Eagle Harbor State Harbor
Harbor Upgrade Feasibility Study
Final Report

Prepared for:
State of Michigan
Michigan Department of Natural Resources
Parks and Recreation Division
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November 6, 2018

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EXECUTIVE SUMMARY

ABSTRACT

This study was conducted to evaluate the existing conditions and identify potential future improvements for the marina facility at Eagle Harbor State Harbor. The boat launch is heavily used in the summer by fisherman and recreational boaters however the marina experiences infrequent use by both seasonal and transient vessels. At one time, the marina offered fueling and pumpout services that have since been eliminated as market demands have decreased. The marina is now operated remotely via DNR Staff based in Copper Harbor. Elements of the existing facility are outdated and in need of evaluation to determine how the site should be improved to be compliant with current standards and meet the current demand. Edgewater Resources (ER) has been retained to conduct an overall existing conditions assessment and feasibility analysis on improving the state harbor.

CONDITIONS ASSESSMENT

Existing conditions of the site were evaluated through several site investigations and review of record information that is available for the site. Site investigations that were performed include a bathymetric and boundary survey, soil sampling, potable water well testing, hazardous material testing, inspection of existing marina seawall, and inspection of existing utility infrastructure which includes the electrical, potable water, fuel and sanitary systems. The bathymetric data was collected and compared against historic and current water levels to assess the navigation depths within the mooring area and the navigation channel where it was determined that the existing water depths are adequate. It was also necessary to perform a boundary survey to confirm site limits and re-establish the eastern property line. The existing steel sheet pile seawall was visually inspected above water and below via underwater camera, and thickness was measured using an ultrasonic thickness gauge where it was determined that existing structure appears to be in good condition. Soil samples were collected using a hand auger under supervision of the local health department, to determine an appropriate location for constructing
a new drain field for the septic system. The health department recommends to implement a new, raised drain field. A draw-down test was performed on the existing potable water well where water samples were taken to be tested for water quality. The well test indicated that the capacity is sufficient for the expected demand and water quality test results showed no presence of bacteria, however some hardness was present meaning the water is potable but may not be palatable. Due to the building’s age, a hazardous materials test was conducted on the building materials to understand any precautions that should be taken as part of any future improvements. Low levels of lead paint and asbestos-containing materials were found to be present in the exterior green paint and the exterior door caulking. The materials are non-friable in their current state, however appropriate PPE should be worn by crews as part of any future improvements. The existing electric system, potable water system, fuel system, sanitary system, and accessible routes where evaluated against the applicable codes and regulations. In general, each of the systems inspected is outdated and in need of replacement to meet compliance requirements with the National Electric Code (NEC), the Accessible Disabilities Act (ADA) standards, and the State of Michigan Construction Code. The inclusive conditions assessment has resulted in the identification and quantification of future improvements which are further explained and detailed in the following sections of this report.

PROJECT FEASIBILITY

Although the marina facility does not experience as much use today as it has in the past, the existing site features and amenities should be replaced and improved to accommodate its current demand and preserve its remote location. Based on the findings of this study, site improvements are feasible and recommended. The preferred conceptual site plan that has been developed focuses on improving the existing site features and infrastructure for boaters, and also introduces a more established parking layout that is intended to create better site flow and simplify site maintenance. The preferred conceptual site plan contains a preliminary construction cost estimate that outlines each individual work item.

PROJECT BACKGROUND

PURPOSE

The goal of this study is to evaluate the existing condition of the MDNR State Harbor in Eagle Harbor, MI to identify the necessity for potential improvements and infrastructure upgrades in order to update the facility to meet current standards. Additionally, alternative solutions will be explored and proposed facility upgrades were prioritized as part of the study to develop an implementation strategy for completing the needed improvements. Cost estimates were developed as part of the implementation strategy to better understand the financial impact of the proposed improvements and to help plan the future funding strategy.

The following services were performed by Edgewater, and qualified sub-consultants, in order to meet the goals of the study:

- Inspection and analysis of the existing steel sheet pile walls
- Analysis and replacement plan for existing drain field including soil borings
- Evaluation and testing of existing water supply
- Evaluation and replacement plan for electrical, water, and sanitary utilities
- Removal plan for existing pump-out and fueling facilities
- Renovation plan for the existing Harbor Master’s building
- Site Improvement strategies to ensure compliance with current ADA Standards
- Design guidelines for a code compliant fire suppression system
- Design guidelines for any needed steel sheet pile wall improvements
- Evaluation of boating access site
- Bathymetric Survey to document and analyze existing water depths
- Boundary and Topographic Survey to document existing site conditions
- Preparation of cost estimates of proposed work

PROJECT LOCATION & BRIEF HISTORY

Eagle Harbor State Dock is located in Michigan’s Upper Peninsula on the East side of the Harbor adjacent to the Village of Eagle Harbor. The marina is located at the end of the eastern peninsula and at the end of Marina Rd.

The marina which was originally called the Eagle Harbor Station and was originally established as a U.S. Life-Saving Service Station #299 from 1912-1915 and a U.S. Coast Guard Station from 1915-1950 servicing Lake Superior. The site also served as a Navy Radio Compass Station from 1921-1928. The coast guard kept around six men stationed at this location, with boats and rescue equipment, to assist stranded ships and/or boats. The crew had quarters on site and were available to serve the surrounding area as the need arose. Three large towers were previously located at Eagle Harbor and were used for both radio communication and as a lookout to monitor the conditions of Lake Superior.

The 1939 boathouse has been preserved at the site and has been added to the National Register of Historic Places by the United States Department of the Interior. The boathouse is currently leased and managed by the Keweenaw County Historical Society, and is a museum celebrating the Lake Superior Life Savers.

According to the 1986 USACE Project Map for Eagle Harbor, the steel sheet pile seawall was constructed in 1960 with the upland area behind the wall filled to the existing grade. This timeline is consistent with the record drawings for the 1967 harbor improvements. These improvements included the installation of a potable water system, electrical system, concrete sidewalks, gasoline storage tank and dispenser, site lighting, sanitary sewer system with septic tank and drain field, and the Harbor Master’s building. In 1976, the facility underwent a second round of improvements that included construction of a new larger boat launch ramp, expanded parking lot, and filling of the existing launch ramp.

Major improvements since 1976 have been minimal. Dredging last occurred at the harbor in 2004. This dredging project restored the project depths at the seawall to a minimum of LWD – 6.0’ (595.1’) with the western 80’ being dredged to a depth of LWD – 8.0’ (593.1’).
DATA COLLECTION & ANALYSIS

Project site data was gathered and processed to formulate a detailed and comprehensive understanding of the site’s existing conditions. Several specialized investigations were conducted to collect the necessary information as part of this overall feasibility study. A bathymetric survey was performed within the marina basin and federal navigation channel up to the harbor entrance. Topographic and boundary surveys were performed to establish the property limits and land characteristics. Historical water levels were compared against existing bathymetric data to determine water depths and fluctuation throughout the facility. Soil testing and analysis was performed to identify the site’s existing conditions and soil type characteristics. Inspection of the existing steel sheet pile seawall was performed via ultrasonic thickness gauge and supplemental underwater video to evaluate its condition. Hazardous material testing was performed on the existing boater services building’s interior and exterior. Well testing was conducted to determine the functionality of the existing well and to understand the water quality. Each component of information gathered was collectively necessary to conduct a thorough analysis and each investigation is separately outlined herein.

