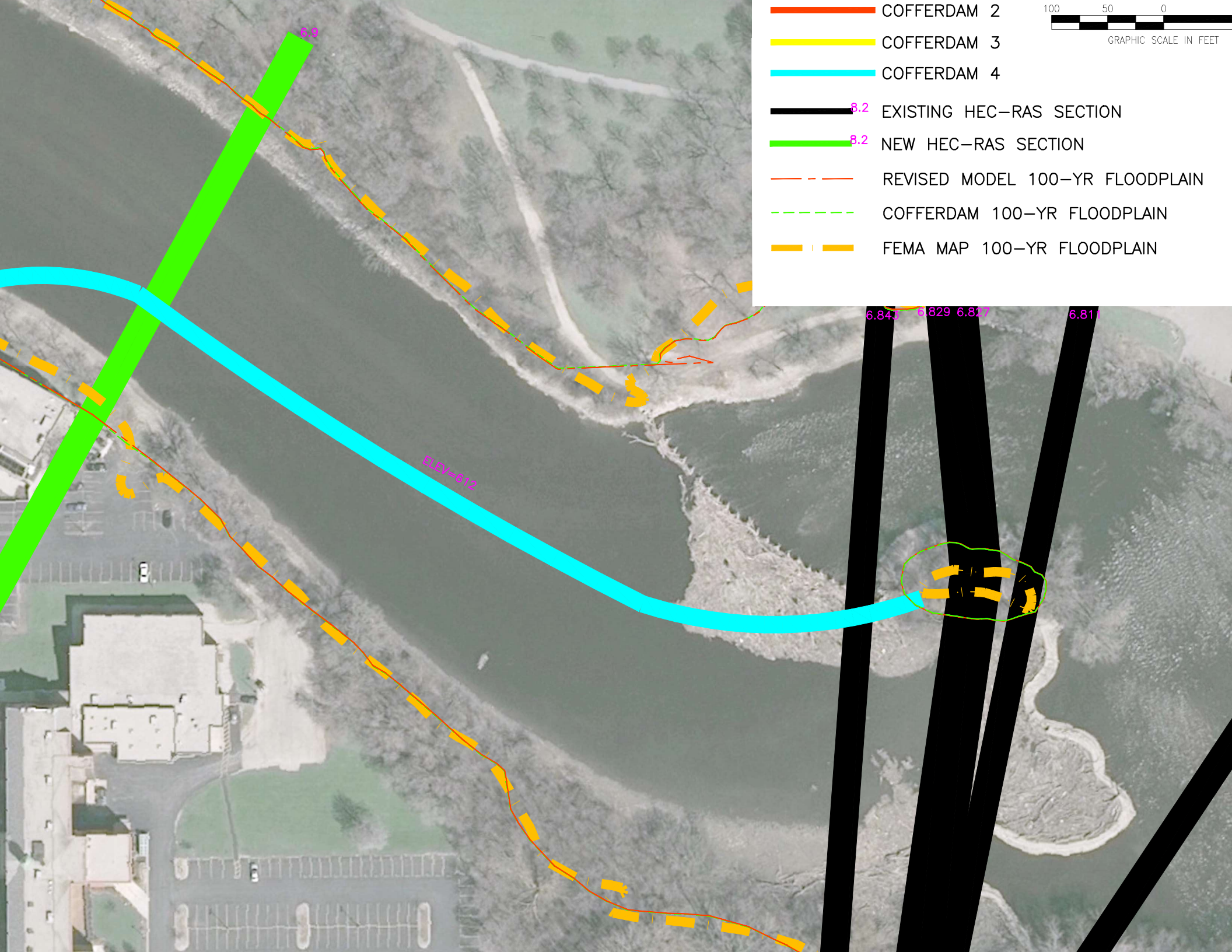
GRAPHIC SCALE IN FEET
ELEV=614.1
7.669
7.654
7.633
7.5
7.4
ELEV=613.8


COFFERDAM 2
COFFERDAM 3
COFFERDAM 4
8.2 EXISTING HEC-RAS SECTION
8.2 NEW HEC-RAS SECTION
REVISED MODEL 100-YR FLOODPLAIN
COFFERDAM 100-YR FLOODPLAIN
FEMA MAP 100-YR FLOODPLAIN
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GRAPHIC SCALE IN FEET
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6.845
6.829
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6.811
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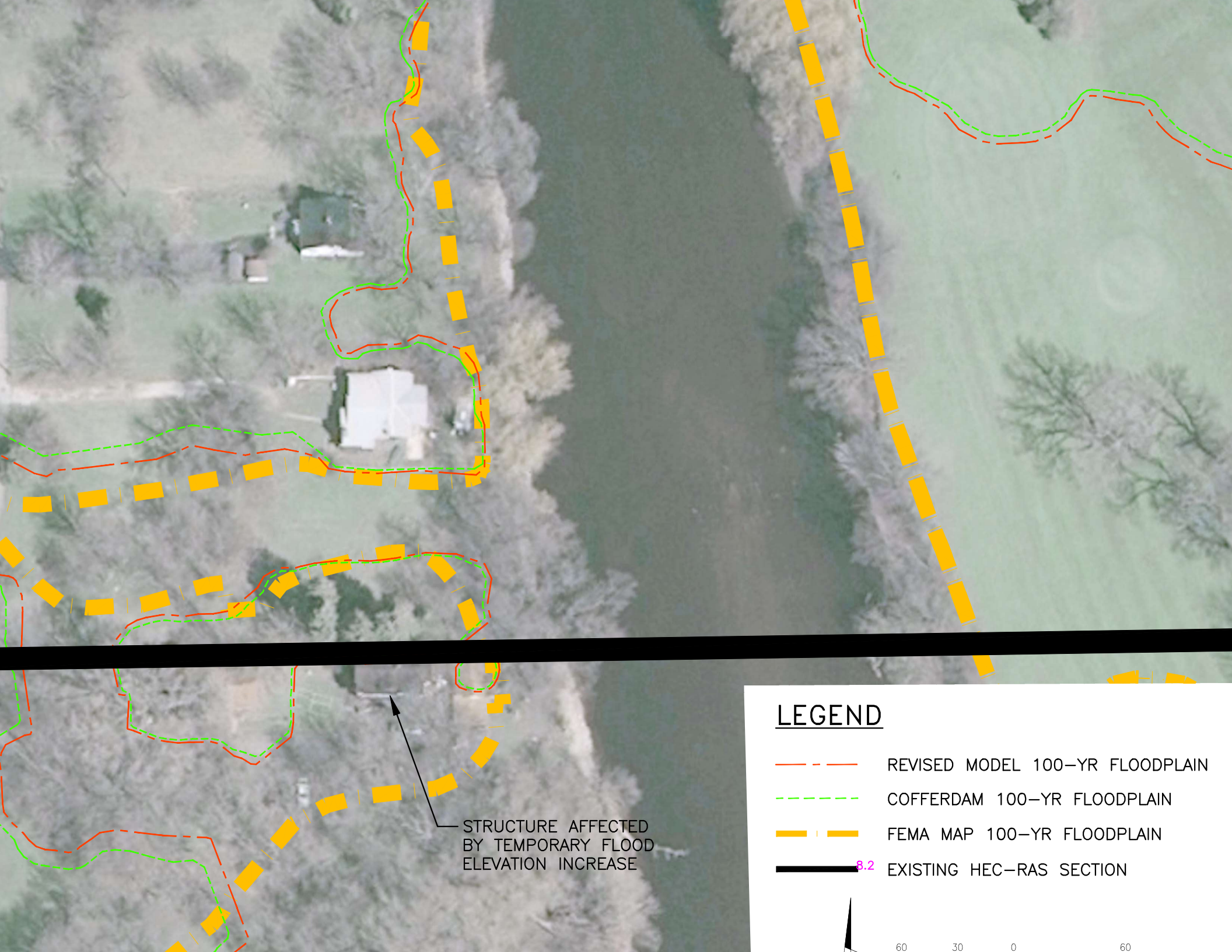
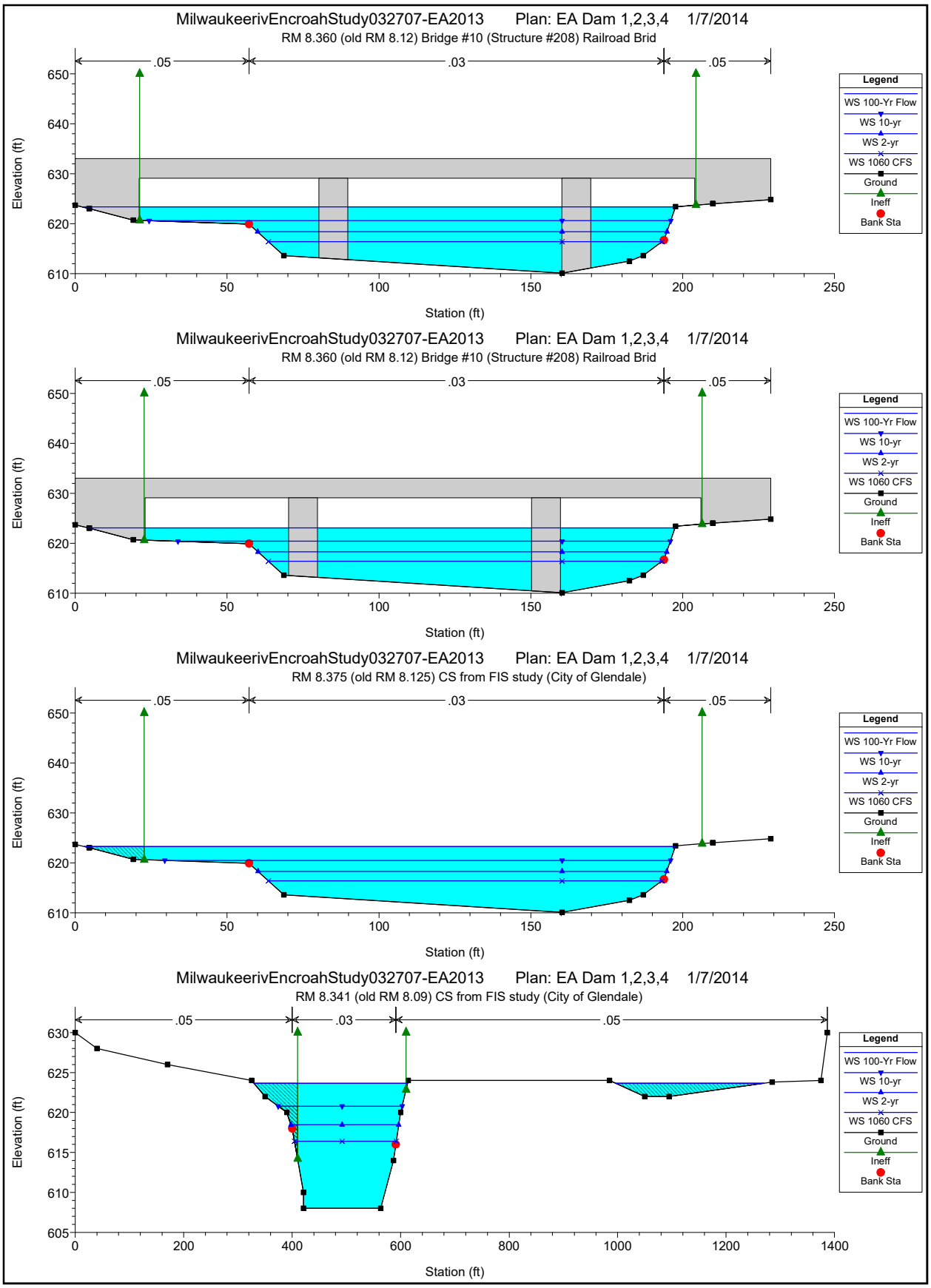
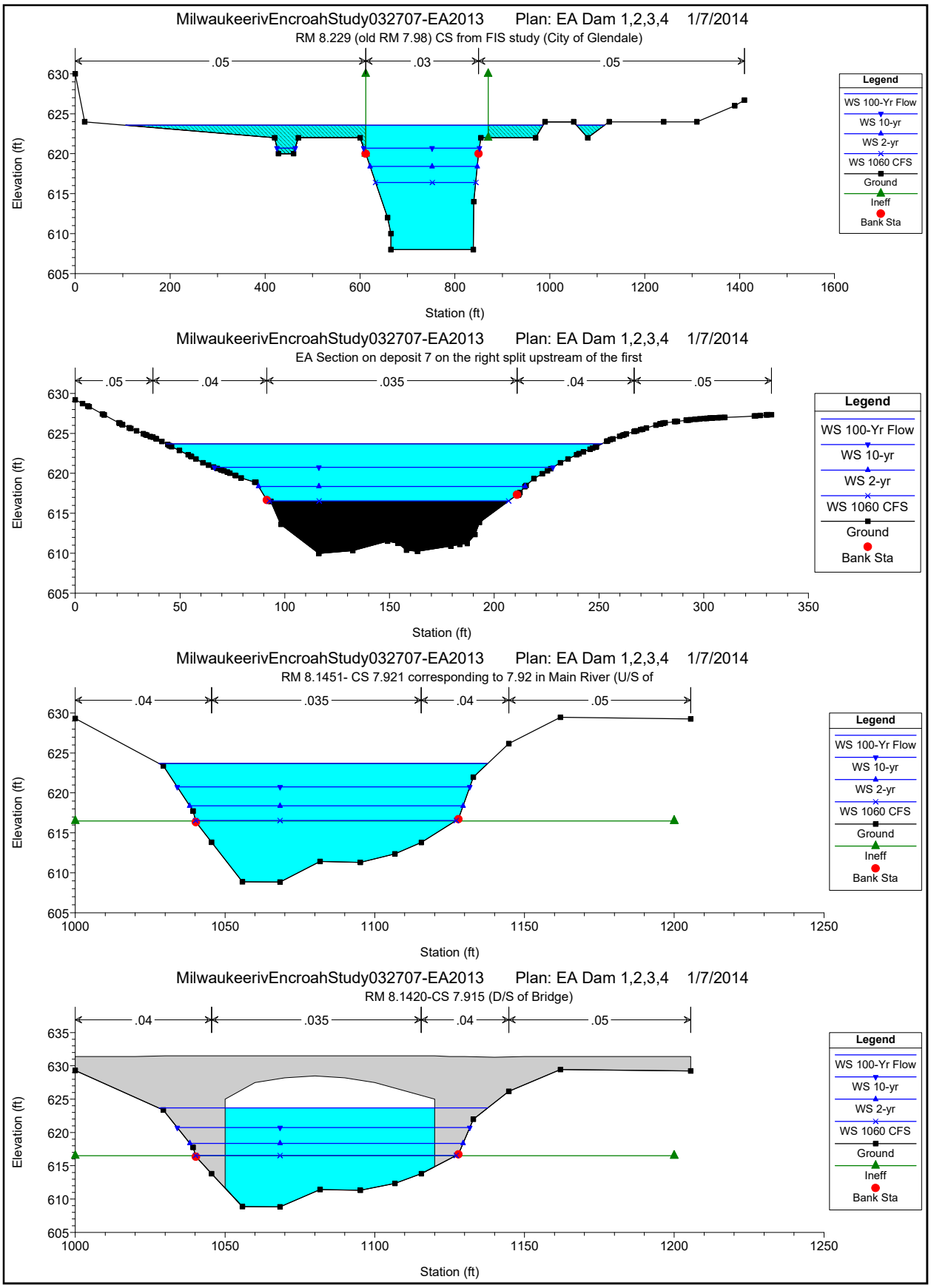
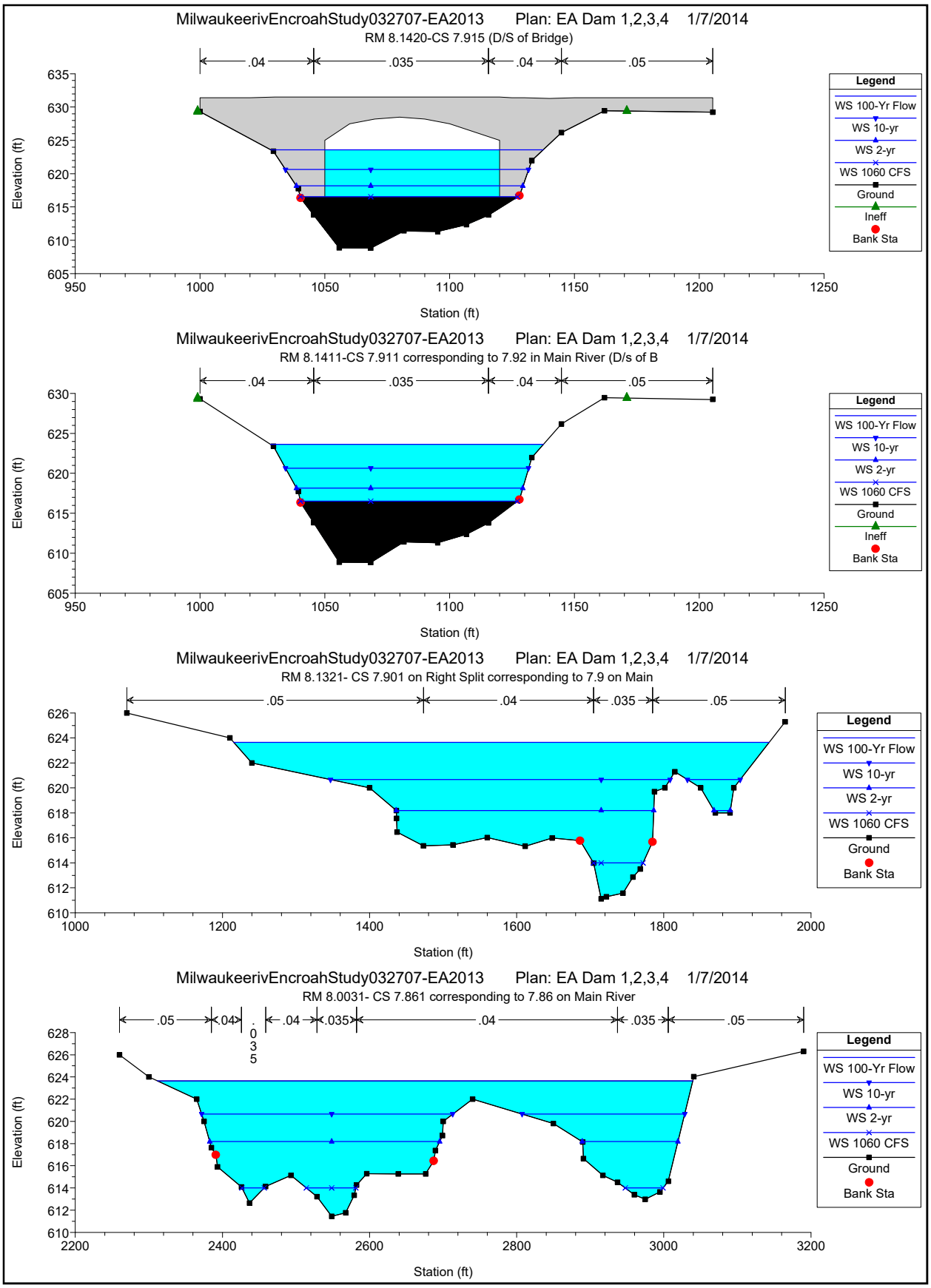
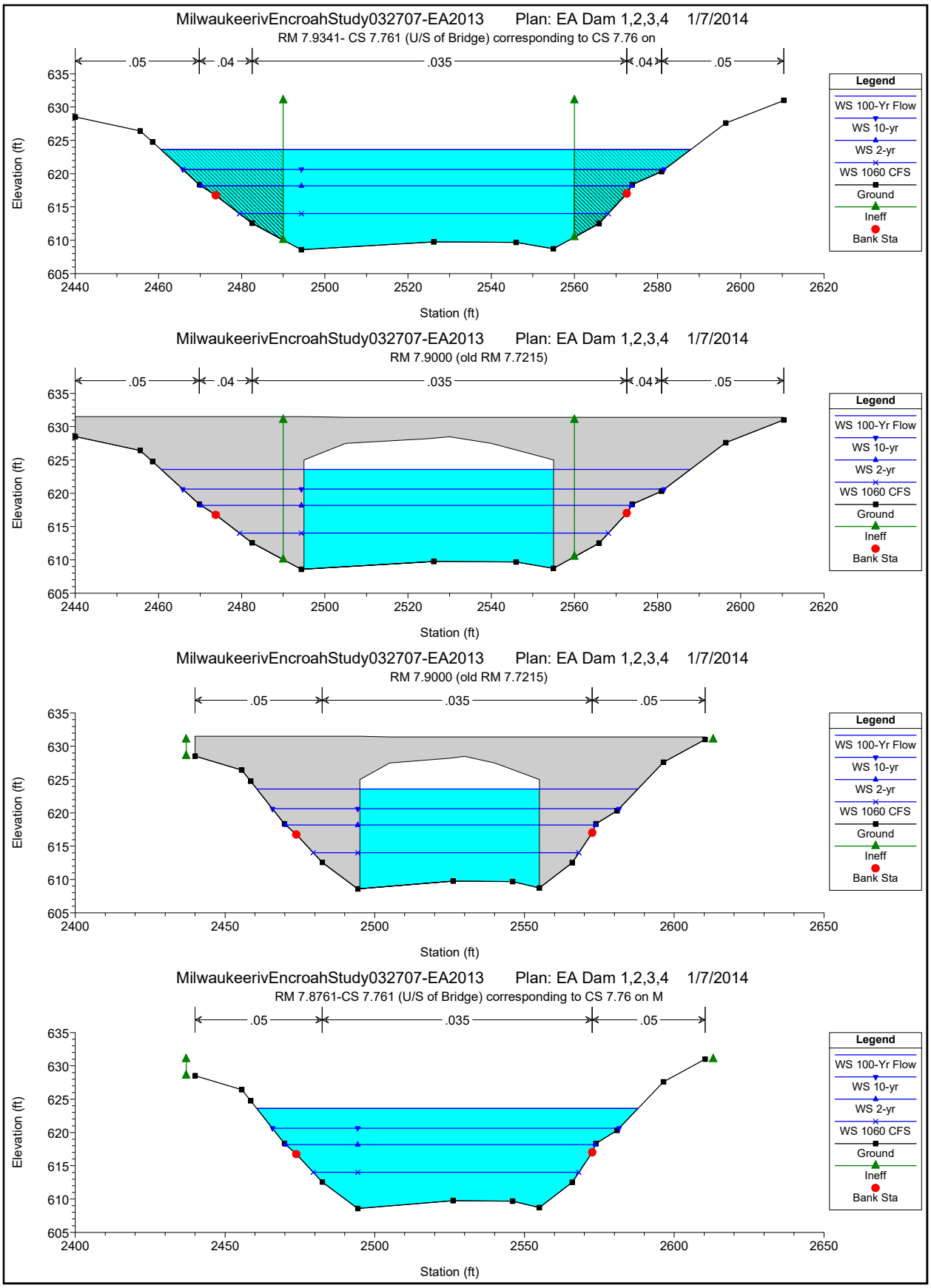
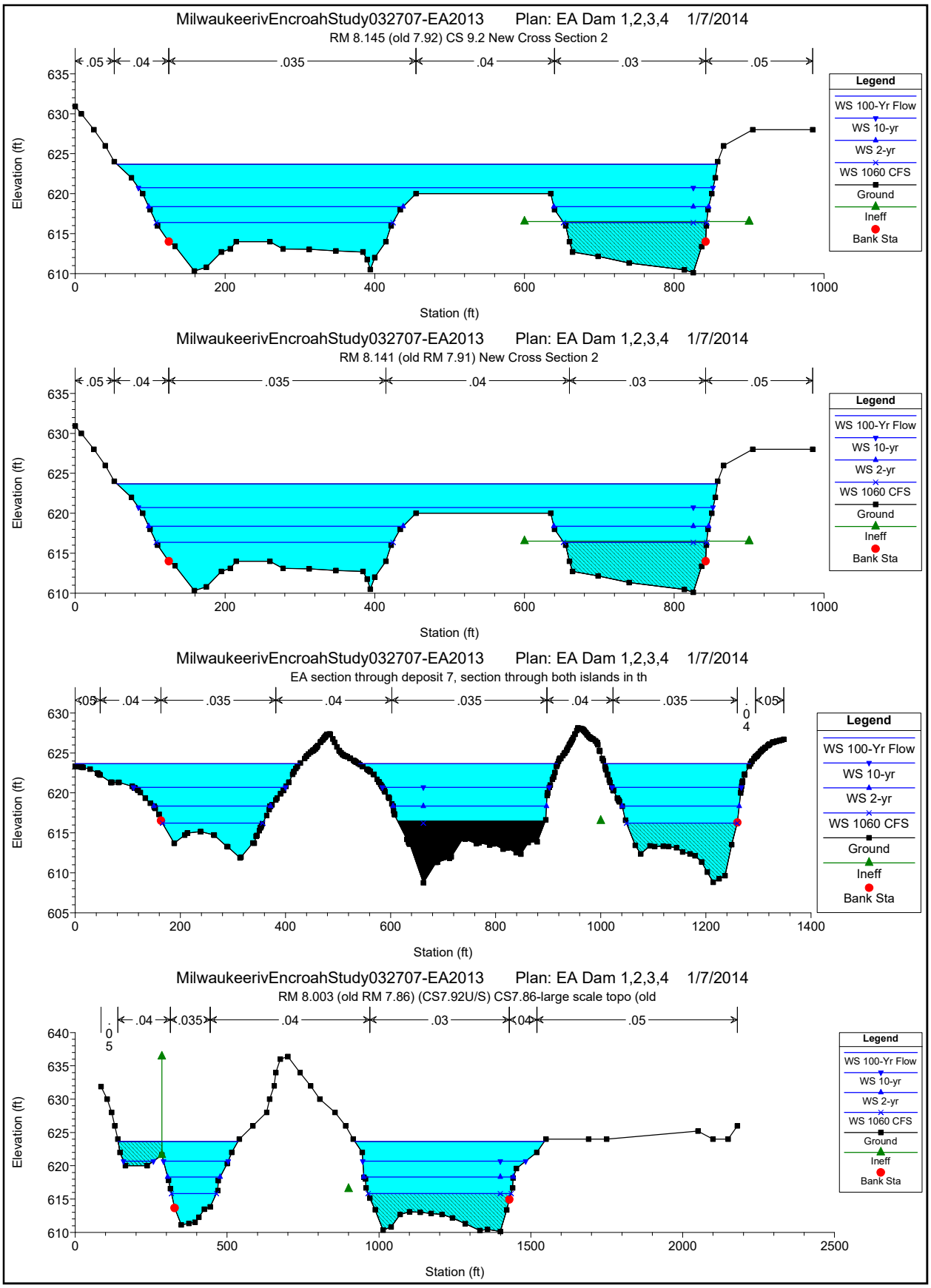

