**CONSTRUCTION COMPLETION REPORT**

Date Issued: February 2, 2016

**Lower Menominee River Area of Concern**

**Menekaunee Harbor Restoration Project**

**Marinette, Wisconsin**

**Prepared For:**

City of Marinette

Wisconsin Department of Natural Resources

**Prepared By:**

Robert E. Lee & Associates, Inc.

**REL Project Number:** 3775-004

**Intergovernmental Agreement for Contaminated Sediment Removal**

**WDNR PO Number:** 9BME0000007

**Great Lakes Restoration Initiative Grant:**

**WDNR PO Number:** 9DMA0000117

**EPA Grant Number:** GL-00E01312-0

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**ABBREVIATIONS AND ACRONYMS**

AOC Lower Menominee River Area of Concern

AYRES Ayres Associates, Inc.

BUI Beneficial Use Impairments

CCR Construction Completion Report

COM City of Marinette

DMU Dredge Management Unit

GLNPO Great Lakes National Program Office

GLRI Great Lakes Restoration Imitative

GLARCI Great Lakes Archaeological Research Center, Inc.

MEC Midpoint Effect Concentration

MJB MJB Industries, Inc.

MSL Mean Sea Level

NE Northeast

NW Northwest

PACE Pace Analytical Services, Inc.

PAH Polycyclic Aromatic Hydrocarbon

PEC Probable Effect Concentration

PCB Polychlorinated Biphenyls

PVC Polyvinyl Chloride (liner)

QAPP Quality Assurance Project Plan

GLWQA Great Lakes Water Quality Agreement

REL Robert E. Lee & Associates, Inc.

SE Southeast

SW Southwest

TEC Threshold Effect Concentration

USACE United States Army Corps of Engineers

USEPA United States Environmental Protection Agency

USFWS United States Fish & Wildlife Services

WDNR Wisconsin Department of Natural Resources

WDOT Wisconsin Department of Transportation

WPDES Wisconsin Pollutant Discharge Elimination System

WHS Wisconsin Historical Society

WWTP Wastewater Treatment Plant

**1 Introduction**

This construction completion report (CCR) was prepared by Robert E. Lee &

Associates, Inc. on behalf of the City of Marinette (COM) to document the Menekaunee

Harbor sediment removal remediation activities implemented in 2014 and 2015, near

the former Jozaitis Distributing Company Inc., property at 828 Ogden Street located in

Marinette, Wisconsin. This CCR is organized into the following sections:

1. Introduction

2. Summary of Activities Performed

3. Summary of Harbor Improvements and Quality Assurance Activities

4. Deviation from Harbor Improvements Design Plans and Specifications

5. Appendix – Provides reference materials cited within this report.

**1.1 Project Background**

Site description and project background for the removal action is as follows:

Menekaunee Harbor (Harbor) is a 13-acre natural embayment of the Menominee River,

and included within the boundaries of the Lower Menominee River Area of Concern

(AOC) by the United States Environmental Protection Agency (USEPA). This AOC

includes the lower three miles of the River, from the Park Mill Dam to the River's mouth,

and approximately 3.1 miles north and south of the mouth along the adjacent shoreline

of Green Bay. The Lower Menominee River AOC is one of 43 in the Great Lakes-St.

Lawrence River Basin. Beneficial Use Impairments (BUIs) in the Lower Menominee

River AOC include: restrictions on fish and wildlife consumption; degradation of fish and

wildlife populations; degradation of benthos; restrictions on dredging activities; and loss

of fish and wildlife habitat. Pollutants contained within the Harbor, caused by years of

upstream heavy industrial manufacturing practices and non-point pollutant storm water

run-off, contribute daily to the cause of the BUIs within the AOC.

The Menekaunee Harbor is located within the City of Marinette, Wisconsin, and lies

adjacent to the Michigan-Wisconsin border at the mouth of the Menominee River where

it enters the bay of Green Bay of Lake Michigan. The Harbor is connected to the

Menominee River by a 1,000-foot long navigable channel. Historically, the Harbor

extended eastward to the shoreline of Green Bay and was an extension of the Lower

Menominee River; however, sand dunes formed on the east side of the Harbor following

the construction of the government pier, establishing a natural barrier that protects the

area from lake and storm activity. These geologic and hydrologic conditions support a

formerly-diverse wetland complex that extends from the east pocket of Menekaunee

Harbor eastward, toward the shoreline of Lake Michigan.

Historically, this wetland and the Harbor area acted as a feeding ground and breeding

sanctuary for migratory birds and game fish, which attracted anglers and birders alike.

The shallow waters, submerged vegetation, and wetlands provided diverse and critical

habitat for a variety of game fish, avian species, reptiles, amphibians, mammals, and

invertebrates. This area continues to be an important wildlife resource, especially for

migratory birds. Menekaunee Harbor along with Red Arrow Park and Seagull Bar State

Natural Area can be an important stopover or “fallout” location during spring and fall

migration, due to their location near the mouth of the junction of Menominee River and

Lake Michigan. However, due to reduced water levels of the Great Lakes, Menekaunee

Harbor has lost its natural free-flowing river characteristics. Additionally, historical

manufacturing practices along the River have resulted in degradation and contamination

to this once diverse ecosystem. Hydrologic alteration has caused extensive sediment

deposition, which has added to the degradation of this wetland by contributing to the

rapid spread of invasive plant species, subsequently decreasing plant species diversity

and ecosystem functioning.

The City of Marinette (COM), in cooperation with the Wisconsin Department of Natural

Resources (WDNR), is undertaking a restoration of the Menekaunee Harbor as part of

the Great Lakes Restoration Initiative (GLRI). The WDNR provided the City with a $1.1

million dollar environmental repair grant that was matched at 35% ($611,474) by the

City. The WDNR also provided an additional $500,000 grant to the City in 2015. The

grant was allocated to the City to help offset additional costs that were associated with

contractors aggressive schedule, additional portland cement, and operation costs

associated with woody debris. (See deviations from harbor improvements for further

details). In addition to these funding sources, the WDNR secured a $6.565 million

dollar grant from the USEPA’s Great Lakes National Program Office (GLNPO) through

the Great Lakes Restoration Initiative (GLRI). Ayres Associates was retained by the

City to assist with the dredging component of the project, including baseline studies,

planning, and design. Project components include replacement of a failing seawall,

removal of sediment (due to contamination and navigation issues), and restoration of

fish and wildlife habitat.

