Water Tower Preservation Plan

Village of Hastings-on-Hudson

February 2022
Water Tower Preservation Plan

Village of Hastings-on-Hudson

February 2022
## Contents

1 **Project Overview**  
1.1 Introduction  
1.2 Site Description  
  1.2.1 Site Background: Harbor at Hastings Superfund Site  
  1.2.2 Water Tower Existing Conditions  
  1.2.3 Options for Relocation of the Water Tower  

2 **Design & Relocation**  
2.1 Lead Abatement & Re-painting  
2.2 Proposed Relocation Site Selection  
2.3 Foundation Design  
2.4 Foundation Construction  
2.5 Rigging & Relocation  
2.6 Reassembly  

3 **Schedule and Costs**  
3.1 Lead abatement and re-painting  
3.2 Relocation site selection  
3.3 Foundation design plans  
3.4 Regulatory compliance and permit acquisition  
3.5 Foundation construction  
3.6 Physical removal and replacement of the Water Tower  

4 **Plan Summary**  

Attachment A – As Built Records  
Attachment B - LBP and Structural Surveys  
Attachment C - Gantt chart
1 Project Overview

1.1 Introduction

Mott MacDonald has been retained by the Village of Hastings-on-Hudson (the Village) to develop this Water Tower Preservation Plan as part of the activities for the remediation of the Harbor at Hastings. The proposed scope of work is to collaborate with the Village and engineers and construction teams (once subcontracted) to preserve the structure known as the Anaconda Wire Water Tower (the Water Tower). The Water Tower is slated for removal as part of the greater remediation project, and while the Water Tower is no longer functioning it has become an important symbol of the waterfront viewshed. For this reason, this preservation plan has been developed to move the Water Tower to a suitable new location and preserve it for possible future relocation. Preservation efforts include lead paint abatement, repainting, and relocation. When complete, the Water Tower will not function to store or distribute water but will be preserved as an important part of the history, culture, and aesthetic of the Village and the Hudson River waterfront.

This Plan has been developed to define the scope of work and schedule for the preservation of the Water Tower. Several steps are required to accomplish the preservation and relocation of the Water Tower, which include:

1. Lead abatement and re-painting;
2. Relocation site selection;
3. Foundation design plans;
4. Regulatory compliance and permit acquisition;
5. Foundation construction; and
6. Physical removal and placement of the Water Tower in the new location.

1.2 Site Description

The Water Tower is currently located at the Harbor at Hastings waterfront superfund site in Hastings-on-Hudson, Westchester County, New York (also known as the former Anaconda Wire and Cable Facility). The superfund property (Tax Parcel 4.30-19-1) resides between the Hudson River shoreline and the Metro North Hudson Rail Line. The superfund site has been cleared of the majority of structures of the former facility, however the Water Tower remains in place.

According to available as-built records, the Water Tower consists of a raised, covered tank with a frost case, balcony and handrails, top/interior/lower posts, struts, ladders, and walkways and platforms. The holding capacity is 75,000 gallons and it stands 108.83 feet tall. The tank rests on four reinforced struts. The diagonal measurement from strut to strut is 42.52 feet. The total weight of the Water Tower when empty is approximately 50,000 pounds. As-built records are provided in Attachment A.

1.2.1 Site Background: Harbor at Hastings Superfund Site

The Water Tower was constructed in 1916 for the National Conduit & Cable Company’s operations at 1 River Street in Hastings-on-Hudson, New York. The site was then transferred to Anaconda Copper and Mining Company in 1919. The company eventually merged into Anaconda Wire and Cable Company, and continued to operate until 1974 when the company ceased operations. Atlantic Richfield (AR) purchased the site in 1977 and an affiliate, ARCO, repurchased the site in 1998. AR and ARCO have since facilitated environmental investigations and remediation at the site. The site is currently under the responsibility of a 2016 Consent Order between British Petroleum (BP) and ARCO Environmental Remediation Limited (ARCO). The site has been categorized as a Superfund Site and is currently undergoing remediation. The Water Tower currently resides at the Harbor at Hastings Superfund Site.
Contamination at the site includes the release of PCBs and metals to site soil, groundwater, and sediments. The site is divided into two Operable Units (OUs). OU1 includes the site soils west of the railroad tracks. OU2 includes the off-site impacts to the Hudson River, which includes portions of the Old Marina and Kinnally Cove to the north of OU1. The Water Tower is currently situated in OU1 in the northwest section known as the Water Tower Area. All other structures in OU1 have been removed, except for the Water Tower which remains in place close to the shoreline (approximate position: 40°59’39.52” N, 73°53’10.82” W). The Water Tower is coated with lead-based paint (LBP) which needs to be abated.

In order for lead abatement to commence, a decision needs to be made regarding the manner in which the Water Tower is handled, namely whether the Water Tower should be disassembled prior to abatement, or should the abatement take place while the Water Tower remains assembled. This decision has both an economic component and an operational component. Once abatement is complete, the Water Tower will need to be removed and relocated for either storage (if disassembled) or placement at its temporary home.