STRUCTURE AFFECTED
BY TEMPORARY FLOOD
ELEVATION INCREASE
LEGEND
REVISED MODEL 100–YR FLOODPLAIN
COFFERDAM 100–YR FLOODPLAIN
FEMA MAP 100–YR FLOODPLAIN
8.2
EXISTING HEC–RAS SECTION
60
30
0
60

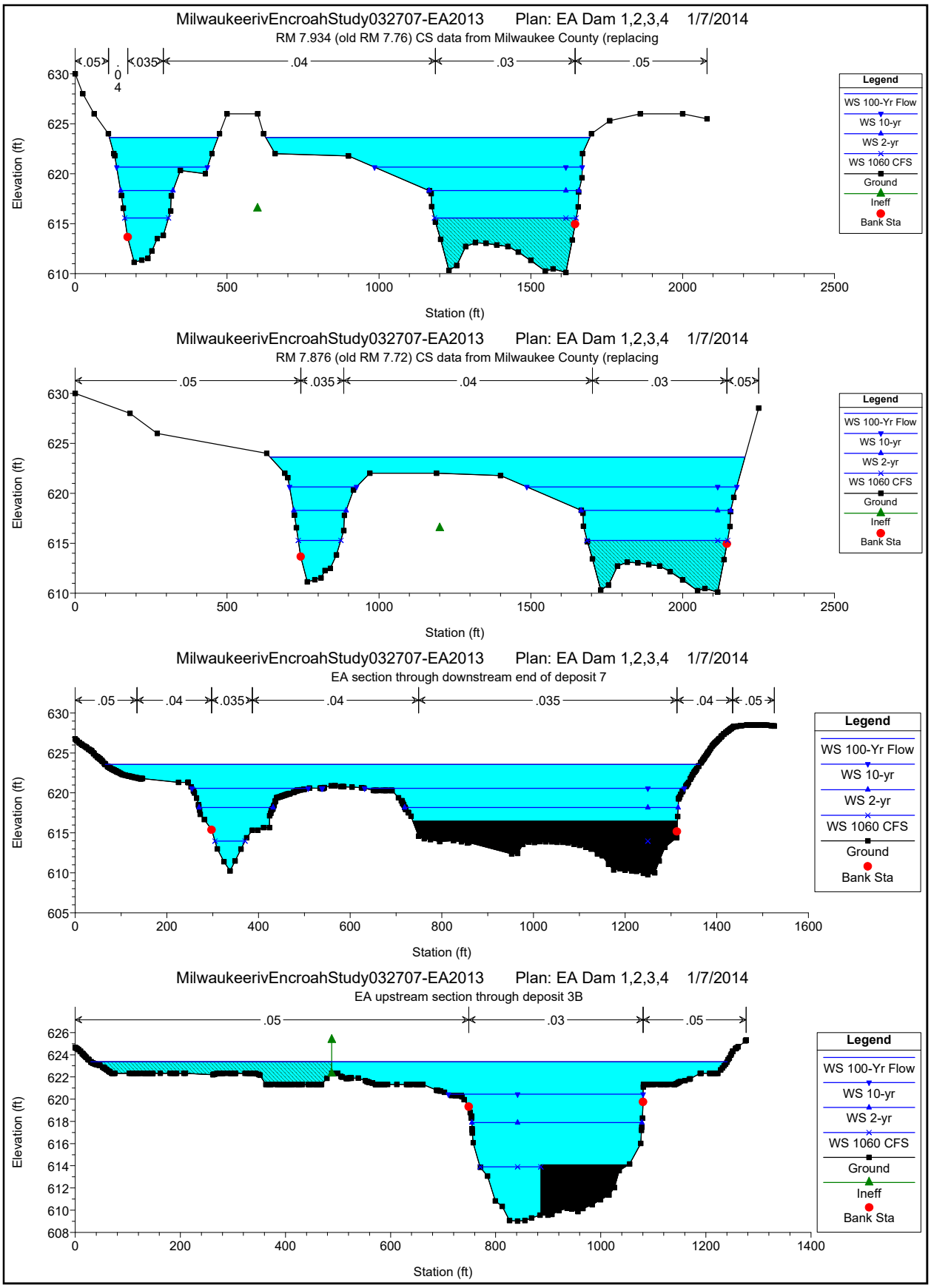

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.360 (old RM 8.12) Bridge #10 (Structure #208) Railroad Brid
.05
.03
.05
Elevation (ft)
650
640
630
620
610
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.360 (old RM 8.12) Bridge #10 (Structure #208) Railroad Brid
.05
.03
.05
Elevation (ft)
650
640
630
620
610
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.375 (old RM 8.125) CS from FIS study (City of Glendale)
.05
.03
.05
Elevation (ft)
650
640
630
620
610
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.341 (old RM 8.09) CS from FIS study (City of Glendale)
.05
.03
.05
Elevation (ft)
630
625
620
615
610
605
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

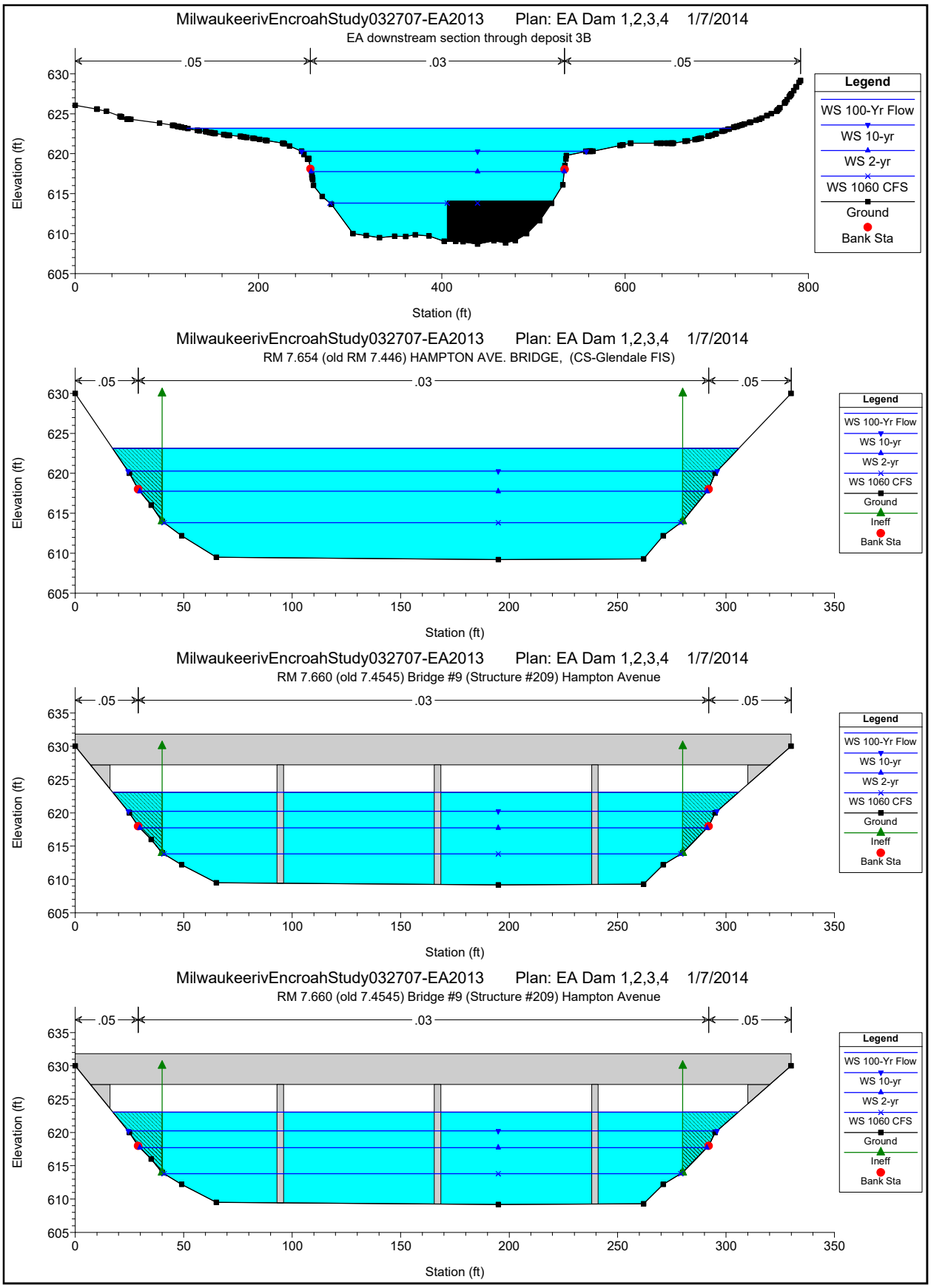

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.229 (old RM 7.98) CS from FIS study (City of Glendale)
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA Section on deposit 7 on the right split upstream of the first
.05
.04
.035
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.1451- CS 7.921 corresponding to 7.92 in Main River (U/S of
.04
.035
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.1420-CS 7.915 (D/S of Bridge)
.04
.035
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

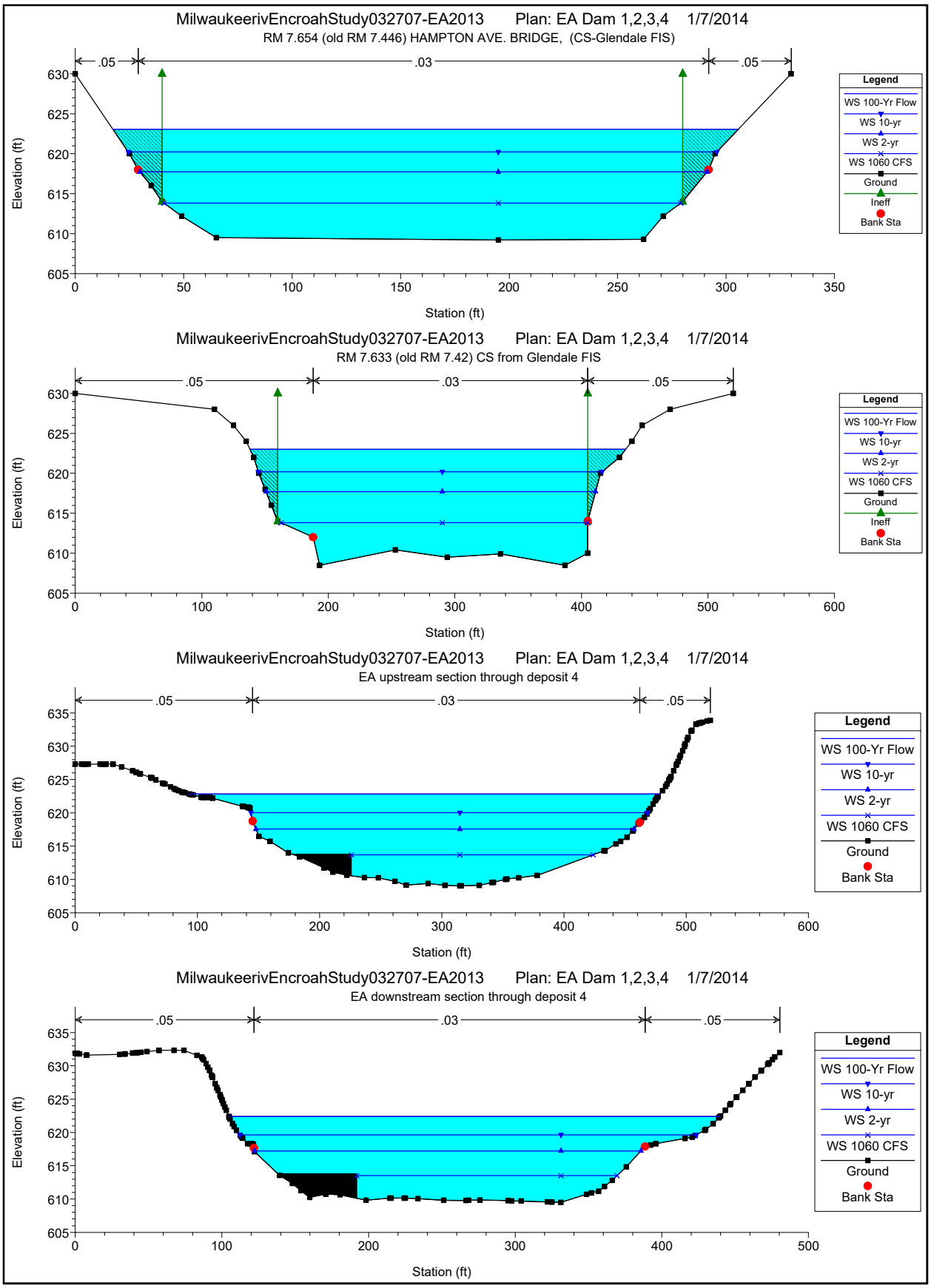

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.1420-CS 7.915 (D/S of Bridge)
.04
.035
.04
.05
Elevation (ft)
635
630
625
620
615
610
605
950
1000
1050
1100
1150
1200
1250
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.1411-CS 7.911 corresponding to 7.92 in Main River (D/s of B
.04
.035
.04
.05
Elevation (ft)
630
625
620
615
610
605
950
1000
1050
1100
1150
1200
1250
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.1321- CS 7.901 on Right Split corresponding to 7.9 on Main
.05
.04
.035
.05
Elevation (ft)
626
624
622
620
618
616
614
612
610
1000
1200
1400
1600
1800
2000
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.0031- CS 7.861 corresponding to 7.86 on Main River
.05
.04
.035
.04
.035
.05
Elevation (ft)
628
626
624
622
620
618
616
614
612
610
2200
2400
2600
2800
3000
3200
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta

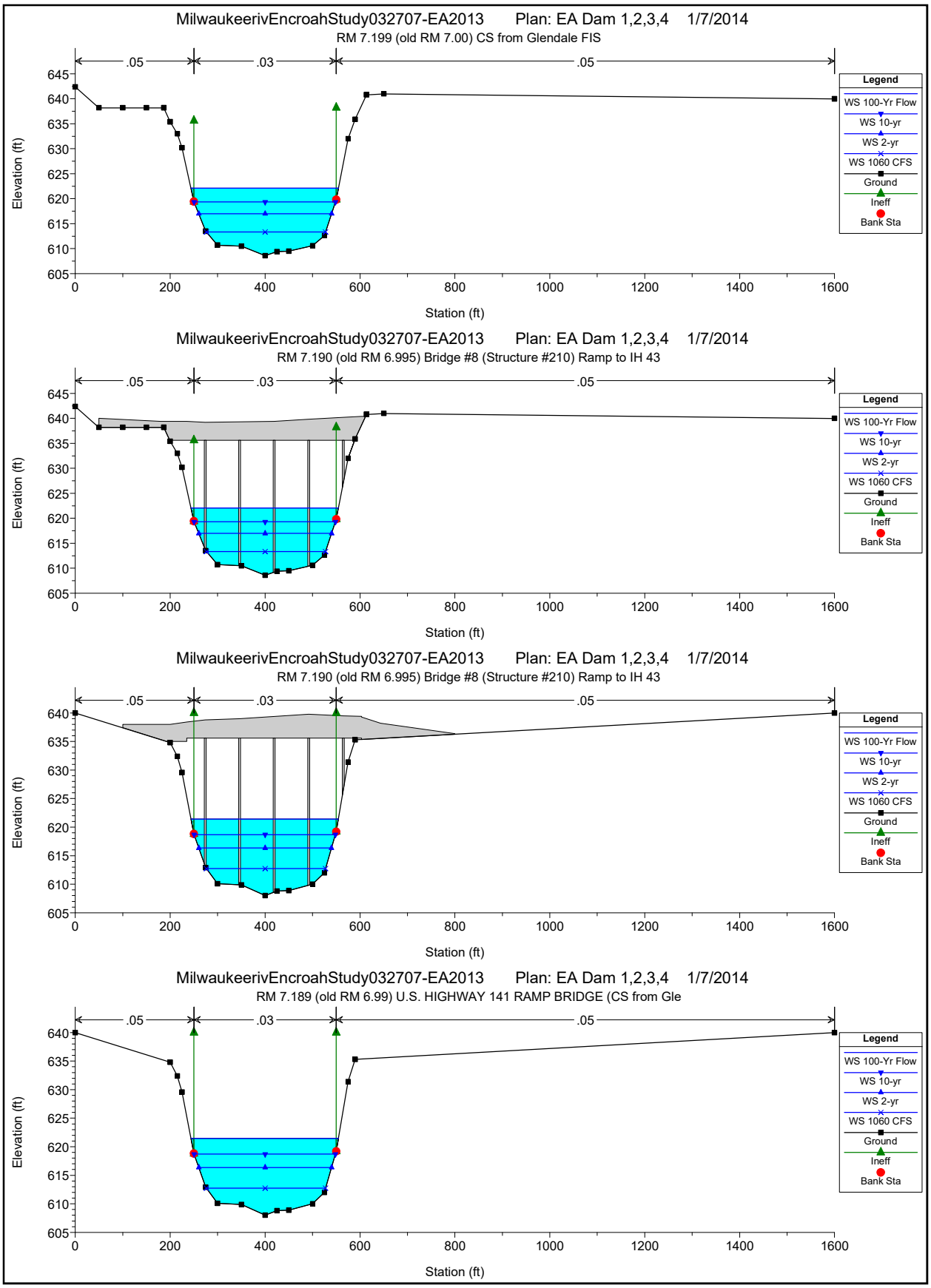

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.9341- CS 7.761 (U/S of Bridge) corresponding to CS 7.76 on
.05
.04
.035
.04
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.9000 (old RM 7.7215)
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.9000 (old RM 7.7215)
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.8761-CS 7.761 (U/S of Bridge) corresponding to CS 7.76 on M

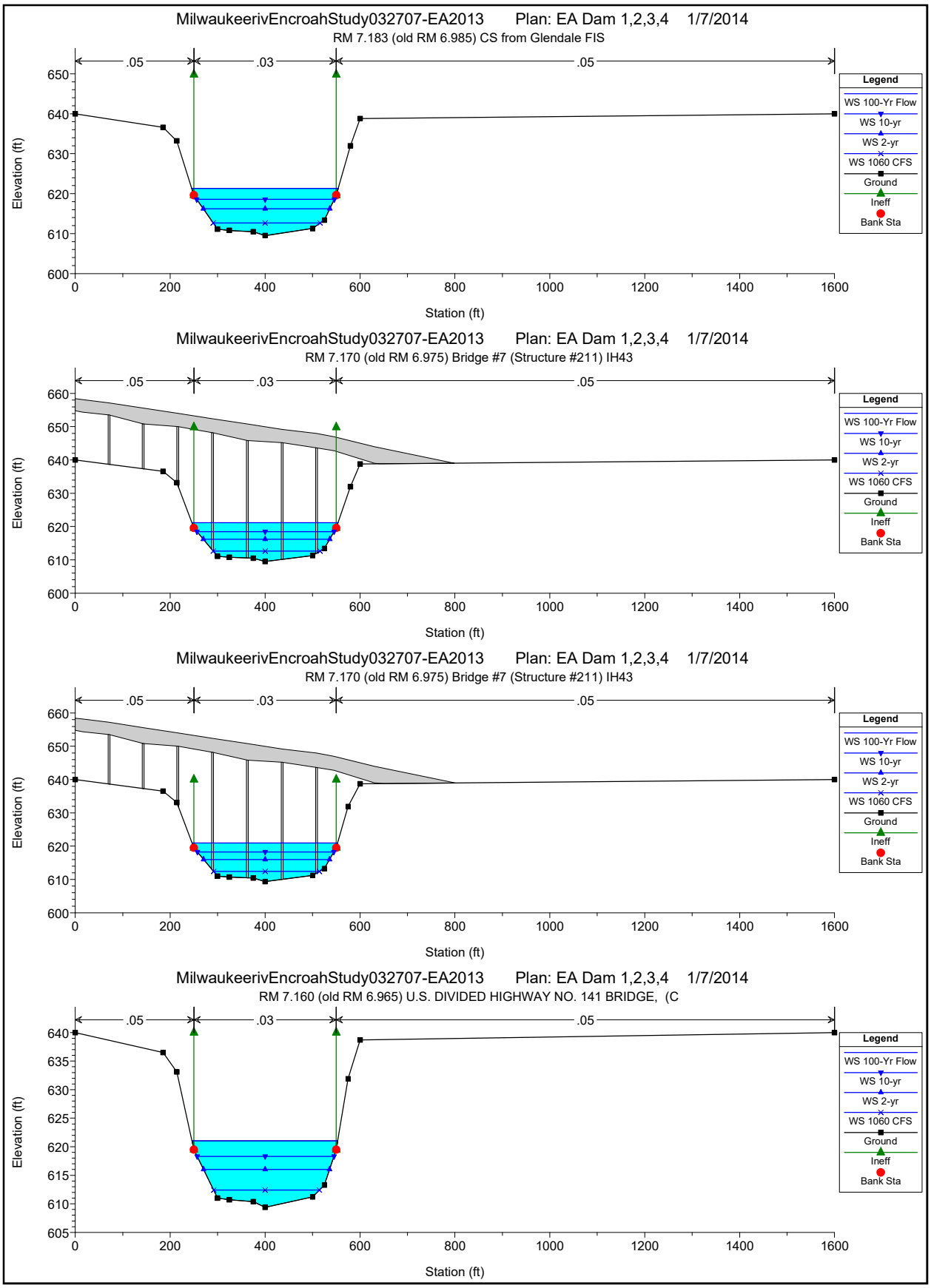

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.145 (old 7.92) CS 9.2 New Cross Section 2
.05 .04 .035 .04 .03 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.141 (old RM 7.91) New Cross Section 2
.05 .04 .035 .04 .03 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA section through deposit 7, section through both islands in th
.05 .04 .035 .04 .035 .04 .035 .04 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 8.003 (old RM 7.86) (CS7.92U/S) CS7.86-large scale topo (old
.05 .04 .035 .04 .03 .04 .05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