Historic sediment sampling conducted by the City, U.S. EPA, and the WDNR has

documented an array of contaminants including heavy metals, PAHs, and low-level

PCBs. The embayment is a critical feeding and breeding sanctuary for migratory birds

and game fish and lies within the Lower Menominee River Area of Concern (AOC), a

State, Federal, and internationally recognized restoration priority within the Great Lakes

Basin. The City and the WDNR have entered into this agreement to mitigate these

concerns and properly address the accumulation of contaminated sediment that

threatens the future delisting of the AOC and U.S. EPA Great Lakes Restoration Action

Plan.

In late autumn 2012, preliminary costs and design concepts were provided to the

WDNR to discuss the possible funding pursuits with USEPA. The design concepts

presented in a grant format to the USEPA included replacing seawalls to restore the

Harbor’s ecological habitat and immediate shoreline, and sediment dredging options. In

February 2013, John Perrecone of the USEPA/GLNPO provided supporting discussions

with the City on the possibility of providing several million in funding. WDNR revisited

the grant contract with the City for an extension request. The City established a formal contract with Ayres & Associates on July 3, 2013, the

planning and design commenced shortly thereafter, and through close coordination with

the U.S. EPA and WDNR, plans and specifications were prepared for the remediation

portion of the Harbor restoration. The design plan and specifications were compiled to

address the long-term goals for the Great Lakes Water Quality Agreement (GLWQA),

AOC and 2013 Fish & Wildlife Population and Habitat Plan and Restoration Plan

Update for the Lower Menominee River:

 Protecting the aquatic ecosystem of the Menominee River and Harbor from the

effects of toxic and conventional pollutants,

 Maintaining a balanced aquatic and terrestrial community to ensure long-term health

of the ecosystem, and

 Maintaining and enhancing recreational and commercial uses of the Menominee

River and Harbor, consistent with the long-term maintenance of the natural resource

base and a healthy economy.

Plans and specifications for the seawall and dredging design were published and

advertised per requirements, and bids were received on July 18th, 2014. The

contractor who was awarded a contract was Sevenson Environmental Services, Inc.

REL was selected by the City of Marinette and WDNR to oversee the construction

activities and established a formal contract in July, 2014.

The Quality Assurance Project Plan (QAPP) / Sediment Management plan was

prepared by Ayres Associates and was finalized by WDNR, City of Marinette, and

Robert E. Lee & Associates, Inc. This document was finalized and signed on October

1, 2014 by all parties.

**1.2 Site Location**

The Menekaunee Harbor is located east of the Ogden Street Bridge within the City of

Marinette, Wisconsin, and lies adjacent to the Michigan-Wisconsin border at the mouth

of the Menominee River where it enters the bay of Green Bay of Lake Michigan. The

project site is located in the SW ¼ of the SW ¼ and the SE ¼ of the SW ¼ of Section 4,

and the NW ¼ of the NW ¼ and the NE ¼ of the NW ¼ of Section 9, Township 30

North, Range 24 East (Appendix A). The construction restoration area will be accessed

via a recreational trail along the south side of the Harbor, with staging/parking from the

gravel lot at the east end of Russell Street.

**1.3 Removal Action Project Team Organization**

Owner: City of Marinette (COM)

Design Engineer: Ayres Associates (Ayres)

Remediation Contractor: Sevenson Environmental Services, Inc.

 Subcontractors:

 Storm Sewer Extensions: MJB Industries, Inc. (MJB)

 Sediment Removal Trucking: MJB

 Lot #24 Site Work: MJB

 Sediment Landfill Waste: Waste Management, Inc.

 Upland Survey and Control Support: JSD Surveyors

 Wastewater Containment Tanks: Rain for Rent

 Structural and Geotechnical Engineering Support: Glynn Geotechnical

Engineering

 Soil, Sediment, Water Chemical Analytical Laboratory: Pace Analytical Services,

Inc. (PACE)

Construction Oversight: Robert E. Lee & Associates, Inc. (REL)

 Subcontractors:

 Soil, Sediment Chemical Analytical Laboratory: Pace Analytical Services, Inc.

(PACE)

**1.4 Project Description**

Dredging, stabilization, and disposal corrective actions were implemented beginning in

August, 2014 and substantially completed in October 2015, in accordance with the

agency-approved design plans and specifications (Ayres 2014). The Menekaunee

Harbor Restoration project involved dredging and removal of contaminated sediment

and restoration activities within the Harbor and along its shorelines. The removed

material consisted of sediment that exceed established contaminant concentration limits

(environmental dredge spoils) and sediment that does not exceed established

contaminant concentration limits (navigational dredge spoils). The environmental

dredge spoils typically consisted of the finer grained sediment typically located at the

top of the sediment profile, and was transported to the Waste Management Landfill in

the City of Menominee, Michigan. The navigational dredge material was generally the

coarser-grained sediment located beneath the finer-grained sediment. This material

were either used as “beneficial use fill material” within the designated Menekaunee

Harbor project area or transported off-site to the City-owned parcel known as “Lot #24”,

for permanent containment. Substantial wood debris was found within the navigational

dredge material layer, which limited the amount of sediment that was replaced within

the Harbor to reach designed plan grades. Additional clean tested sand was imported

to the Harbor to cover any post-dredge low level contaminated sediment to a

redesigned target elevation in the designated project area near the Harbor Town Marine

Dock. This area was approximately 12,500 square feet (50’ x 250’) and received a 6”

cover of clean sand.