1.2.2 Water Tower Existing Conditions

A limited environmental lead-based paint survey was conducted on the Water Tower by Louis Berger in April 2017. LBP was detected on three out of four of the structural posts of the Water Tower. The fourth structural post was not tested due to no paint present. A structural survey was also conducted by Louis Berger in November 2016, which determined that the existing Tower was in overall good condition exhibiting minor corrosion throughout, with only minor loss of material and no observed missing rivets. Some section loss was present on one of the posts and the water tank, but this was not considered significant. Because the Water Tower no longer holds water and will not hold water after relocation, the stresses on the steel members are significantly less than that for which they were designed. The Water Tower should survive relocation if the operations are properly performed by qualified contractors.

Copies of the LBP and Structural Surveys are provided in Attachment B.

1.2.3 Options for Relocation of the Water Tower

Five Options have been identified as possible temporary locations for the Water Tower during the estimated 7 years of remediation at the Harbor at Hastings. Once the remediation project is complete, it is understood that the Village may move the Water Tower back to its original location, or nearby, but this is expected to be negotiated later with future property owners. The first four options can be accomplished by water transport (barge and crane) while the fifth option can be accommodated by truck. The five options are:

1. Tower Ridge Yacht Club. An earthen/rubble pier structure was built in the 1970’s immediately north of the Tower Yacht Club’s boat basin. The pier’s crest width is approximately 30-ft wide while the base of the Water Tower’s legs measures 32-ft. Pile drilling will be required through the rubble, and the support structure will likely encroach on jurisdictional waters of the US (WOUS) which has permitting implications. This location, being private, would not encourage the general public to access the tower, however its presence would remain an important visual aspect of the river.

2. Tennis Courts. The strip of land immediately south of the Old Marina and north of the tennis courts. This land is wide enough to support the structure although setbacks from the shoreline and property ownership will require study. This area is adjacent to future PCB dredging operations during the Harbor Remediation OU-02 project, and therefore it is anticipated that the area would not be accessible to the public during this time period. After remediation of OU-02, this location would allow pedestrian access such that the Water Tower would become an interactive part of the waterfront. The Village would need to take measures to prevent climbing.

The land between the tennis courts and the Old Marina is split between two lots within Block 4.30. A land survey would be required to ascertain ownership. The Old Marina and Kinnally Cove is Lot 19-3, and the tennis courts are in Lot 19-2.
3. MacEachron Park. MacEachron Waterfront Park exists along the Hudson River north of the Harbor at Hastings remediation site. The Park currently consists of a parking lot and open space park area with vegetation, playground, and maintained lawn along the Hudson River. An area of the open space could potentially be set aside to support the Water Tower. The park is immediately north of Kinnally Cove and adjoins the Harvest Restaurant. There are multiple potential locations within the park to support the structure. Being incorporated within the park would encourage pedestrian access and allow the Water Tower to become an interactive or historic part of the waterfront. The Village would need to take measures to prevent climbing. This land is owned by the Village of Hastings-on-Hudson.

4. Hudson River. An old timber dolphin (navigational mooring structure) exists approximately 75 feet from the MacEachron Park shoreline in the Hudson River. Suitable piles could be driven in this location to support a foundation for the Water Tower. Water depth in this area is approximately 14 feet. The support will definitely be in jurisdictional waters of the US (WOUS) which will require USACE permits. This location could be inaccessible to the general public, or it could form a component of a future non-motorized watercraft dock. Public access could be achieved (and regulated) through an elevated gangway from the park. This location would allow the Water Tower to retain its visual importance when observed from the park.

5. Multi-year Temporary Storage. The Water Tower can be disassembled for LBP abatement, re-painted, and then trucked and stored in a suitable warehouse. The Water Tower should be stored in a manner to minimize corrosion. The Tower Ridge Yacht Club has offered to store it for a monthly rental fee, but it would be exposed to the elements unless suitable precautions are taken. An alternative location has not yet been recommended. This option also requires reassembly at a new location which would, similar to the other options, require a foundation to be designed and constructed.
2 Design & Relocation

2.1 Lead Abatement & Re-painting

The Water Tower is currently coated with lead-based paint (LBP). Prior to any relocation activities, the Water Tower must be stripped of LBP and re-painted with an alternative, lead-free material. A contractor that has proficiency and experience in paint removal and repainting of superstructures should be retained. The contractor must have all local, state and federal approvals for this type of work. The contractor’s personnel must be trained in accordance with the Occupational Safety and Health Act (OSHA) standard for lead safety (29 CFR 1926.62 lead).

The contractor shall also follow the procedures as presented in the Steel Structures Painting Council "Industrial Lead Paint Removal Handbook, (current edition)". These include chapters for the abatement of lead-based paint from superstructures: Chapter 1 Introduction; Chapter 3 Definition of Lead-Containing Paint and How to Test For It; Chapter 5 Lead Paint Removal Methods; and Chapter 6 Containment Systems.