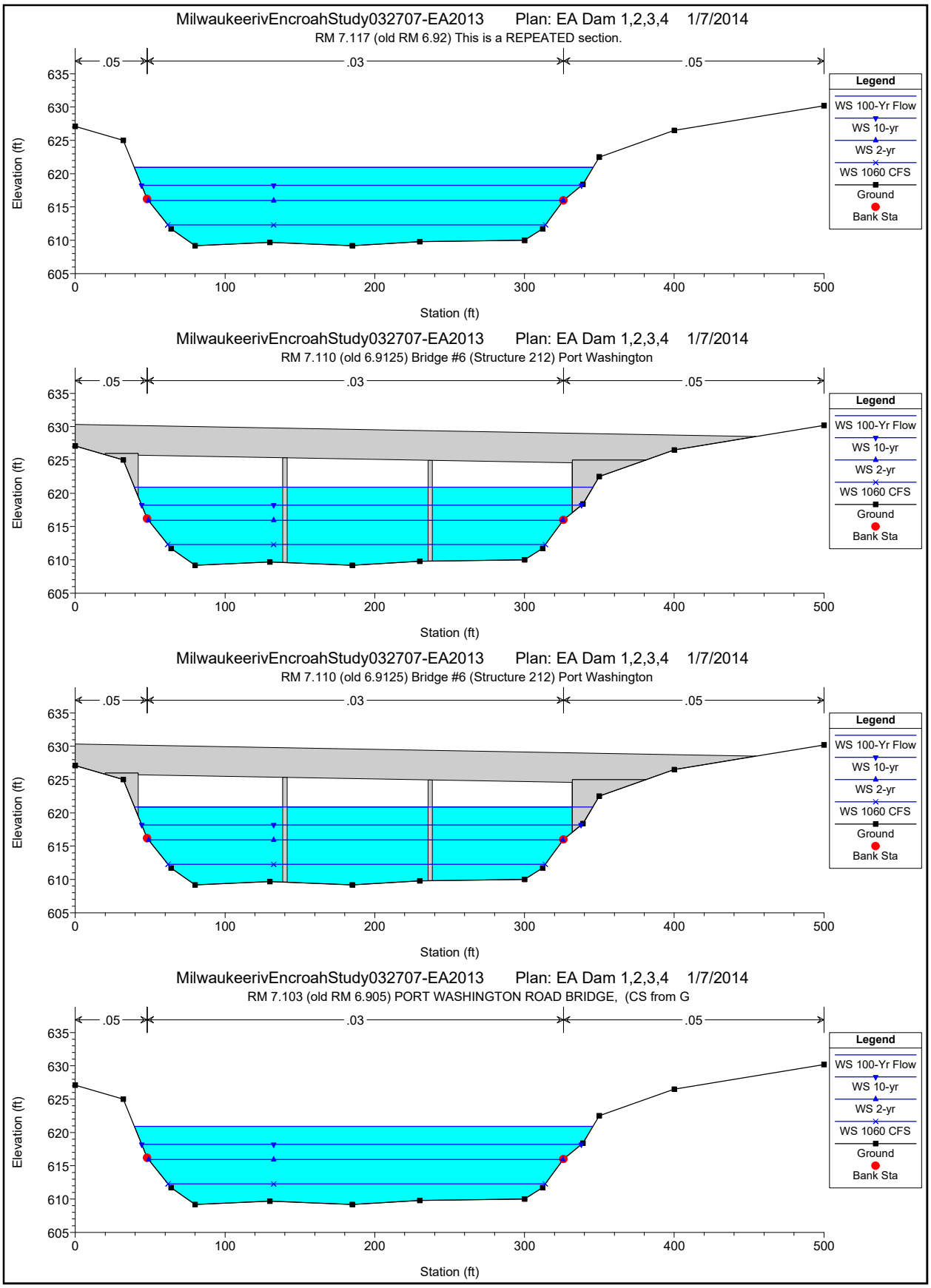

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.934 (old RM 7.76) CS data from Milwaukee County (replacing
.05
.04
.035
.04
.03
.05
Elevation (ft)
630
625
620
615
610
0
500
1000
1500
2000
2500
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.876 (old RM 7.72) CS data from Milwaukee County (replacing
.05
.035
.04
.03
.05
Elevation (ft)
630
625
620
615
610
0
500
1000
1500
2000
2500
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA section through downstream end of deposit 7
.05
.04
.035
.04
.035
.04
.05
Elevation (ft)
630
625
620
615
610
605
0
200
400
600
800
1000
1200
1400
1600
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA upstream section through deposit 3B
.05
.03
.05
Elevation (ft)
626
624
622
620
618
616
614
612
610
608
0
200
400
600
800
1000
1200
1400
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

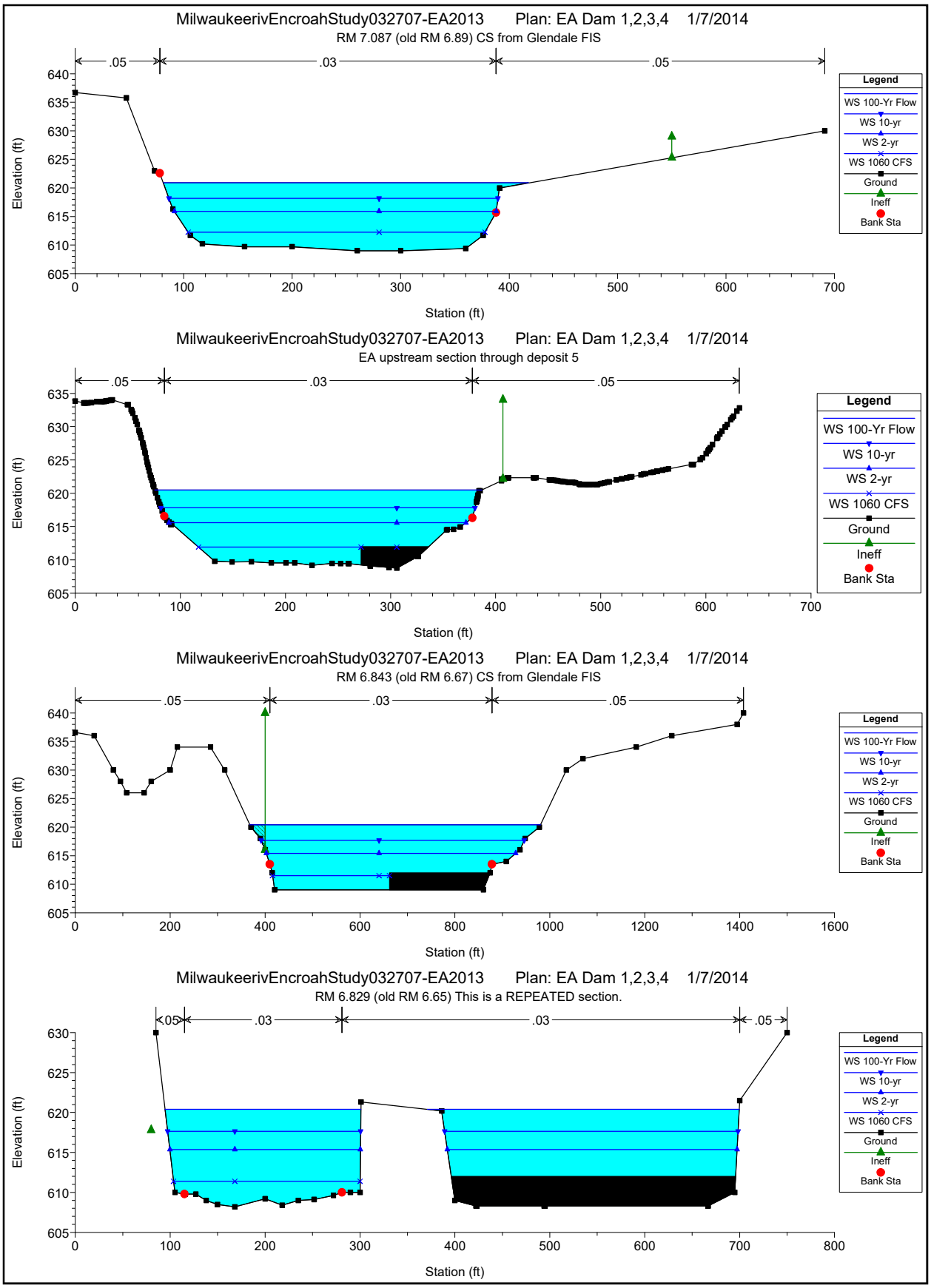

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA downstream section through deposit 3B
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.654 (old RM 7.446) HAMPTON AVE. BRIDGE, (CS-Glendale FIS)
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.660 (old 7.4545) Bridge #9 (Structure #209) Hampton Avenue
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.660 (old 7.4545) Bridge #9 (Structure #209) Hampton Avenue
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

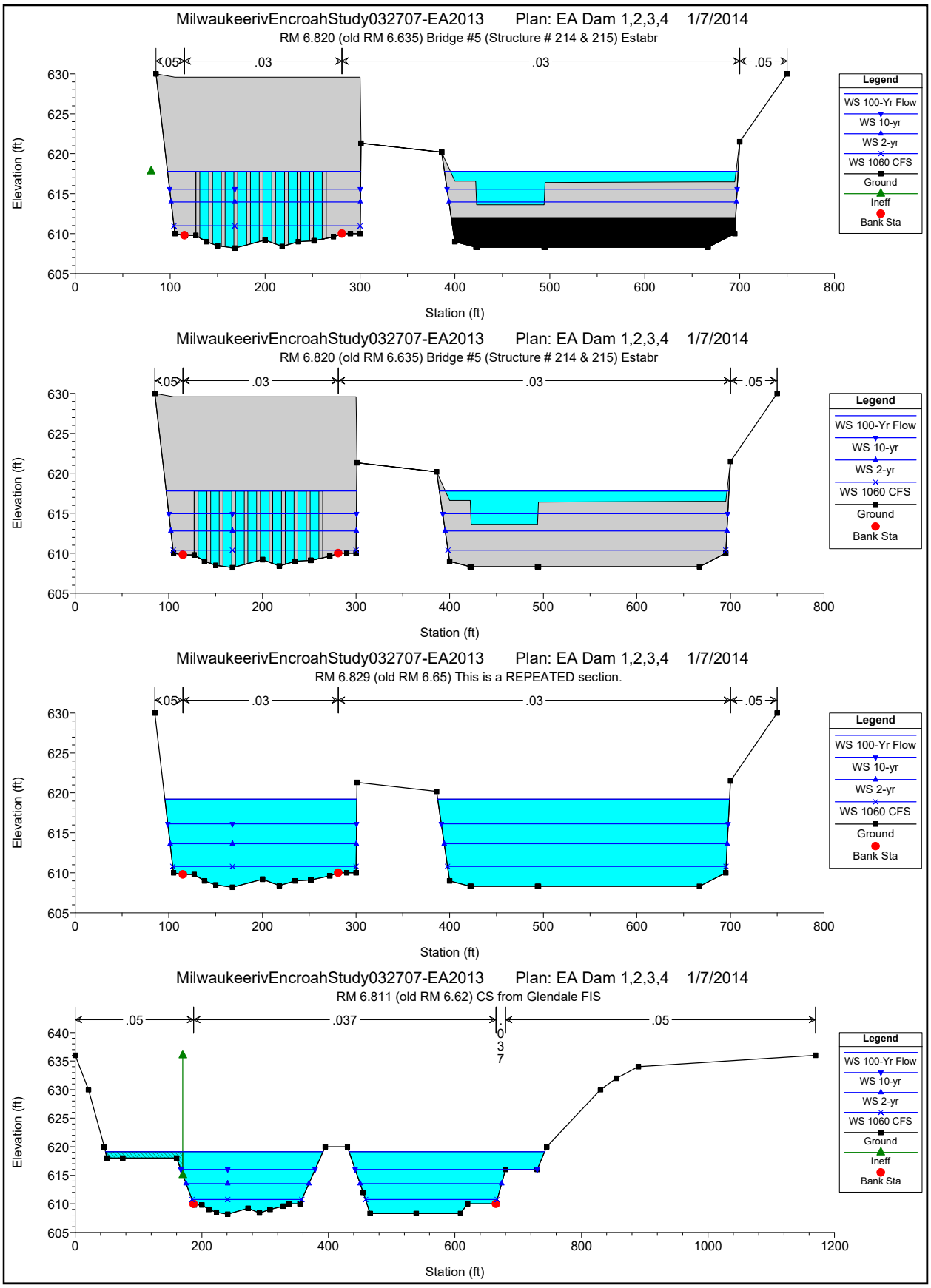

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.654 (old RM 7.446) HAMPTON AVE. BRIDGE, (CS-Glendale FIS)
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.633 (old RM 7.42) CS from Glendale FIS
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA upstream section through deposit 4
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA downstream section through deposit 4
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta


MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.199 (old RM 7.00) CS from Glendale FIS
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.190 (old RM 6.995) Bridge #8 (Structure #210) Ramp to IH 43
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.190 (old RM 6.995) Bridge #8 (Structure #210) Ramp to IH 43
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.189 (old RM 6.99) U.S. HIGHWAY 141 RAMP BRIDGE (CS from Gle


MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.183 (old RM 6.985) CS from Glendale FIS
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.170 (old RM 6.975) Bridge #7 (Structure #211) IH43
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.170 (old RM 6.975) Bridge #7 (Structure #211) IH43
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.160 (old RM 6.965) U.S. DIVIDED HIGHWAY NO. 141 BRIDGE, (C


MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.117 (old RM 6.92) This is a REPEATED section.
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.110 (old 6.9125) Bridge #6 (Structure 212) Port Washington
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.110 (old 6.9125) Bridge #6 (Structure 212) Port Washington
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.103 (old RM 6.905) PORT WASHINGTON ROAD BRIDGE, (CS from G

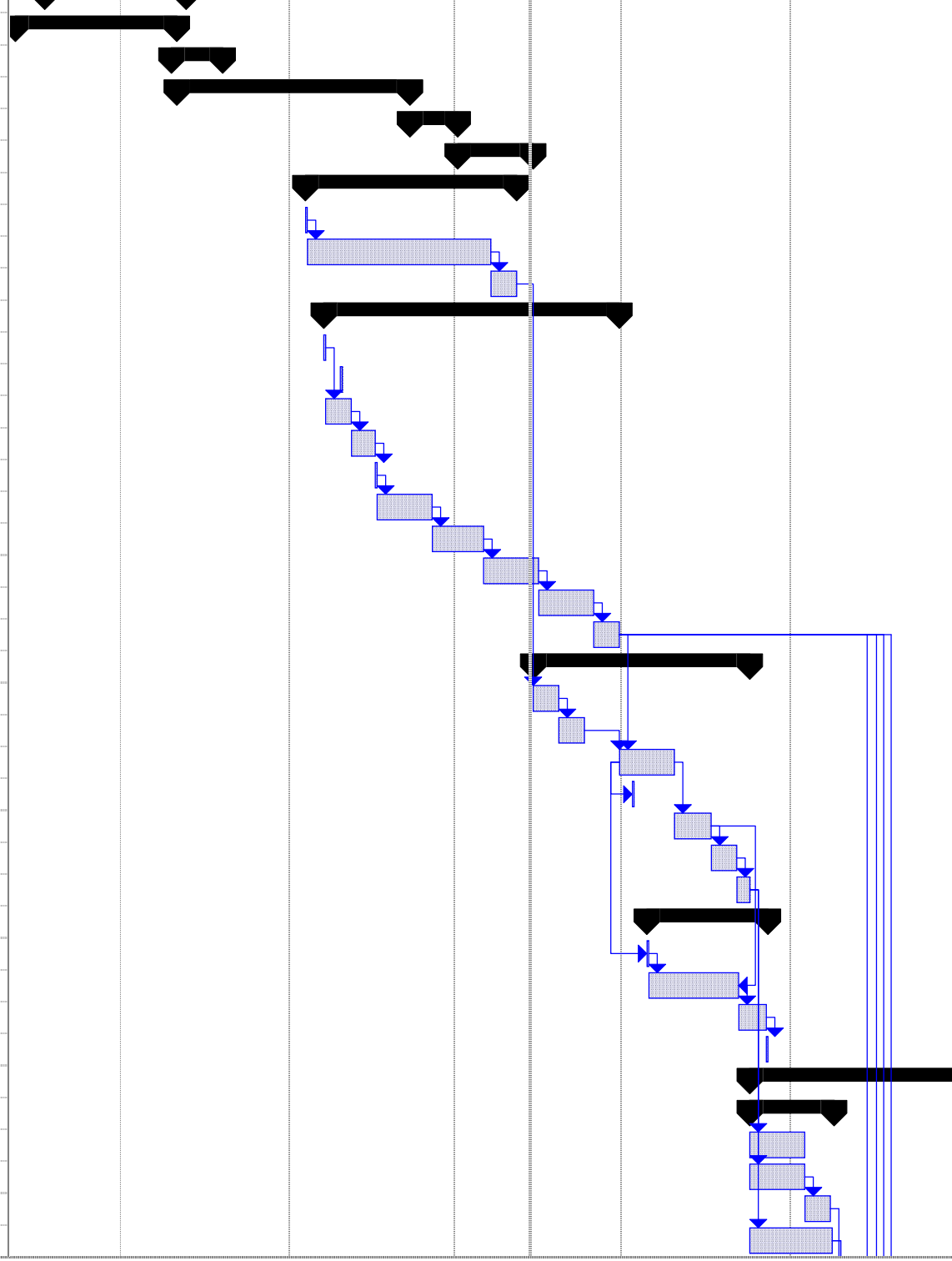

MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 7.087 (old RM 6.89) CS from Glendale FIS
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
EA upstream section through deposit 5
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.843 (old RM 6.67) CS from Glendale FIS
.05
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.829 (old RM 6.65) This is a REPEATED section.
.05
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta


MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.820 (old RM 6.635) Bridge #5 (Structure # 214 & 215) Estabr
.05
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.820 (old RM 6.635) Bridge #5 (Structure # 214 & 215) Estabr
.05
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.829 (old RM 6.65) This is a REPEATED section.
.05
.03
.03
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Bank Sta
MilwaukeerivEncroahStudy032707-EA2013 Plan: EA Dam 1,2,3,4 1/7/2014
RM 6.811 (old RM 6.62) CS from Glendale FIS
.05
.037
.037
.05
Elevation (ft)
Station (ft)
Legend
WS 100-Yr Flow
WS 10-yr
WS 2-yr
WS 1060 CFS
Ground
Ineff
Bank Sta