The Menekaunee Harbor Improvement project dredged the Harbor during a period of

historic low lake levels to a navigable depth over 8 feet (a bed elevation of 568 feet

above mean sea level (MSL))—to remove contaminants at or above the Threshold

Effect Concentration (TEC) for total arsenic, copper, lead, mercury, and zinc (*see*

*Appendix A – As-built Plan Set)*. The non-navigational areas on the eastern side of the

Harbor were backfilled to 570-571 feet MSL to provide an average water depth of 8 feet

for habitat restoration purposes. Clean dredge material (termed “beneficial-use fill”)

removed from the west side of the Harbor were used to bring the east side to the desired restoration depths. A total of 27,129 cubic yards of Environmental (39,834.82

Tons), 30,680 cubic yards of Navigational Dredging, and 7,700 cubic yards of beneficial

use fill material was moved within the Harbor. The beneficial use material was far less

than the 22,500 cubic yards planned, as the contractor encountered large amounts of

woody debris within the Harbor. This debris needed to be mechanically removed,

transported, and disposed at Lot #24, rather than hydraulically dredged and transported

to the beneficial use area within the harbor. All other large trash and debris items were

transported to the landfill.

Elevations that are referenced in this document are based on survey data of the

Menekaunee Harbor with control from the United States Army Corps of Engineers

(USACE) benchmark located near Ogden Street as indicated on the drawings. The

Wisconsin County Coordinate System (WCCS), Marinette Zone, North American Datum

of 1983 – 1991 Adjustment (NAD83(91)) was used for horizontal control, and the North

American Vertical Datum of 1988 (NAVD88) for vertical control.

The contractor completed the project by the use of mechanical and hydraulic dredging.

Hydraulic dredging was used to complete part of the beneficial-use portion of the

dredging and mechanical dredging was used for all material disposed of off-site. The

contractor allowed the material to dewater naturally by placing, working, and blending

the material on a dewatering pad constructed in the staging area. The contractor used

Portland cement, quick lime, fly ash, and appropriate equipment on-site to blend with

the environmental materials, if necessary, for assisted solidification after dewatering. All

wastewater was collected and partially treated by an on-site facility and disposed into

the sanitary sewer lines to be delivered to the City of Marinette WWTP for final

treatment.

The existing shoreline timber pile wall removal and replacement took place in

conjunction with the dredging operations, as dredging along the existing timber pile

walls could have caused the walls to become undermined and the shoreline to collapse.

The existing timber pile walls were removed entirely or broke off at a minimum of two

feet below final grade and covered with beneficial-use fill and/or riprap, as indicated on

the plans. The project included shoreline improvements consisting of 8,405 square

yards of riprap installation and 162 feet of anchored sheet pile wall. The planned 200

feet of stepped ledge stone was removed from the project, and rip rap was installed in

its place, which is included in the values above. The remaining shoreline (at the east

side of the Harbor, east of Harbor Town Marine) remained in its existing state. The

concrete fishing steps, located in the southwest corner of the Harbor, also remained in

place.

The project also included development of a dredge spoils containment site at Lot #24,

located at the west end of Murray Street on the west side of Marinette. This containment

site footprint is approximately three acres, and has the capacity to hold up to 54,500

cubic yards of dredge spoils. Only navigational dredge spoils with a total arsenic

concentration less than 6.0 ppm were delivered to this site. The calculated difference

between the pre-placement and the post-placement conditions indicate that a volume of 27,670 cubic yards of material is in place at Lot #24. Figure 1-1 (Dredge Spoils

Management Criteria-based on the Consensus-Based Sediment Quality Guidelines)

shows how different classes of spoils were handled. Material that was sent to Lot #24

was required to contain less than 6 ppm total arsenic (less than the 9.8 ppm TEC limit)

per the WDNR Exemption for Low Hazard Waste. Material between 6 ppm and 9.8 ppm

total arsenic was used for ecological restoration as “beneficial-use fill”. Lot #24 material

was identified through visual observation and by in-situ testing provided by the

contractor prior to transport to the containment site.

**Figure 1-1. Dredge Spoils Management Criteria**

**2 Summary of Activities Performed**

The following is a summary of major construction activities preformed in chronological

order during the 2014 and 2015 dredging activities. Detailed REL daily process of

events can be found in Appendix D and Sevenson daily reports are available upon

request.

**2.1 2014 Activities**

2014 activities included the following:

 Mobilized equipment and personnel, August 2014.

 Site preparation for dredging, processing, and disposal operations. Staging was

isolated to the former Jozaitis property, north of the Harbor.

 Installation of temporary partial water treatment system on City property, including

dewatering pads.

 Installation of turbidity controls and upland erosion control devices.

 Cleared and grubbed vegetative growth from the existing shorelines around the

Harbor.

 Performed bathymetric survey to document the pre-dredge sediment elevations.

 Additional bathymetric surveys were taken both by Sevenson and REL as both

pre-dredge surveys deviated from the designed existing elevations. Coloration

between both pre-dredge survey’s validated existing elevations and were different

than planned existing upper elevations, resulting in a modification of dredge

material strata. The survey elevation data deviation was resolved by additional

bathymetric surveys, pole sounding, and correlation between CADD surface tins

prior to dredging. All parties agreed to the pre-dredge surface elevations

documented through e-mail, daily reports, and weekly meetings.

 Lot #24 containment site was prepared to receive navigational dredge spoils.

 Lot #24 was surveyed to determine the amount of topsoil that was stockpiled on-site

and to determine pre-placement elevations.

 Contractor installed the shore-line portion of the proposed sheet pile wall per plans.

The contractor halted operations after the constructability of the concrete anchor wall

was questioned, as the planned concrete anchor wall would need to be built below

water elevations. The contractor proposed using an alternate anchoring system

utilizing sheet piles designed by a professional engineer; this option was discussed

and the City and WDNR were in concurrence to install this alternate system.

 Environmental dredge spoils were removed first from within the Harbor in locations

that contained underlying navigational spoils that were planned to be placed in the

beneficial use area.

 Once environmental dredge spoils were removed, bathymetric surveys were

completed to verify that design elevations were met. Navigational dredge spoils were

sampled and analyzed to verify the sediment met the metal Threshold Effect

Concentrations (TEC) for placement within the beneficial use area. Testing was

completed by Sevenson and REL prior to any placement in the beneficial use area.

Sample results were within TEC limits, allowing the navigational materials to be

placed in the eastern portion of the Harbor using hydraulic dredging & placement

methods. Dredging continued until the contractor encountered woody debris. The

contractor then moved his operation to other suitable areas to continue hydraulic

dredging, but again additional wood waste was encountered. A total of 7,700 cubic

yards of sediment was transported (pumped) to the beneficial use area before the

contractor ended hydraulic dredging. It was determined by the project team to cease

hydraulic dredging and send the remaining navigational materials to Lot #24.