All LBP debris must be properly containerized, samples for waste classification obtained for laboratory analyses, and all waste properly disposed of at a permitted facility that accepts LBP waste. Air monitoring during the abatement process shall follow the Environmental Protection agency (EPA) regulations as set forth in 40 CFR Subchapter C (50 – 99).

It is also recommended that soil samples around the Water Tower be obtained prior to the start of the paint removal to establish baseline levels of metals. Upon completion of the paint removal and repainting, additional samples should be obtained at the same location as the previous samples. The second set of samples should be analyzed for metals. If the results of any sample exceed baseline concentrations, the contractor shall be responsible for remediation of the location.

2.2 Proposed Relocation Site Selection

Due to the layout of the remediation site and surrounding area access, the Water Tower will need to remain on the west side of the rail line tracks in an area between the tracks and the Hudson River. As stated earlier, several options are available as a relocation site for the Water Tower and are currently under assessment and negotiation. Additionally, these sites may be considered temporary during the Harbor at Hastings remediation project, or permanent. Each site will have unique engineering challenges, permitting considerations, and will require different construction techniques. Because of this, the proposed schedule is highly dependent on a rapid determination of the preferred location for the Water Tower.

If the selected relocation site is not available for any reason at the time of relocation operations, a temporary and separate storage and/or staging area may need to be established. If the preferred alternative is to disassemble the Water Tower for abatement, then a storage area may be required.

At this point, all relocation site options will most likely require regulatory compliance and environmental review by State and Federal authorities, including the US Army Corps of Engineers (USACE) and the NY Department of Environmental Conservation (NYSDEC). Additionally, local county and municipal regulations will be reviewed and assessed for compliance. The in-water and earthen pier options will likely receive the most USACE Section 408 and Coast Guard scrutiny. The upland options, if above the high tide line (HTL), would only require NYSDEC authorization.

2.3 Foundation Design

Upon the Village’s decision to choose a relocation site, a design plan will need to be created to ensure a stable foundation for the Water Tower. Engineering and design considerations will be determined based on the chosen location. Considerations include soil types and/or shoreline types, platform elevation, foundation bearing capacity,
platform specifications, and permitting. Both the Tower Ridge Yacht Club location and offshore MacEachron Park location will encroach on jurisdictional waters. If the option for Kinnally Cove/Hudson River is chosen, a marine geophysical survey will need to be conducted in order to determine the water depth, sediment bottom type and foundation requirements. Geotechnical boring(s) will be required for any of the other options as well.

Any in-water construction will require review and permission from the USACE and NYSDEC to ensure environmental compliance. Specifications for protection against wave action, erosion and flooding will also need to be taken into consideration.

Depending on the selected location of the foundation, appropriate public safety parameters should be implemented. Barriers and signs to restrict access should be put in place during construction to keep out unauthorized individuals.

The Village has received 2 proposals for the foundation design.

1. Maser Consulting proposal dated December 11, 2020. This proposal provided for geotechnical exploration (test borings 40-ft deep) and structural engineer/foundation design for the platform to support the water tower.
2. Plan B Engineering proposal dated October 14, 2021. This proposal provided for geotechnical exploration (test borings 100-ft deep) and structural engineer/foundation design for the pile-supported concrete slab to support the Water Tower.

2.4 Foundation Construction

Once the location is determined, and the foundation design has progressed to permit level (65%), the project will need to be submitted to agencies for permits. When permits are determined to be likely, a Request For Proposal (RFP) for construction of the platform will be released by the Village. The foundation construction will begin upon award of the contract.

It is likely that the foundation for the water tower will require piles. Driving pile in the Hudson River brings an additional consideration which is the potential for a time of year restriction (TOYR) for anadromous fish.

2.5 Rigging & Relocation

R. Baker and Sons provided a bid to the Village dated 22 September 2020 in response to a Request For Quote (RFQ). The proposal was to disconnect the Water Tower from its base, engineer the lift points and rig it to a crane, place it on a barge, and transport via barge to the Tower Ridge Yacht Club. Due to limited land transportation accessibility, transport via waterway is considered the safest and most efficient option. R. Baker intends to work with Weeks Marine.

Assuming that the tower can be lead abated in its standing position, the Water Tower will be transported to the new location and connected to the foundation. The physical relocation process is expected to take one day.

Specific steps include loading the Water Tower onto a barge by crane, vessel transport, and attaching the Water Tower to its new foundation.

