ONONDAGA LAKE REMEDIATION AREA E SHORELINE TECHNICAL SUPPORT DOCUMENT

Prepared For:

Honeywell

301 Plainfield Road, Suite 330
Syracuse, NY 13212

Prepared By:

PARSONS

301 Plainfield Road, Suite 350
Syracuse, NY 13212

and

Geosyntec consultants

JULY 2014

TABLE OF CONTENTS

PAGE

1.0 INTRODUCTION.....1

2.0 SHORELINE REVISED REMEDIAL APPROACH 2

3.0 CONSIDERED ALTERNATIVES 3

4.0 CONCLUSIONS 5

5.0 REFERENCES.....5

LIST OF FIGURES

Figure 1 Remediation Area C, D, and E Dredge and Cap Areas
Figure 2 Shoreline Railroad Lines
Figure 3 Conceptual Cross-Sections
Figure 4 Remediation Area E Shoreline Offset and Wave Damper
Figure 5 ROD Specified Minimum Cap and Minimum Practical Cap
Figure 6 Shoreline Sheetpile
Figure 7 Sheetpile Cell Conceptual Design
Figure 8 Shoreline Debris
Figure 9 Offshore Sheetpile – Cross-Section
Figure 10 Surcharge Conceptual Design

LIST OF APPENDICES

APPENDIX A – SHORELINE GEOTECHNICAL EVALUATION

ONONDAGA LAKE REMEDIATION AREA E SHORELINE TECHNICAL SUPPORT DOCUMENT

1.0 INTRODUCTION

NYSDEC[1] and USEPA[2] issued a Record of Decision (ROD) in July 2005 that selected a remedy for the Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site (NYSDEC and USEPA, 2005). This included establishment of sediment cleanup criteria. These criteria and the results of extensive sediment sampling completed prior and subsequent to the ROD were used to define the area of the lake requiring sediment dredging and/or capping. This included an area in the southeastern part of the lake referred to as Remediation Area E (RA-E), as shown in Figure 1.

Dredging was incorporated into the remedy for this portion of the lake (SMU 6 and eastern portion of SMU 7) to allow placement of the cap without loss of lake surface area and to achieve post-capping elevations that are consistent with the habitat goals detailed in the ROD. However, unlike the In-Lake Waste Deposit (ILWD) in SMU 1 and portions of SMUs 2 and 7, dredging was not required in RA-E to remove contaminant mass or reduce sediment contaminant concentrations prior to capping based on lower contaminant levels.

The remedy called for in the ROD for this area, including both dredging and capping, cannot be carried out in the area adjacent to the shoreline from east of Harbor Brook to just north of Onondaga Creek, as shown in Figure 1. Three active rail lines are located immediately adjacent to part of the RA-E shoreline (Figure 2). Detailed geotechnical analysis (Appendix A) indicates that dredging along this shoreline could result in shoreline and rail line instability, which could cause movement of the rail lines. Therefore, a buffer zone where no dredging will occur has been established to prevent shoreline and rail line instability. This buffer zone extends to approximately 130 to 200 ft from the shoreline and impacts an area of approximately 10 acres (approximately 2% of the total area dredged and/or capped as part of the overall remedy). The water in this area is relatively shallow, ranging from 0 to 3 ft (Figure 3). The shallow nature of this area combined with the high wind/wave energy levels inhibits productive habitat conditions. Placement of a sediment cap without dredging would result in loss of lake surface, which is contrary to ROD requirements. However, since the levels of contamination in this area are relatively low, implementing a revised remedial approach that includes measures to improve habitat and promote natural recovery provides more environmental benefit than losing lake surface area through placement of a cap without prior dredging.

No unacceptable human health risks are presented by the relatively low contamination levels present in this area. Human health risks related to direct exposure to sediments in the southern basin nearshore area, including sediments in RA-E, through activities such as wading and swimming were evaluated as part of the baseline risk assessment. The results were found to be within the USEPA target risk range for cancer risks and below the target threshold for non-

[1] NYSDEC - New York State Department of Environmental Conservation
[2] USEPA – United States Environmental Protection Agency

cancer risks (NYSDEC and USEPA, 2005). Potential ecological risks for the lake are generally related to direct toxicity to organisms (such as aquatic insects) living within the sediment and bioaccumulation of contaminants (including mercury) into fish. Contaminant concentrations in some sample locations in the buffer zone exceeded the mean probable effects concentration quotient (mean PECQ) of 1, which is the threshold used to delineate potential direct toxicity. However, the relatively small size of this area would not substantively affect populations. The mean PECQ in surface samples in this area ranges from 0.4 to 27. The elevated mean PECQ in this area is primarily driven by heavy polyaromatic hydrocarbons (PAHs), which are not very mobile (compared to volatile organic contaminants, chlorinated benzenes and naphthalene) in sediment porewater and therefore have less potential to migrate to clean material which may accumulate above the existing sediment surface. Among the 17 surface sediment samples within the area, eight exceeded the site-specific mercury probable effect concentration (PEC) of 2.2 mg/kg; at only two of the eight locations was the mercury PEC exceeded by more than a factor of two. The bioaccumulation-based sediment quality value (BSQV) of 0.8 mg/kg total mercury would continue to be achieved in the "South Corner area" (relevant BSQV area defined in the Final Design, Appendix N, 2012). PCBs were generally not detected at elevated concentrations in the samples collected from this area, and therefore this area does not present a lake-wide bioaccumulation concern for PCBs.