BATHYMETRIC DATA COLLECTION

To accurately understand the existing elevations of the marina basin, entrance channel and federal navigation limits, a bathymetric survey was performed between 9/13/17 and 9/15/17 using GPS surveying equipment. A Topcon RTK GPS receiver paired with a SonarMite single beam echo sounder was used to perform the data collection process. See Figure 8 for a representative schematic of the survey vessel setup. Due to the project’s remote location, supplementary equipment was required to establish a connection with the National Geodetic Survey’s (NGS) known spatial reference system for this region. Prior to collection, the GPS was programmed to communicate with a base station that was set up over one of the several established benchmarks that were identified on site. The particular benchmark used for the survey was National Oceanic Survey brass disk number 9039E – 1982 found set in a rock outcropping along the properties northern shoreline roughly 5 feet from the water’s edge. All data was gathered in reference to the North American Datum of 1983 (NAD83), Michigan State Plane Coordinates, North Zone, International Feet. Data was gathered in reference to the North American Vertical Datum of 1988 (NAVD’88) and then converted to the equivalent International Great Lakes Datum of 1985 (IGLD’85) for comparative analytical purposes. The appropriate data collection formula was provided by the MDOT Continuously Operating Reference Station (CORS) network. The data points collected contain northing, easting, and elevation information referencing the previously mentioned datum. The resolution specification for the aforementioned surveying equipment is within the tolerance of +/- 0.1 feet horizontally and +/-0.05 feet vertically. The survey information was stored in the GPS data collector until being imported into the computer software program AutoCAD Civil 3d for editing and analysis.
Utilizing AutoCAD Civil 3d, the survey data points were used to develop a three-dimensional model of the bathymetric surface. In addition to the lake bed surface, other GPS points were gathered to model topography of the shoreline and nearby existing structures. The three-dimensional CAD model allowed for an accurate understanding of lake bed elevations that are applicable when considering fluctuating water levels and the resulting water depth around the project site. See Appendix A for the resulting bathymetric survey exhibit that was created by the information gathered.

Water depths are in reference the USACE Lake Superior low water datum (LWD) which is an elevation of 601.1’ (IGLD’85). Record documents indicate that the most recent maintenance dredging efforts were conducted in 2004, which show the mooring area project depths at LWD-6’ along most of the sheet pile wall and at LWD-8’ in an isolated portion towards the historic USCG launch. Adequate water depths were found within the primary mooring area, however some shoaling was observed at the two limits of the existing sheet pile wall near the boat launch and also near the existing historic USCG launch basin. Depths ranging from LWD-6’ to LWD-10’ were observed within the mooring area which is considered to be sufficient for safe navigation and mooring. The two areas of shoaling were surveyed at depths as high as LWD-3’, therefore, maintenance dredging should be considered as part of future improvement measures to create an entirely navigable vessel basin mooring area. The federal navigation channel has a project depth of LWD-12’ and serves as ingress and egress to the marina facility and greater Eagle Harbor waterway. Depths recorded within the navigation channel limits were observed to be within the LWD-10’ to LWD-12’ range with an isolated area of shoaling near the existing timber crib and concrete pier along the west side of the historic USCG launch. This is an area to consider introducing armor stone protection as the pier remains fairly exposed to wave energies from the west northwesterly direction. The timber crib and concrete pier also remains susceptible to ice forces which
could be combated by an armor stone revetment. Overall, water depths within the entrance channel, federal navigation channel, and marina basin mooring area were observed to be adequate for navigation, however, maintenance dredging should be a consideration to address the two aforementioned areas within the mooring basin.

**BOUNDARY AND TOPOGRAPHIC SURVEY DATA COLLECTION**

A boundary survey was performed on the property during the September 2017 site visit utilizing the aforementioned Topcon RTK GPS receiver connected to the NGS known reference system for this region. Record surveys of adjacent properties and the county section in the area were gathered from the Keweenaw County Courthouse, located in Eagle River. The record surveys provided useful information in locating several monuments onsite and the property’s eastern boundary.

A section line runs east to west through the property establishing Keweenaw County section 32, T59N-R30W to the north and Keweenaw County section 5, T58N-R30W to the south. Two meander corner survey monuments were recovered along this line within the site’s property which helped to determine the location of the eastern boundary. The easternmost meander corner was found to be a 5/8” iron surrounded by loose cobble rock located roughly 30’ from the water’s edge. The brass re-monument cap was not found, however it was determined that this 5/8” iron is the meander corner marker based on its geographic location and recorded witnesses around the set iron. Another meander corner was recovered along the section line roughly 18’ from the water’s edge northeast of the existing boat launch. The historic northern property corner was recovered intact as an iron pin set within an approximately 4” casing. The remains of what appeared to be a property fence made of timber posts and barbed wire was found along this property line. The southern property corner was not recovered intact, and although an iron pin was found within the general area, a survey iron has been set by a licensed professional surveyor at the appropriate location to re-establish the eastern property boundary. The adjacent property owner to the south of Marina Rd appears to be occupying some of the MDNR property with what appears to be stored building materials. In addition to the property corner that was set, another survey iron was placed along the property line just north of the marina entrance drive to mark the eastern property line. See Appendix A for the boundary survey exhibit that shows the existing monuments recovered and established property boundary onsite.

As part of assessing the site’s overall existing conditions, a topographic survey was performed on the immediate project site and overall property. Topographic information was collected using the previously mentioned Topcon RTK GPS surveying equipment. Similarly to the bathymetric data collection, the topographic survey was conducted by recording a number of survey points that hold northing, easting, and elevation data. The points were then implemented into AutoCAD Civil 3D to process and analyze the information. Survey points were used to create a three-dimensional surface which is represented via contours and elevation labels that can be found in the Topographic and Bathymetric Survey Exhibit in Appendix A. The three-dimensional surface model is useful for understanding existing conditions and potential earthwork quantities that may be required as part of potential harbor improvement measures. In some areas within the northern portion of the property, dense canopy coverage limited the collection of topographic information, however through the use of diligent field notes, a well-rounded survey was completed throughout the property. Most of the area
south of the entrance road is relatively flat and clear of trees and vegetation. The area north of the entrance road was observed to be primarily forest and have higher elevations than that of the property to the south. Large outcroppings were found along the northern shoreline, where in certain areas, cascade more than 12’ down to the lake elevation.

The location of key elements and structures were recorded while onsite and are shown on the Topographic and Bathymetric Survey Exhibit in Appendix A. One feature that was recorded for further analysis was the shoreline protection measure west of the USCG historical museum building. According to record documents, the shoreline protection consisted of the placement of 567 tons of 80 to 240 pound mattress stone and 1,213 tons of 900 to 1800 pound armor stone in a typical rubble mound structure approximately 50 ft by 129 ft. Due to the lack of as-built record drawings of the rubble mound structure, the original configuration of the structure is unknown. Based on detailed survey data that was gathered in this area, the rubble mound structure is intact and has experienced minimal migration since its installation in 1983. Several large armor stones have shifted near the water line, likely from ice shove/ice forces, however the structure appeared to be stable and in good condition. See Figure A below that represents a typical cross section through the rubble mound. The lakeward side slope is roughly 3H:1V and the landward side slope is roughly 2H:1V with a gradual plateau area roughly 5’-6’ wide at the top. The stone that was used is adequately sized, roughly 1-2 ton conglomerate armor stone sourced from the nearby Bumbletown Mine located in Allouez, MI. The top of the rubble mound is at an elevation of 612’ (IGLD’85) which is roughly 9’ above the Lake Superior OHWM (603.1 IGLD’85). The footprint of the structure matches the record documents that are available. Considering the recorded side slopes, top height, and position/footprint of the rubble mound, the structure is considered to be an adequate shoreline protection measure. Continual monitoring should take place per the USACE Operation and Maintenance Manual for Shoreline Erosion Protection that was issued following its construction in 1983.

STEEL SHEET PILE SEAWALL INSPECTION

Steel sheeting is present at the site along the western edge of the marina, adjacent to the former U.S.C.G. boat well, and along the southeastern edge for a total distance of around 390’ (100’ to west and 290’ to the southeast). As discussed previously, the majority of the sheeting is understood to have been installed in 1960 while a 12’ section of sheeting was installed in 1976 in the former boat launch location.

The existing sheeting is all hot-rolled, U-shaped type with C-shaped interlocks. The sheeting appears to all be connected to a waler and tie-back system behind the wall. Record plans indicate that the 1976 sheeting additions included a double c-channel beam waler system that is anchored to steel sheet deadmen with 1 ¼” steel tie-rods. The sheeting has a 12” steel c-channel cap across its entire length. The existing top of cap for the seawall is around elevation 604.0’ (IGLD 85). Based upon record plans, the dredge depth adjacent to the wall was 594.0’ when originally installed, the installed tip elevation of the sheets is unknown.