2.6 Reassembly

If the Village determines that it is beneficial to disassemble the Water Tower for lead abatement, then the Rigging and Relocation step as described in 2.5 would not be needed. A land-based crane would be required during disassembly. In this case the components would be trucked to a storage area after abatement, and reassembled after the new location is determined, and the foundation is designed and constructed. No bids have been solicited for this option.
3 Schedule and Costs

BP-ARCO has indicated that the Village should remove the Water Tower by early 2023 to support remediation at the Hastings Waterfront site. The following preliminary schedule was developed to achieve the goal of complete removal of the Water Tower by December 31st, 2022. The preliminary schedule is based on a February 1st, 2022 start date and applies to Options 1-4. Please see attached Gannt chart identifying the individual tasks, responsibility for each task, and the interdependency of the tasks (Attachment C). Option 5 (Multi-year Temporary Storage) would have it’s own unique schedule once abatement and disassembly are complete.

3.1 Lead abatement and re-painting
Tasks 1 through 5 of the attached Gannt Chart relate to LBP abatement and re-painting. There is some degree of float to this portion of the schedule. It is, however, important to receive bids from contractors to inform the decision by the Village regarding whether the Water Tower should be disassembled or left intact. Based on recent bids on similar projects, abatement contractors will likely prefer to leave the Water Tower intact. The preliminary engineer’s cost estimate is $880,000. Disassembly would likely increase the cost of abatement. These estimated costs are subject to refinement upon receipt of bids from abatement contractors.

The schedule for abatement and re-painting will depend on the selected contractor’s schedule and whether disassembly is preferred. The duration of the onsite work is currently estimated to be 2 months.

3.2 Relocation site selection
Tasks 6 and 7 are considered critical path items. This is due to the fact that permitting, foundation design and construction are dependent on the temporary or permanent location. If the decision is made to disassemble the Water Tower, then a location will need to be identified that can house the components. In either case, the location must be identified to allow the remainder of work to progress. In order to meet the Water Tower removal date of the end of December 2022, final determination of the location must happen by early March 2022.

3.3 Foundation design plans
Tasks 8, 9 and 10 relate to the design of the foundation. The initial activity will be the geotechnical evaluation which requires drilling. Drilling on land generally does not require a permit, but drilling in water (for the Hudson River option) generally requires a Nationwide Permit No. 6. Approximately 2 months into the design, the contractor would provide permit-level design drawings. These drawings would allow the permitting team to prepare permit applications. The duration of the design work is currently estimated to be nearly 4 months.

3.4 Regulatory compliance and permit acquisition
Tasks 11 through 14 are the permitting tasks which may include a pre-application meeting with regulatory agencies prior to submittal of the application. The location of the new site and permit-level drawings are required for permit submittal. Once submitted, the agencies will review and likely ask questions of the applicant. Once all questions are satisfactorily resolved, (and this may include some required design changes) the permits can be issued.

3.5 Foundation construction
Tasks 15 through 18 relate to construction of the foundation upon which the tower will be attached. The duration of the onsite work will vary with location, but for purposes of scheduling, it is currently estimated to be slightly more than 2 months.
3.6 Physical removal and replacement of the Water Tower

For Options 1-4, once the equipment is mobilized and the rigging design is complete, the physical removal and relocation of the Water Tower can be completed in one day. This operation and transit will be weather dependent. For the Multi-year temporary storage option, replacement costs include trucking the components to the new site and re-assembling the Water Tower.
# 4 Plan Summary

As presently scheduled, this plan for removal of the Water Tower and relocation can be achieved by the end of 2022 if initiated in February 2022. Certain critical path items exist, such as the determination of the preferred tower relocation site. To aid in this determination, the following table has been prepared. Cost estimates are very preliminary at this stage and will be refined as the project moves forward. Permitting can also add considerable duration to a project.

A two-phase process has been envisioned. The first phase is to move the Water Tower to a temporary location for up to seven years while the remediation of the Anaconda Wire facility is completed. A second phase, if deemed warranted by the Village, would move the Water Tower back to its original location.

Cost, permittability and schedule for the Temporary Storage option are complicated due to the uncertainty of where and when the Water Tower would be reassembled and located. While this is the least expensive option in the short term, it may be more expensive at a future date. Costs for Tasks 8-20 have been escalated at 3% per year for 7 years.

When using the estimated costs below, the reader should be aware that these are early estimates, and no contingency has been added. Typically at this stage, the contingency for budgeting purposes can be as much as 50% due to uncertainties.