Appendix E

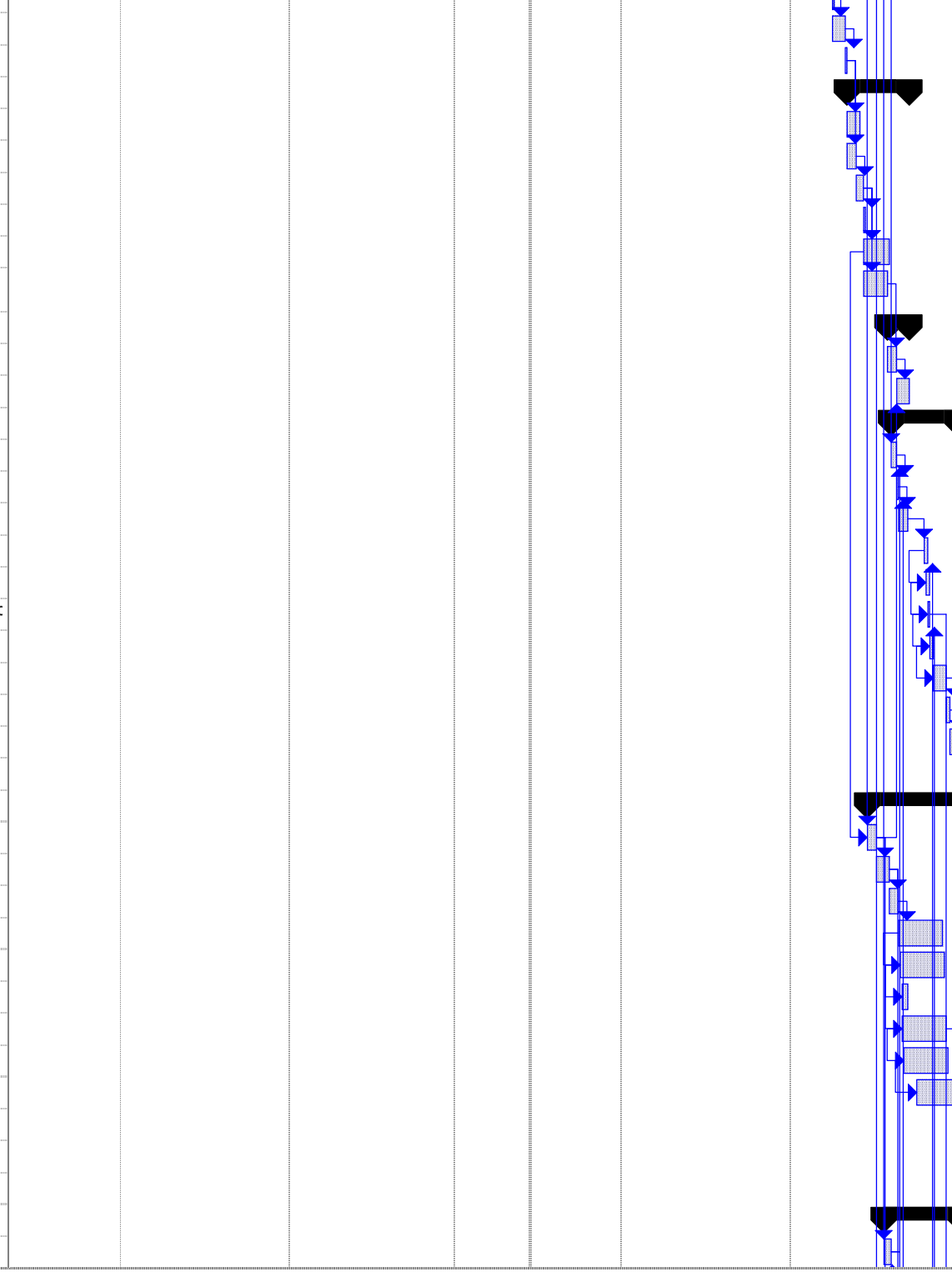
Construction Schedule

	88 days	**Mon 8/5/13**	**Thu 10/31/13**	
	28 days	**Tue 10/29/13**	**Mon 11/25/13**	
	127 days	**Thu 10/31/13**	**Fri 3/7/14**	
	26 days	**Fri 3/7/14**	**Wed 4/2/14**	
	41 days	**Thu 4/3/14**	**Tue 5/13/14**	
	115 days	**Fri 1/10/14**	**Sun 5/4/14**	
ion	1 day	Fri 1/10/14	Fri 1/10/14	
	100 days	Sat 1/11/14	Sun 4/20/14	39
	14 days	Mon 4/21/14	Sun 5/4/14	40
	161 days	**Mon 1/20/14**	**Sun 6/29/14**	
PCT	1 day	Mon 1/20/14	Mon 1/20/14	
	1 day	Wed 1/29/14	Wed 1/29/14	
	14 edays	Mon 1/20/14	Mon 2/3/14	43
t Applications	13 edays	Mon 2/3/14	Sun 2/16/14	45
	1 eday	Sun 2/16/14	Mon 2/17/14	46
	30 edays	Mon 2/17/14	Wed 3/19/14	47
	28 edays	Wed 3/19/14	Wed 4/16/14	48
	30 edays	Wed 4/16/14	Fri 5/16/14	49
	30 edays	Fri 5/16/14	Sun 6/15/14	50
	14 edays	Sun 6/15/14	Sun 6/29/14	51,37
	118 days	**Wed 5/14/14**	**Mon 9/8/14**	
	14 days	Wed 5/14/14	Tue 5/27/14	41,37
	14 days	Wed 5/28/14	Tue 6/10/14	54
	30 days	Mon 6/30/14	Tue 7/29/14	55,52
	1 day	Mon 7/7/14	Mon 7/7/14	56SS+7 days
	20 days	Wed 7/30/14	Mon 8/18/14	56
	14 days	Tue 8/19/14	Mon 9/1/14	58
	7 edays	Mon 9/1/14	Mon 9/8/14	59
	66 days	**Tue 7/15/14**	**Thu 9/18/14**	
	1 day	Tue 7/15/14	Tue 7/15/14	56SS+15 days
	49 days	Wed 7/16/14	Tue 9/2/14	62,58FF+15 days
	15 days	Wed 9/3/14	Wed 9/17/14	63
	1 day	Thu 9/18/14	Thu 9/18/14	64
	145 days	**Mon 9/8/14**	**Sat 1/31/15**	
	46 days	**Mon 9/8/14**	**Fri 10/24/14**	
	30 edays	Mon 9/8/14	Wed 10/8/14	60
	30 edays	Mon 9/8/14	Wed 10/8/14	60
	14 edays	Wed 10/8/14	Wed 10/22/14	69
	45 edays	Mon 9/8/14	Thu 10/23/14	60



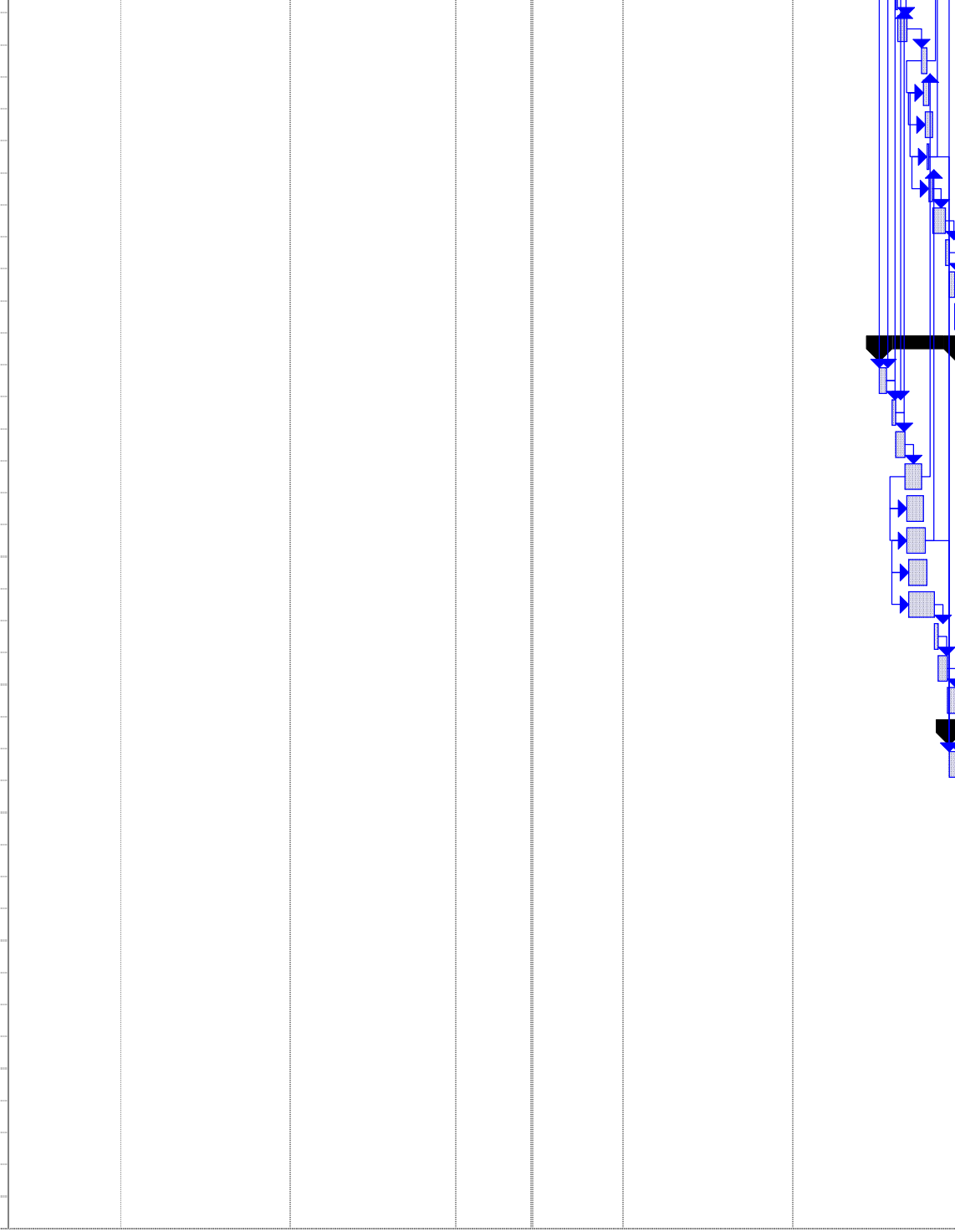
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

	7 edays	Thu 10/23/14	Thu 10/30/14	71
	1 eday	Thu 10/30/14	Fri 10/31/14	73
	34 days	**Fri 10/31/14**	**Thu 12/4/14**	
	7 edays	Fri 10/31/14	Fri 11/7/14	74
s	5 edays	Fri 10/31/14	Wed 11/5/14	74
	4 edays	Wed 11/5/14	Sun 11/9/14	77
	1 eday	Sun 11/9/14	Mon 11/10/14	78
nation Pads	14 edays	Sun 11/9/14	Sun 11/23/14	78
ater Treatment Pad	13 edays	Sun 11/9/14	Sat 11/22/14	78
Facilities	**12 days**	**Sat 11/22/14**	**Thu 12/4/14**	
	5 edays	Sat 11/22/14	Thu 11/27/14	81
	7 days	Fri 11/28/14	Thu 12/4/14	83,98
	36 days	**Mon 11/24/14**	**Tue 12/30/14**	
	3 edays	Mon 11/24/14	Thu 11/27/14	111,52
	1 eday	Thu 11/27/14	Fri 11/28/14	86,112
	5 edays	Fri 11/28/14	Wed 12/3/14	87
ey and Sample)	2 edays	Fri 12/12/14	Sun 12/14/14	88,114
	2 edays	Sat 12/13/14	Mon 12/15/14	89SS+1 day
	1 eday	Sun 12/14/14	Mon 12/15/14	90SS+1 day,117FS+1 d
sis	2 edays	Mon 12/15/14	Wed 12/17/14	91SS+1 day
on	7 edays	Wed 12/17/14	Wed 12/24/14	92SS+2 days
	2 edays	Wed 12/24/14	Fri 12/26/14	93
ntamination Pads	2 edays	Fri 12/26/14	Sun 12/28/14	94
Areas	2 edays	Sun 12/28/14	Tue 12/30/14	95
	56 days	**Tue 11/11/14**	**Tue 1/6/15**	
	5 edays	Tue 11/11/14	Sun 11/16/14	80SS+2 days,52
	7 edays	Sun 11/16/14	Sun 11/23/14	98
	5 edays	Sun 11/23/14	Fri 11/28/14	99
ey and Sample)	24 edays	Fri 11/28/14	Mon 12/22/14	100
	24 edays	Sat 11/29/14	Tue 12/23/14	101SS+1 day
	3 edays	Sun 11/30/14	Wed 12/3/14	102SS+1 day
	24 edays	Sun 11/30/14	Wed 12/24/14	102SS+1 day
sis	24 edays	Mon 12/1/14	Thu 12/25/14	104SS+1 day
on	21 edays	Mon 12/8/14	Mon 12/29/14	105SS+7 days
	4 edays	Mon 12/29/14	Fri 1/2/15	106
ntamination Pads	2 edays	Fri 1/2/15	Sun 1/4/15	107
Areas	2 edays	Sun 1/4/15	Tue 1/6/15	108
	42 days	**Thu 11/20/14**	**Thu 1/1/15**	
	4 edays	Thu 11/20/14	Mon 11/24/14	124,52



Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

	5 edays	Wed 11/26/14	Mon 12/1/14	112
ey and Sample)	3 edays	Tue 12/9/14	Fri 12/12/14	113,127
	3 edays	Wed 12/10/14	Sat 12/13/14	114SS+1 day
	4 edays	Thu 12/11/14	Mon 12/15/14	115SS+1 day
	1 eday	Fri 12/12/14	Sat 12/13/14	115SS+1 day,129FS+1
sis	2 edays	Sat 12/13/14	Mon 12/15/14	117SS+1 day
n	7 edays	Mon 12/15/14	Mon 12/22/14	118
	2 edays	Mon 12/22/14	Wed 12/24/14	119
tamination Pads	3 edays	Wed 12/24/14	Sat 12/27/14	120
reas	5 edays	Sat 12/27/14	Thu 1/1/15	121
	42 days	**Sun 11/16/14**	**Sun 12/28/14**	
	4 edays	Sun 11/16/14	Thu 11/20/14	98,52
	2 edays	Sun 11/23/14	Tue 11/25/14	124,99
	5 edays	Tue 11/25/14	Sun 11/30/14	125
ey and Sample)	9 edays	Sun 11/30/14	Tue 12/9/14	126
	9 edays	Mon 12/1/14	Wed 12/10/14	127SS+1 day
	10 edays	Mon 12/1/14	Thu 12/11/14	128SS
sis	10 edays	Tue 12/2/14	Fri 12/12/14	129SS+1 day
n	14 edays	Tue 12/2/14	Tue 12/16/14	130SS
	2 edays	Tue 12/16/14	Thu 12/18/14	131
tamination Pads	5 edays	Thu 12/18/14	Tue 12/23/14	132
rea	5 edays	Tue 12/23/14	Sun 12/28/14	133
al	**15 days**	**Wed 12/24/14**	**Thu 1/8/15**	
	10 edays	Wed 12/24/14	Sat 1/3/15	117,129,104,91
	5 edays	Sat 1/3/15	Thu 1/8/15	136
	23 days	**Thu 1/8/15**	**Sat 1/31/15**	
	12 edays	Thu 1/8/15	Tue 1/20/15	137
	1 eday	Tue 1/20/15	Wed 1/21/15	139
bilization	5 edays	Wed 1/21/15	Mon 1/26/15	140
	3 edays	Thu 1/8/15	Sun 1/11/15	137
	3 edays	Sun 1/11/15	Wed 1/14/15	142,106,122,134
	2 edays	Sun 1/11/15	Tue 1/13/15	142
	7 edays	Tue 1/13/15	Tue 1/20/15	144
	5 edays	Tue 1/20/15	Sun 1/25/15	145
	5 edays	Sun 1/25/15	Fri 1/30/15	146
rea	6 edays	Sun 1/25/15	Sat 1/31/15	146
	105 days	**Fri 5/1/15**	**Thu 8/13/15**	
	730 days	**Thu 8/13/15**	**Sat 8/12/17**	



Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Appendix F

Cost Estimate

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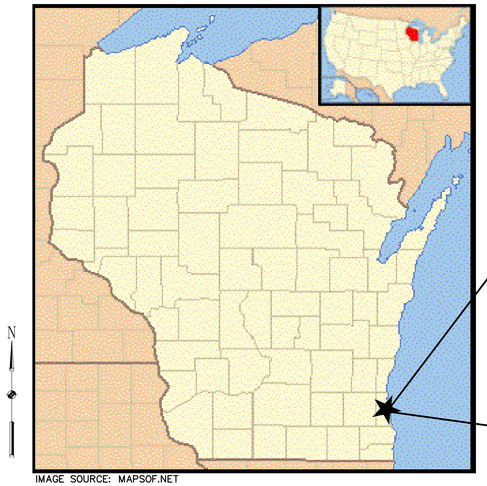

IMAGE SOURCE: MAPSOF.NET

STATE MAP
NOT TO SCALE

APPROXIMATE SITE LOCATION

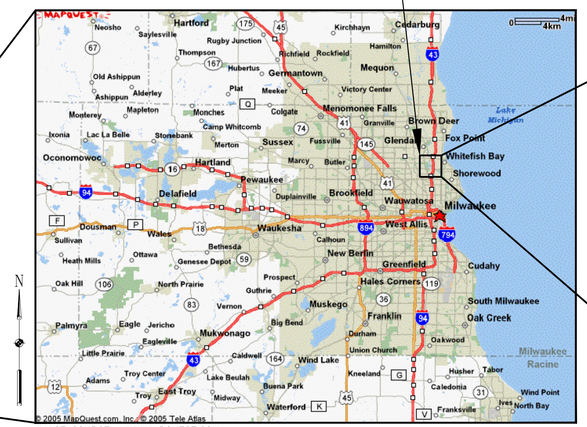

IMAGE SOURCE: WWW.MAPQUEST.COM

LOCAL AREA MAP
NOT TO SCALE

APPROXIMATE SITE BOUNDARY

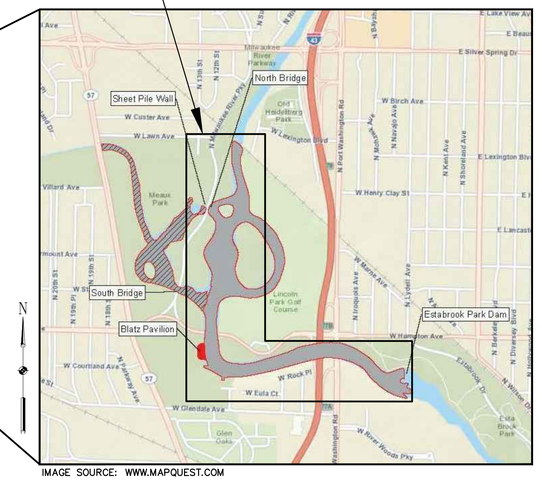

IMAGE SOURCE: WWW.MAPQUEST.COM

VICINITY MAP
NOT TO SCALE

REMEDIAL DESIGN

LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II

MILWAUKEE COUNTY, WISCONSIN

PREPARED FOR

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 5
CHICAGO, IL

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN ENGINEER
JON M. TROMBINO
E-43204-6
PROFESSIONAL

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

TITLE SHEET

PREPARED FOR:
EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	G-001
SHEET NUMBER	1 OF 22

FILE PATH: F:\FEDERAL\ADM DOD\QUALITY\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\COVER SHEET.DWG [1 TITLE SHEET] 3/19/14 jmather

GENERAL CONSTRUCTION NOTES:

1. THIS PROJECT INVOLVES THE DEWATERING, REMOVAL, HAULING, AND DISPOSAL OF PCB, PAH, AND NAPL CONTAMINATED SEDIMENT FROM THE MILWAUKEE RIVER.
2. THE CONTAMINATED SEDIMENTS ARE LOCATED AT NINE SEPARATE LOCATIONS IN THE RIVER SHOWN ON THE PLAN SET.
3. SOME OF THE CONTAMINATED SEDIMENTS HAVE PCB CONCENTRATIONS THAT CLASSIFY IT AS TSCA WASTE.
4. A SITE SURVEY WAS NOT CONDUCTED. LOCATIONS SHOWN ARE APPROXIMATE AND ARE BASED ON LIDAR. AERIAL PHOTOGRAPHY, PHASE 1 DOCUMENTS, UTILITY ONE-CALLS, AND HAND-HELD GPS MEASUREMENTS.
5. TEMPORARY FACILITIES ARE UP TO CONTRACTOR TO SIZE AND LAYOUT. ALTERNATE BUT EQUIVALENT DESIGNS ARE ALLOWED. SEE TECHNICAL SPECIFICATION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS.
6. SLOPES DEPICTED ON DRAWINGS IMPLY VERTICAL CUTS AND STEEP SLOPES IN SOME LOCATIONS, WHICH ARE INTENDED ONLY TO REFLECT THE ANTICIPATED EXTENT OF CONTAMINATED SEDIMENT. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF ALL CUT AND FILL SLOPES IN THE LIMITS OF WORK, AND TO PROVIDE APPROPRIATE TEMPORARY SHORING OR SUPPORT OF STRUCTURES FOR CUT SLOPES AS NEEDED TO PREVENT SEDIMENT OR SOIL INSTABILITY, SLOUGHING INTO EXCAVATION, OR SETTLEMENT OF ADJACENT STRUCTURES OR GRADES. ADDITIONAL SEDIMENT OR SOIL SLOUGHING INTO EXCAVATION AREAS BEYOND THE LIMITS OF THE APPROVED EXCAVATION PLAN WILL BE THE CONTRACTOR'S RESPONSIBILITY FOR PAYMENT.

INFORMATION SOURCE NOTES:

1. AERIAL IMAGE FROM 2010 WAS PROVIDED BY THE USGS WWW.VIEWER.NATIONALMAP.GOV/VIEWER.
2. SURFACE CONTOURS ARE BASED ON DEM OBTAINED FROM MILWAUKEE COUNTY LAND INFORMATION OFFICE'S INTERACTIVE MAPPING SERVICE http://county.milwaukee.gov/LandInformationProgr23113/LIOInteractiveMapping.htm, HORIZONTAL DATUM IS STATE PLANE COORDINATE 1983 ZONE: WISCONSIN SOUTH ZONE AND VERTICAL DATUM IS NGVD29.
3. BATHYMETRIC INFORMATION IS A COMBINATION OF SURVEY DONE BY EA IN FEBRUARY AND MAY 2013 AND INFORMATION PROVIDED BY A PREVIOUS SURVEY DONE IN FEBRUARY THROUGH APRIL 2010 BY CH2M HILL. HORIZONTAL DATUM IS STATE PLANE COORDINATE 1983 ZONE: WISCONSIN SOUTH ZONE AND VERTICAL DATUM IS NGVD29.
4. PUBLIC UTILITY INFORMATION OBTAINED FROM MAPS OBTAINED FROM WISCONSIN DIGGERS HOTLINE AUGUST 2013.
5. APPROXIMATE DEPOSIT BOUNDARIES, TSCA LOCATIONS, AND NAPL LOCATIONS ARE ESTIMATED BASED ON AN EXISTING ANALYTICAL DATA.
6. WETLAND LOCATIONS BASED ON A WETLAND DELINEATION DONE BY EA IN SEPTEMBER 2013.
7. FLOOD PLAIN INFORMATION BASED ON A FLOOD INSURANCE RATE MAP PROVIDED BY FEMA. MAP NUMBER 55079C0081E, SEPTEMBER 26, 2008. HORIZONTAL DATUM IS STATE PLANE COORDINATE 1983 ZONE: WISCONSIN SOUTH ZONE AND VERTICAL DATUM IS NGVD29.
8. CITY LIMITS AND COUNTY PARK BOUNDARY BASED ON WWW.MAPS.MILWAUKEECOUNTY.ORG DOWNLOADABLE GIS DATA OBTAINED AUGUST 2013.
9. PHASE 1 INFORMATION WAS OBTAINED FROM CH2M HILL RECORD DRAWINGS.

ABBREVIATIONS:

APPROX	APPROXIMATE
AVE	AVENUE
CD	COFFER DAM
℄	CENTERLINE
DEM	DIGITAL ELEVATION MODEL
EA	EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
EPA	ENVIRONMENTAL PROTECTION AGENCY
FEMA	FEDERAL EMERGENCY MANAGEMENT AGENCY
FL	FLOWLINE
G	GAS MAIN
GIS	GEOGRAPHIC INFORMATION SYSTEM
GPS	GLOBAL POSITIONING SYSTEM
HDPE	HIGH-DENSITY POLYETHYLENE PLASTIC PIPE
LBS	POUNDS
LOD	LIMITS OF DISTURBANCE
MAX	MAXIMUM
MIL	MILLIMETER
MIN	MINIMUM
MW	MONITORING WELL
N	NORTH
NAD83	NORTH AMERICAN DATUM 1983
NAPL	NON-AQUEOUS PHASE LIQUID
NG	NATIVE GRASS
NGVD29	NATIONAL GEODETIC VERTICAL DATUM 1929
NO.	NUMBER
NPDES	NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
NTS	NOT TO SCALE
OHP	OVERHEAD POWER LINE
OZ	OUNCES
PAH	POLYCYCLIC AROMATIC HYDROCARBON
PCB	POLYCHLORINATED BIPHENYL
PRE	PRELIMINARY
SS	SEWER LINE
SC	SILT CURTAIN
SF	SILT FENCE
TEMP	TEMPORARY
TSCA	TOXIC SUBSTANCES CONTROL ACT
TYP	TYPICAL
USGS	UNITED STATES GEOLOGICAL SURVEY
W	WATER LINE
WISDOT	WISCONSIN DEPARTMENT OF TRANSPORTATION
YR	YEAR

INDEX:

LEGEND:

13 / C-501 — DETAIL NUMBER; DRAWING NUMBER OF DETAIL

NOTES:

1. "A" INDICATES THAT A SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS DRAWN ON THE SAME SHEET.
2. IF THE SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS REFERENCED ON MULTIPLE SHEETS, ALL SHEETS ARE REFERENCED WITHIN THE DETAIL BUBBLE.