Overall, the existing steel sheeting appeared to be in good condition for its age. Visually the wall did not appear to have any irregularities, leaning sections, or bulges. The wall was inspected visually from above via the sidewalk, from the face via a vessel, and underwater by use of an underwater camera along its entire length. The waterline area was inspected for signs of localized areas of advanced corrosion and
deterioration from years of varying water and ice exposure. The surface of the wall appeared to be in consistent condition with no obvious areas of advanced deterioration observed. The sheeting located on the west side of the marina, within the former U.S.C.G. boat well, appeared to be more corroded than the other sheeting on site but was still functional. The record documents do not indicate whether this boat well sheeting was installed in 1960 along the other marina sheeting of it was pre-existing at that time. Based upon the record documents and observed sheeting profile, we understand the sheeting to be a PMA-22 section, or similar, with an original web thickness of 0.375". An ultrasonic thickness gauge was used to measure the existing thickness of the sheeting in two locations, at the approximate 1/3 points of the southeastern portion of the seawall. In each testing location, the thickness was tested 6" above the current water line, at the waterline, and 6" below the water line. All of the thickness measurements recorded were very similar and indicated an existing steel thickness of around 0.360". Therefore the sheeting has lost approximately 0.015" or 1/64" from corrosion in the last 57 years. The top cap has varying amounts of corrosion with localized areas showing pitting, bubbling, and flaking. these areas should be addressed as part of any wall improvements to preserve functionality. Hardware connections along the wall were also observed to ensure that waler bolts and tie-rods were still connected and functional. All tie-rods, waler bolts, and plate washers observed appeared to be in good condition for their age and were functional. Timber fendering was attached to the sheeting at various locations along the seawall. The only deficient hardware observed were timber fendering connection bolts that had the heads welded to the sheeting to support the fendering. Fendering was in place along the southeastern portion of the marina but was missing from the entire west side. The western timber fendering bolts were mostly in place but were either bent or broken. The toe of the seawall was inspected and no signs of toe failure or scour were observed. Please see the underwater photo that was taken during a September 2017 site visit. Additional existing conditions and inspection photos are included in Appendix VI.
SITE UTILITIES INSPECTION

The site utilities were inspected and tested including the electrical, potable water, fuel, and sanitary systems. The electrical system was originally installed as part of the 1967 improvements. The system consists of a 240V 3-wire main underground electrical service that is fed to the harbormaster’s building from an onsite aerial supply and a 100 kVA transformer. The underground feed connects to a meter bank on the buildings southeastern face. These three meters feed a 100A/70A split bus electrical panel. The 100A portion feeds the interior circuits while the 70A supplies the exterior, fuel, and marina circuits. The water heater is directly connected to its own meter. Building wiring appears to be distributed through metallic conduit ran through the masonry walls and concrete floor. The marina circuits are from a 60A circuit and connect to the seven concrete abutments and three steel stanchions located along the seawall. The concrete abutments appear to have been installed as part of the 1967 improvements while the steel stanchions appear to have been added to the electric system at a later date. All of these utility appurtenances offer 2-20A grounded outlets with each having a designated 20A circuit breaker. Some circuit breakers were locked in the off position during the time of observation indicating that not all of the receptacles may be functional. In review of the site for compliance with current National Electrical Code (NEC), the following major deficiencies were observed:

- Only 20A, straight-bladed, receptacles are offered along the seawall for shore power, NEC 555.19 requires that single receptacles offering shore power for boats must be rated for not less than 30A. Additionally, it requires that all 30A and 50A shore power receptacles must be of the locking and grounding type.
- All 20A 125V outdoor receptacles are required to have GFCI protection, no such protection was observed for the existing receptacles.
- Per NEC 555.9 and 555.19, all electrical connections and receptacles need to be located at least 12” above the deck (considered as the top on concrete in this case) and above the Electrical Datum Plane (EDP). The EDP is defined as the horizontal plane that is 2’ the highest water level during normal conditions. Along the great lakes this plane is considered as 2’ above the record high static water level of the associated lake. The record high static water level of Lake Superior is 603.38’ (IGLD 85) which occurred in October of 1985. Therefore the EDP adjacent to Lake Superior would be at elevation 605.38’. The electrical receptacles at Eagle Harbor are installed 12’ above the deck but are at an elevation of 605.00’, meaning that they are at least 4’ below the required minimum elevation. The electrical connections supplying these receptacles are located below them at a lower elevation and would likely not be in compliance either.
- The main marina feeder conductors, at minimum, must have ground-fault protection not exceeding 100 mA per NEC 555.3. This requirement has become more prominent lately due to increased awareness of the phenomenon of electrical shock drowning which can occur if stray current from vessels is leaking into the water and a person enters the water body in that vicinity and becomes temporarily paralyzed from the current passing through their body. No such ground fault system was observed at Eagle Harbor, this system should be incorporated as part of any improvements to the facility.

The potable water system at Eagle Harbor consists of a well pump and pressure tank inside the harbormaster’s building that feeds the bathrooms, utility room, and the marina water services. The well is installed to a depth of 44’ with a 6’ well screen for a total depth of 50’ from the buildings finished floor.
The underground piping to the marina is 2" galvanized steel piping that runs out from the building and along the back of the sidewalk. Individual water services are ¾" galvanized steel pipe that run from the 2" main to each of the concrete utility abutments. At the abutments, water is distributed via twin hose bibs. The existing well was tested for capacity and recovery while the water supply itself was tested for water quality. The well was pumped at a rate of 15 gpm (roughly equivalent to 2 showers and 1 hose bib running constantly) for a duration of 60 minutes. After 60 minutes the well had a drawdown of 29.68’. The pump has then shut off, allowing the well to recharge on its own. After another 60 minute duration, the well recovered a distance of 27.77’ for a recovery ratio of nearly 1:1. This well should have the capacity serve the current or similar demand of the facility. One water sample was taken from the pressure and tested for bacteria content. This sample was tested using the Modified Colitag method and produced negative results for the presence of coliforms and E. coli, meaning no bacteria was detected. A second sample was collected from the tank and sent to the MDEQ Drinking Water Laboratory for testing. This testing indicated that the water has high chloride, fluoride, hardness, Iron, Sodium, and Sulfate levels. A water softener and filtration system should be considered as part of any improvements to the potable water system to improve water quality and taste. The potable water testing results are included in the appendix.

The existing sanitary system was installed as part of the 1967 improvements and consists of building drains that connect to a sanitary manhole located behind the harbormaster’s building. A decommissioned sanitary pump-out system existing on eastern side of the marina and also connects to this first sanitary manhole. From here the sanitary system runs north across the driveway, via a 4” cast iron pipe, to a second manhole located in the central turf area. This second manhole then connects to an adjacent concrete septic tank. The septic tank is connected to a 100’x36’ drain field to the north. In 1990 a 40’x40’ air monitoring station was constructed on top of the drain field and is surrounded by 6’ chain link fencing. This station is required to have a maintained gravel footprint per their special use permit, however, thick vegetation covered the entire fenced in area when observed in September 2017. The construction of the air monitoring station along with the presence of thick vegetation directly on top of the drain field prompted for soil borings to be performed throughout the site in order to evaluate the best location for a replacement drain field. The site was reviewed with the Western Upper Peninsula Health Department for possible drain field locations and 5 possible locations within the center turf area were selected for testing boring due to the Departments 100’ offset from water bodies and water well requirements. The test boring locations are shown below in Figure 3 while the entire evaluation report is included in the appendix.
All test borings were performed by using a 3 ¾” hollow stem hand auger. Due to the historical nature of the project site, the allowable boring methods were reviewed with the State Historic Preservation Office (SHPO) prior to implementation. SHPO indicated that soils exploration through augur methods would be permissible at the site without being preceded by a Phase 1 Archeological Survey while exploration by means of backhoe-dug test pits would need to be preceded by a Phase 1 Survey in order to ensure they were not disrupting a historically significant area. Therefore, soil maps were reviewed and it was decided to attempt the borings via the hand auger method first and if the ground conditions were not conducive to this method then the Phase 1 Survey would be performed and exploration would then be done with the test pit method. The exploration revealed that the water table ranges from 36-48” from existing grade. The soils on the western side of the site, Borings 1 & 2, had the highest absorption rate of the area tested. Due to the relatively shallow depth of the water table found at the site, the Department recommended that a raised system be considered as part of a replacement drain field design.