<table>
<thead>
<tr>
<th>Location</th>
<th>Preliminary Cost Estimate</th>
<th>Permittability</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennis Courts</td>
<td>$1,570,500.00</td>
<td>simple</td>
<td>&lt;1 year</td>
</tr>
<tr>
<td>MacEachron Park</td>
<td>$1,415,800.00</td>
<td>simple</td>
<td>&lt;1 year</td>
</tr>
<tr>
<td>Tower Ridge Yacht Club</td>
<td>$1,881,300.00</td>
<td>complex</td>
<td>1 year</td>
</tr>
<tr>
<td>Hudson River</td>
<td>$1,629,100.00</td>
<td>complex</td>
<td>1 year</td>
</tr>
<tr>
<td>Multi-year Temporary Storage</td>
<td>$1,229,064.00</td>
<td>Initially simple. Undetermined for final location.</td>
<td>&lt;6 months for storage, multi-year to complete relocation</td>
</tr>
<tr>
<td><strong>Phase 2 (if desired)</strong></td>
<td><strong>Additional Costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennis Courts</td>
<td>$603,253</td>
<td>simple</td>
<td>7 years</td>
</tr>
<tr>
<td>MacEachron Park</td>
<td>$577,180</td>
<td>simple</td>
<td>7 years</td>
</tr>
<tr>
<td>Tower Ridge Yacht Club</td>
<td>$577,180</td>
<td>complex</td>
<td>7 years</td>
</tr>
<tr>
<td>Hudson River</td>
<td>$551,106</td>
<td>complex</td>
<td>7 years</td>
</tr>
<tr>
<td>Multi-year Temporary Storage</td>
<td>$367,811</td>
<td>Undetermined for final location due to potential remediation restrictions.</td>
<td>7 years</td>
</tr>
</tbody>
</table>
Attachment A – As Built Records
GENERAL PLAN

75,000 GALLON TANK & TOWER

TOTAL HEIGHT = 108'-10"

FOR NATIONAL CONDUIT & CABLE CO.

Hastings-on-Hudson, N.Y.

Chicago Bridge & Iron Works

CONTRACT NO. 7799

WWB 00771

Point 1 Shop Coat Std Block Graphite
Field Coat Std Green Graphite

Foundation Std They Furnish

Anchor Bolts 2-1/4 2-1/2

Bored Hole in Ctr. of Shoe

Inspection, Test

Sheet 1

Rev. 1-20-30

AEDDES 2-1-30
24 PLATES REQ'D.
5 lbs per sq ft, Rivets 5/8"
Order 12 Plates 37'6"x11'7"
11-30-27

Use these dimensions for 20,000 gallon tanks 3 Plates High

<table>
<thead>
<tr>
<th>No.</th>
<th>Mark</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>G</td>
<td>Rivet Flange 5 Flange 9 Fl</td>
<td>5 Fl</td>
</tr>
<tr>
<td>41</td>
<td>D</td>
<td>Deck 13 13 13 13 13 13 13 13</td>
<td>13 13</td>
</tr>
<tr>
<td>40</td>
<td>C</td>
<td>10 10 10 10 10 10 10 10 10 10</td>
<td>10 10</td>
</tr>
<tr>
<td>39</td>
<td>B</td>
<td>Hinge &amp; 1 Hoop for Beer</td>
<td>10 24</td>
</tr>
<tr>
<td>38</td>
<td>A</td>
<td>Roof 13 13 13 13 13 13 13 13</td>
<td>13 13</td>
</tr>
</tbody>
</table>

Bevel - 3 4 5

M.C. 12/13/27

Use No. 18 Gauge for 20,000 gallon tanks

Chicago Bridge & Iron Works

Contract No. 1-3-40
Attachment B - LBP and Structural Surveys
April 6, 2017

Mr. Fran Frobel
Village Manager
Village of Hastings-on-Hudson
Municipal Building
7 Maple Avenue
Hastings-on-Hudson, NY 10706

Subject: Report of Limited Environmental Lead Based Paint Survey Services for the Proposed Water Tower Dismantling Project in Hastings-on-Hudson.

Dear Mr. Frobel:

Louis Berger (Berger) has completed a limited environmental lead based paint survey of the water tower located at the Atlantic Richfield Co. (AR) Harbor-at-Hastings Site (site) in the village of Hastings-on-Hudson, NY. The survey was conducted on April 5, 2017 by Drew Cheskin, a NYS EPA Licensed Lead Risk Assessor (cert # NY-R-11931-1). The survey included visual observation and X-Ray Fluorescence (XRF) analysis of suspect lead based paint (LBP) for the upcoming proposed water tower dismantling project.

The readings of painted surfaces were taken using an RMD LPA-1 XRF Lead Paint Spectrum Analyzer. The LPA-1 method of measurement is based on the spectrometric analysis of lead K-shell X-ray fluorescence within a controlled depth of interrogation. The LPA-1 Analyzer uses a Co-57 radioactive source and an advanced, solid-state, room temperature, radiation detector to generate and detect the x-ray fluorescence spectrum of a painted surface. The spectrum is then analyzed by a microprocessor to eliminate the effects of substrate and other factors such as scattering to allow an accurate determination of the amount of lead on a surface. The LPA-1 automatically analyzes spectrometric data in real time and differentiates the lead signal from the spectrum. The x-ray fluorescence properties are determined through calibration process and are used for automatic substrate correction and calculation of the lead content of a painted surface.