 Bedding stone and rip rap were obtained from Jackie Foster quarry located in

Marinette County, 1/4SE, 1/4SE, 519, T31N, R22E and were installed within the

Harbor.

 To document the subsurface elevations at the end of 2014 work season, REL

completed bathymetric surveys. . A minimal amount of re-dredging was necessary,

and this work was completed and design grades met by December 2014. There were

six (6) areas that were outside specified vertical tolerance above the 568.00

elevation. These areas were addressed and used pole soundings to verify design

elevations were met. The Location of these areas were documented through

inspector daily reports and e-mail correspondence.

 Decontamination of site and equipment following dredging activities.

**2.2 2015 Activities**

2015 activities included the following:

 Mobilized equipment and personnel.

 Restoration activities were completed (fine grading topsoil, seeding, fertilizing,

seeding, and mulching areas around the Harbor).

 Placed hydraulically moved sediment within the eastern portion of the Harbor to neardesign

elevations. Sediment quantity was not sufficient to achieve design elevations.

REL redesigned an alternate plan within the eastern portion of the Harbor, and this

design was reviewed and approved by WDNR and the project team. Sevenson then

placed the material to the redesigned elevations. A material shortage was

discovered again, and additional sand cover was needed to ensure adequate cover

was placed over the 568 elevation within the eastern portion of the Harbor.

Sevenson imported, tested, and approved clean sand to complete the eastern harbor

restoration’s desired elevations. Sevenson used soil boxes to verify that a minimum

of 6 inches of sand cover was placed throughout the Harbor Town Marine area, as

well as the habitat area.

 Graded eastern Harbor shoreline per the redesign prepared by REL and restored

area adjacent to the Harbor. This redesign was needed due to the beneficial use

material shortage, and this shortage of material would have caused shoreline drop

offs and potential erosion problems on the shoreline. The regrading eliminated these

potential concerns.

 Storm sewer pipe extensions and modifications were designed by REL, and

approved by the project team. The contractor placed all storm sewer modifications

within and around the Harbor to maintain existing outfalls to the Harbor.

 Contractor removed and replaced concrete sidewalk (south-side of the Harbor) that

was damaged in the fall of 2014 due to heavy equipment driving over it. Reinforced

concrete was used at the Habitat Restoration Area access point to provide a stronger

walkway that can handle future vehicular traffic.

 REL completed a post-dredging bathymetric survey within the Harbor and postconstruction

surveys around the upland Harbor area.

 REL completed post-placement survey of Lot #24 to determine final placed sediment

within Lot #24.

 Contractor placed salvaged topsoil over sediment brought to Lot #24, and hydroseeded

the entire lot in the fall of 2015. Vegetation will not be established and

verified until spring of 2016.

 All contract items were finalized in October, 2015.

**3 Summary of Harbor Improvements and Quality**

**Assurance Activities**

Harbor improvement activities were performed in conformance with the Menekaunee

Harbor Improvements Plans and Specifications, QAPP, and permitted guidelines.

**3.1 Harbor Improvements Documentation**

Harbor improvement documentation was completed through weekly progress meetings,

weekly meeting minutes, daily photographs, bathymetric and upland surveys,

confirmation sediment sampling, daily reports, monthly reports, and quarterly reporting.

**3.1.1 Harbor Improvements Schedule**

Harbor improvement activities began on August 12, 2014 and were substantially

completed June 16, 2015. Capping and restoration closing activities at Lot #24 were

substantially completed in October, 2015. The submitted Sevenson project schedule

and work plan are provided within Appendix B.

**3.1.2 Harbor Improvements Photographic Documentation**

REL and Sevenson took pre-construction photographs of upland area property features

prior to mobilization activities for the purpose of documenting pre-construction

conditions for reference during restoration activities following the removal action.

Upon substantial completion of the removal action in 2015, REL conducted the same

photographic documentation to reference the transformation of the site. Harbor

improvement activities and progress were also documented through daily photographs.

All photographs have been archived in REL’s project files and are available in Appendix

J.

**3.1.4 Harbor Improvement Meeting Minutes**

Weekly progress meetings were held to discuss the following items:

 Work completed since the last meeting.

 Work that is proposed over the next 7 days.

 Project Schedule.

 Review outstanding project team discussion items or issues.

 Review current project team discussion items or issues.

 Requests for information.

 Progress payments.

 Permits.

 Change Orders.

 Testing requirements.

 Group discussions or questions.

Prior to the following week’s meeting, the weekly meeting minutes were distributed to all

meeting attendees. These are provided in Appendix C.

**3.1.5 Harbor Improvements Daily Reports**

Daily observations of removal activities and Harbor improvements were recorded within

a Daily Inspection Diary prepared by REL (Appendix D).

At a minimum, daily reports included:

 Report date and number.

 Names of REL field personnel inspecting construction.

 Weather conditions including temperature and precipitation.

 Number and class of personnel working on site.

 Major equipment items working on site.

 Daily observations of work accomplished that day.

 Description of sampling events if any.

**3.2 Site Mobilization and Dredging Preparations**

**3.2.1 Mobilization and Set-up**

Sevenson was required by the plans and specifications to preserve and protect site

features that were to remain during the removal action. Sevenson took the following

measures to meet these requirements:

 Underground utilities were located.

 City floating dock/pier was removed from water and placed on southern shore.

 Installed erosion control measures.

 Installed water buoy markers.

 Existing monitoring wells were located and marked to avoid future conflicts.

 Floating woody debris was removed from harbor.

During this time, the site survey control was established, and an initial survey

completed. The site was cleared and grubbed to create space for operating equipment

and staging materials. As Sevenson cleared and grubbed the site on the northern

portion of the Harbor, the following items were set up in preparation of the dredging

operation:

 Rental agreement with Jozaitis Distributing Company was gained to utilize the

existing building as an on-site field trailer for Sevenson, with separate dedicated

space for REL staff.

 Temporary phone and internet services were installed.

 Heavy equipment to complete dredging was mobilized to the site and included

excavators, loaders, scows, and barges.