FACILITY ADA COMPLIANCE

The Department of Justice has published regulations for Titles II and III of the Americans with Disabilities Act of 1990 in the Federal Register with the most recent publication in 2010. The 2010 ADA Standards, set minimum requirements for newly designed and constructed or altered State and local government facilities, public accommodations, and commercial facilities to be readily accessible and usable by individuals with disabilities. Therefore, the existing State Harbor facilities were inspected for ADA compliance. According to record plans, the sheet pile wall was constructed in 1960 while the boater services building and other facility improvements came at a later date in 1967. Since the facility
was built before the most current 2010 ADA standards, several aspects of the facility were observed to be non-compliant. The major items that were determined to be non-compliant include:

- The sidewalk surrounding the boater services building is 30” wide, ADA 403.5.1 requires the clear width of all walking surface to be 36” at minimum.
- The boater services bathrooms don’t contain a 5’ turning radius or “T” in the room, ADA 304.3.1 requires the turning space to be 60” diameter minimum.
- The boater services bathrooms don’t contain an ADA stall, ADA 604.3.1 requires clearance within a stall to be 60” minimum (measured from the side wall) and 56” minimum (measured from the rear wall).
- The boater services restrooms have a large step into them, ADA 404.2.5 requires doorway thresholds to ½ inch maximum.
- The side slope of the concrete walk along the sheet pile wall is 1:27, ADA 403.3 requires that the cross slope of walking surfaces shall not be steeper than 1:48.
- The mirrors within the boater services bathrooms are roughly 48” above the finished floor elevation, ADA 603.3 requires mirrors to be 40” maximum above finished floor elevation.
- The boater services bathroom sinks have exposed pipes underneath of them, ADA 606.5 requires that water supply and drain pipes under lavatories and sinks shall be insulated or otherwise configured to protect against contact.
- The showers in the boater services restroom do not meet the spacing requirements and have no grab bars, ADA 608.2.1 requires 36” wide minimum entry on the face of the shower compartment. Clearances of 36 inches wide minimum by 48 inches long minimum shall be provided. ADA 608.3.1 requires that in transfer type showers, grab bars shall be provided across the control wall and back wall to a point 18” from the control wall.
- The existing concrete utility pedestals have water valves and electrical outlets that are 12” from the ground, ADA 308.3.1 requires the low side reach to be 15” minimum above finish floor or ground.
- The existing steel sheet piling cap sits above the concrete sidewalk roughly 1”, ADA 303.2 requires changes in level to be ¼” high maximum.
- Twist handles were found within the existing building and on the water valves on the utility pedestals, ADA 309.4 requires operable parts to be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist.
- There is no ADA compliant route from the facility parking lot to the boater services building or the marina dock.

In review of the harbor facility, it is recommended that the ADA non-compliant site amenities are upgraded as part of any future facility improvements.

HAZARDOUS MATERIAL TESTING

The existing site facilities were tested to determine if any hazardous materials are present. The testing performed was focused on the boater services building, where the concern was materials containing lead and asbestos. The 1967 boater service building has a concrete slab foundation and concrete block walls. The roof cover is made of asphalt singles that were newly installed in 2014. The exterior walls are painted white, while the exterior doors, window trims, and wooden fascia are all painted forest
Within the interior of the building, there is tan floor paint and white wall paint. Caulking was found around the exterior doors. The attic floor and adjacent timber truss structures appeared to be coated with black tar and did not contain insulation. The aforementioned materials were all tested for lead-based paint and asbestos which was found within some areas of the building. The forest green exterior paint that is present on the doors, window trims, and timber fascia all tested positive for lead-based paint. Paint chip samples were tested on a percent weight basis meaning that if the substance contains > 0.5% lead per weight of the sample, the lead levels are great enough that precautions should be taken when disturbing or maintaining the substance. Results for the green exterior paint showed a lead content of 1.6% by weight which is greater than the 0.5% by standard set by the federal government. Based upon results and recommendations from the hazardous materials report, appropriate PPE should be worn by anyone performing renovations or disturbing the forest green exterior paint or caulking. Because the caulking is non-friable, meaning that it can’t be crushed, crumbled, or pulverized by hand pressure, it is generally less of a concern, however, precautions should still be taken if this material is to be disturbed. For more information regarding what samples were collected and tested and testing results, please see the hazardous materials report that is included in Appendix B.

HARBOR UPGRADES FEASIBILITY

PERMITTING AND APPROVALS

Septic System – A new septic system would need a permit from the local health department who were involved with the soils exploration activities and have made recommendations regarding field type and location.

Removal of fuel tank – The removal of the fuel tank would be a permitted activity and the demolition contractor shall comply with all State and Federal regulations for hazardous waste disposal.

Building Renovation – A building permit will be required for renovations/upgrades to the building. Specific permits will be required for any plumbing and electrical work.

Marina Improvements – Any dredging would require an MDEQ/USACE joint permit. New timber fendering would likely also need authorization from the agencies depending on its design and location.

DESIGN CONSIDERATIONS

Harbor Master Building and Site – Sidewalks need to be updated to provide accessible routes and equipment access. It is recommended that the sidewalks around the building and site be increased to 4' in width to provide ample space for accessible routes. Building renovations would require a remodel of the bathrooms. Site work would require replacement of the
concrete to achieve require clear widths and slopes. New doors, windows, and siding over the existing block could be added to make the building more weathertight and improve architectural aesthetics. Any future improvements to the existing building should be verified with the MSHPO to ensure the building is not a designated historic structure. Additional parking areas can be considered to accommodate daily use vehicles and trailers as well as seasonally stored boats and trailers. The existing electrical system is not sized to properly supply an upgraded marine electrical system with capacities to meet current demand. The existing pole transformer is a 100 kVA unit per U.P. Power Company’s records. The record plans indicate that the existing building electrical supply is one-set of #3/0 conductors. In order to supply the proposed marina electrical upgrades, building heat, bathrooms, well pump, lighting, proposed grinder pump, and other miscellaneous electric demand the supply would need to be replaced. This new supply would need to be two-sets of #3/0 conductors, or similar, given the preliminary demand understood as part of this study. This new supply will require a buried conduit, 2-1/2” min., connecting the building to the existing pole-mounted transformer to accommodate the new conductors and ultimately to allow the local utility to reconnect to their transformer. The existing transformer is of adequate size to supply this new feed. As part of this electrical system upgrade, we recommend that the existing panel in the building be replaced with a 250A main panel that includes shunt-trip type breakers for each of the marina feeds.

**New Septic System** – A new septic field will need to be 4,000 square feet in area, based on the location west of the existing field, and would have dimensions of 40’ x 100’ and shall have a 1,000 gallon septic tank and a 1,000 gallon dosing tank. The field will need to be a raised field and will need to above the water table. These results are based on application rate of 0.5 gallon per square foot, which will require an absorption area of 4,040 square feet. The absorption area would consist of a trench system design. Using a configuration of a 3 ft wide trench with a total of 24 inches of 6-A washed stone in the trench and two foot of distance between trenches the system will require 808 linear feet of trench.

The trench system will require a solid 4-inch diameter header. The ends of the trenches must be capped. The maximum length is 100 feet. A minimum of 12 inches and a maximum of 24 inches of cover will be required over each trench.

The system described above is designed to allow a future pumpout system to be added to the site. We are anticipating three transient slips each pumping out up to 40 gallons per day. It is assumed seasonal slips will use the bathroom and shower facilities for design purposes.

Both the septic tank and the dosing tank would be located outside of the Harbor Master Building. The gravity flow of the sanitary sewer flow would leave the building and enter the tank system and would be pumped from the dosing tank to the raised septic field through a force main. The power for the pump system would be connected to the electric panel in the Harbor Master Building.