LEGEND:

- CITY BOUNDARY
- FEMA 100-YR FLOOD PLAIN BOUNDARY
- SCRUB-SHRUB/EMERGENT WETLAND
- FORESTED WETLAND
- INTERMITTENT STREAM
- SEDIMENT REMOVAL AREA
- APPROXIMATE NAPL LOCATION
- APPROXIMATE TSCA LOCATION
- SS — APPROXIMATE SEWER LOCATION
- G — APPROXIMATE GAS MAIN LOCATION
- W W — APPROXIMATE WATER LINE LOCATION
- OHP — OVERHEAD POWER LINE
- LOD — LIMITS OF DISTURBANCE
- CENTERLINE OF ROAD
- 620 — EXISTING CONTOURS
- TOPSOIL STOCKPILE AREA
- DECONTAMINATION PAD
- DEWATERING PAD
- WASTEWATER TREATMENT PAD
- MOBILE EQUIPMENT STORAGE
- ACCESS RAMP
- CONSTRUCTION ENTRANCE
- AVAILABLE STAGING AREA
- X X — TEMPORARY CHAIN LINK SECURITY FENCE
- SF — SILT FENCE
- CD-1 — COFFERDAM 1
- CD-2 — COFFERDAM 2
- CD-3 — COFFERDAM 3
- CD-4 — COFFERDAM 4
- SC — SILT CURTAIN
- 620 — PROPOSED CONTOURS
- BOULDER RESTORATION
- ROOT WAD
- SUBSTRATE RESTORATION
- NG / SN — NATIVE GRASS HYDROSEEDING
- NO MOW/LOW GROW HYDROSEEDING

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN — JON M. TROMBINO — E-43204-6 — ENGINEER — PROFESSIONAL

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ABBREVIATIONS, GENERAL NOTES, LEGEND AND DRAWING INDEX

PREPARED FOR: EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	G-002
SHEET NUMBER	2 OF 22

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DEPOSIT 7-1

DEPOSIT 7-2

DEPOSIT 7-3

ZONES 3 AND 7
SEE DRAWING C-102 FOR EXISTING CONDITIONS
SEE DRAWING C-202 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-301 FOR RESTORATION PLAN

DEPOSIT 7-4

DEPOSIT 3B-1

ZONE 4
SEE DRAWING C-103 FOR EXISTING CONDITIONS
SEE DRAWING C-204 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-302 FOR RESTORATION PLAN

DEPOSIT 4-1

DEPOSIT 4-2

DEPOSIT 4-3

ZONE 5
SEE DRAWING C-104 FOR EXISTING CONDITIONS
SEE DRAWING C-206 FOR SEDIMENT REMOVAL PLAN
SEE DRAWING C-303 FOR RESTORATION PLAN

DEPOSIT 5-1

N

SITE SHEET INDEX

300 150 0 300 600
GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

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WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6
2/12/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

SITE SHEET INDEX

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DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
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DRAWING NUMBER	C-101
SHEET NUMBER	3 OF 22

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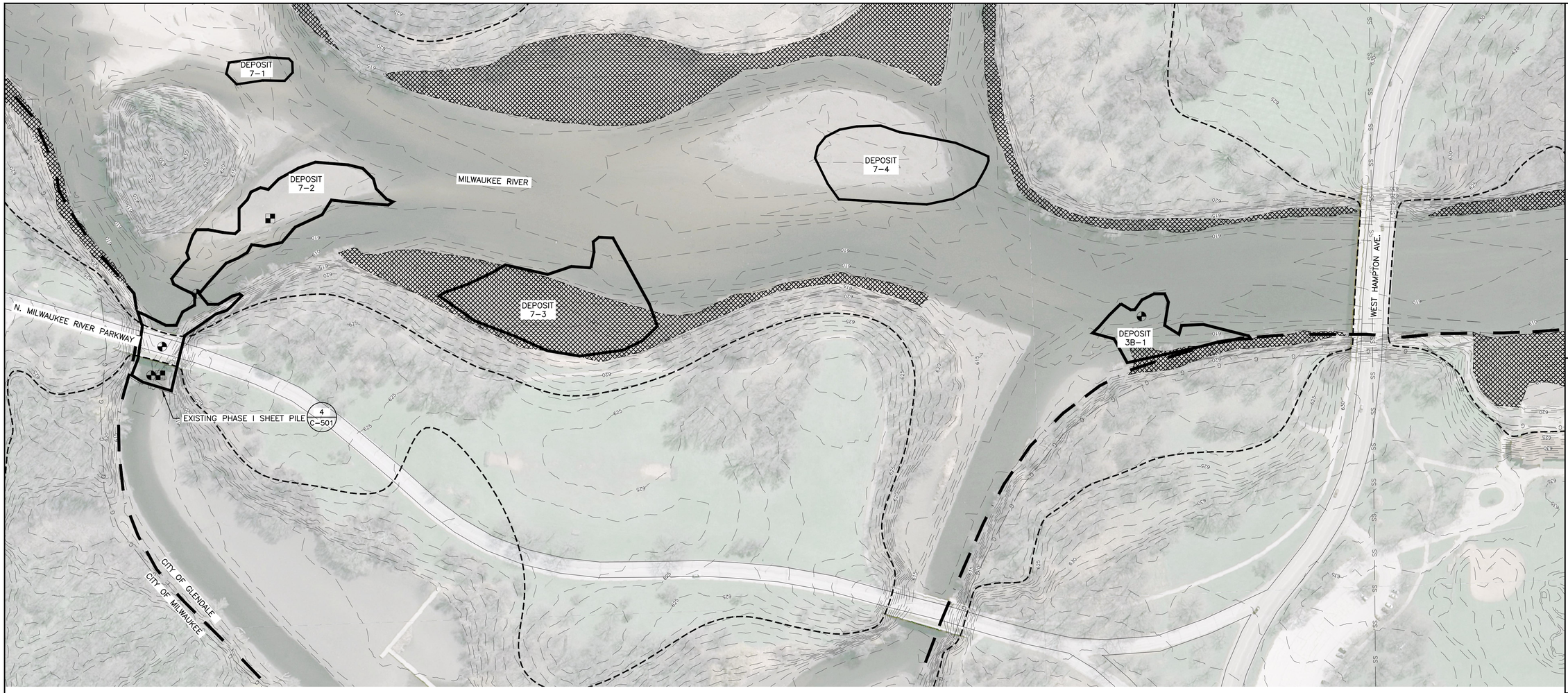

ZONES 3 AND 7 EXISTING CONDITIONS

100 50 0 100 200

GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONES 3 AND 7 EXISTING CONDITIONS

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444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945–8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C–102
SHEET NUMBER	4 OF 22

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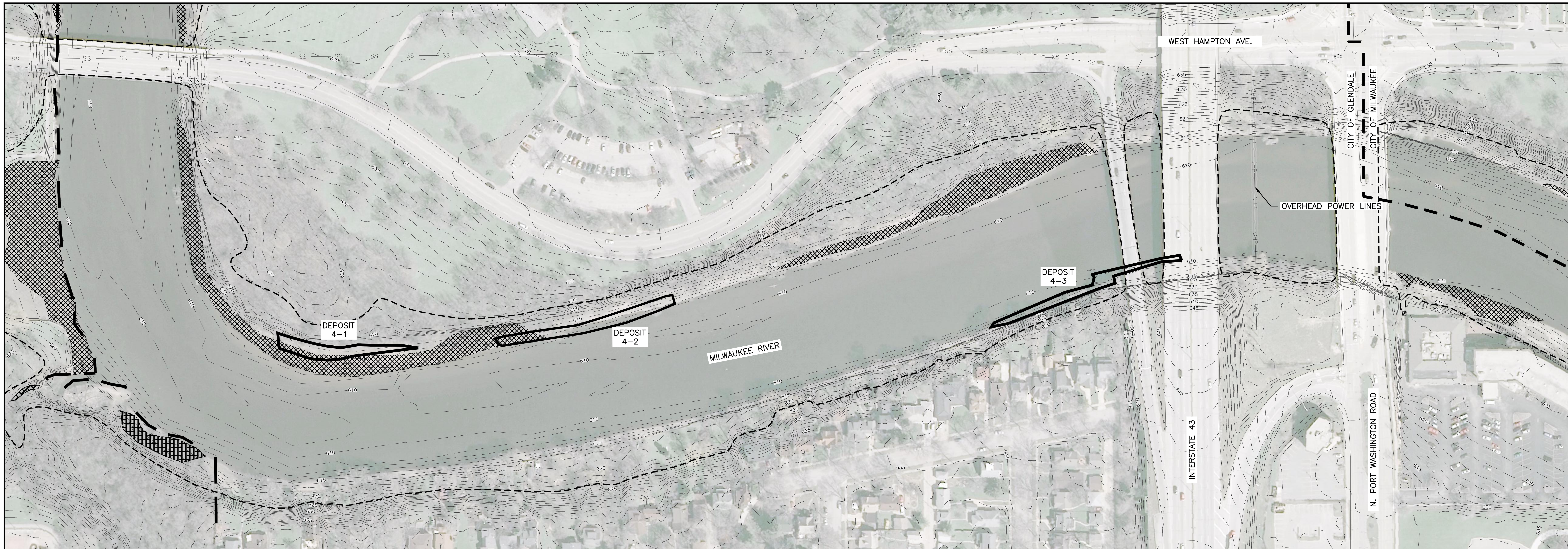

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ZONE 4 EXISTING CONDITIONS

100 50 0 100 200
GRAPHIC SCALE IN FEET

REVISIONS

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REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONE 4 EXISTING CONDITIONS

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SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
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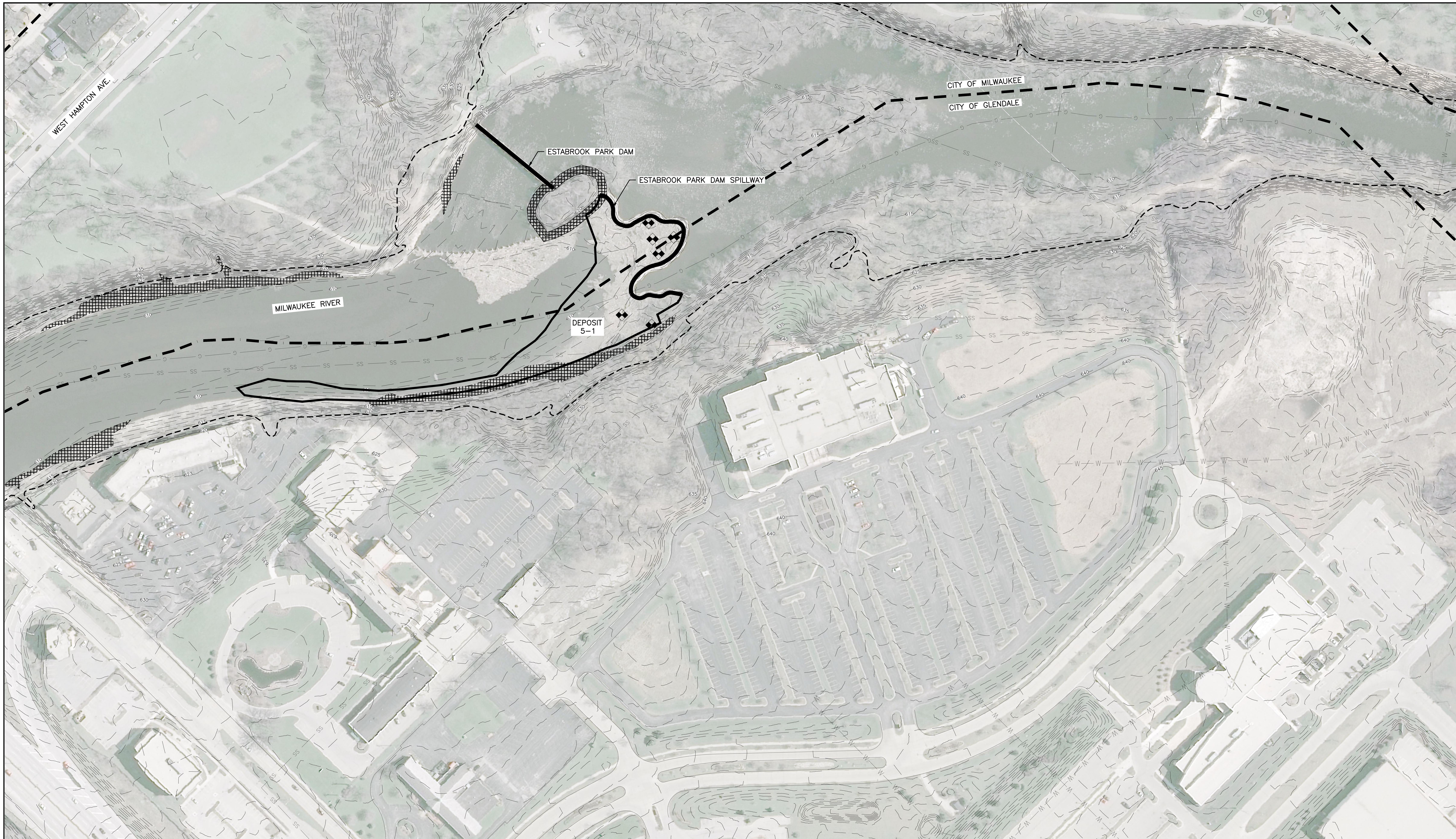

ZONE 5 EXISTING CONDITIONS

100 50 0 100 200
GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL: JON M. TROMBINO E-43204-6 WISCONSIN PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONE 5 EXISTING CONDITIONS

PREPARED FOR:
EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
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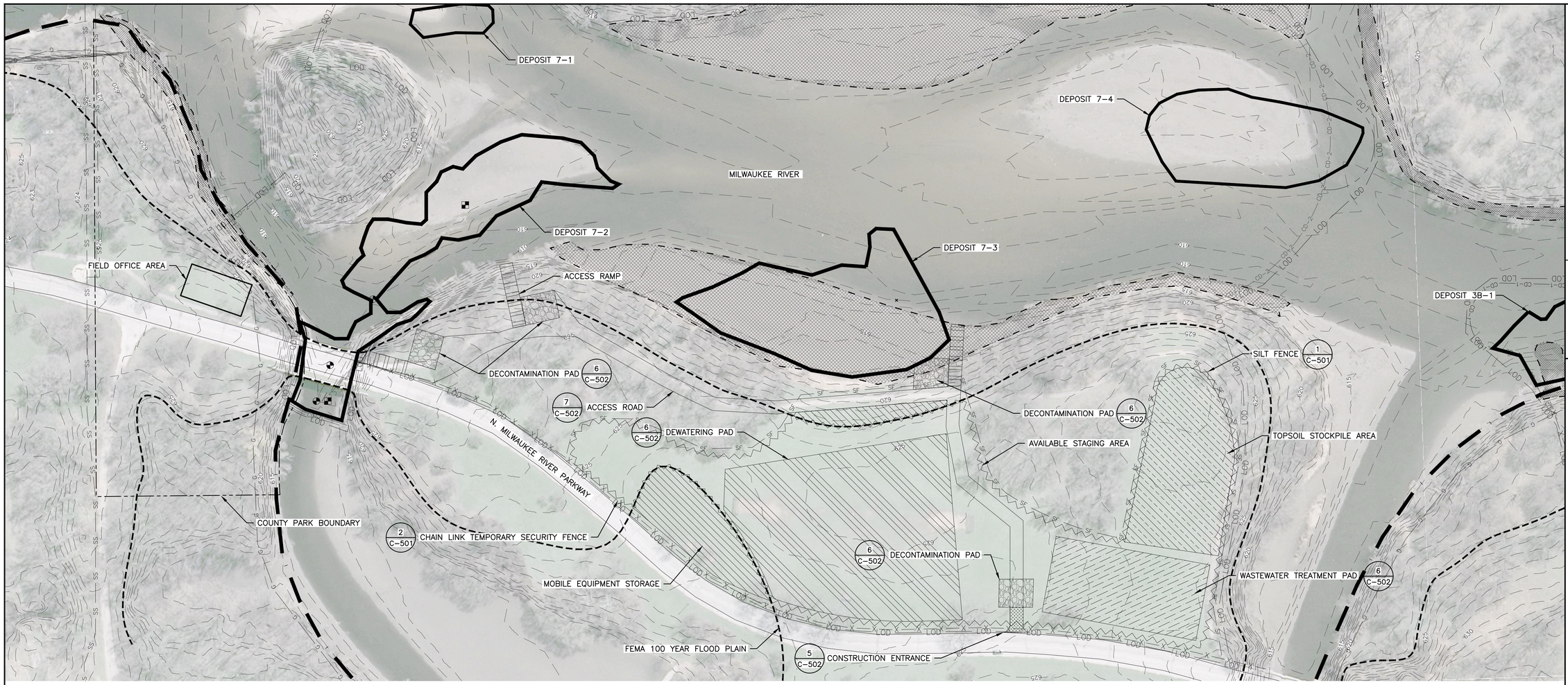

AVAILABLE STAGING AREAS AND TEMPORARY FACILITIES

N

80 40 0 80 160

GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

2/21/14

REMEDIAL DESIGN

LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II

MILWAUKEE COUNTY, WISCONSIN

AVAILABLE STAGING AREAS AND TEMPORARY FACILITIES

PREPARED FOR:

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-201
SHEET NUMBER	7 OF 22

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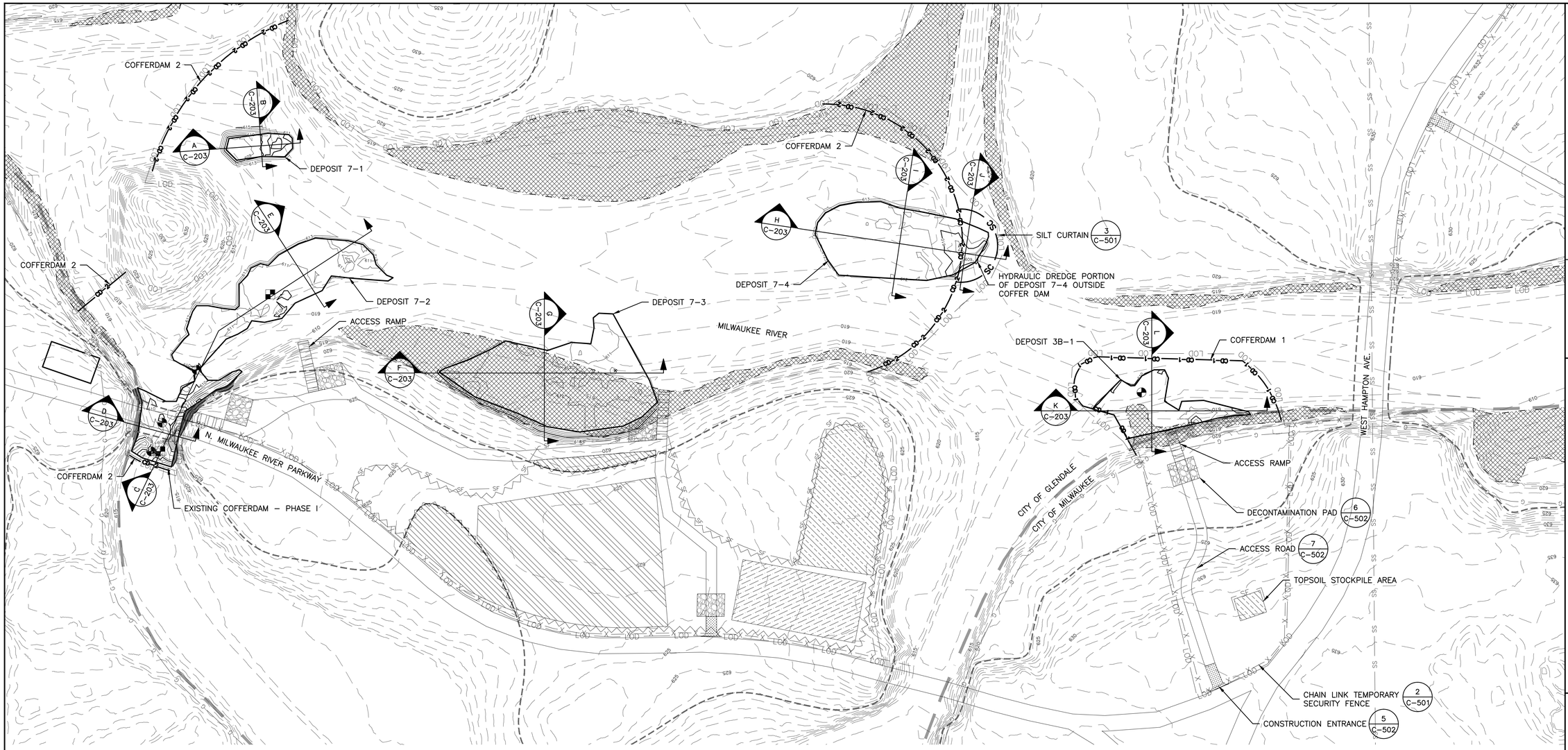

ZONES 3 AND 7 SEDIMENT REMOVAL PLAN

GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN — JON M. TROMBINO — E-43204-6 — PROFESSIONAL ENGINEER

REMEDIAL DESIGN

LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II

MILWAUKEE COUNTY, WISCONSIN

ZONES 3 AND 7 SEDIMENT REMOVAL PLAN

PREPARED FOR: EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-202
SHEET NUMBER	8 OF 22

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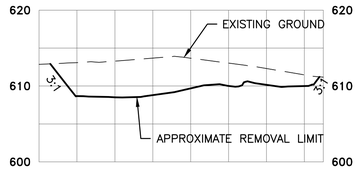

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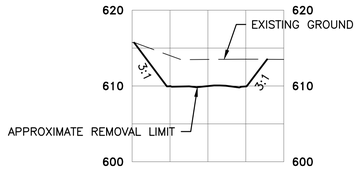
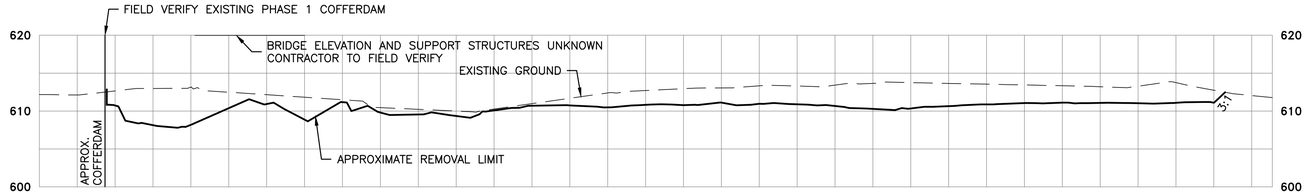
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



B C-202 DEPOSIT 7-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

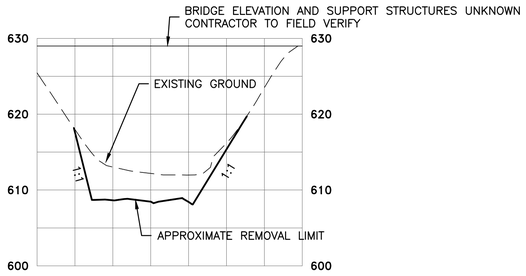
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