 Temporary wastewater containment and partial treatment systems were set up.

**3.2.2 Environmental Management**

Environmental management controls were implemented before equipment arrived onsite

and throughout the removal action. Environmental management controls/activities

included:

 Installation of temporary plastic site security fencing.

 Installation of upland erosion and sediment controls.

 Installation of turbidity barrier out of Harbor outlet (prior to dredging), and also

installation of turbidity barrier prior to beneficial use hydraulic pumping.

 Installation of temporary / permanent seeding.

 Installation of the sediment stabilization and equipment dewatering pad and

containment.

 Set-up of the wastewater partial treatment system and pumping station.

 Installed sealed piping to transfer wastewater from the northern dewatering pad to a

City wastewater manhole on the south side of the Harbor.

***3.2.2.1 Site Security***

Temporary fencing was installed by Sevenson during mobilization activities, to separate

the removal action activities and the general public. REL personnel inspected the site

security fence daily to confirm that the fence was intact and functioning as intended.

REL personnel immediately informed Sevenson of any problems identified during these

daily inspections so that they could be rectified by Sevenson. The site security fence

was removed during deconstruction of upland support features and was entirely

removed by the end of November, 2014.

***3.2.2.2 Erosion and Sediment Controls***

Sevenson installed the following erosion and sediment control measures to prevent offsite

transport of surficial soils:

 Silt fence around stockpile areas.

 Silt fabric and sediment socks around the parking lot storm sewer inlet.

 A Polyvinyl Chloride (PVC) liner was used as a “tracking pad” and contained by

Jersey barriers at the loading site near the dewatering pads. Trucks and PVC were

washed regularly to prevent off-site tracking of sediment from haul trucks leaving the

site.

 The decontamination pad was hand-swept between trucks as an additional

measure to limit tracking of sediment.

 During the project, a mechanical sweeper would travel the truck route to sweep

and clean route. Throughout the project, REL inspected the erosion and sediment controls weekly as well as after rain events of one-half inch or more. REL documented these inspections

and any necessary repairs in Field Inspection Reports (Appendix E).During site

restoration activities in May 2015, Sevenson installed silt fence along the shoreline to

prevent migration of eroded upland soils into the Harbor near the “beneficial use area.”

***3.2.2.3 Stabilization and Dewatering Pad Construction***

Sediment stabilization and dewatering pads were constructed in the upland support

area primarily over the existing Jozaitis parking lot to provide a location to mix dredged

sediment with stabilization amendments and to dewater soils while minimizing impacts

to the soils in the upland support area. Additional dewatering pads were constructed on

the Jozaitis property to allow for additional dewatering area for the environmental

dredge spoils, and a secondary pad was built for dewatering of navigational dredge

spoils. The pads consisted of five areas: a large section for mixing and stabilizing

sediment, a load-out area located at the north end of the pad of the environmental

dredge pad, a pad extension used to add additional environmental dredge spoils

dewatering area, a navigational dredge dewatering pad and a load-out area. The

environmental stabilization/mixing and dewatering areas were constructed as one unit.

The pad extension was constructed after completion of the stabilization and

decontamination areas. All sections were constructed in a similar manner with

successive layers of (in order from bottom to top) 4 inches of dense-graded aggregate

road base and 3-4 inches of compacted asphalt. An asphalt curb was built around the

dewatering pads to eliminate water runoff. Jersey barriers were placed within the

asphalt curb to eliminate spoils from over topping the asphalt curb. All pad surfaces

were graded to promote drainage of free liquids to its southwestern corner, where free

water was collected within an existing inlet with a sump. The outlet pipe was bulk

headed to prevent water from leaving the inlet area. The inlet consisted of a concrete

barrel section inlet and internal electric submersible pump with automatic float controls

to pump the captured water to the adjacent water containment and partial treatment

plant.

***3.2.2.4 Wastewater Containment, Partial Treatment, and Pumping***

All pad surface water was collected within an existing inlet that was bulk-headed, and

an internal electric submersible pump with automatic float controls was used to pump

the captured water to the adjacent 21,000-gallon fraction (frac) tank. Once the water

was pumped to the frac tank, the wastewater solids began to settle out within the tank,

as it worked through a weir-type system to contain floatables. Once the tank neared

capacity, it was either pumped to another 21,000-gallon frac tank, or it was pumped to a

3-inch Dri-prime pump to a bag filter unit. The bag filter unit consisted of a Fil-Trek

ELPA24, 6 element bag filter housing to partially treat the water prior to pumping. Prior

to pumping, wastewater was sampled from effluent sample port located after the filter

bag area. The samples were tested to ensure effluent water met the following

perimeters:

**Metals\* Grab Samples\* Surchargeables\***

Arsenic  0.10 mg/l Cyanide 0.19 mg/l BOD 300 mg/l

Cadmium  0.14 mg/l Oil/Grease 100 mg/l TSS 350 mg/l

Chromium  2.41 mg/l Phanols 25 mg/l Phos 14.5 mg/l

Copper  1.40 mg/l P4 6.0 – 9.0

Lead  2.02 mg/l

Mercury  0.01 mg/l

Nickel  1.35 mg/l

Selenium  0.12 mg/l

Silver  0.50 mg/l

Zinc  2.25 mg/l

*Note: \*all test results were reviewed and the City WWTP accepted the wastewater.*

Once the water was partially treated, it went through a flow meter and additional 3-inch

hose, which was laid out from the north side containment area, and ran to an existing

wastewater manhole located on the south side of the Harbor. Once the water reached

the existing manhole, it entered the City’s wastewater system and completed its final

treatment at the City’s wastewater treatment plant. Approximately 782,801 gallons of

water was discharged to the City WWTP.

Wastewater was sampled per the guidelines dictated by the City of Marinette Water and

Wastewater Utility at the following intervals:

 Once prior to first discharge.

 Two times on two different days during the first calendar week of discharge.

 Once per week during the second through fifth calendar weeks of discharge.

 Once per month after the fifth week for the remaining duration of the project.

Sevenson collected all wastewater samples, witnessed by REL staff during collection.

All sample results were reviewed by REL and shared with the Wastewater Utility.