**Marina Upgrades:**

*Fire suppression* – Fire pedestals could be installed on the walkway at 150’ or less intervals, with each pedestal having a life ring and a fire extinguisher. A water intake system for the local fire department should be considered as part of any improvements.
Utility Pedestals - Modern, code-compliant, utility pedestals should be installed to service both the transient and the seasonal boats along the walkway. In order to meet the demands of modern vessels and anticipated users, each pedestal can contain 30A and 50A shore power receptacles on each side to supply two vessels at a time. Each pedestal would be connected to the building on its own electrical circuit. These pedestals would have NEC compliant electrical connections and breakers, ADA compliant potable water controls, and be protected by a ground fault monitoring system located in the harbormaster’s building. The monitoring system is a safety measure to combat electric shock drowning (ESD) which can occur when an undetected stray current leaks into the adjacent waterbody. The monitoring system is designed to detect and automatically shut down the marina electrical supply when a potentially dangerous stray current is present. The system would be comprised of two parts, the first being GFCI type breakers located in the marina pedestals and the second being a ground fault monitor inside the building. The GFCI breakers would be connected to each individual receptacle and would trip at a level of 30mA while the monitor would be connected to each pedestal as a whole and would trip if the all the receptacles on that pedestal were leaking a cumulative 100mA or more. In the event the breakers trip, they can be reset by users at the pedestals while the monitor would not allow the entire pedestal (circuit) to function until the stray current was no longer present which would require marina staff to identify the source and reset the marina electrical system. This should be considered as part of any future facility improvements at Eagle Harbor, which is understood to be operated by DNR staff remotely from Copper Harbor (approximately 14 miles away). The upgrades to the existing marina electrical system may result in a greater demand on DNR staff to operate the facility following a significant (100mA or greater) stray current leak but would reduce the chances of an ESD incident at the harbor. The various breaker and ground fault trip levels along with the proposed wiring method should be re-evaluated and confirmed during Phase 500 Final Design to ensure that both current NEC codes and MDNR operational preferences are met at the time construction occurs.

Concrete Promenade – The existing concrete walkway could be replaced at the same time as utility replacement to minimize impact and achieve multiples levels of compliance. Concrete could encapsulate existing steel sheeting cap in order to increase its functional life. It is recommended that any future improvements to the existing marina facility should consider an 8’ wide new concrete walkway to provide an adequate upland fairway along the broadside mooring area.

Moorings/Fendering – Improvements are recommended along the edge of the walkway. Appropriately sized cleats could be installed at the edge of the walkway to accommodate the transient and the seasonal boats. Wood fendering could be installed along the face of the sheet piling to create a better surface for boat’s buoys to press against when they are moored in the marina.

Pump Out – The existing pump out system does not work properly and can be removed. At this time, it is recommended that a new system is not installed; however, if in the future if the decision is made to add a pump out system, the septic field and tanks are sized appropriately to accommodate this flow.
**Fuel System** – The existing fuel system should be removed and properly disposed of per Federal and State requirements.

**Boat Launch & Site Layout** – The boat launch is in good shape and we do not see any need for improvements to this item. The overall site layout will remain the same; however, we would plan on adding either a split rail fence or large rocks to protect the perimeter of the proposed septic field.

### CONCEPT ALTERNATIVES & COST ESTIMATION

**CONCEPT ALTERNATIVES**

Using the design considerations listed previously herein, the following concepts improvement plans were created. There is significant overlap in each of the concepts with respect to the facility improvements as many of the core improvements remain constant. In each case, the recommended approach would be to remove the existing fuel tank and pumpout, replace the existing septic field with a new raised drain field, implement new gravel parking areas to improve site flow, replace and add new concrete sidewalks, make upgrades to the existing building, marina fendering, marina utilities, and provide additional armor stone in areas that are acceptable to scour. Each concept suggests a different site layout with adequate parking areas for vehicles, vehicles with boat trailers, and long term parking for boat trailers.
Concept B
These concepts were reviewed with DNR staff and ultimately the most desirable attributes of each were combined into a preferred concept.
The preferred concept proposes to significantly reconfigure and add space to the marina car parking area and the boat trailer parking area to help reduce congestion and the undesignated parking of boat trailers. The existing gravel access drive would be improved throughout the site in addition to introducing the boat trailer parking area. Additional sidewalks are proposed in the preferred concept to connect both the parking area with the marina facilities and the adjacent museum. The existing sidewalks would be replaced with new concrete walkways along the seawall and around the existing marina building to achieve ADA compliance for accessible routes. New marina utilities are proposed which could be installed during replacement of the existing concrete walkways. Existing electrical panels in the building would be replaced to combine existing circuits and meet new demand. The preferred concept includes the implementation of new timber fendering along the entire length of the broadside dock. A new septic system would be implemented which includes the installation of a raised septic field with necessary storage tanks, dosage tanks, and plumbing. It is also recommended that supplemental armor stone be placed along the western side of the timber crib and concrete dock to protect this structure from anticipated wind and wave energies. All improvements would be designed to meet current standards. In addition to overall site improvements, the preferred concept includes interior and exterior renovations to the existing boater services building, which is depicted in schematic building plan seen in figure 7.
Recommended interior renovations include designation of the existing gender labeled bathrooms as two unisex bathrooms with proper ADA compliant fixtures. The existing office space in the building would also be converted into a boater lounge area to give boaters a refuge during inclement weather. It is anticipated that the existing mechanical room will have adequate space to accommodate a new water softening system. Interior renovations for each restroom to accomplish ADA Barrier Free Compliance are as follows:

- New 48” wide sidewalk designed to accommodate the ½” threshold height at the door and the cross slope required to slope away from the building (ADA requires 36” minimum for accessible routes, however due to the building proximity, 48” is recommended)
- Restroom doors at 36” wide, require flipping the hinge to the outside wall for latch side clearance and ADA compliant hardware
- Fixtures include a single toilet with 60” x 60” clearance, roll in shower with 30” x 60” clearance, vanity sink with 30” x 48” clearance and open knee space
- Include a 60” diameter turning circle in the room
- Grab bars at toilet and shower to be in compliance
- Shower curtain, hand held shower head and folding seat included in each shower
- Vanity sink in a counter top for guest use with a 24” wide lockable base cabinet under for paper and cleaning storage items. Sink hardware to be ADA compliant
- Mirrors would be installed at ADA heights
- Transfer shower is an option for one restroom. One roll in shower is required
- A drinking fountain is required, but can be outside the building

Exterior renovations include the replacement of all doors and windows on the building and refinishing the exterior with a resilient exterior coating.
CONCLUDING SUMMARY

The goal of this study is to assess the existing conditions of Eagle Harbor State Harbor to identify the upgrades that are necessary to meet current standards. The property has a long maritime history as it was originally established as a U.S. Life-Saving Service Station and operated as such from 1912-1915, when it was then operated as a U.S. Coast Guard Station from 1915-1950. According to record plans, the steel sheet pile wall was constructed in 1960 whereas the upland site infrastructure elements were introduced in 1967. The upland improvements included the installation of a potable water system, electrical system, an independent sanitary sewer system, and the harbor master building. In 1976, a new, larger boat launch ramp was established and the parking lot was expanded to accommodate demand at that time. Maintenance dredging was conducted within the harbor in 2004 to restore the area to original project depths of LWD-6.0' along the seawall and LWD-8.0' throughout the remainder of the navigation channel. There have been no major improvements to the upland elements of the facility since 1976.