2.0 SHORELINE REVISED REMEDIAL APPROACH

The revised approach incorporates measures to improve habitat and promote natural recovery of sediments in the RA-E area (Figure 3). The prevailing wind direction and the associated high wave action result in low vegetation density and habitat value. Aquatic plant coverage is sparse, and the number of fish nests documented is lower than almost any other shallow water area of the lake (Onondaga County, 2013). Therefore, a wave damper will be constructed along approximately 1000 feet of the buffer zone to reduce the wave energy along this shoreline (Figure 4). The wave damper will be a raised linear mound of cobble with a top width of approximately 10 ft. The design elevation for the top of the wave damper is 361.5 ft NAVD88, which is approximately 1 ft. below the lake design elevation of 362.5. This will provide significant wave energy reduction while still allowing free exchange of water and preventing stagnation of the area on the shoreward side of the wave damper.

The wave damper will reduce shoreline wave energy and thus allow for better growing conditions for aquatic vegetation. In addition, active planting of primarily emergent wetland species will be implemented in the areas behind the wave damper and behind areas with a shallow cap which would serve as a wave damper. The wave damper and increased vegetation will improve the area's habitat value for fish and other organisms. It will also help stabilize sediments and promote natural recovery through deposition and retention of new clean sediments such as those entering the lake from Onondaga Creek and/or resulting from decay of vegetation. Deposition rates are expected to be low.

No wave damper is included in the area in front of the Metro shoreline discharge pipe or in the areas immediately north and south of the discharge to avoid impeding effluent dispersion into the lake, and to prevent nutrient-rich water from negatively impacting water quality behind the wave damper. No wave damper is included at the southern end of the off-set area because the

post-capping bathymetry in the Final Design already includes shallow water in this area to serve as a wave damper for the Wastebed B/Harbor Brook outboard area wetland.

The wave damper will be constructed of natural materials (cobble), consistent with the habitat/erosion protection substrate in this area. Baseline and long-term surface sediment sampling will be implemented to monitor conditions over time. Dredging and capping will be performed at the location of the wave dampers prior to placement of the additional cobbles for the wave damper, such that full dredging and capping will be implemented immediately outboard of the wave dampers. Additional details on the design of the wave damper will be provided in an addendum to the final design.

The remedial program in this area will also include the following.

- Baseline surface sediment sampling at approximately the same density as sampled during the pre-design investigation for the full list of mean PECQ parameters plus benzene, toluene and phenol; total organic carbon (TOC); and grain size.
- Characterization of existing substrate, structure, and vegetation. The vegetation present will be surveyed during baseline sampling to gain a better understanding of the need for additional plantings/types of plantings as well as the presence of invasive species. Additional information on success criteria and the potential need for adaptive management regarding the plantings will be submitted as part of the forthcoming monitoring plan.
- Post-remedy surface sediment sampling and vegetation monitoring at/near baseline locations (frequency to be determined) to confirm natural recovery and restoration success.

Details pertaining to monitoring and maintenance activities in this area, including the wave damper, will be included in the Onondaga Lake Monitoring and Maintenance Plan.

3.0 CONSIDERED ALTERNATIVES

In addition to the recommended revised approach described above, the following alternatives were evaluated in detail for this area:

- Modified cap
- Sequential dredging/capping
- Sheetpile to improve stability
- Temporary surcharge
- *In situ* treatment

A description of each of these alternatives and the basis for determining that they were not appropriate are provided below.

Modified Cap. Placement of a thinner cap without prior dredging would not be an appropriate approach because it would result in loss of lake surface. The ROD-specified cap includes a chemical isolation layer with a minimum thickness of one foot overlain by a habitat layer with a minimum thickness of one foot. Allowances must also be made for mixing with

underlying sediment and the overplacement that result during construction, as shown in Figure 5. This results in an average cap thickness of approximately 3 ft. Thinner caps were considered for this area. The minimum constructible cap that would provide chemical isolation and erosion protection would be approximately 17 inches thick, as shown in Figure 5. However, the water depth in this area remains shallow for a significant distance from the shore, and placement of a 17-inch thick cap would result in a loss of lake surface area of approximately five acres.

Sequential Dredging/Capping. Sequential dredging and capping would not be an acceptable approach because it could result in shoreline and rail line instability. Sequential dredging and capping would involve dredging a portion of the shoreline area and then capping this dredged area before proceeding with dredging and capping the adjacent area. The entire shoreline area would ultimately be dredged and capped through a series of such steps. This would reduce the potential impacts to the shoreline and rail stability, but it would not eliminate them. Geotechnical analysis (Appendix A) indicated that any activity that reduces the shoreline stability from its current state would not be acceptable.

Sheetpiling to Improve Stability. Driving sheetpile along the shoreline prior to dredging was evaluated as a potential method of improving stability in this area. Two options were considered, neither of which would be an appropriate approach based on multiple considerations. The first option consisted of a continuous sheetpile along the length of the shoreline (Figure 6). The second option consisted of a series of smaller cells along the shoreline totally enclosed by sheetpiles (Figure 7). There is significant debris and rip-rap along the shoreline that would have to be removed through excavation prior to driving the sheetpile, as shown in Figure 8. Excavation of debris is consistent with the required installation methods for other sheetpile installations along the shoreline, such as the sheetpile installed as part of the Willis/Semet and Wastebed B/Harbor Brook barrier walls. However, as discussed in Section 2, any excavation in this area would unacceptably reduce shoreline and railroad stability; therefore, installation of a shoreline sheetpile wall or a series of sheetpile cells would not be an acceptable approach.

Installing the barrier wall approximately 30 feet from the shoreline was also evaluated under the assumption that there would be less debris to manage. However, geotechnical analysis indicated that, even if the barrier wall were driven to 80 feet deep, dredging outboard of the barrier wall would result in unacceptable movement of the railroad tracks (Appendix A). Construction of a 30-foot-wide soil buttress on the lake side of the wall would be required to prevent unacceptable deflection of the wall during dredging. This 30-foot-wide buttress would result in permanent loss of lake surface area, as shown in Figure 9. Therefore, installation of a sheetpile wall offset from the shoreline would not be an acceptable approach.