C C-202 DEPOSIT 7-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

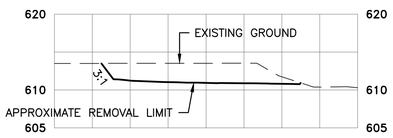
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



D C-202 DEPOSIT 7-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

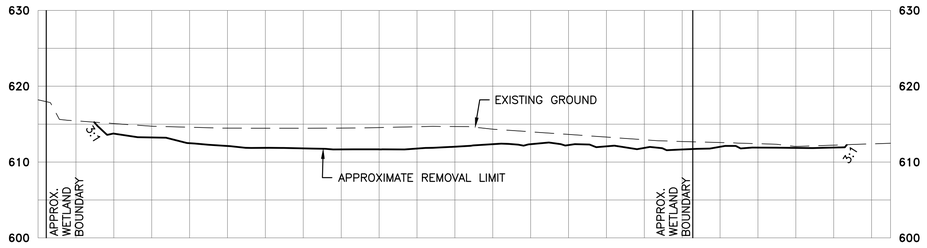
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



E C-202 DEPOSIT 7-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

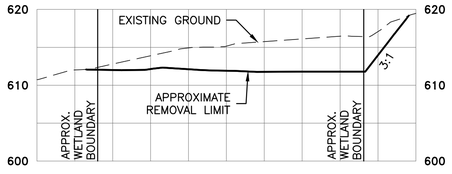
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



F C-202 DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

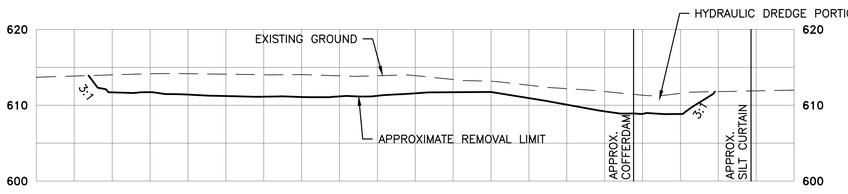
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



G C-202 DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

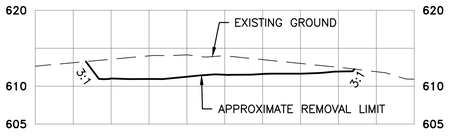
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



H C-202 DEPOSIT 7-4 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

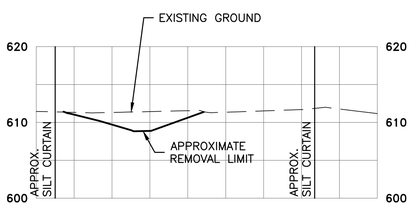
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



I C-202 DEPOSIT 7-4 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

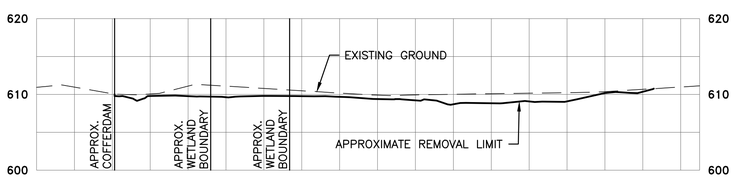
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



J C-202 DEPOSIT 7-4 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

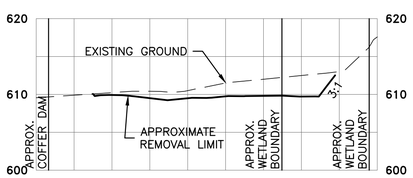
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



K C-202 DEPOSIT 3B-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



L C-202 DEPOSIT 3B-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONES 3 AND 7 SEDIMENT REMOVAL CROSS SECTIONS

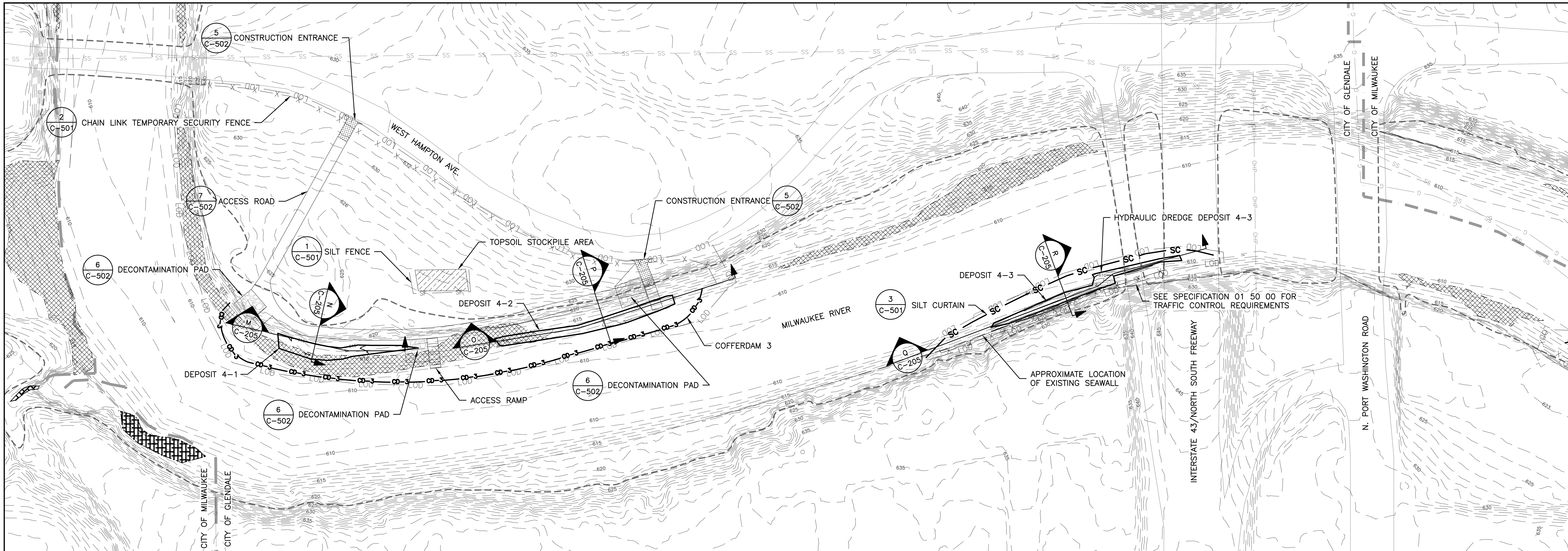
PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-203
SHEET NUMBER	9 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\C-9 ZONES 3, 7 SEDIMENT REMOVAL PLAN.DWG [09 ZONES 3 AND 7 REMOVAL CROSS SECTIONS] 3/18/14 jmather



ZONE 4 SEDIMENT REMOVAL PLAN

100 50 0 100 200
GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

JON M. TROMBINO E-43204-6

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

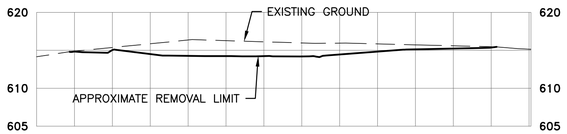
ZONE 4 SEDIMENT REMOVAL PLAN

PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-204
SHEET NUMBER	10 OF 22

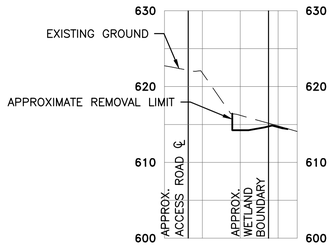


M C-204

DEPOSIT 4-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

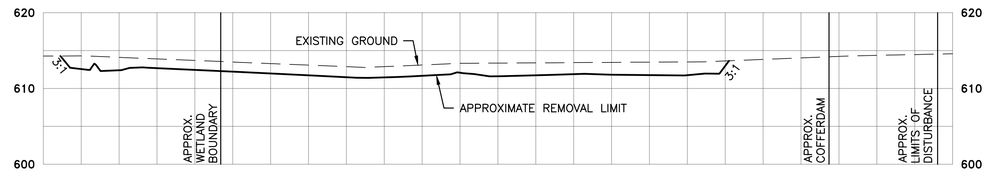


N C-204

DEPOSIT 4-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

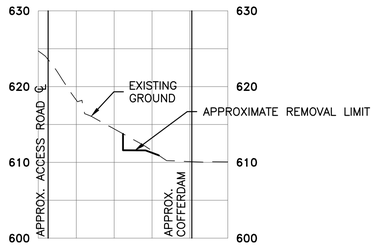


O C-204

DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

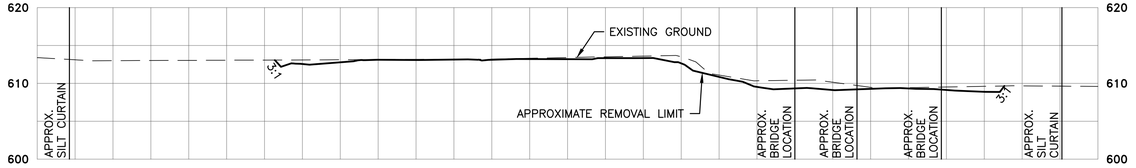


P C-204

DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

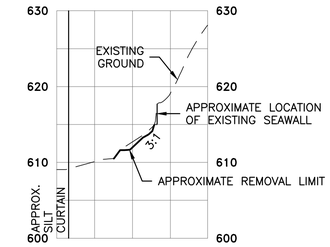


Q C-204

DEPOSIT 4-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



R C-204

DEPOSIT 4-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONE 4 SEDIMENT REMOVAL CROSS SECTIONS

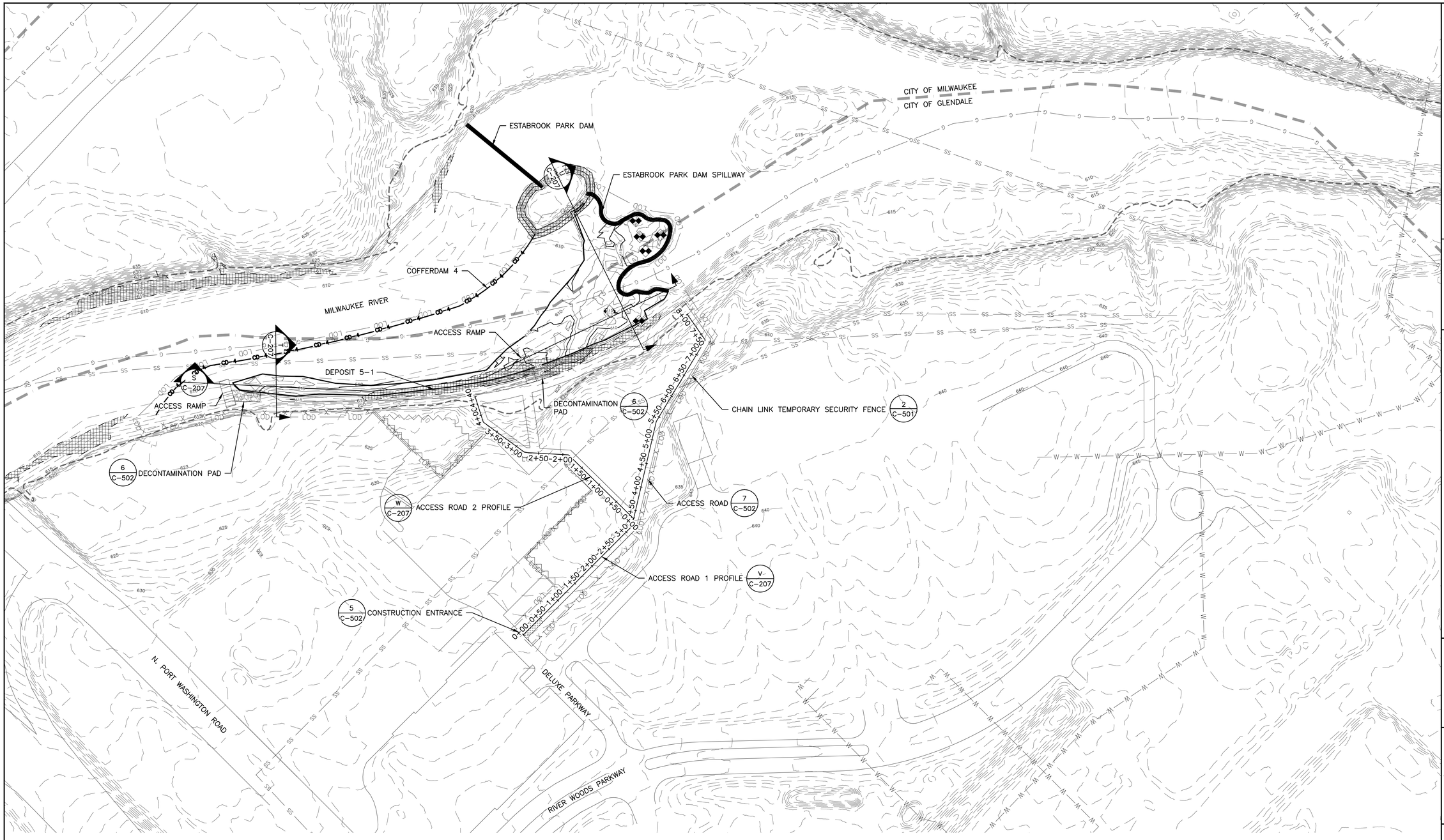
PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-205
SHEET NUMBER	11 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\C-10 ZONE 4 SEDIMENT REMOVAL PLAN.DWG [11 ZONE 4 SEDIMENT REMOVAL CROSS SECTIONS] 2/26/14 jmather



ZONE 5 SEDIMENT REMOVAL PLAN

100 50 0 100 200
GRAPHIC SCALE IN FEET

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN
JON M. TROMBINO
E-43204-6
PROFESSIONAL ENGINEER
2/24/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

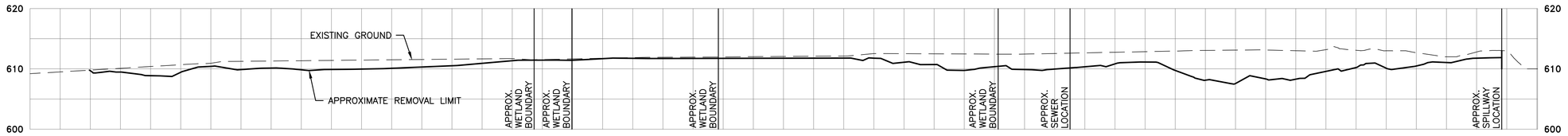
ZONE 5 SEDIMENT REMOVAL PLAN

PREPARED FOR:
EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-206
SHEET NUMBER	12 OF 22

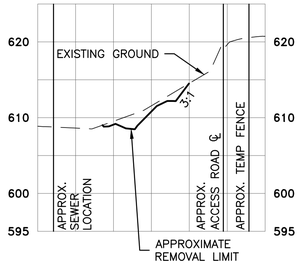
FILE PATH: P:\FEDERAL\MON DOD\GIS\PROJECTS\6256105 - LINCOLN PARK (TS-HOV)\FIGURES\90% DRAWINGS\C-11 ZONE 5 SEDIMENT REMOVAL PLAN.DWG [12 ZONE 5 SEDIMENT REMOVAL PLAN] 2/24/14 jmather



S / C-206 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

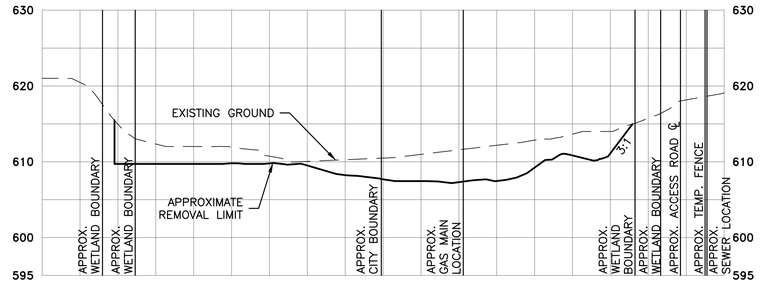
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



T / C-206 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

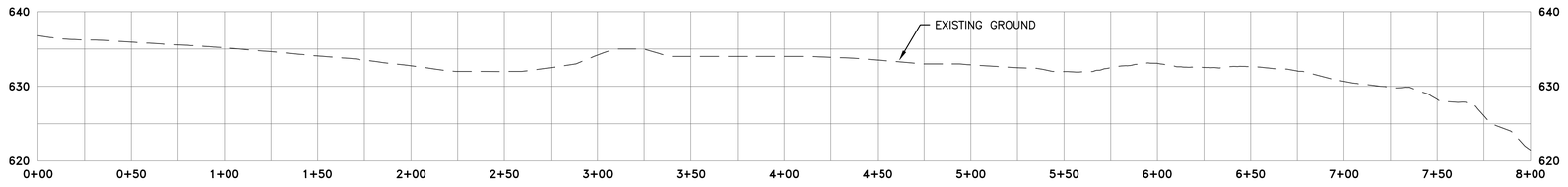
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



U / C-206 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

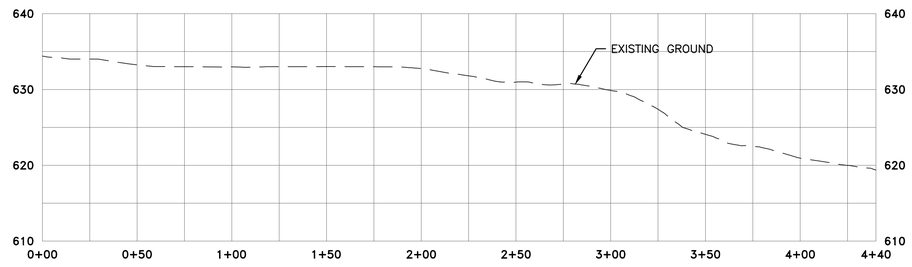
VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



V / C-206 ACCESS 1 ROAD PROFILE

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET



W / C-206 ACCESS 2 ROAD PROFILE

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

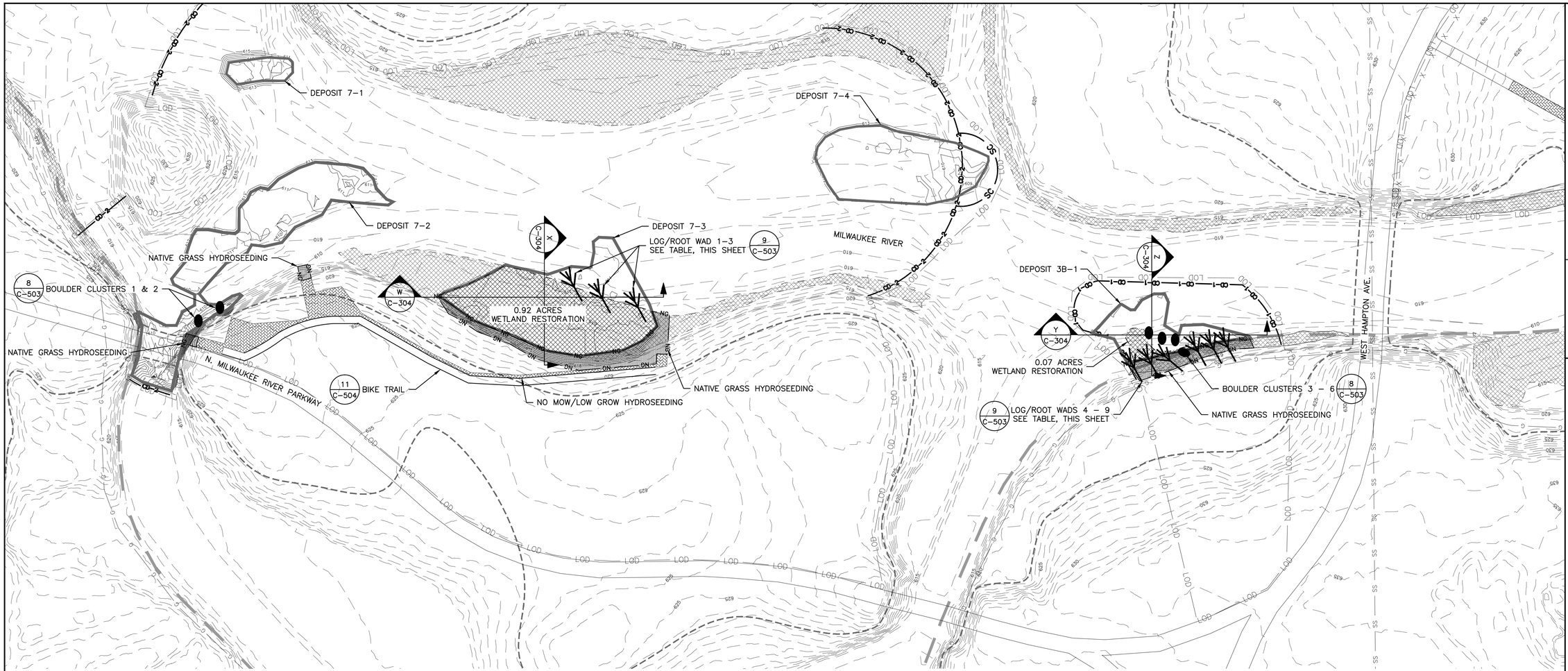
ZONE 5 SEDIMENT REMOVAL CROSS SECTIONS

PREPARED FOR: EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-207
SHEET NUMBER	13 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\C-11 ZONE 5 SEDIMENT REMOVAL PLAN.DWG [13 ZONE 5 SEDIMENT REMOVAL CROSS SECTIONS] 2/24/14 jmather



ZONES 3 AND 7 RESTORATION PLAN

GRAPHIC SCALE IN FEET
100 50 0 100 200

LOG/ROOT WAD TABLE						
ROOT WAD NO.	ZONE	ARM LENGTH A	POSITION B	BANK ANGLE C	POSITION D	ANCHOR LENGTH E
#1	3-7	10'-20'	611'-612'	40-60	613'	>10'
#2	3-7	10'-20'	611'-612'	40-60	613'	>10'
#3	3-7	10'-20'	611'-612'	40-60	613'	>10'
#4-9	3-7	10'-20'	612'	60-90	613'-614'	>10'

PLANTING/SEEDING SCHEDULE	
DESCRIPTION	ACRES
WETLAND PLANTING	0.99
NATIVE GRASS HYDROSEEDING	1.44
NO MOW/LOW GROW GRASS HYDROSEEDING	0.35

NOTES:
1. OTHER DISTURBED AREAS SHALL BE HYDROSEEDED FOR TURFGRASS IN ACCORDANCE WITH SECTION 32 90 00 – PLANTING.
2. HYDROSEEDING AREAS ARE BASED ON TEMPORARY FACILITY LOCATIONS AS SHOWN ON DRAWINGS. CONTRACTOR SHALL HYDROSEED ADDITIONAL AREAS DUE TO CHANGES IN TEMPORARY FACILITIES.