The site was subject to several investigation measures that were conducted to obtain existing conditions information on the site. Information from each site investigation was used to determine the level of upgrades that are necessary. A topographic survey was conducted to understand elevations and to locate different key elements throughout the site. Much of the topography on the southern half of the property is relatively flat with minimal contour change. The northern part of the property is densely
wooded with some moderate grade changes, however the northern shoreline of the property is primarily exposed rock outcroppings that meet the water’s edge. A boundary survey was performed to locate the eastern property boundary. One property iron was recovered intact at the north end of the property line along with one section corner monument and a meander corner monument, which were all used to help re-establish the southeastern property corner. An iron was set at the southern point of the eastern property line and another iron was set just north of the eagle harbor entrance drive on the property line. It appears that the adjacent property owner on the south side on the entrance drive is occupying a portion of the DNR property with what appear to be stored building materials. As part of the site survey, a bathymetric survey was performed to determine water depths throughout the existing marina basin and navigation channel. Upon comparing the bathymetric survey elevations found throughout the marina basin and navigation channel with current and historic USACE water level information, depths are understood to be adequate and no dredging is recommended. Areas of shoaling where recorded at the two ends of the existing steel sheet piling seawall but are not anticipated to hinder vessel navigation at this time. These areas should be inspected annually for additional accumulation of bed material. Inspection of the existing steel sheet pile seawall was conducted visually and with an underwater video. In addition to visual inspection, an ultrasonic thickness gauge was used to measure the wall thickness for comparison with the record drawings. The wall appears to be in good condition. All tie rod connections where observed to be intact at the wall surface and no areas of advanced corrosion were observed. No irregular areas of deflection or leaning were observed along the wall. The timber fendering was in place along the southeastern portion of the marina but was missing from the entire west side. As part of the preferred concept, it is recommended that the existing timber fendering is removed and new fendering is installed to be uniform and continuous. The seawall cap appears to be corroded in spots and should be replaced during future improvements, which could be incorporated into the proposed new concrete promenade. The seawall toe was inspected through underwater video and no areas of localized scour were observed. Due to the age of the structure, it is recommended that the seawall is inspected every 3-5 years for areas of advanced deterioration or irregularities. The seawall and its anchorage system should be further inspected during excavations as part of potential future improvements.

The existing site utilities are outdated and in need of replacement in order to meet current standards. The marina electrical system does not meet current NEC or ADA standards and should be replaced to achieve compliance. New utility pedestals with lights are included as part of the preferred concept plan. The existing sidewalks around the building and seawall are currently not ADA compliant and should be replaced as part of future site improvements. It is recommended that the promenade sidewalk should be at least 8’ wide and the sidewalk around the building should be 4’ to both achieve the minimum ADA requirement and provide additional width for comfort as decided by the project team. Accessible routes have also been proposed throughout the site to connect the parking area to the marina building and the adjacent museum. The existing potable water supply was tested for functionality via draw down test which resulted in sufficient recovery for the facility’s estimated water demand. Water quality test results showed that the water contains no bacteria and is safe to drink, although hardness was detected. The preferred concept plan includes implementation of a water softening and filtration system that would be installed in the existing building mechanical room. The existing fueling system has been abandoned and it is recommended to remove and dispose of the tanks and any other associated mechanical items. The existing pumpout is no longer in use and should be removed and disposed of
also. The preferred concept suggests that each system would be removed and disposed of. Based on record information, the air quality monitoring station has been placed right on top of the existing drain field which is thought to hinder the drain field's performance along with the system's close proximity to the water table. The preferred concept plan includes the installation of a new raised septic field. It should be noted that although not included in the preferred concept plan, if future improvements included a pumpout facility, the proposed septic field is sized to accommodate for the increased load.

The existing building is in need of renovation to meet current standards. The preferred concept includes building renovations that include the replacement of all doors and windows, refinishing the building exterior, and remodel the interior of the bathrooms and office area. Please see the schematic design plan that has been developed to highlight renovation measures that are recommended for the existing building. Two unisex bathrooms are recommended with ADA compliant routes and fixtures, along with the creation of small boater lounge area where the existing harbor master's office is located. The building schematic includes a water softening system that would go in the existing mechanical room.

The boat launch ramp appears to be in good condition and no improvements are suggested at this time. Additional parking and reconfiguration of the existing parking layout is included in the preferred concept plan to accommodate the boat launch users. There are currently users who use the lawn space as an overflow or long term trailer parking area, however the preferred concept plan is intended to reduce congestion and a flow for more organized parking.

Upon conducting the necessary field investigations and analyzing the collected results and data through the lengths of this study, it has been determined that site improvements are necessary to bring the site up to date with current standards and to increase the functionality of the site.
Appendix I:
Existing Conditions Survey Exhibit
Appendix II:
Preferred Concept & Cost Estimate
NOTES:
EXISTING WALLS, ROOF, CEILINGS AND FOUNDATIONS TO REMAIN
REMOVE ALL WINDOWS AND DOORS
REMOVE AND PROPERLY DISPOSE OF ALL LEAD PAINT AND ASBESTOS
CONTAINING CAULK AT WINDOWS AND DOORS AND ELSEWHERE

TWO RESTROOMS:
REMOVE ALL PLUMBING FIXTURES, FAUCETS AND PARTITIONS IN RESTROOMS
REMOVE SHOWER AND ALL SHOWER RELATED ACCESSORIES
REMOVE INTERIOR LIGHTING FIXTURES
REVIEW AND REPAIR OR REPLACE ALL FANS, RECEPTACLES AND SWITCHES

INSTALL NEW DOORS AND WINDOWS IN EXISTING OPENINGS PER SPECIFICATION
RENOVATE TOILET ROOMS PER PROPOSED FLOOR PLAN:
ACHIEVE ADA COMPLIANCE FOR ALL FIXTURES AND DOOR CLEARANCES
ABANDON AND CAP ALL UNUSED PLUMBING
PATCH AND REPAIR WALLS, CEILING AND FLOOR AS NEEDED
INSTALL NEW EPOXY FLOOR COATING IN ENTIRE ROOM (AFTER ALTERING SHOWER FLOOR)
PAIN ALL WALLS AND CEILING
INSTALL NEW 48" x 30" 2 LAW OR METAL SHOWER PARTITION
RENOVATE FLOOR AT SHOWER FOR ZERO CURB AND SLOPE TO DRAIN
INSTALL NEW SHOWER GRAB BARS AND CONTROLS w/MOUNTED HANDHELD SHOWER HEAD
INSTALL NEW 60" x 24" CORIAN VANITY TOP w/INTEGRAL SINK & BACKSPPL.
INSTALL NEW 30" WIDE CABINET UNDER NEW VANITY
INSTALL NEW ADA COMPLIANT TOILET, GRAB BARS AND ACCESSORIES
REPLACE ALL LIGHTING FIXTURES WITH LED FIXTURES

LOUNGE AND MECHANICAL ROOMS:
REMOVE ALL OLD PAINT, PATCH AND REPAIR ALL WALLS AND FLOOR
NEW PAINT ON ALL WALLS AND CEILING
INSTALL PROPOSED EPOXY FLOOR COATING
REMOVE AND REPLACE SINK w/JANITORIAL FLOOR SINK
INSTALL NEW WATER SOFTENER/FILTER UNIT
CONSIDER REPLACING THE WATER HEATER

INSTALL NEW METAL DOORS AND FRAMES IN ALL OPENINGS
INSTALL NEW ALUMINUM WINDOWS AND FRAMES IN ALL OPENINGS

EXTERIOR WALLS:
PATCH AND REPAIR ROOF, ALL WALLS, SOFFIT AND FASCIA AS NEEDED
SCRAP AND REMOVE ALL LOOSE PAINT
NEW PAINT ON ALL EXTERIOR WALLS, SILLS AND SURFACES

EXTERIOR ALTERNATE:
ALTERNATE 1: INSTALL NEW COMMERCIAL GRADE VINYL SIDING ON NEW FURRING ON EXISTING EXTERIOR CMU INCLUDING DOOR AND WINDOW EXTENSION JAMBS, TRIM, VENTED SOFFIT AND FASCIA ON ENTIRE BUILDING

SITE:
REMOVE CONCRETE WALK AROUND THE BUILDING. REPLACE WITH NEW CONCRETE AT 42" MINIMUM WIDTH AND SLOPED TO ACCOMMODATE ADA THRESHOLD AT ALL EXTERIOR DOORS.