Temporary Surcharge. Placement of a temporary surcharge would not be an appropriate approach based on multiple considerations. This approach would involve placing the cap without prior dredging along the shoreline area adjacent to the rail lines, and then covering the cap with a large temporary soil pile (berm), as shown in Figure 10. Over time, the weight of the soil would result in compression of the sediments underlying the cap by an amount equal to the cap thickness, thereby lowering the cap surface. The goal would be to create enough settlement so that when the temporary soil pile was removed, the cap surface would be below the lake surface so that there was no loss of lake surface area.

The average cap thickness based on ROD-specified minimums plus average overplacements is approximately 3 ft. Geotechnical analysis indicated that placement of a 10-foot-tall temporary soil pile over the impacted area along the entire shoreline would result in a settlement of approximately 3 ft within approximately five years (Appendix A). However, this would result in a loss of lake surface area during the 5-year settlement period. It would also present a significant negative visual impact due to the length and height of the soil pile. Most significantly, detailed geotechnical modeling indicates it could also result in unacceptable settlement of the adjacent rail lines.

In situ Treatment. *In situ* treatment would consist of applying a treatment media to the surface of the sediment. The media would either be actively mixed or allowed to mix naturally with the upper layer of contaminated sediment, thereby reducing potential risks. Powdered activated carbon (PAC) and granular activated carbon (GAC) are the most widely used treatment media at other sediment sites and have the greatest potential for success in this area. Since activated carbon does not reduce the contaminant concentration within the sediment, it would not achieve the sediment criteria established in the ROD. However, the high sorptive capacity of activated carbon may reduce the contaminant concentration within the sediment porewater and thus may reduce contaminant bioavailability.

PAC and GAC are susceptible to disturbance and movement by currents or wave action because they are less dense then typical sediment particles. They are most commonly applied in relatively low energy environments, such as wetlands or in deep water. The shoreline area of RA-E is the highest energy shoreline within the lake. Even with the wave damper discussed in Section 1 in place, this area will still be subject to waves and ice scour that would periodically displace and move surface sediments and any activated carbon. In-situ treatment would therefore not provide long-term effectiveness in this area and would not be appropriate.

4.0 CONCLUSIONS

As discussed above, a capping and dredging offset has been established for the RA-E shoreline adjacent to the active railroad lines to ensure that the shoreline and rail stability is not impacted. A detailed evaluation of potential alternatives was completed, resulting in selection of a revised approach that incorporates measures to improve habitat and promote natural recovery of sediments in this area. The low concentrations of contaminants in this area present minimal risks if not actively remediated. The reduced wind/wave energy along the shoreline following construction of a wave damper and planting of emergent wetland species will allow habitat recovery and natural recovery of the sediments in the RA-E shoreline area. Details documenting the final design in this area will be provided in an addendum to Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU8) Final Design.

5.0 REFERENCES

New York State Department of Environmental Conservation and United States Environmental Protection Agency Region 2. 2005. *Record of Decision. Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site*. July 2005.

Onondaga County. 2013. Ambient Monitoring Program: 2011. 2011 Annual Report Final, February 2013.