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL: WISCONSIN PROFESSIONAL ENGINEER — JON M. TROMBINO E-43204-6 — 5/12/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

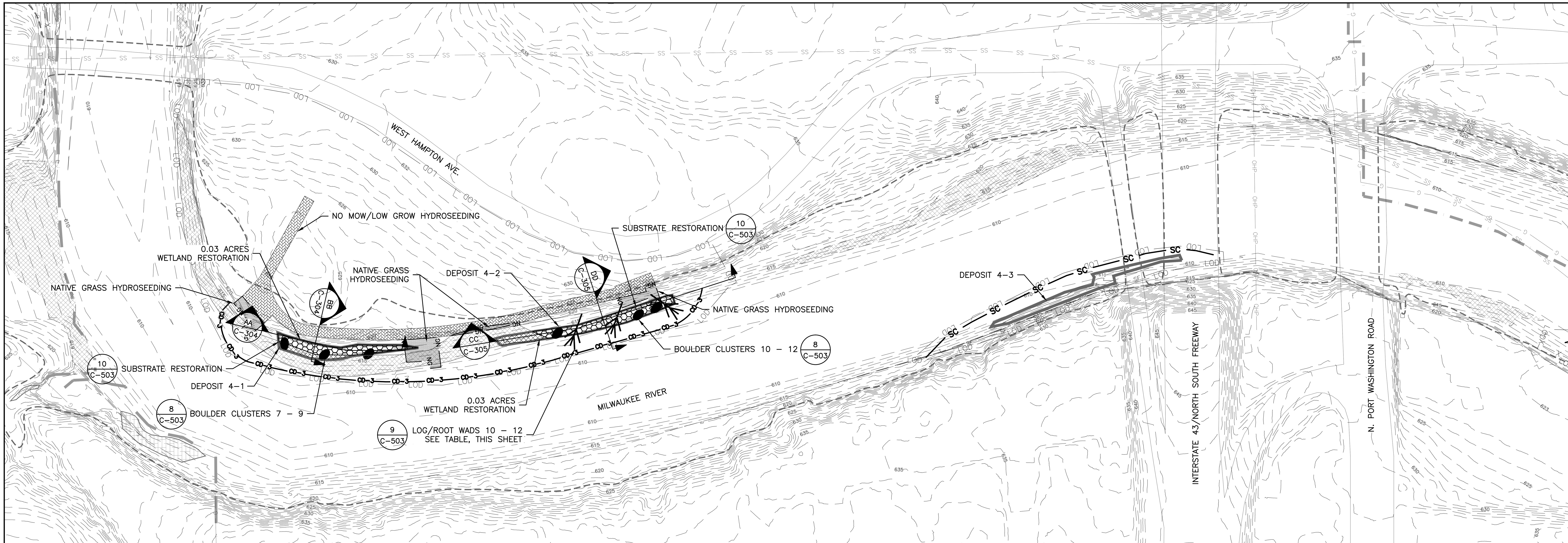
ZONES 3 AND 7 RESTORATION PLAN

PREPARED FOR: EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JM
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-301
SHEET NUMBER	14 OF 22

FILE PATH: P:\FEEBAL\NON DOD\DUKES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\C-12 HABITAT RESTORATION SITE PLAN.DWG [14 ZONES 3 AND 7 HABITAT RESTORATION] 3/18/14 jmather



ZONE 4 RESTORATION PLAN

N

100 50 0 100 200

GRAPHIC SCALE IN FEET

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.

LOG/ROOT WAD TABLE						
ROOT WAD NO.	ZONE	ARM LENGTH A	POSITION B	BANK ANGLE C	POSITION D	ANCHOR LENGTH E
#10–12	4	10'–20'	610'	60–120	612'	>10'

PLANTING/SEEDING SCHEDULE	
DESCRIPTION	ACRES
WETLAND PLANTING	0.06
NATIVE GRASS HYDROSEEDING	0.22
NO MOW/LOW GROW GRASS HYDROSEEDING	0.49

NOTES:
1. OTHER DISTURBED AREAS SHALL BE HYDROSEEDED FOR TURFGRASS IN ACCORDANCE WITH SECTION 32 90 00 – PLANTING.
2. HYDROSEEDING AREAS ARE BASED ON TEMPORARY FACILITY LOCATIONS AS SHOWN ON DRAWINGS. CONTRACTOR SHALL HYDROSEED ADDITIONAL AREAS DUE TO CHANGES IN TEMPORARY FACILITIES.

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

ZONE 4 RESTORATION PLAN

PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE: MAY 2014
DESIGNED BY: JM
DRAWN BY: JRM
CHECKED BY: JMT
PROJECT MANAGER: MC
PROJECT NUMBER: 6256105
SCALE: AS SHOWN
FILE NAME: SEE FILE PATH
DRAWING NUMBER: C-302
SHEET NUMBER: 15 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 – LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\C-12 HABITAT RESTORATION SITE PLAN.DWG [15 ZONE 4 HABITAT RESTORATION] 3/18/14 jmother

PLANTING/SEEDING SCHEDULE	
DESCRIPTION	ACRES
WETLAND PLANTING	0.12
NATIVE GRASS HYDROSEEDING	0.36
NO MOW/LOW GROW GRASS HYDROSEEDING	0.23

NOTES:
1. OTHER DISTURBED AREAS SHALL BE HYDROSEEDED FOR TURFGRASS IN ACCORDANCE WITH SECTION 32 90 00 – PLANTING.
2. HYDROSEEDING AREAS ARE BASED ON TEMPORARY FACILITY LOCATIONS AS SHOWN ON DRAWINGS. CONTRACTOR SHALL HYDROSEED ADDITIONAL AREAS DUE TO CHANGES IN TEMPORARY FACILITIES.

ZONE 5 RESTORATION PLAN

100 50 0 100 200
GRAPHIC SCALE IN FEET

NOTE:
RESTORATION AND HYDROSEEDING AREAS ARE SHOWN BASED ON APPROXIMATE REMOVAL LIMITS AND DISTURBED AREAS. RESTORATION AND HYDROSEEDING AREAS WILL CHANGE BASED ON ACTUAL EXCAVATION AND DISTURBED AREAS.

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL
WISCONSIN
JON M. TROMBINO
E-43204-6
PROFESSIONAL ENGINEER
3/18/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

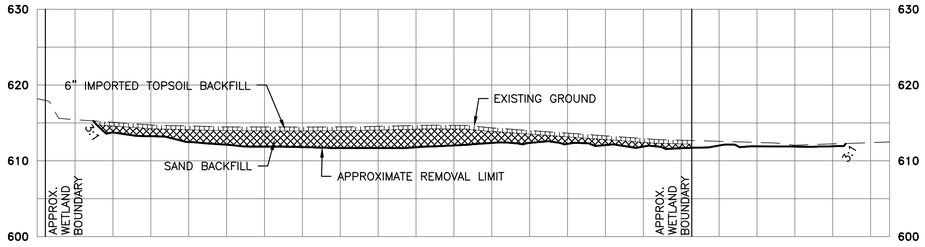
ZONE 5 RESTORATION PLAN

PREPARED FOR:
EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JM
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-303
SHEET NUMBER	16 OF 22

FILE PATH: P:\FEDERAL\MON DOD\GLACIS\PROJECTS\6256105 - LINCOLN PARK 7S-HDY\FIGURES\90% DRAWINGS\C-12 HABITAT RESTORATION SITE PLAN.DWG [16 ZONE 5 HABITAT RESTORATION] 3/18/14 jmotter

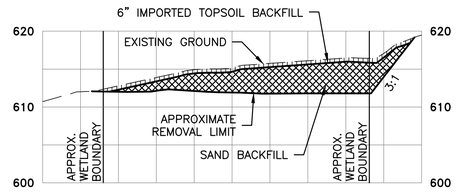


W C-301 DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

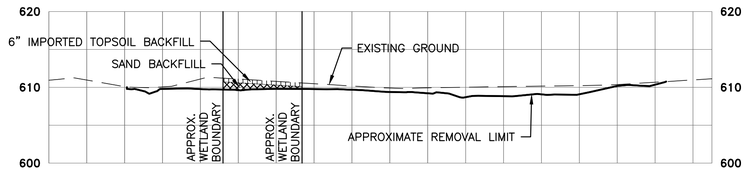


X C-301 DEPOSIT 7-3 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

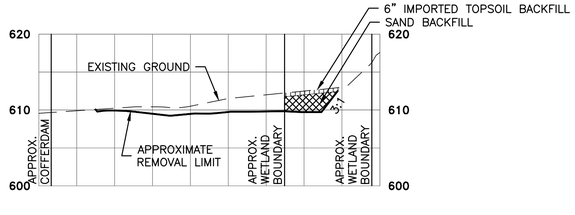


Y C-301 DEPOSIT 3B-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

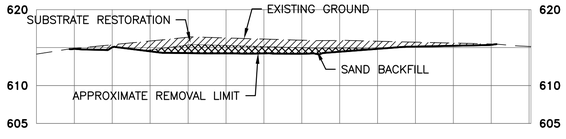


Z C-301 DEPOSIT 3B-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

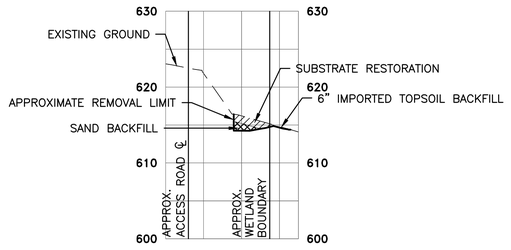


AA C-302 DEPOSIT 4-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.



NOTES:
1. BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.
2. BACKFILL WETLAND AREAS WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

BB C-302 DEPOSIT 4-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

RESTORATION AND BACKFILL CROSS SECTIONS

PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
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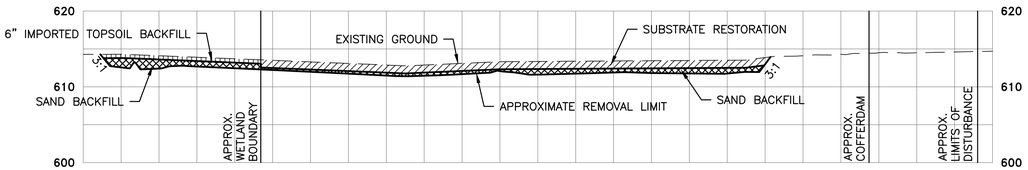
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JM
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-304
SHEET NUMBER	17 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\RESTORATION PLAN CROSS SECTIONS.DWG [17 RESTORATION CROSS SECTIONS] 3/18/14 jmather

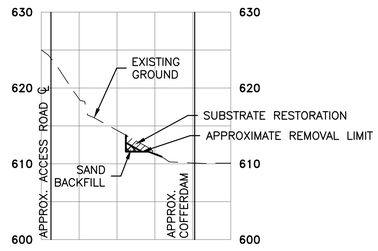


CC C-302 DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTES:
1. BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.
2. BACKFILL WETLAND AREAS WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

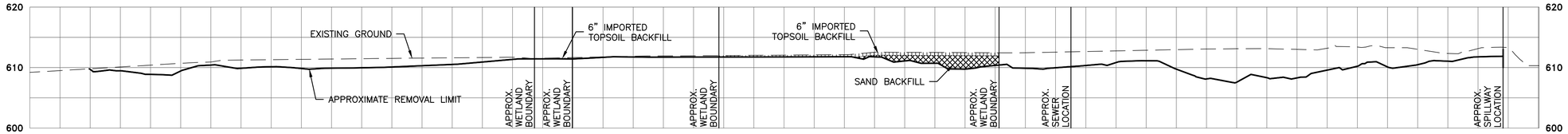


DD C-302 DEPOSIT 4-2 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 12 INCHES WITHIN EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS. BACKFILL WITH SUBSTRATE RESTORATION TO EXISTING/FINAL GROUND OUTSIDE WETLAND AREAS.

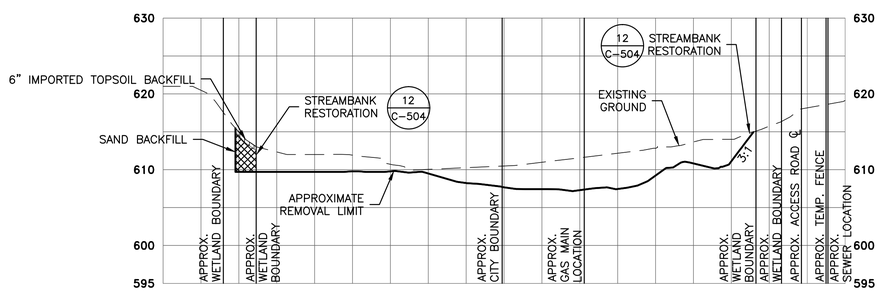


EE C-303 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.



FF C-303 DEPOSIT 5-1 - CROSS SECTION

HORIZONTAL SCALE: 40 20 0 40 80 GRAPHIC SCALE IN FEET

VERTICAL SCALE: 10 5 0 10 20 GRAPHIC SCALE IN FEET

NOTE:
BACKFILL EXCAVATION WITH SAND UP TO 6 INCHES WITHIN EXISTING/FINAL GROUND. BACKFILL WITH IMPORTED TOPSOIL TO EXISTING/FINAL GROUND.

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER 3/18/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

RESTORATION AND BACKFILL CROSS SECTIONS 2

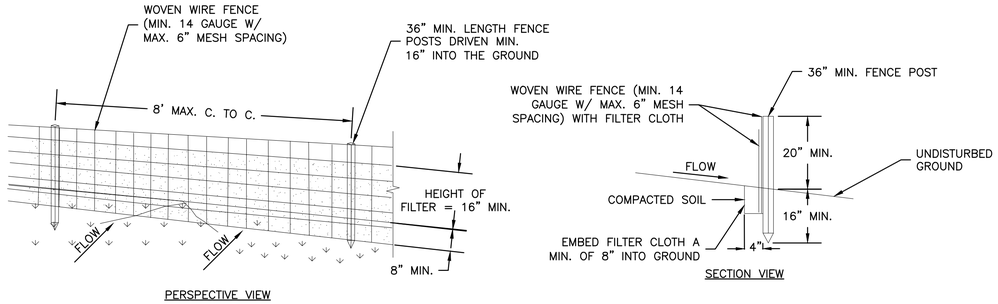
PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JM
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-305
SHEET NUMBER	18 OF 22

FILE PATH: F:\FEDERAL\NON DOD\GLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\90% DRAWINGS\RESTORATION PLAN CROSS SECTIONS.DWG [18 RESTORATION CROSS SECTIONS (2)] 3/18/14 jmather

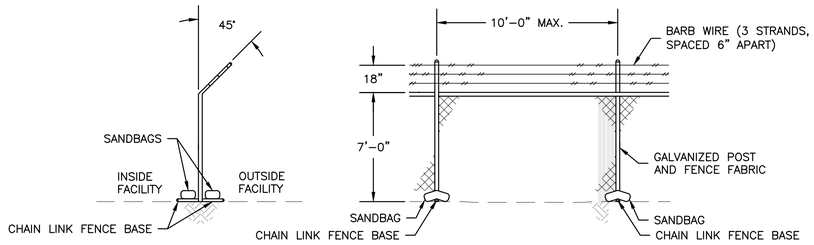


NOTES:

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD WITH A MINIMUM CROSS–SECTIONAL AREA OF 3 SQUARE INCHES.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH SPACED EVERY 24" AT TOP, MID SECTION, AND BOTTOM. FENCE SHALL BE WOVEN WIRE, 14 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
6. ANY TORN SILT FENCE CLOTH SECTIONS SHALL BE REPLACED BY THE CONTRACTOR IMMEDIATELY.

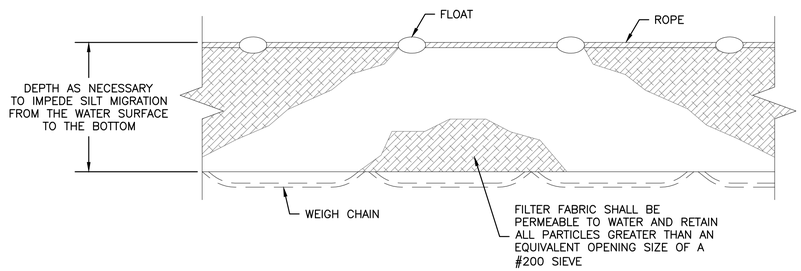
1 C–201 C–202 C–204 C–206 — TEMPORARY SILT FENCE DETAIL

NTS



2 C–201 C–202 C–204 C–206 — CHAIN LINK TEMPORARY SECURITY FENCE DETAIL

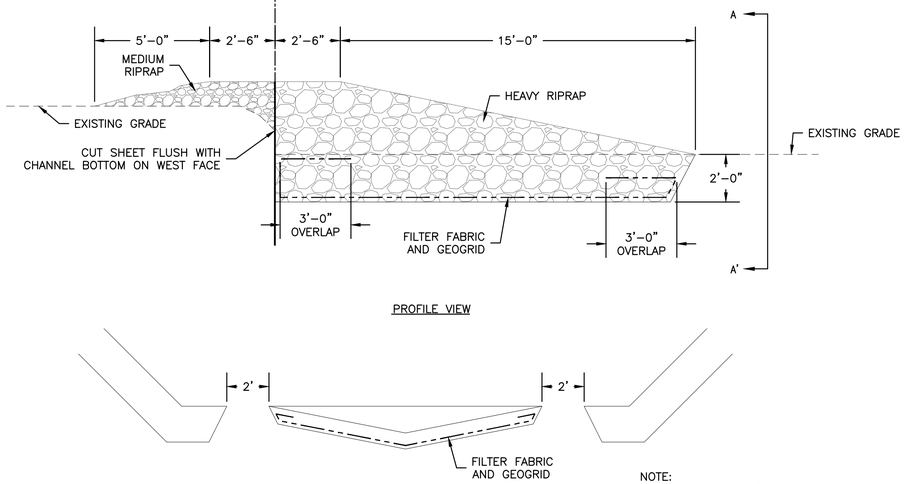
NTS



3 C–202 C–204 — SILT CURTAIN DETAIL

NTS

NOTE:
THE TOP SHALL BE WITHIN 6 INCHES FROM THE WATER SURFACE AND THE BOTTOM OF SILT FENCE SHALL BE MAINTAINED TO PREVENT CONTACT WITH SEDIMENT AND CAUSE RE–SUSPENSION.



NOTE:
SLOPE NORTH AND SOUTH ENDS TO TIE IN WITH BANK TOE TO MAINTAIN DEEPEST PORTION OF THIS DETAIL IN THE CENTER OF THE CHANNEL.

4 C–102 — EXISTING PHASE I SHEET PILE DETAIL

NTS

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6
3/12/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

DETAILS 1

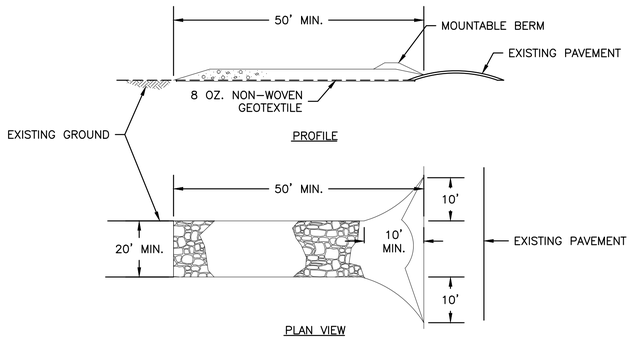
PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945–8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C–501
SHEET NUMBER	19 OF 22

FILE PATH: F:\FEDERAL\NON DOD\OAKES\PROJECTS\6256105 – LINCOLN PARK FS–RD\FIGURES\90% DRAWINGS\C–19 DETAILS 1.DWG [19 DETAILS 1] 3/18/14 jmather

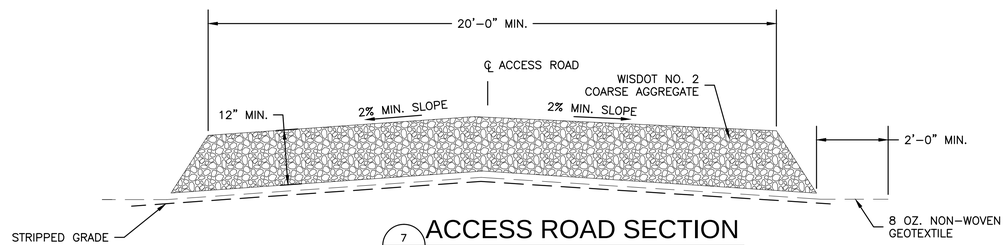


STABILIZED CONSTRUCTION ENTRANCE

5 / C-201 NTS

C-202
C-204
C-206

NOTE:
ENTRANCE SHALL BE AS SHOWN OR AS APPROVED BY OWNER.



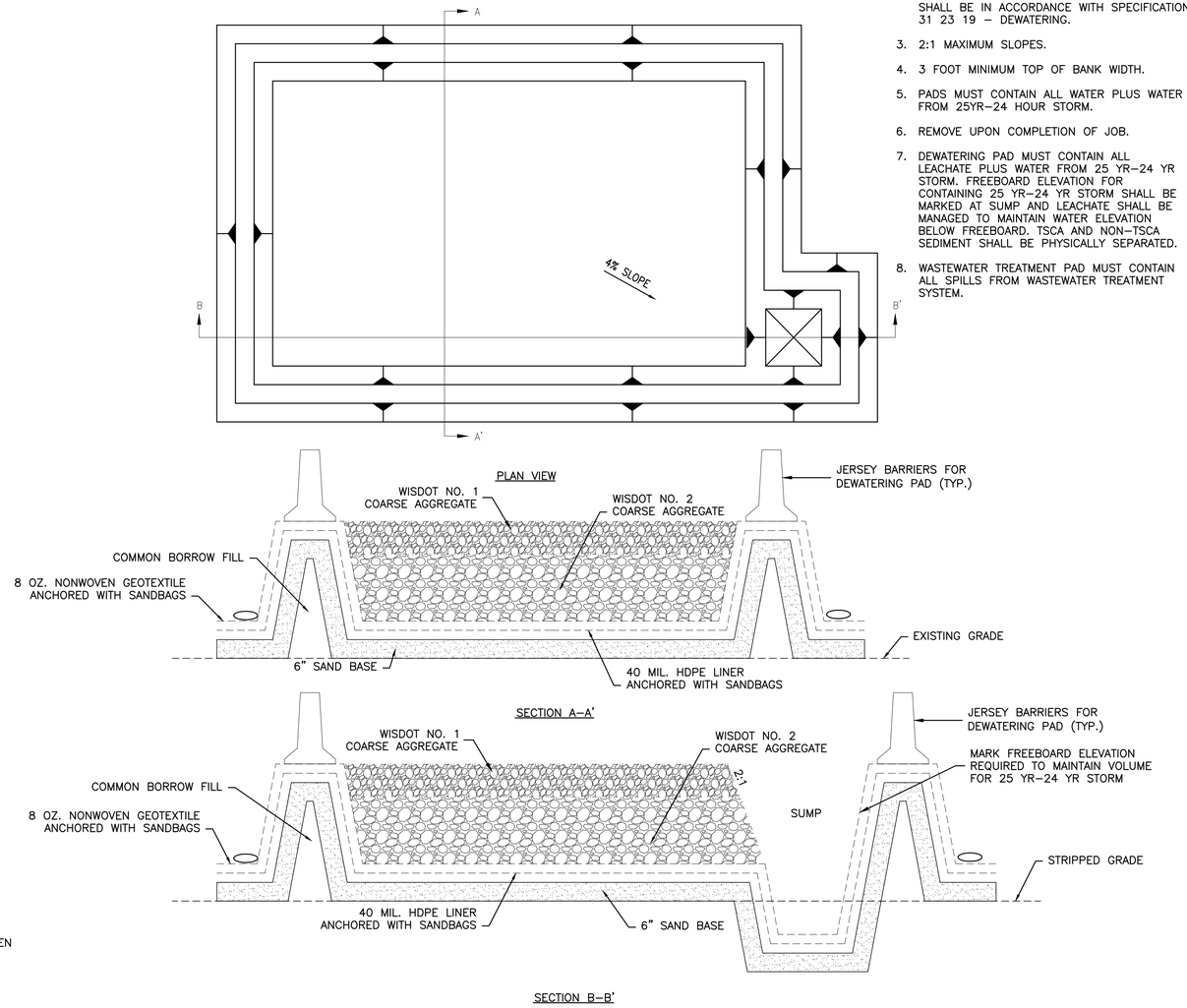
ACCESS ROAD SECTION

7 / C-201 NTS

C-202
C-204
C-206

NOTES:
1. EXISTING PARK TRAILS MAY BE UTILIZED INSTEAD OF BUILDING AN ACCESS ROAD WITH PRIOR APPROVAL OF OWNER. ANY PARK TRAILS UTILIZED MUST BE REMOVED AND RECONSTRUCTED AT COMPLETION OF PROJECT.
2. ACCESS ROAD SHALL BE AS SHOWN OR AS APPROVED BY OWNER.