THIS PLAN IS SCHEMATIC AND NOT TO BE USED FOR CONSTRUCTION
Eagle Harbor Ph. 100 Study - Concept Cost Estimate

Preferred Concept Plan

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Qty</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Notes</th>
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<td>Mobilization and General Conditions</td>
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<td>LS</td>
<td>$20,000.00</td>
<td>$20,000.00</td>
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<td>2</td>
<td>Demolition and Removals</td>
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<td>$5,000.00</td>
<td>Includes existing sidewalks and marina utilities</td>
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<td>Site and Turf Restoration</td>
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<td>SF</td>
<td>$3.00</td>
<td>$15,423.00</td>
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<td>$5,000.00</td>
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<td>$40,000.00</td>
<td>$40,000.00</td>
<td>Includes new 100'x40' drain field, 1,000 gallon septic tank, and 1,000 gallon dosing tank</td>
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<td>Concrete Sidewalk</td>
<td>6,200</td>
<td>SF</td>
<td>$12.00</td>
<td>$74,400.00</td>
<td>5' wide sidewalks and 8' promenade along seawall</td>
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<td>Building Upgrades</td>
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<td>LS</td>
<td>$45,000.00</td>
<td>$45,000.00</td>
<td>Bathroom upgrades, siding veneer, new doors &amp; windows</td>
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<tr>
<td>9</td>
<td>Building Electrical</td>
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<td>$15,000.00</td>
<td>$15,000.00</td>
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<td>10</td>
<td>Marina Fendering</td>
<td>260</td>
<td>LF</td>
<td>$250.00</td>
<td>$65,000.00</td>
<td>Timber fending system and ladders along seawall for mooring</td>
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<td>11</td>
<td>Supplemental Armor Stone</td>
<td>85</td>
<td>LF</td>
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<td>$21,250.00</td>
<td>Additional 200 Tons armor stone on western edge, assumes landside access</td>
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<td>Marina Utilities</td>
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<td>LS</td>
<td>$45,000.00</td>
<td>$45,000.00</td>
<td>Includes new electrical and potable water system connected to existing building, 3 pedestals with 30A &amp; 50A power</td>
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<td>13</td>
<td>Water Softening System</td>
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<td>$2,500.00</td>
<td>$2,500.00</td>
<td>in mechanical room</td>
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<td>LS</td>
<td>$12,000.00</td>
<td>$12,000.00</td>
<td>new wall coverings, basic furnishings, kitchenette</td>
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Notes:
1. This estimate is conceptual and is furnished for comparative analysis only
2. Utility estimates assume connections by Service Provider

Project Subtotal $403,103.00

Design, Permitting, and Contingency (20%) $80,620.60

Total Estimate $483,723.60
Appendix III:

Soil Boring and Analysis
December 7, 2017

Coleman Engineering Company
Mr. Mike Foley
635 Circle Drive
Iron Mountain, MI 49801

Re: Soil Evaluation
   Eagle Harbor State Marina
   Keweenaw County, Eagle Harbor Township
   T58N, R30W, Section 5

Dear Mr. Foley:

Enclosed are the soil evaluation results for the above referenced property evaluated on November 30, 2017.

If you have any questions or comments, please do not hesitate to contact this office at (906) 482-7382 x124, between 8:00 am and 4:00 pm, Monday through Friday.

Sincerely,

[Signature]
Glen Anderson, REHS
Environmental Health Sanitarian

Encl.: Site Evaluation Report Form
SITE EVALUATION REPORT FORM

Name: MDNR Eagle Harbor State Marina
Applicant Mailing Address:
Mr. Mike Foley
Coleman Engineering Company
635 Circle Drive

Subject Property Location
County: Keweenaw Township: Eagle Harbor
Section #: 5 Township #: 58 Range #: 30

City/State/Zip Code:
Iron Mountain, MI 49801

Additional Property Information: Michigamme End of Marina Road

Home Phone: (906) 364-3443
Work Phone:

RESULTS OF SEWAGE SYSTEM SITE EVALUATION

☒ New Construction ☐ Replacement/Repair
Intended Use: Residential/Number of Bedrooms
☐ Public or Commercial System Public Marina

☐ Proposed Site Suitable ☐ Proposed Site Unsuitable
☐ Proposed Site Suitable With Special Restrictions
☒ Further Information Required (Refer to Comments)

Absorption Bed Area (aggregate area): _____Ft² Per Bedroom ______Ft² Total
Minimum Fill Sand Requirement:

Additional/Design/Considerations:
Attached is the soil description for the onsite evaluation done with a hand auger on November 30, 2017. In general the site has sandy soils with a seasonal water table within 48 inches of the original grade. The attached soil data can be used to design a sewage system based on the amount of water usage for the MDNR Eagle Harbor State Marina.

For sewage system design you would want to review the following:
• Michigan Criteria for Subsurface Sewage Disposal
• Michigan Criteria for on-Site Wastewater Treatment
• Test Holes 1 & 2 application rate .5 Gallon/sq. ft. raised bed, Test Holes 3 - 5 application rate .375 Gallon/sq. ft. raised bed

SOIL DESCRIPTION REPORT

Test Hole #: 1 ☐ Backhoe Cut ☒ Auger Boring

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<thead>
<tr>
<th>Depth (in.)</th>
<th>Soil Description</th>
<th>Roots</th>
<th>Mottles</th>
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<tbody>
<tr>
<td>0-4</td>
<td>Dark brown, loamy sand</td>
<td>Yes</td>
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<tr>
<td>4-36</td>
<td>Beige, fine sand</td>
<td>Yes</td>
<td></td>
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<td>36-40</td>
<td>Beige, fine sand, wet texture</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>40-46</td>
<td>Dark brown, saturated, silty very fine sand</td>
<td>Yes</td>
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Limiting Layer: Unsuitable Soils Encountered At: 36" Water Table Encountered: ☒ Y ☐ N Encountered At: 36" ☐ Well Site Evaluation on Reverse Side
### Test Hole 2
- **Backhoe Cut**: No
- **Auger Boring**: Yes

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<th>Soil Description</th>
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<tr>
<td>0-5</td>
<td>Dark brown, loamy sand</td>
<td></td>
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</tr>
<tr>
<td>5-39</td>
<td>Beige, fine sand</td>
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<tr>
<td>39-47</td>
<td>Beige, fine sand, wet texture</td>
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**Limiting Layer**: Unsuitable Soils Encountered At: 39"

**Water Table Encountered**: No

### Test Hole 3
- **Backhoe Cut**: No
- **Auger Boring**: Yes

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<td>Dark brown, very fine sandy loam</td>
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<td>5-20</td>
<td>Brown, loamy sand</td>
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<td>20-26</td>
<td>Brown, fine sand</td>
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<td>26-28</td>
<td>Dark brown, firm, loamy sand</td>
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<td>28-36</td>
<td>Brown, fine sand</td>
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<td>36-44</td>
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<tr>
<td>44-47</td>
<td>Gravelly medium saturated medium sand</td>
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**Limiting Layer**: Unsuitable Soils Encountered At: 36"

**Water Table Encountered**: Yes

### Test Hole 4
- **Backhoe Cut**: No
- **Auger Boring**: Yes

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<th>Soil Description</th>
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<tbody>
<tr>
<td>0-7</td>
<td>Dark brown, very fine sandy loam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-32</td>
<td>Beige, fine sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32-36</td>
<td>Brown, loamy sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36-39</td>
<td>Brown, loamy sand, mixed with black coal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39-46</td>
<td>Brown, fine sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46-48</td>
<td>Dark brown, gravelly, fine sand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Limiting Layer**: Unsuitable Soils Encountered At: 46"

**Water Table Encountered**: Yes
(SOIL DESCRIPTION CONTINUED)

Test Hole #: 5

<table>
<thead>
<tr>
<th>Depth (in.)</th>
<th>Soil Description</th>
<th>Roots</th>
<th>Mottles</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6</td>
<td>Dark brown, very sandy loam</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>6-29</td>
<td>Brown, loamy sand</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>29-33</td>
<td>Dark brown, loamy sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33-38</td>
<td>Brown, gravelly, fine sand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Limiting Layer: Auger refusal Encountered At: 38"

Water Table Encountered: Y  N  Encountered At: Na

WELL SITE EVALUATION

Well Site Approved: Yes  No  NA  Variance Required

Required

<table>
<thead>
<tr>
<th>Contaminant Isolation</th>
<th>75+ feet from absorption system</th>
<th>75+ feet from septic tank</th>
<th>75+ feet from sewer line</th>
<th>75+ feet from privy</th>
<th>800+ feet from fuel tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing buildings</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nearby roads or driveways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nearby property lines?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead or buried utility lines?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will trees or other obstructions interfere with drill rig setup?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site topography allows for access for drill rig?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well accessible for maintenance (after development)?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing wells on site?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, will existing wells be kept in service?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well abandonment required?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed well location approved?</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

☐ Replacement Area is available and the location is shown on the site diagram.
☐ There is no replacement area available on site.