FIGURES

Remediation Area Boundary

Isolation Cap Area

SMU 8 Thin-layer Cap Area

Dredge Area

Sediment Management Unit (SMU) Boundary

Extent of ILWD in Littoral Zone

Willis/Semet IRM Barrier Wall

West Wall Portion of the WB-B/HB IRM

East Wall Portion of the WB-B/HB IRM

Eastern Shoreline Groundwater Collection Trench

N

New York State Digital Orthoimagery from 2009

650 325 0 650

Feet

FIGURE 1

Honeywell

Onondaga Lake
Syracuse, New York

Remediation Areas C, D, & E
Dredge & Cap Areas

PARSONS

301 PLAINFIELD RD, SUITE 350, SYRACUSE, NY 13212

User: 40189

Date Revised: 1/31/2014 11:56:42 AM

Path: Q:\GIS\GIS_Lake\CAP\MXD\Intermediate_Design\RemsCDE_Dredge_Cap.mxd

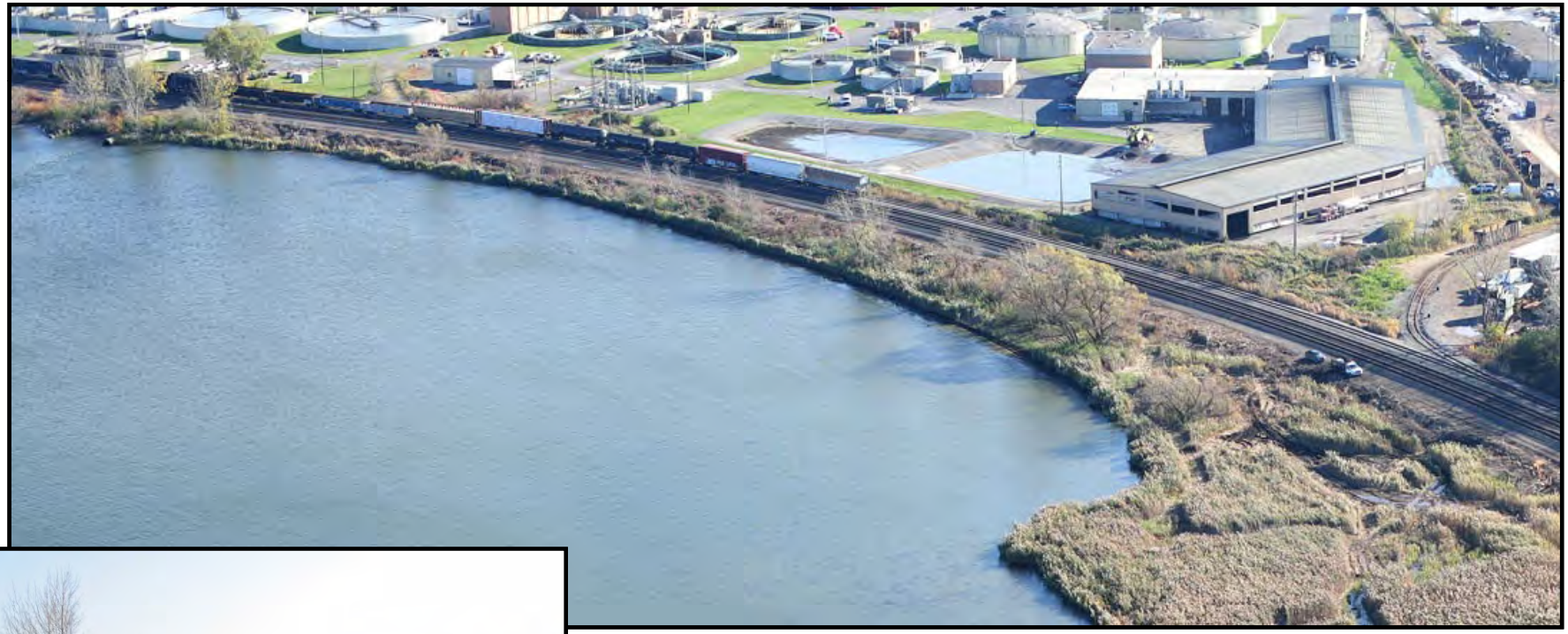


FIGURE 2

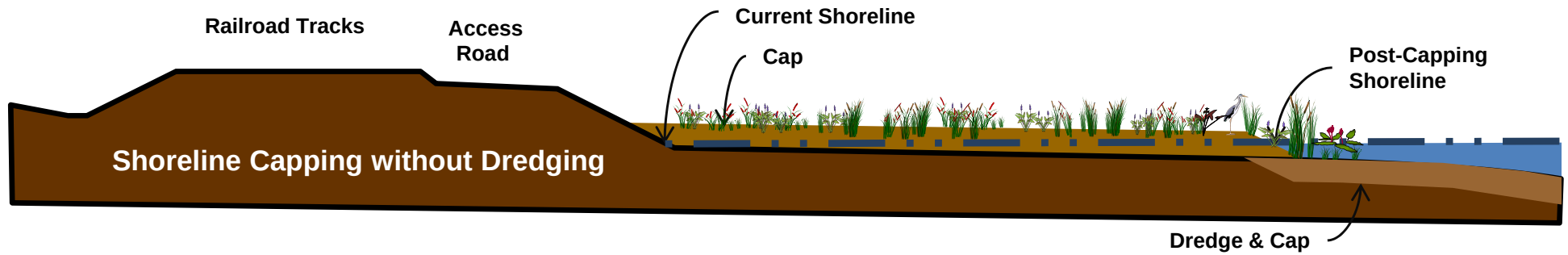
Honeywell

Onondaga Lake
Syracuse, New York

Shoreline Railroad Lines

PARSONS

301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560



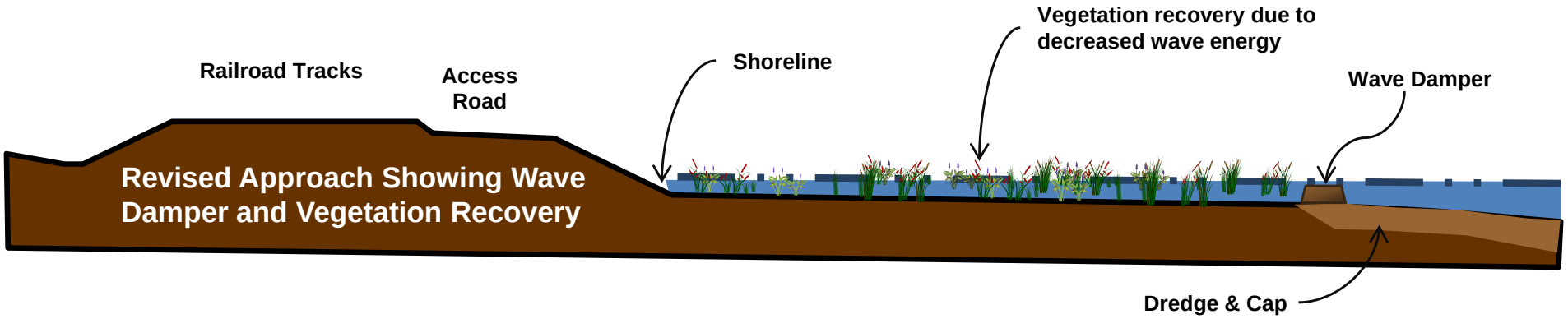


FIGURE 3

Honeywell

Onondaga Lake
Syracuse, New York

Conceptual Cross-Sections

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560

P:/Hon-Syr/446232/9.0/9.4 Design Addendum/CSX Design Addend/CSX Figures 1-9 (2-5-14).pptx

User: 40189

Date Revised: 6/20/2014 1:11:42 PM

Path: Q:\GIS\GIS_Lake\CAP\MXD\2014\RemsCDE_Dredge_Cap.mxd

Remediation Area Boundary

Offset/Buffer Area

Isolation Cap Area

SMU 8 Thin-layer Cap Area

Dredge Area

Sediment Management Unit (SMU) Boundary

Wave Damper (Approximate Location)