Testing results were within parameters acceptable to the Wastewater Utility via their

Wisconsin Pollutant Discharge Elimination System (WPDES) Municipal Wastewater

Permit, and sample results are included in Appendix F.

**3.3 Sheet Pile Wall Installation**

**3.2.1 Sheet Pile Wall Installation**

Sevenson was required to install a sheet pile with concrete dead-man anchors, per

plans and specifications. Sevenson began installing PZC© 18 steel sheet pile wall

components, working from west to east near the water shown on Plan Sheet C3.2 (see

Appendix I – Alternate Sheet Pile Restraint Design). Once the sheet pile wall was

installed, Sevenson began excavating for the concrete dead man wall installation. Upon

excavating an area, it was determined that the existing soils in the area were not

suitable to support the foundation, and that the base would need to be installed below

the existing water elevation. Sevenson proposed using a sheet pile anchoring system,

and provided an alternate design that was stamped and approved by a licensed

structural engineer. Once this alternate design was reviewed and approved, the

contractor installed PZC© 18 sheet pile anchoring wall in the same manner as the front

facing wall near the water. Once both sets of sheet piles were installed, anchor rods,

whalers, and associated fasteners were installed, per plans and specifications.

**3.4 Dredging**

The Menekaunee Harbor Improvement project dredged the Harbor to an elevation of

568 feet (MSL) in all locations to remove contaminants at or above the DNR’s Threshold

Effect Concentration (TEC) for total arsenic, copper, lead, mercury, and/or zinc (see

Appendix A – As-built Plan Set and Appendix B - Sevenson Work and Dewatering

Plan). The non-navigational areas on the eastern side of the Harbor were backfilled to

570-571 feet MSL to provide final water depths of approximately 8 feet for habitat

restoration purposes. Clean dredge material (termed “beneficial-use fill”) removed from

the west side of the Harbor was used to bring the east side to the desired restoration

depths. A total of 27,129 cubic yards of Environmental Dredging (39,834.82 Tons),

30,680 cubic yards of Navigational Dredging, and 7,700 cubic yards of beneficial use

material was moved within the Harbor. The beneficial use material was far less than the

22,500 cubic yards planned, as the contractor encountered various large amounts of

woody debris within the Harbor. This debris needed to be mechanically removed and

transported to Lot #24. To account for the material shortfall, clean, tested sand fill was

brought to the beneficial use area and placed to ensure that all areas within the

beneficial use zone had adequate sand cover over remaining low level metal

contaminants, both at at Harbor Town Dock and within the habitat restoration area. All

other large trash and debris items were transported to the landfill.

The contractor completed the project by use of mechanical and hydraulic dredging.

Hydraulic dredging was used to complete the beneficial use portion of the dredging, but

was halted due to excessive woody debris encountered during that process.

Mechanical dredging was used for all material disposed of off-site.

The material that was mechanically dredged was removed from in-water scows and

placed on the dewatering pad to dewater. Lot #24 material, dewatered naturally under

its own weight, was typically transported off-site within 24 hours from being dredged.

Environmental dredge spoils were also removed from in-water scows via backhoes and

placed on a dewatering pad to dewater. This material contained a high concentration of

silts, which needed additional time to dewater. The contractor used mainly Portland

cement to help solidify and dewater the material more quickly. During construction,

there was a Portland cement shortage and the contractor needed to use alternative

dewatering additives, such as fly ash, quick lime, and Calciment©. These additives did

not function as well as Portland cement, which caused the need of additional additives,

and also additional dewatering time on the pad. On average, five (5) trucks per day

would be hauling waste sediment off-site to either Lot #24 and/or waste management

landfill facility.

**3.4.1 Bathymetric Surveying**

Initial baseline, bi-weekly, and final bathymetric surveys were completed by REL survey

crews. Survey data was gathered (NAVD88 Datum) at a frequency necessary to

adequately profile the existing grade within the Harbor. Survey data was completed

using a SonarMite© echo sounder and spot checked with traditional poling methods to

verify accuracy. The initial survey was conducted to develop a baseline bathymetric

survey and was verified by Sevenson’s own bathymetric survey. Deviations between

surveys were reconciled and ground trothed with mechanical sounding to confirm our

base survey.

Bi-weekly checks were made to validate progress payments of material removed by

dredging. Bi-weekly checks were also used to correlate and cross check depth and

accuracy of dredge prior to conducting post-dredge confirmation sampling. Dredge

depth accuracy was obtained through the use of the HyPack Dredgepack© dredge

positioning software with DGPS antenna (Sevenson Work and Dewatering Plan –

Appendix B) with zone dredging completion, and respective 24-hour post-dredge

sampling criteria.

Surveys were also completed before and after bulk removal, then again after final bulk

placement of beneficial use material in the restoration area. One post-dredge, digital

bathymetric survey was completed for purposes of confirming final depths and contours.

The design of these surveys did follow the methodology established during the predredge

bathymetric survey performed by the design engineer.

**3.4.2 Sediment Sampling and Analysis**

Sampling procedures implemented were selected based upon the sediment layer being

sampled and environmental conditions encountered, and were laid out within the QAPP

(See Appendix G).

***3.4.2.1 Beneficial Use Samples***

Sampling (Sevenson) was conducted by pushing an aluminum sampling pipe into the

sediment using an excavator bucket to collect the sediment samples to dredge depth.

In the area that contained woody debris, samples were collected using an excavator

bucket to obtain comprehensive depth-integrated samples. Cores were assessed

visually for strata and transition between any silty overburden and larger grain size

materials. From that interface, cores were segmented into maximum 2-foot increments

(per requirements in NR 347 Wis. Adm. Code). Segments were composited and a

subsample retrieved for chemical analysis.

***3.4.3.1 Confirmation Samples (DMUs 4, 5, and 2)***

In Dredge Management Units (DMUs) 4 and 5, confirmation sampling (REL) occurred

once the overburden was removed and a combination of bathymetry and visual

assessment confirmed target elevations for contaminated sediment removal were met.