Berger tested the following suspect paints to be impacted by the current scope of work (SOW):

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Component</th>
<th>Substrate</th>
<th>Color</th>
<th>Condition</th>
<th>LEAD Result (mg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Positive Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.9</td>
</tr>
<tr>
<td>2</td>
<td>Positive Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.9</td>
</tr>
<tr>
<td>3</td>
<td>Positive Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.9</td>
</tr>
<tr>
<td>4</td>
<td>Negative Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-0.1</td>
</tr>
<tr>
<td>5</td>
<td>Negative Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-0.0</td>
</tr>
<tr>
<td>6</td>
<td>Negative Calibration</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>-0.0</td>
</tr>
<tr>
<td>7</td>
<td>NE Structural Post, S Side</td>
<td>Metal</td>
<td>Grey</td>
<td>Poor</td>
<td>0.1</td>
</tr>
<tr>
<td>8</td>
<td>NE Structural Post, N Side</td>
<td>Metal</td>
<td>Grey</td>
<td>Poor</td>
<td>4.2</td>
</tr>
<tr>
<td>9</td>
<td>NE Structural Post, E Side</td>
<td>Metal</td>
<td>NA¹</td>
<td>NA¹</td>
<td>-0.1</td>
</tr>
<tr>
<td>10</td>
<td>SE Structural Post, E Side</td>
<td>Metal</td>
<td>Grey</td>
<td>Poor</td>
<td>&gt;9.9</td>
</tr>
<tr>
<td>11</td>
<td>SE Structural Post, S Side</td>
<td>Metal</td>
<td>Grey</td>
<td>Poor</td>
<td>&gt;9.9</td>
</tr>
<tr>
<td>12</td>
<td>NW Structural Post, E Side</td>
<td>Metal</td>
<td>Grey</td>
<td>Poor</td>
<td>&gt;9.9</td>
</tr>
</tbody>
</table>
Six (6) of seven (7) painted surfaces tested were confirmed to contain lead-based paint. A single test of the bare metal on a structural post showed no indication of lead contained within the metal itself. Regulatory levels established by the EPA identify lead-based paint as containing 0.5% lead content by weight or 1.0 mg/cm². Surfaces coated with lead-based paint can create dust-lead, soil-lead or airborne-lead hazards if the paint is turned into dust or fumes by blasting, abrasion, scraping, sanding or torch cutting. Any work which disturbs painted surfaces containing lead needs to be performed in accordance with the Occupational Safety and Health Administrations (OSHA) 29 CFR 1926.62 Lead in Construction Standard and EPA’s 40 CFR 745 regulations. Personal air monitoring should be conducted when disturbing lead based paints and lead containing materials as per 29 CFR 1926.62 (OSHA).

It is our hope that the information provided in this letter has met the project requirements. Thank you for the opportunity to provide you and your staff with our continued services. Please contact me via email at acheskin@louisberger.com or at 914-798-3733 if you have any questions or require any additional information.

Sincerely,

Drew Cheskin
Manager, Emergency Management & IH Services

Attachment A – Consultant & Inspector Certifications
Attachment B – XRF Data
Attachment C – Photolog
PROJECT SCOPE

This project consists of the inspection and condition assessment of the water tower located on the Atlantic Richfield Co. (AR) Harbor-at-Hastings Site (site), located in the Village of Hastings-on-Hudson, NY. The existing water tower must either be dismantled or demolished to accommodate construction activities for the Superfund remediation of the former Anaconda Wire and Cable Co., including excavation of PCB- and metal-contaminated soils to depths of 9 to 12 feet below grade and restoration of a sloped shoreline.

The existing water tower may be restored or replaced with a replica following the completion of the soil remediation and site redevelopment activities. The water tower is not used as a functioning water tower, but the Village of Hastings-on-Hudson (Village) is exploring its preservation as an aesthetic element of the view shed of the Hudson River and Palisades Cliffs, and as an emblem of the Village. The Village’s primary study question, addressed through this assessment, is whether the existing water tower structure can withstand being dismantled, restored, and re-erected.

The following tasks were conducted for this project by Louis Berger U.S. (Louis Berger):

- Attended an on-site coordination meeting with AR on 13 September 2016 to review Louis Berger's proposed assessment activities and AR’s safety orientation and procedures for site activities.
- Prepared a site- and activity-specific Health and Safety Plan for the structural evaluation task and incorporate AR’s comments on the plan.
- Conducted the water tower structural evaluation field work on 11 November 2016.
- Prepare this evaluation report indicating the condition and findings of the water tower and recommendations.

WATER TOWER DESCRIPTION

The water tower was constructed circa 1916 for the National Conduit & Cable Company, which later became the Anaconda Wire and Cable Company (Photo No. 1). As per the as-built plans the structure consists of four (4) riveted steel, laced posts/columns, each made up of two 12-inch channels with a 14-inch cover plate on the inside face of the post, and cross bars (lacing) on the outside face. The posts extend up approximately 90 high and are each constructed from three sections with splices and lateral support struts spaced at approximately 30-foot intervals. Lateral tower stiffness is provided at each bay of the three post sections with 1 ⅛-inch square steel cross rods.