Willis/Semet IRM Barrier Wall

West Wall Portion of the WB-B/HB IRM

East Wall Portion of the WB-B/HB IRM

Eastern Shoreline Groundwater Collection Trench

N

New York State Digital Orthoimagery from 2009

650 325 0 650

Feet

FIGURE 4

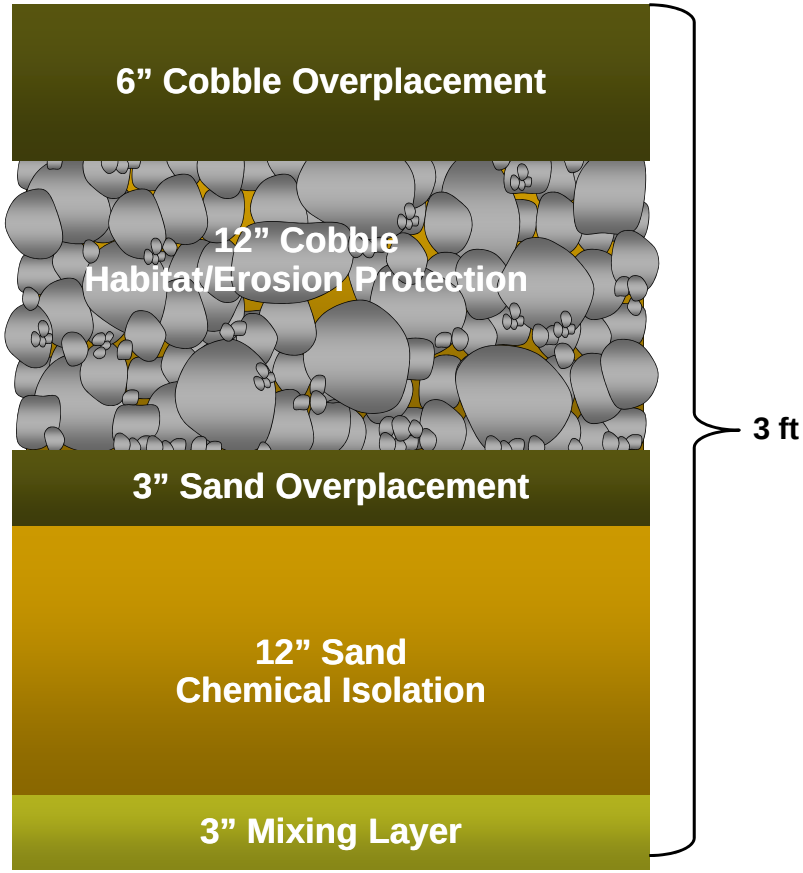
Honeywell

Onondaga Lake
Syracuse, New York

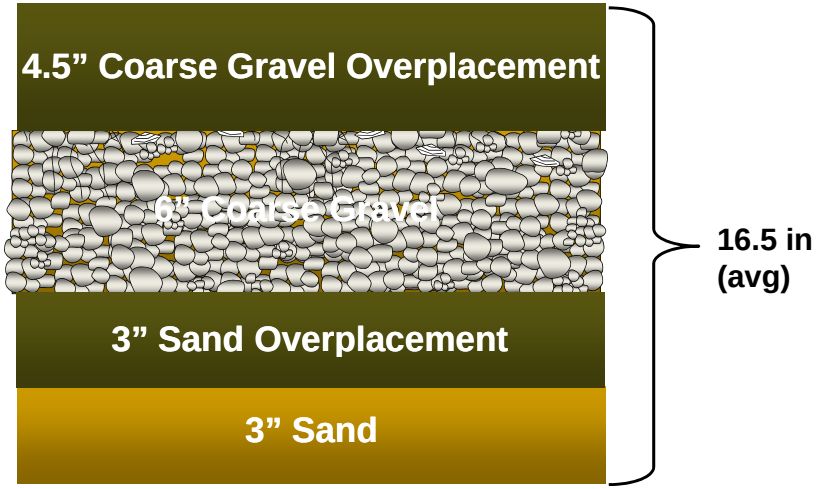
Remediation Area E Shoreline Offset and Wave Damper