In that area, REL overlaid an approximate 50-foot x 50-foot grid. The grid was adjusted

larger or smaller to account for edge and side slope areas. Within each grid area, a

sample location was selected randomly. The preferred sampling method was to use a

push core to retrieve 18–24 inches. Minimum acceptable retrieval was 6 inches. All

retrieved cores were photographed. If the coring technique was unsuccessful in

retrieving the minimum amount of material, the next choice of method for surface

sampling was using a Ponar.

Cores were capped and stored upright until processing on land. Prior to processing

each core, the REL sampler marked the position of water-sediment interface. The

water layer was carefully removed from the top of the core to minimize disturbance on

the sediment surface. A representative subsample of the top 6-inch segment was

transferred to an aluminum pan, homogenized, and a subsample placed into a sample

container for analysis immediately. The 6 to 12-inch segment and potentially the 12–18

inches were subsampled using the same procedures described and then retained

(archived) in the event surface sediment concentrations were above the TEC and

additional characterization was necessary. When Ponar sampling was used, the entire

grab sample was homogenized and subsampled for subsequent analysis.

In DMU 2, sampling was limited to the surface material so the first choice method was

with a Ponar. When material was placed to target elevations, the area or sub-area was

divided into approximately 100-foot x 100-foot grids. In consultation with WDNR, REL

selected three locations within each grid area and collected Ponar grabs from each

station. Ultimately, the three grab samples were homogenized and roughly equal

aliquots (volumes) were combined into a single composite that was thoroughly mixed,

prior to placement into a sample container for laboratory analysis. If any of the

individual grabs appeared to contain more silt than expected in the beneficial use

material or appeared intermingled with overburden, a separate subsample was taken.

Sample results are available in Appendix H.

**3.5 Equipment Decontamination**

Upon completion of dredging activities, Sevenson began removing and decontaminating

dredging equipment. Equipment was staged on the stabilization pad and

decontaminated with a hot pressure washer. Once equipment was decontaminated, it

was demobilized. Decontamination water was pumped to the on-site water treatment

system.

**3.6 Site Restoration**

Site restoration activities began in late October 2014 and completed in October 2015.

Site restoration activities included:

 Shoreline restoration.

 Upland support area restoration.

 Removal of temporary construction facilities and upland support features.

 Various sidewalk replacements and upgrades due to contractor damage.

 Storm sewer outfall extensions and upgrades around the Harbor.

 Lot #24 was graded to final elevations determined by the City and covered with

topsoil and restored with seed.

**3.6.1 Shoreline Restoration**

Site restoration activities began in late October 2014 and were completed in June 2015.

They were conducted in a manner to achieve target elevations specified within the plans

and specifications.

Four types of backfill were placed, including:

 On-site, upland clean general fill material obtained from site grading.

 Washed fine-graded cover sand from Verrette Material dba Marinette Concrete

Products – Pound Pit.

 Wisconsin Department of Transportation (WDOT) Breaker Run bedding material

obtained from Jackie Foster Quarry, loaded in Marinette County, 1/4SE, 1/4SE, S19,

T31N, R22E.

 Wisconsin WDOT Heavy Rip Rap material obtained from Jackie Foster Quarry.

General fill material was used for backfilling along Harbor side slopes in and around the

Harbor. General fill was obtained from excavations on-site as well as fill material from

street reconstruction being done on 6th Street in the City of Marinette

Washed fine-graded cover sand was used in the beneficial re-use area to obtain target

elevations under the water surface, and to provide appropriate sloping measures to

minimize erosion in the beneficial re-use area.

WisDOT breaker run bedding (6-inch thick) and heavy rip rap (24-inch thick) were used

throughout the Harbor to reconstruct shorelines (top of slope to bottom of slope) and

provide for erosion protection.

Final elevations were verified by REL through upland topographic and bathymetric

surveys to confirm compliance with the requirements of the technical specifications and

drawings.

**3.6.2 Upland Area Restoration**

Prior to demobilizing in November 2014 (and before final site restoration in May-October

2015), Sevenson completed the following restoration activities in the upland support

area:

 Removal and disposal of the sediment stabilization pad, decontamination pad, and

pad extension. The pad materials (asphalt and aggregate) were disposed at Waste

Management’s Menominee Landfill.

 Demobilization of the contact water partial treatment plant.

 Site grading, topsoil placement, seeding, fertilizing, and hydro mulching.

The following temporary facilities were also removed at this time:

 Job trailer equipment.

 Security fence.

 Electrical service.

 Phone and internet service.

 Erosion and sediment controls.

The following restoration activities were completed in May through October 2015:

 Placement of topsoil, seed, and mulch or erosion mat in disturbed areas.

 Reinstallation of site features/amenities including City dock and final items needed

for Harbor Town Marine dock.

 Installation of storm sewer pipe extensions and upgrades.

 The removal and replacement of damaged concrete sidewalk throughout the Harbor

site.

 Final site stabilization practices, seed, and mulch.

**3.6.3 Lot #24 Restoration**

 Placement of topsoil that was stockpiled at the start of the project.

 Final grading, seed, mulch.

 Removal of tracking pad.

 Low Hazard Exemption Closure

**4 Deviation from Harbor Improvements Design Plans and**

**Specifications**

**4.1 Sheet Pile Wall Modification**

Contractor installed the shoreline portion of the proposed sheet pile wall per plans. The

contractor halted operations after the constructability of the concrete anchor wall was

questioned, as the planned concrete anchor wall would need to be built below water

elevations. The contractor proposed utilizing an alternate anchoring system utilizing

sheet piles designed by a professional engineer; this option was discussed with the City

and the WDNR, and each were in concurrence to utilize this alternate system, which was

installed per the new design. The new anchor system utilized a sheet pile wall to anchor

to in lieu of concrete deadman. See Appendix I, Alternate Sheet Pile Restraint Design.

**4.2 Flat Graded Bump Out Area for Future Structure**

The plans show a “Future Structure Area” (community facility) (near sections 3 and 4) to

be built out into the Harbor, but do not indicate how it is to be built. The project team

discussed multiple options. Due to structural stability concerns, on-site general fill and

imported sand fill were ruled out. It was determined by the team to utilize breaker run

stone to fill this area within the Harbor, thus providing a sound foundation for any future

structure activities planned for this area.