The 75,000 gallon capacity tank, supported by the four posts, is made up of 5 steel welded cylindrical plates with a diameter of 22 feet and a conical shaped steel roof. The bottom two plates and top two plates of the tank have a thickness of ¼-inch and the middle plate has a thickness of 5/16-inch. The water tower is anchored to a concrete foundation with one 2.5-inch diameter by 6-foot long anchor bolt at each post anchor. The as-built plans indicate that the tower received a shop coat paint of standard Black Graphite and 3 field coats of standard Green Graphite. The current total weight of the water tower is estimated at approximately 50,000 pounds.
INSPECTION PROCEDURE

The inspection was performed by a three-person team (two structural engineers and a Health and Safety Officer), plus the operator for the personnel lift, on the morning of 11 November 2016. The team leader, a registered professional engineer, was responsible for planning the inspection procedures so that the water tower structural components were properly inspected. The weather was sunny with a 60 degrees F temperature and winds between 9 and 20 mph. Ten photographs documenting the inspection are attached to this report.

A visual inspection of the structural members and their connections was performed using a 135-foot personnel lift (Photo No. 2). Where access was possible, a hands-on inspection was performed including recording the thickness of structural members and the water tank using an ultrasonic measuring device and a basic caliper, to determine possible section loss due to corrosion.

Glossary of Inspection Terminology

1) Corrosion
   a) Minor (or light) - A light surface rust.
   b) Moderate - Rust that is loose and flaking with some pitting. This scaling, or exfoliation, can be removed with some effort by use of a scraper or chipping hammer. Element exhibits measurable but not significant loss of section.
   c) Severe - Heavy, stratified rust or rust scales with extensive pitting. Removal requires exerted effort and may require mechanical means. Significant loss of section.

2) Pack Rust - Rust collected between two interfacing surfaces, usually two steel plates. Pack rust can be minor, moderate, or severe as described above. Pack rust can severely deform the steel members due to the expansive nature of rust.

3) Pitting - Formation of cavities due to corrosion. Minor, moderate, and severe pitting categories are used based upon depth and density of cavities.
   a) Minor - Typically less than ¼ inch diameter and 1/32 inch deep.
   b) Moderate - ¼ inch to ½ inch diameter and up to ⅛ inch deep.
   c) Severe - Greater than ½ inch diameter and over ⅛ inch deep.

SUMMARY OF FINDINGS

The existing water tower is overall in good condition exhibiting mostly minor corrosion throughout, with only minor loss of material and no observed missing rivets. Pitting of material due to corrosion was not found. The original field paint coatings have peeled off, revealing the shop graphite primer coating that partially remains throughout the tower structure.

The tower anchors are in overall good condition with the northwest and southwest anchors exhibiting moderate pack rust at the stiffener plates and moderate corrosion on the base plate (Photos Nos. 3 & 4). The anchors for the northeast and southeast posts are partially buried by the soil and exhibit moderate corrosion on the stiffener plates (Photos Nos. 5 & 6). The horizontal rods located at the level of the anchor base have been removed or have become loose (Photo No. 4); however, the current state of these rods does not compromise the structural integrity of the water tower.

The posts are in good condition, exhibiting minor to moderate corrosion overall. Only the
northeast post is exhibiting moderate corrosion on one of the channels near the base of the post. The layers of corrosion were removed to record the thickness of the channel web, which revealed approximately 10 percent section loss of the web area (Photo No. 7). The post splice connection plates, struts and bracing channels, and cross rods are all in good condition, exhibiting only minor corrosion (Photo No. 8) and the connection to the tank is also in good condition (Photo No. 9). The tank is in overall good condition, exhibiting minor corrosion with approximately 10 percent section loss on the tank’s cylindrical plates (Photos Nos. 9 & 10).

CONCLUSION AND RECOMMENDATIONS

As noted in the Summary of Findings, the water tower is in overall good condition with only minor corrosion throughout and some section loss on one of the posts and the water tank. These losses are considerably small given the age of the structure and are not considered significant. In addition, the water tank no longer stores water and the stresses on the steel members are significantly less than that for which they were designed. As such, given the condition of the water tower, it should be able to withstand being dismantled and re-erected if properly performed by a competent Contractor who can demonstrate pertinent project experience.

As stated in the Project Scope, the Village may either restore the water tower or replace it with a replica following the completion of the site cleanup. If The Village decides to dismantle, restore, and re-erect the water tower, Louis Berger recommends that the project scope include at a minimum, but not be limited to:

- A lead paint survey of the water tower structure and lead paint abatement in compliance with all applicable regulations, as necessary, for dismantling, restoration, and re-installation.
- Identification and application of an appropriate finish to preserve the water tower structural elements from additional corrosion after re-installation.
- Construction of a new water tower foundation and cleaning and painting of all four anchors up to 3 feet from each anchor base plate.