PARSONS

301 PLAINFIELD RD, SUITE 350, SYRACUSE, NY 13212



Rod-Specified Minimum Cap



Minimum Practical Cap

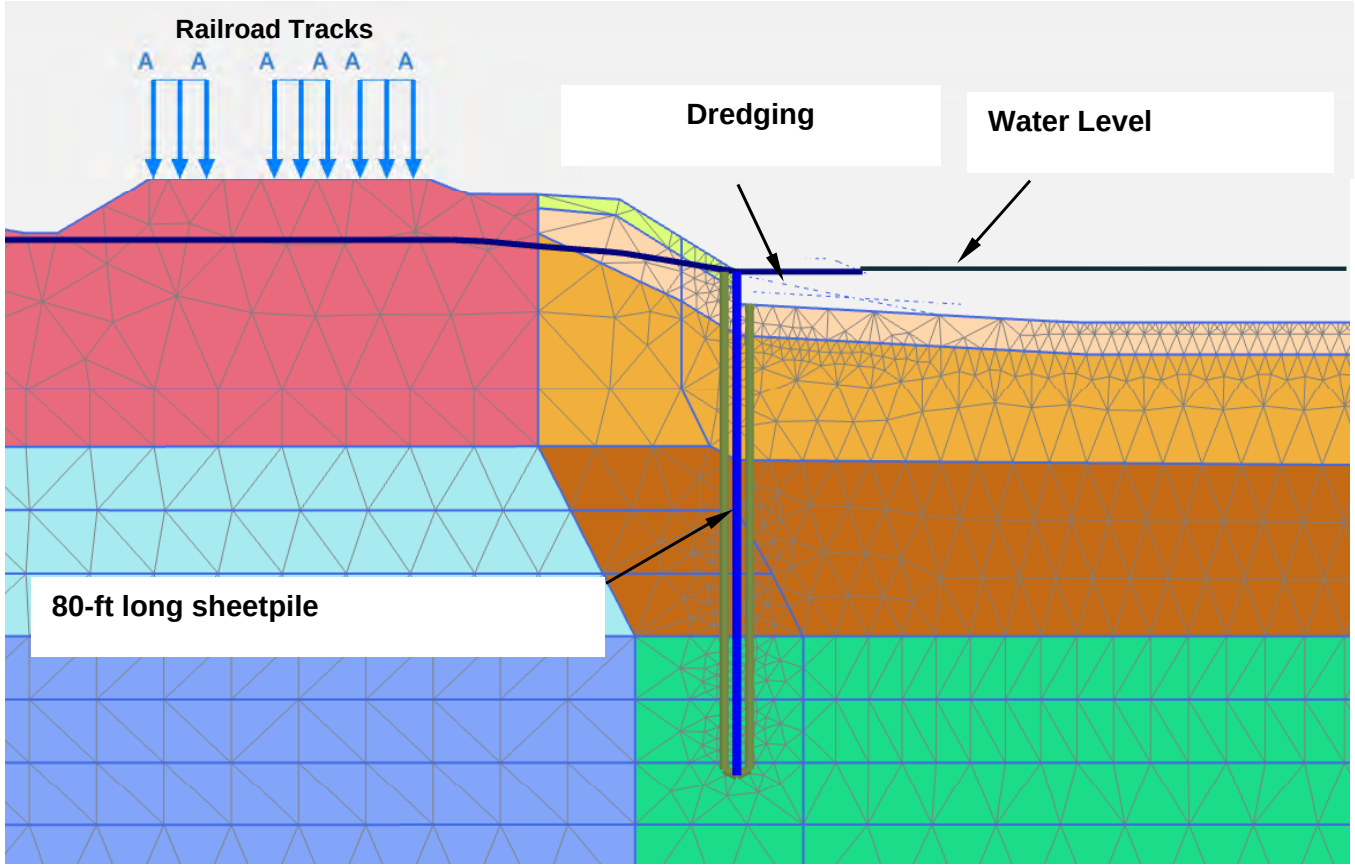
FIGURE 5

Honeywell

Onondaga Lake
Syracuse, New York

ROD-Specified Minimum Cap and Minimum Practical Cap

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560



Finite Element Mesh (Cross Section)
Used for Sheetpile Stability Modeling

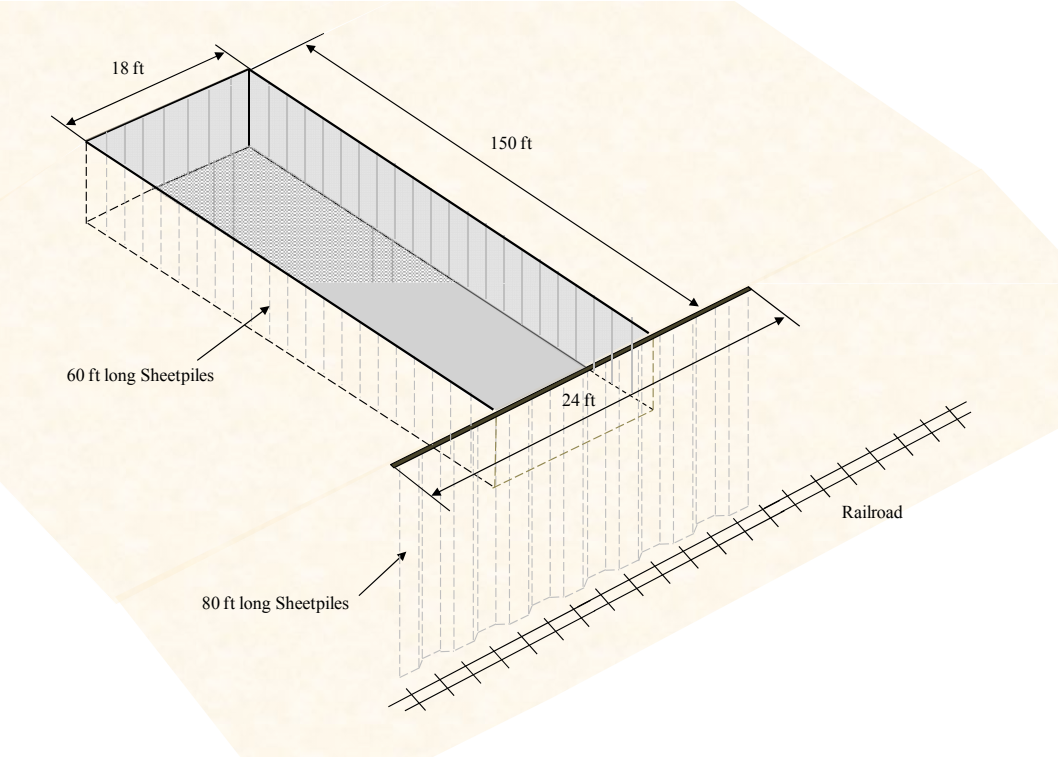
FIGURE 6

Honeywell

Onondaga Lake
Syracuse, New York

Shoreline Sheetpile