**4.3 Bathymetric Surveys During Construction Versus Design**

**Elevations**

During the pre-dredge activities, both Sevenson and REL conducted bathymetric

surveys within the Harbor. Both surveys indicated discrepancies between what the

current survey data indicated and what the plan showed. A base map was created by

both surveys being analyzed for anomalies, the differences verified through direct pole

sounding to clarify elevations. Once this map was created and approved by all parties,

it indicated that the subsurface elevations were different than what was shown in the

plans. Through visual inspection and sampling results, REL and Sevenson were able to

determine re-dredge boundaries and place cover material in the appropriate locations,

see as-built drawing in Appendix A.

**4.4 Woody Debris Within Harbor**

During the Harbor’s dredging activities, varying types of woody debris were encountered

in numerous locations. Mechanical dredging near plan section #5 (north side of the

Harbor) encountered woody debris in the form of cut plank wood. This wood was saw

mill material that was previously used as fill material and placed below the water line.

The contractor excavated additional area to ensure this woody debris was removed

before placing any rip rap bedding and rip rap in this area.

Additional woody debris was found within the navigational dredging spoils, which were

planned to be placed in the beneficial use area by hydraulic dredging efforts. During the

hydraulic dredging operations, Sevenson encountered plank wood, logs, stumps, and

overall woody debris. Sevenson tried various dredging methods to avoid the woody

debris within the strata, such as using an alternate dredge cutter head, adding

additional filter attachments, and moving within the Harbor to areas containing

sediment more suitable for the beneficial use area. After all of the efforts to

hydraulically move dredge material to the beneficial use area, it was determined by the

project team that the planned quantity to be moved was not achievable nor practical. It

was also determined that Sevenson would mechanically dredge the remaining

navigational dredge spoils and transport that material to Lot #24.

**4.5 Cover Material Shortage Within the Beneficial Use Area**

Once the project team determined there would not be sufficient material for the

beneficial use area, budgets and possible options were reviewed. It was determined

that a minimum sand cover would be required in that area, and a plan was formulated

to maintain target cover thickness. Two feet of sand would be placed over the beneficial

use area, with additional fill along the southern and eastern shores utilizing material that

was already hydraulically moved.

Sevenson remobilized to the site in the spring of 2015 and began placing material that

was hydraulically moved in the fall of 2014. As Sevenson placed the material, it was

determined again that there would be a material shortfall in the beneficial use area.

Once again, the project team reviewed budgets and possible options, and it was

determined that additional clean sand fill would need to be brought in to ensure the

beneficial use area would be covered appropriately.

An area not originally planned to be covered near the western edge of the beneficial use

area near the Harbor Town Marine dock was determined to still have higher levels of

residual contaminants. Limits of residual contaminants were identified through the

confirmation sediment sampling conducted by REL. It was determined by the project

team that a minimum of 6 inches of clean sand should be placed over this area

(approximately 12,500 SF) to ensure it was covered as part of this project.

**4.6 Additional Dewatering Additives**

The original Sevenson dewatering and work plan indicated an anticipated need for an

amendment of 2% Portland cement to help speed up the dewatering process of the

environmental-dredge material. During the dredging process, the spoils that were being

removed from environmental strata had high silt concentrations, which required

additional additives to help speed up the dewatering process. As Sevenson was

approaching the mid-point of the dredging operations, a cement shortage was

encountered. During this time, limited shipments of cement were available and

Sevenson utilized alternate dewatering additives such as fly ash, quick lime, and

Calciment©. These additives did not work as well as Portland cement, which caused

the need of additional additives, and also additional dewatering time on the pad.

**5 Permits and Approvals**

**Date Agency Title Description Activity Covered**

4/25/2013 USFWS Sec 7 Endangered Species Act

4/18/2013 WDNR NR 27 & State Stat 29.604 End & Thr Species

9/1/2014 GLARCI Great Lakes Archaeological Fed Arch

4/15/2013 WHS Sec 106 Cultural Resource

4/29/2014 WDNR NR 500 Low Hazard Waste Exemption Lot #24

7/18/2014 USACE Sec 404 Dredging & Sand Cover

6/6/2014 WDNR Ch. 30 & NR 103 Dredging & Sand Cover

7/3/2014 WDNR NR 5.09 Aids to Navigation

5/7/2014 WDNR NR 216 NR 151 Construction Site Storm Water

– Lot #24

6/4/2014 WDNR NR 216 NR 151 Construction Site Storm Water

– Harbor

11/3/2014 WDNR NR 107 Chemical Aquatic Plant Control &

Pesticide Control (*Phragmites*)

10/31/14 City of Marinette Deed Restriction Lot #24 Per NR 500

**6 Conclusion and Summary Table**

Description Volume & Unit

Environmental Dredge Material

(Waste Management Landfill- Menominee)

39,834.82 Tons

27,129 Cubic Yards

Navigational Dredge Material

(Lot #24 – Marinette)

30,680 Cubic Yards

Beneficial Use Material

(Habitat Area)

7,700 Cubic Yards

6” Sand Cover

(Harbor Town Marine Dock)

12,500 Square Feet,

Sand Cover

(Habitat Area)

61,200 Square Feet

Sheet Pile Wall

(Future Boat Launch)

162 Linear Feet

Rip Rap Shoreline

(Replacing wooden seawall)

5,681.28 Tons

Wastewater Discharged to Marinette WWTP 782,801 Gallons

Portland Cement 2,528.17 Tons

Calciment© 48.70 Tons

Fly Ash 1,247.57 Tons

Pebble Lime 50.28 Tons

**7 References**

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Ayres. 2014E Grant of Exemption – Low Hazard Waste, Dredge Material Disposal Site,

Marinette, WI. April 28.

Ayres. 2014F Erosion Control and Stormwater Management Plan, Marinette, WI. May

21.

Ayres. 2014G Storm Water Pollution Prevention Plan, Marinette, WI. April 16.

Ayres. 2014H Dredging, Riprap, Beneficial Use Fill Individual Permit, Marinette, WI.

May 5.

Robert E. Lee. 2014a Quality Assurance Project Plan and Dredge Handling Plan,

Marinette, WI. October 1.

Marinette Water Utility. 2014a Wastewater Treatment Plant Agreement Letter,

Marinette, WI. March 25.