Please contact Len Warner with any questions regarding this report at (914) 798-3721.
Photo No. 1: View of the Water Tower looking west.
Photo No. 2: View of the Water Tower and personnel lift looking west.
Photo No. 3: Northwest post anchor exhibiting moderate pack rust at the stiffener plates and moderate corrosion on the base plate. Note concrete foundation.

Photo No. 4: Southwest post anchor exhibiting moderate pack rust at the stiffener plates and moderate corrosion on the base plate.
Photo No. 5: Northeast post anchor partially buried and exhibiting moderate corrosion on the stiffener plates.

Photo No. 6: Southeast post anchor partially buried and exhibiting moderate corrosion on the stiffener plates.
Photo No. 7: Northeast post exhibiting moderate corrosion. The layer of corrosion was removed from a testing location to record the thickness of the channel web, revealing approximately 10 percent loss of web area.

Photo No. 8: Typical post splice connection plates, struts bracing channels and cross rods exhibiting minor corrosion.
Photo No. 9: View of connection between tank and post in good condition.

Photo No. 10: View of tank lower section exhibiting minor corrosion. Note recording of tank plate thickness using the ultrasonic measuring device.
Attachment C - Gannt chart
<table>
<thead>
<tr>
<th>ID</th>
<th>Task Name</th>
<th>Duration</th>
<th>Start</th>
<th>Finish</th>
<th>Predecessors</th>
<th>Resource Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prepare RFP for LBP Abatement</td>
<td>10 days</td>
<td>Tue 2/1/22</td>
<td>Mon 2/14/22</td>
<td>MM</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Issue LBP RFP</td>
<td>10 days</td>
<td>Tue 2/15/22</td>
<td>Mon 2/28/22</td>
<td>1 MM,Village</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Award Contract to LBP RFP</td>
<td>30 days</td>
<td>Tue 3/1/22</td>
<td>Mon 4/11/22</td>
<td>2 Village</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mobilize LBP Contractor</td>
<td>5 days</td>
<td>Tue 4/12/22</td>
<td>Mon 4/18/22</td>
<td>3 Contractor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Complete abatement and repainting</td>
<td>40 days</td>
<td>Tue 4/19/22</td>
<td>Mon 6/13/22</td>
<td>4 Contractor</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Assess Relocation Area</td>
<td>15 days</td>
<td>Tue 2/1/22</td>
<td>Mon 2/21/22</td>
<td>MM,Village</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Chose Final Relocation area</td>
<td>10 days</td>
<td>Tue 2/22/22</td>
<td>Mon 3/7/22</td>
<td>6 Village</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Award contract with Foundation Engineer</td>
<td>15 days</td>
<td>Tue 3/8/22</td>
<td>Mon 3/28/22</td>
<td>7 Village</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Foundation geotech and design</td>
<td>75 days</td>
<td>Tue 3/29/22</td>
<td>Mon 7/11/22</td>
<td>8 Contractor</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>30% Design for use in Permit application</td>
<td>40 days</td>
<td>Tue 3/29/22</td>
<td>Mon 5/23/22</td>
<td>8 Contractor</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Prepare Permit Application</td>
<td>15 days</td>
<td>Tue 5/24/22</td>
<td>Mon 6/13/22</td>
<td>10 MM</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Submit Permit Application</td>
<td>15 days</td>
<td>Tue 6/14/22</td>
<td>Mon 7/4/22</td>
<td>11 MM,Village</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Permit review process</td>
<td>80 days</td>
<td>Tue 7/5/22</td>
<td>Mon 10/24/22</td>
<td>DEC &amp; USACE</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Obtain Permit(s)</td>
<td>0 days</td>
<td>Mon 10/24/22</td>
<td>Mon 10/24/22</td>
<td>DEC &amp; USACE</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Prepare RFP for Foundation Construction</td>
<td>15 days</td>
<td>Tue 7/12/22</td>
<td>Mon 8/1/22</td>
<td>9 MM</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Issue Foundation Construction RFP</td>
<td>10 days</td>
<td>Tue 8/2/22</td>
<td>Mon 8/15/22</td>
<td>15 MM,Village</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Award Foundation Construction</td>
<td>30 days</td>
<td>Tue 8/16/22</td>
<td>Mon 9/26/22</td>
<td>16 Village</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Foundation Construction</td>
<td>45 days</td>
<td>Tue 9/27/22</td>
<td>Mon 11/28/22</td>
<td>17 Contractor</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Award Water Tower Relocation Contract</td>
<td>15 days</td>
<td>Tue 10/25/22</td>
<td>Mon 11/14/22</td>
<td>9,1 Village</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Mobilize and Relocate Water</td>
<td>30 days</td>
<td>Tue 11/15/22</td>
<td>Mon 12/26/22</td>
<td>19 Contractor</td>
<td></td>
</tr>
</tbody>
</table>