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560



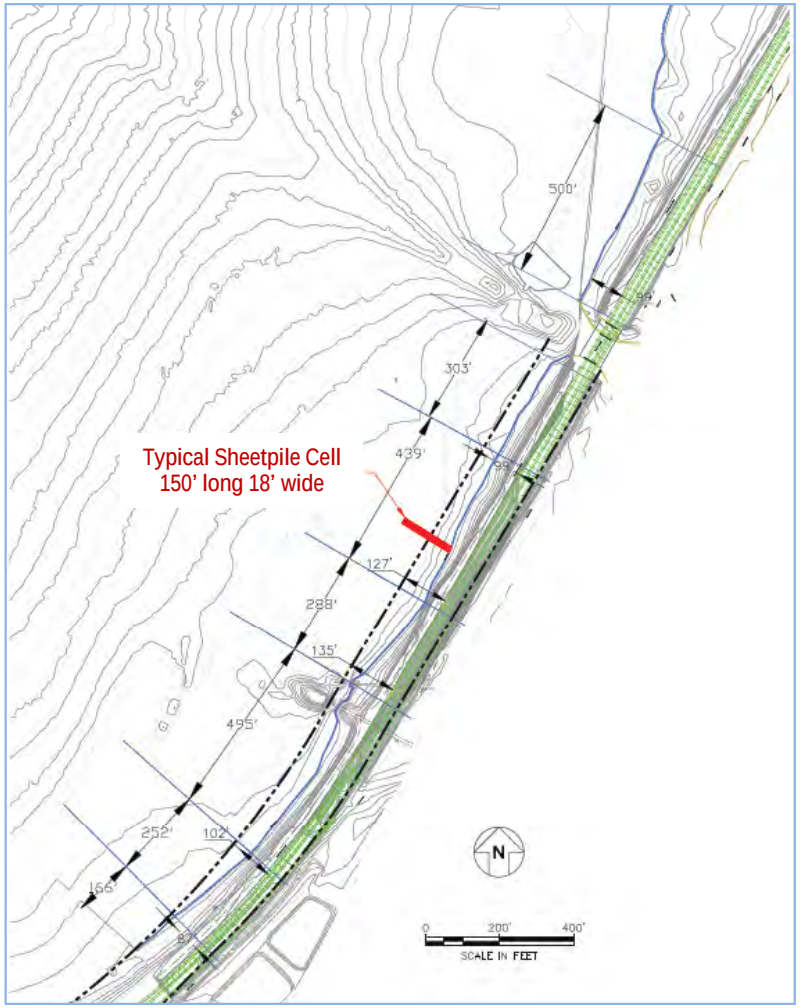


FIGURE 7

Honeywell

Onondaga Lake
Syracuse, New York

Sheetpile Cell Conceptual Design

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560

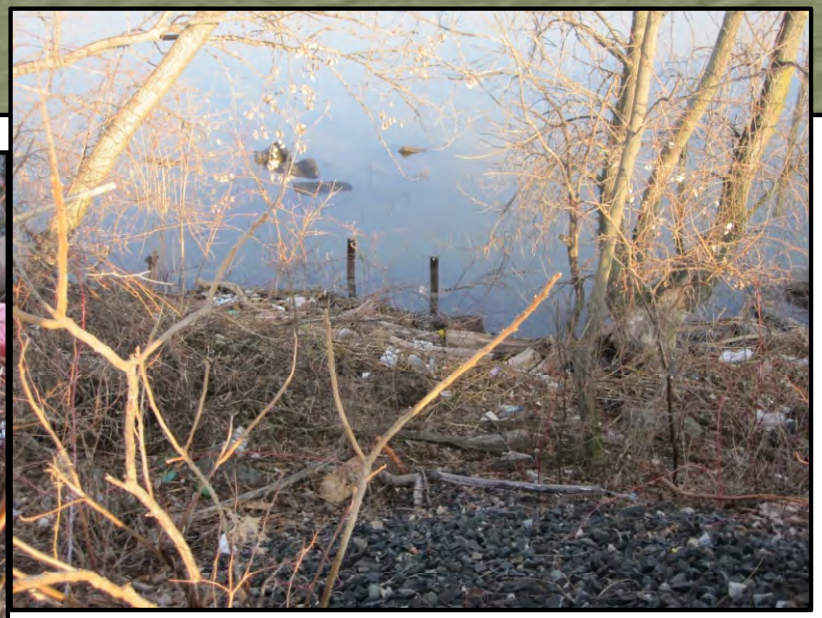


FIGURE 8

Honeywell

Onondaga Lake
Syracuse, New York

Shoreline Debris

PARSONS

301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560

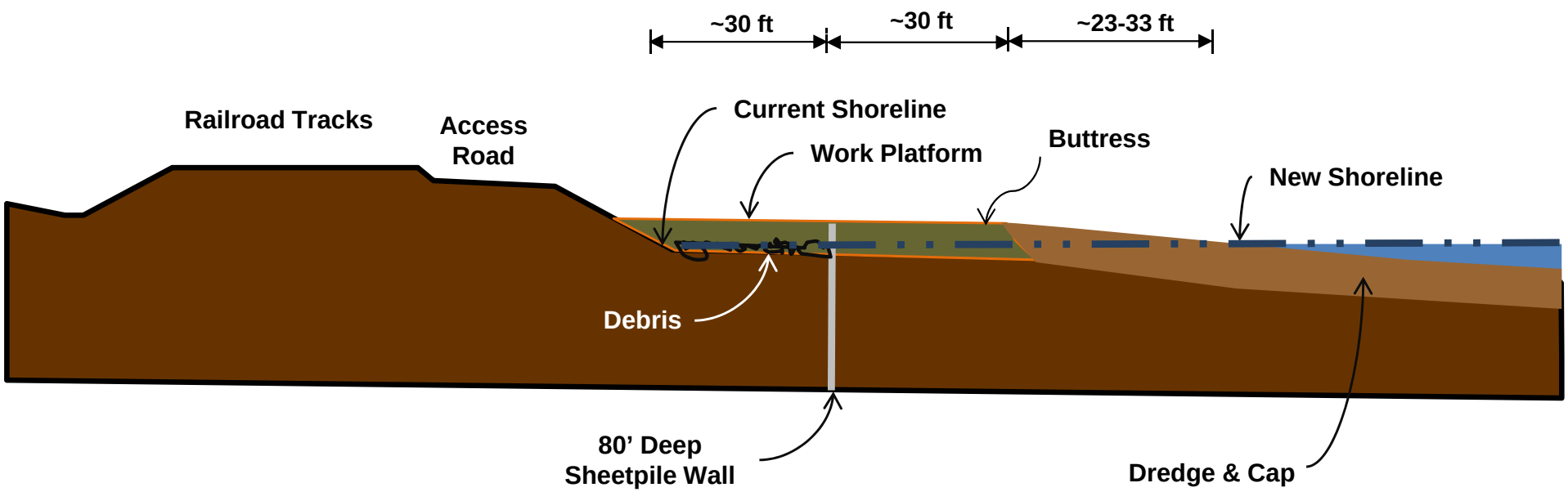


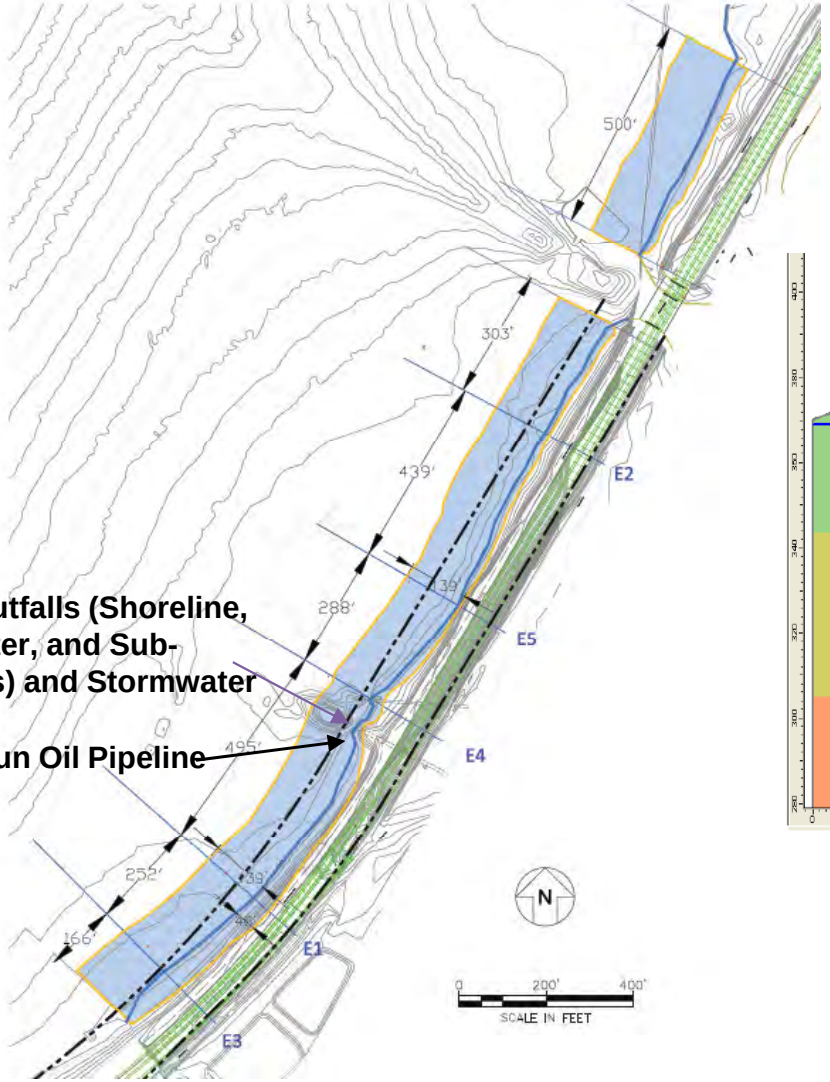
FIGURE 9

Honeywell

Onondaga Lake