NOTES:
1. PADS SHALL BE AS SHOWN OR AS APPROVED BY OWNER.
2. WASTEWATER TREATMENT AND DISCHARGE SHALL BE IN ACCORDANCE WITH SPECIFICATION 31 23 19 – DEWATERING.
3. 2:1 MAXIMUM SLOPES.
4. 3 FOOT MINIMUM TOP OF BANK WIDTH.
5. PADS MUST CONTAIN ALL WATER PLUS WATER FROM 25YR–24 HOUR STORM.
6. REMOVE UPON COMPLETION OF JOB.
7. DEWATERING PAD MUST CONTAIN ALL LEACHATE PLUS WATER FROM 25 YR–24 YR STORM. FREEBOARD ELEVATION FOR CONTAINING 25 YR–24 YR STORM SHALL BE MARKED AT SUMP AND LEACHATE SHALL BE MANAGED TO MAINTAIN WATER ELEVATION BELOW FREEBOARD. TSCA AND NON–TSCA SEDIMENT SHALL BE PHYSICALLY SEPARATED.
8. WASTEWATER TREATMENT PAD MUST CONTAIN ALL SPILLS FROM WASTEWATER TREATMENT SYSTEM.



DECONTAMINATION PAD , DEWATERING PAD, AND WATER TREATMENT PAD - TYPICAL DETAIL

6 / C-201 NTS

C-202
C-204
C-206

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6
5/7/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

DETAILS 2

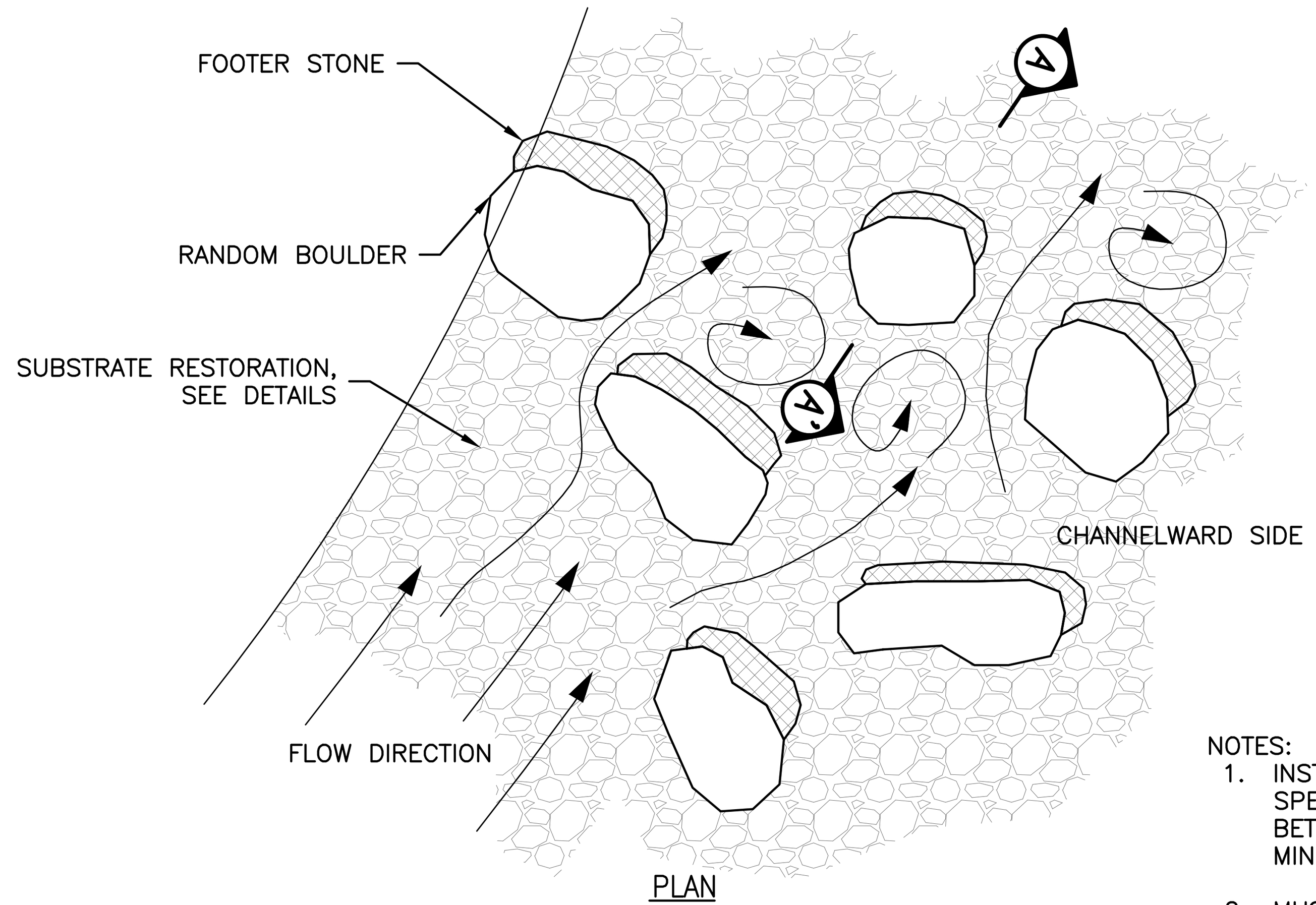
PREPARED FOR:

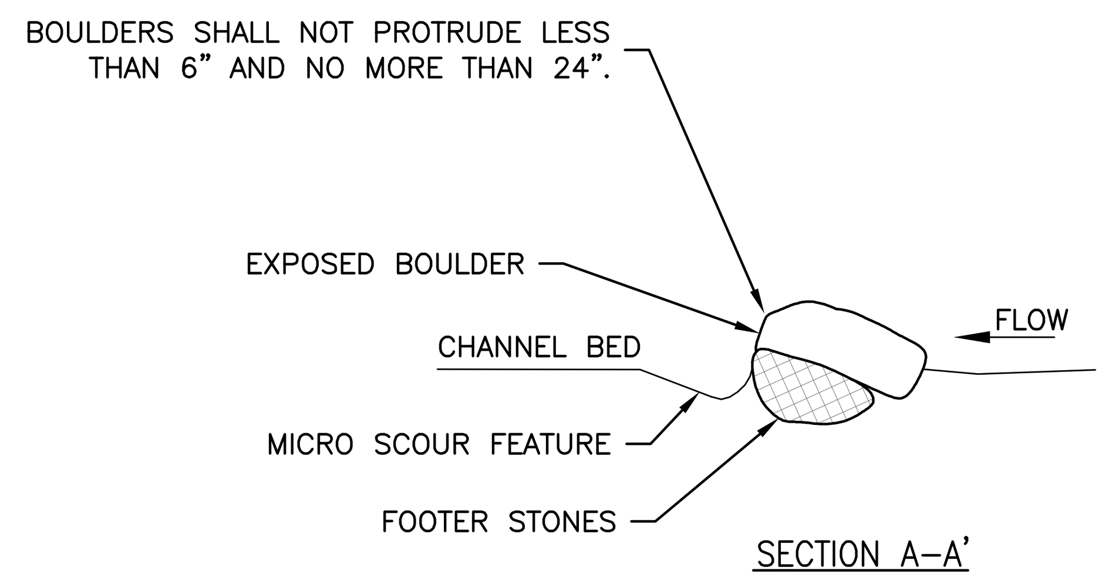
EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945-8010

DATE	MAY 2014
DESIGNED BY	JRB
DRAWN BY	JRM
CHECKED BY	JMT
PROJECT MANAGER	MC
PROJECT NUMBER	6256105
SCALE	AS SHOWN
FILE NAME	SEE FILE PATH
DRAWING NUMBER	C-502
SHEET NUMBER	20 OF 22

FILE PATH: F:\FEDERAL\NON DOD\OLAES\PROJECTS\6256105 - LINCOLN PARK FS-RD\FIGURES\WORK DRAWINGS\C-18 DETAILS 1.DWG [20 DETAILS 2] 5/16/14 jmother

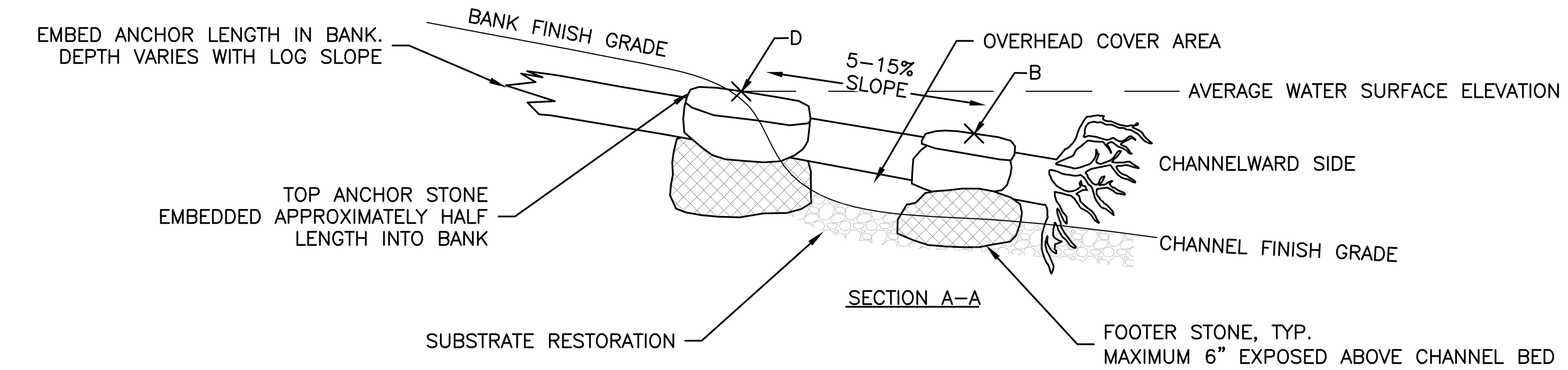


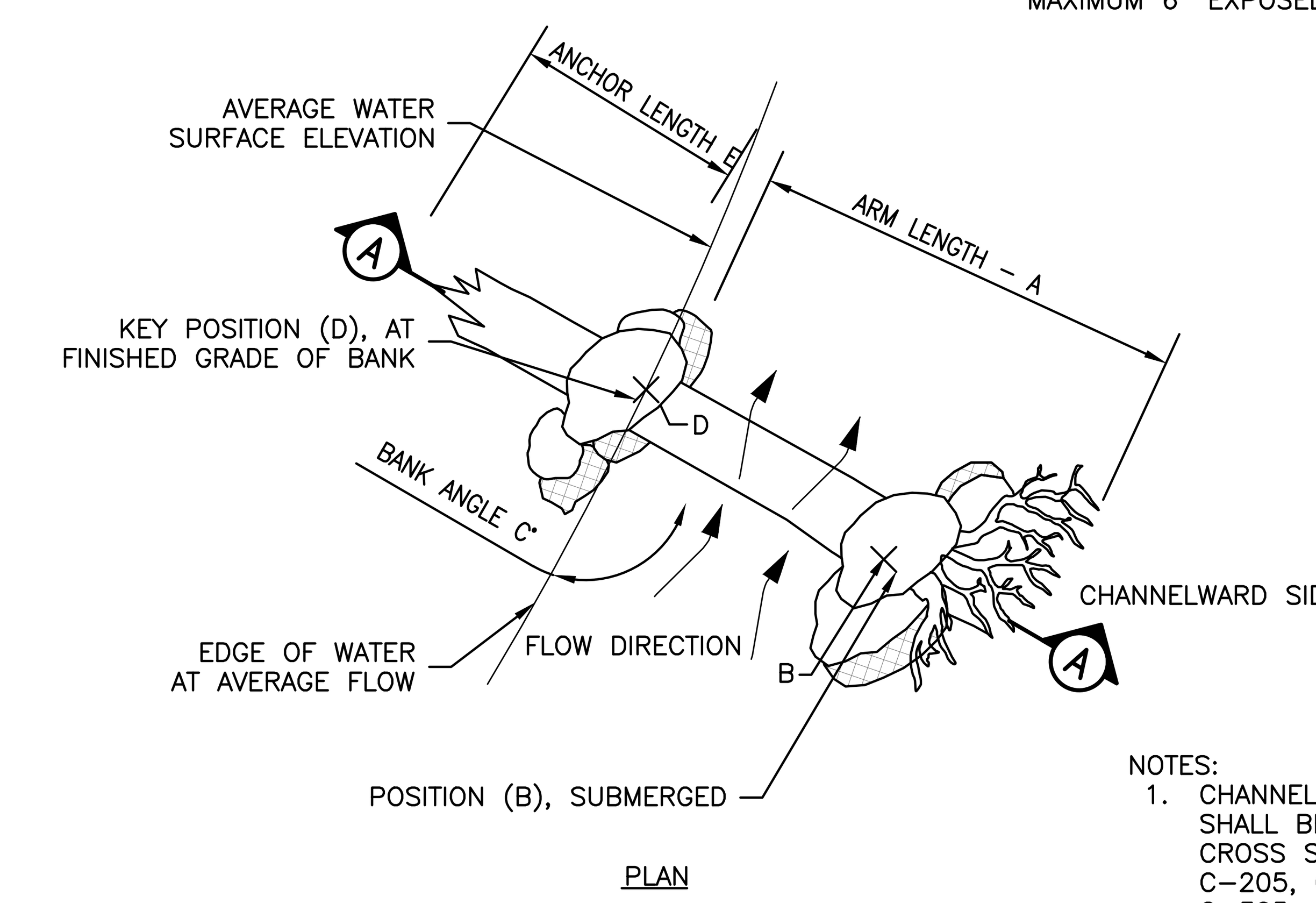


NOTES:
1. INSTALL BOULDERS AT SIZE SPECIFIED. MAXIMUM SPACING BETWEEN BOULDERS IS 5 FEET, MINIMUM 2 FEET.
2. MUST BE FIELD–FIT. CONFIGURATION VARIES. MINIMUM 6 BOULDERS PER CLUSTER.
3. COORDINATE ACTUAL LOCATIONS/ ELEVATIONS WITH OWNER.

8 C–301 C–302 BOULDER CLUSTER PLACEMENT

NTS

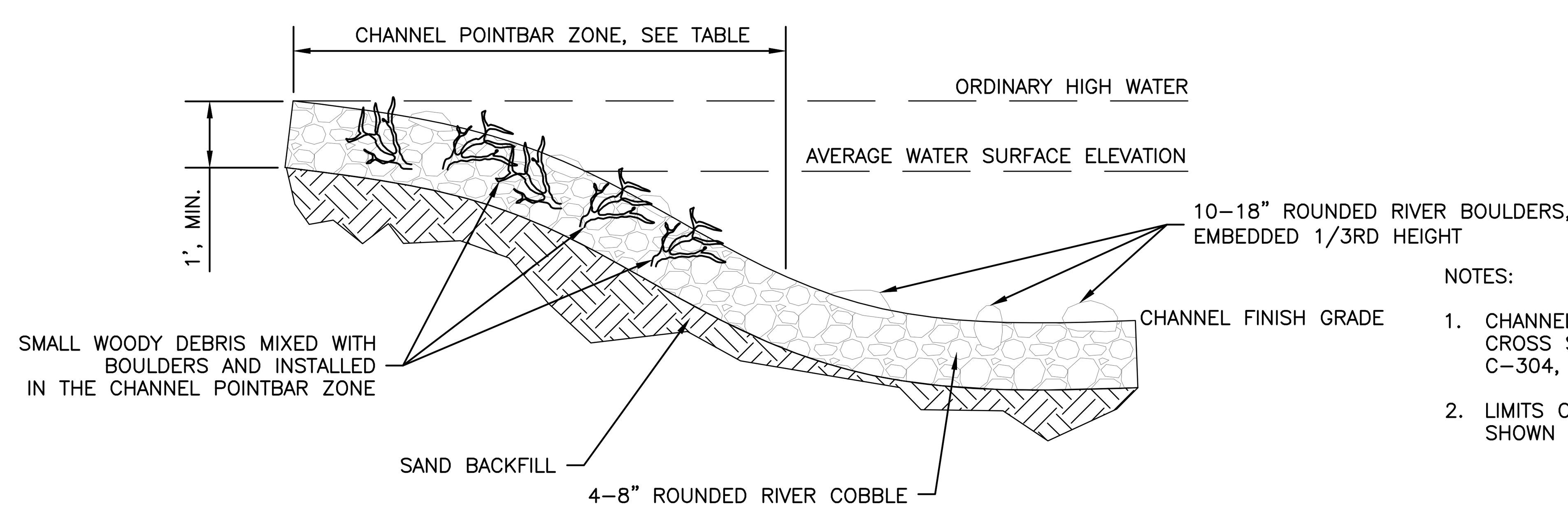




NOTES:
1. CHANNEL FINISH GRADE SHALL BE AS SHOWN ON CROSS SECTIONS AND C–203, C–205, C–207, C–304, AND C–305.
2. SEE ROOT WAD TABLES ON C–301 AND C–302.

9 C–301 C–302 LOG/ROOT WAD DETAIL

NTS



NOTES:
1. CHANNEL FINISH GRADE SHALL BE AS SHOWN ON CROSS SECTIONS AND C–203, C–205, C–207, C–304, AND C–305.
2. LIMITS OF SUBSTRATE RESTORATION SHALL BE AS SHOWN ON DRAWINGS C–302, C–304, AND C–305.

TABLE A: POINTBAR ELEVATION BY ZONES

ZONE	ELEVATION RANGE
ZONES 3 & 7	PRACTICE NOT PROPOSED
ZONE 4	ELEVATION 610–612'
ZONE 5	PRACTICE NOT PROPOSED

10 C–302 SUBSTRATE RESTORATION TYPICAL DETAIL

NTS

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN JON M. TROMBINO E-43204-6 PROFESSIONAL ENGINEER

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

DETAILS 3

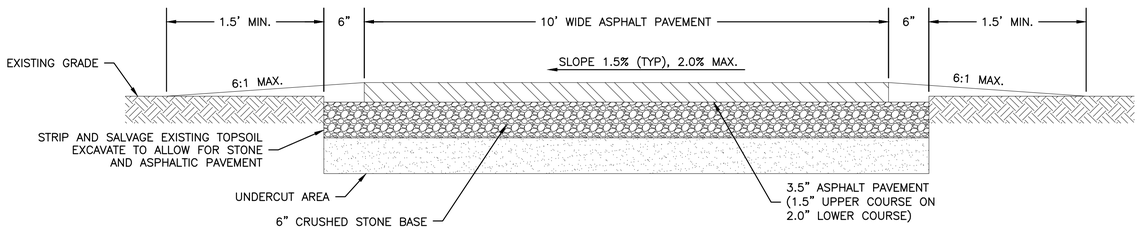
PREPARED FOR:

EPA

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.
444 LAKE COOK ROAD
SUITE 18
DEERFIELD, IL 60015
(847) 945–8010

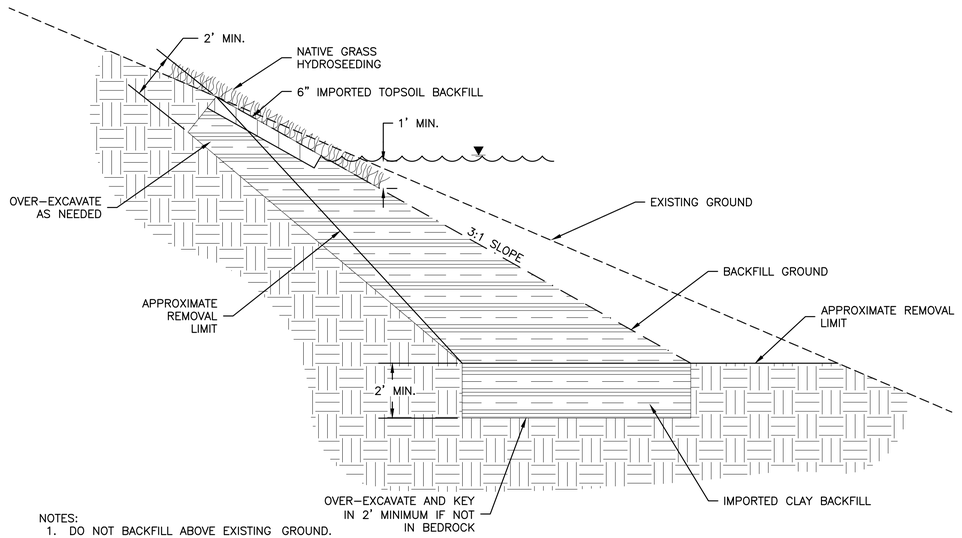
DATE: MAY 2014
DESIGNED BY: JM
DRAWN BY: JRM
CHECKED BY: JMT
PROJECT MANAGER: MC
PROJECT NUMBER: 6256105
SCALE: AS SHOWN
FILE NAME: SEE FILE PATH
DRAWING NUMBER: C–503
SHEET NUMBER: 21 OF 22

FILE PATH: F:\FEDERAL\MON DOD\GLAES\PROJECTS\6256105 – LINCOLN PARK FS–RD\FIGURES\90% DRAWINGS\C–18 DETAILS 1.DWG [21 DETAILS 3] 3/18/14 jmather



NOTES:
1. PROVIDE CLEAR ZONE WITH NO VERTICAL OBSTRUCTION WITHIN 3' FROM EDGE OF TRAIL UNLESS SHOWN OTHERWISE ON THE PLAN.
2. UNDERCUT ONLY WHERE DIRECTED BY OWNER.
3. CROSS SLOPE OF PAVEMENT SHALL BE TO LOW SIDE OF TOPOGRAPHY.

11 / C-301 TYPICAL BIKE TRAIL SECTION ON GRADE
NTS



NOTES:
1. DO NOT BACKFILL ABOVE EXISTING GROUND.
2. OWNER MAY REDUCE OVER-EXCAVATION REQUIREMENTS.

12 / C-305 STREAMBANK RESTORATION DETAIL
NTS

REVISIONS

NO.	DATE	BY	DESCRIPTION

SEAL

WISCONSIN PROFESSIONAL ENGINEER
JON M. TROMBINO
E-43204-6
5/12/14

REMEDIAL DESIGN
LINCOLN PARK/MILWAUKEE RIVER CHANNEL
SEDIMENTS SITE PHASE II
MILWAUKEE COUNTY, WISCONSIN

DETAILS 4

PREPARED FOR:
EPA

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DESIGNED BY	JRB
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