Syracuse, New York

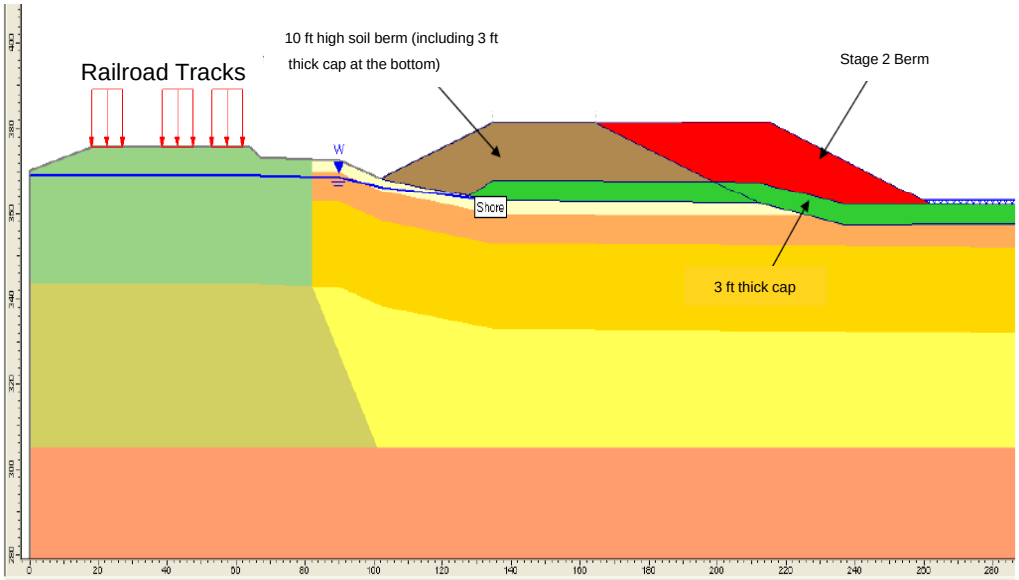
Offshore Sheetpile – Cross-Section

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560



Metro Outfalls (Shoreline, Deepwater, and Sub-Aqueous) and Stormwater Drain

Sun Oil Pipeline



Uncertainty associated with potential settlement under the railroad tracks

Legend

- **Surcharge Area**
- **Shoreline**

FIGURE 10

Honeywell

Onondaga Lake
Syracuse, New York

Surcharge Conceptual Design

PARSONS
301 Plainfield Rd, Suite 350, Syracuse, NY, 13212, Phone 315-451-9560