Permit(s) can be issued once the completed application forms and fees are submitted and approved. Provide a detailed sewage system design and site map indicating isolation distances to surface water, on-site wells, neighboring wells, property lines, subsoil drains, foundation walls, etc. Ensure all minimum isolation distance requirements set forth in the "Michigan Criteria for Subsurface Sewage Disposal" are maintained. Application forms and informational materials are attached.

SITE APPROVED ☑ SITE NOT APPROVED ☐

Reported By: [Signature] Date: 12-7-2017 (valid for 1 year from date)

THIS IS NOT A PERMIT
Appendix IV:
Well Testing Report
### PUMP TEST DATA SHEET

**Application:**  
**Permit:** 6 **Certificate:**  
**Pod Id:**

All water-level measurements must either be in feet and inches, or feet and decimal fractions.

#### Drawdown Data

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Time Since Pump Started (minutes)</th>
<th>Depth to Water Below Measuring Pt</th>
<th>Depth to Land Surface</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-8-17</td>
<td>10:46</td>
<td>9.58</td>
<td>15</td>
<td>15</td>
<td>Start Pump</td>
</tr>
<tr>
<td></td>
<td>10:46</td>
<td>6</td>
<td>19.25</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:47</td>
<td>7</td>
<td>22.28</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:48</td>
<td>8</td>
<td>23.62</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:49</td>
<td>9</td>
<td>25.3</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:50</td>
<td>10</td>
<td>25.5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10:55</td>
<td>15</td>
<td>29.11</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:00</td>
<td>20</td>
<td>31.5</td>
<td>16.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:05</td>
<td>25</td>
<td>33.24</td>
<td>16.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:10</td>
<td>30</td>
<td>34.94</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:15</td>
<td>35</td>
<td>35.98</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:20</td>
<td>40</td>
<td>37.6</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:25</td>
<td>45</td>
<td>37.52</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:30</td>
<td>50</td>
<td>38.12</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:35</td>
<td>55</td>
<td>39.53</td>
<td>14.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:40</td>
<td>60</td>
<td>40.16</td>
<td>14.5</td>
<td>1hr Pumped</td>
</tr>
</tbody>
</table>

#### Recovery Data

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Time Since Pump Stopped (minutes)</th>
<th>Depth to Water Below Measuring Pt</th>
<th>Depth to Land Surface</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-8-17</td>
<td>11:41</td>
<td>1</td>
<td>37.64</td>
<td>16.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:42</td>
<td>2</td>
<td>34.25</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:43</td>
<td>3</td>
<td>28.5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:44</td>
<td>4</td>
<td>25.6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:45</td>
<td>5</td>
<td>22.62</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:46</td>
<td>6</td>
<td>20.62</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:47</td>
<td>7</td>
<td>20.16</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:48</td>
<td>8</td>
<td>18.24</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:49</td>
<td>9</td>
<td>17.24</td>
<td>3</td>
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</tr>
<tr>
<td></td>
<td>11:50</td>
<td>10</td>
<td>15.94</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:51</td>
<td>11</td>
<td>13.84</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11:55</td>
<td>15</td>
<td>16.2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:00</td>
<td>20</td>
<td>13.64</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:05</td>
<td>25</td>
<td>12.64</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:10</td>
<td>30</td>
<td>11.64</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:15</td>
<td>35</td>
<td>10.64</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:20</td>
<td>40</td>
<td>9.54</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:25</td>
<td>45</td>
<td>8.54</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:30</td>
<td>50</td>
<td>7.54</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:35</td>
<td>55</td>
<td>6.54</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12:40</td>
<td>60</td>
<td>5.54</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Static Water Level:** 7.5

**Measurements taken @ casing top @ 2' above grade**

Additional forms can be obtained from our web site at: OWRD 2/9/2000

**Used:** EchoScientific Well Sounder  
**By:** Curt Larson  
Larson Pumpe LLC
**Official Laboratory Report**

**Report To:** CURT LARSON  
18132 2ND SAND BEACH RD  
LANE MI 49946

**System Name/Owner:** STATE OF MICH  
**Collection Address:** EAGLE HARBOR MARINA,  
**Collected By:** CURT  
**Township/Well#/Section:** D.N.R.//  
**County:** Keweenaw  
**Sample Point:** TANK DRAIN  
**Water System:** Other  

<table>
<thead>
<tr>
<th>Analyte Name</th>
<th>Result (mg/L)</th>
<th>Date Tested</th>
<th>RL (mg/L)</th>
<th>MCL/AL (mg/L)</th>
<th>Method</th>
<th>CAS #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride</td>
<td>1486</td>
<td>11/10/2017</td>
<td>4</td>
<td>SM 4500-CI E</td>
<td>7647-14-5</td>
<td></td>
</tr>
<tr>
<td>Fluoride</td>
<td>0.12</td>
<td>11/10/2017</td>
<td>0.1</td>
<td>4.0</td>
<td>SM 4500 FC</td>
<td>16984-48-8</td>
</tr>
<tr>
<td>Hardness as CaCO3</td>
<td>540</td>
<td>11/10/2017</td>
<td>20</td>
<td>SM 2340 C</td>
<td>HARD-00-C</td>
<td></td>
</tr>
<tr>
<td>Iron (automated)</td>
<td>0.5</td>
<td>11/10/2017</td>
<td>0.1</td>
<td>SM 3500 FeB</td>
<td>7439-89-6</td>
<td></td>
</tr>
<tr>
<td>Nitrate as N</td>
<td>Not Detected</td>
<td>11/10/2017</td>
<td>0.4</td>
<td>10</td>
<td>10-107-04-2-A</td>
<td>14797-55-8</td>
</tr>
</tbody>
</table>

Sample did not meet thermal preservation requirements for this analysis when received at the lab. Result(s) may not be accepted for compliance purposes.

Nitrate as N  
Not detected  
11/10/2017  
0.05  
1  
10-107-04-2-A  
14797-65-0

Sample did not meet thermal preservation requirements for this analysis when received at the lab. Result(s) may not be accepted for compliance purposes.

Sodium (automated)  
708  
11/10/2017  
5  
SM 3500 NaB  
7440-23-5

Sulfate  
54  
11/10/2017  
10  
SM 4500 SO4E  
14808-79-8

Sample did not meet thermal preservation requirements for this analysis when received at the lab. Result(s) may not be accepted for compliance purposes.

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

**Western Upper Peninsula District**  
540 Depot Street  
Hancock, MI 49930  
906 482-7382

---

**CAS#** : Chemical Abstract Service Registry Number  
**mg/L** : milligrams / Liter (ppm)  
**Laboratory Contact**: Scott Hayward

**MCL** : Maximum Contaminant Level  
**ppm** : parts per million  
**MPN** : Most Probable Number

**AL** : Action Level  
**CFU** : Colony Forming Unit  
**RL** : Reporting Limit

---

By authority of PA 368 of 1978 as amended  
**Work Order 71101560_01**  
**Report Created on:** 11/14/2017 11:55:38AM  
Page 1 of 1
<table>
<thead>
<tr>
<th>Sample Number</th>
<th>ID</th>
<th>Description</th>
<th>Date/Time Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>73119-001</td>
<td></td>
<td>18132 Second Sand Beach Rd, L’Anse MI 49946</td>
<td>Eagle HM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Flags</th>
<th>Units</th>
<th>Date/Time</th>
<th>Method</th>
<th>MDL</th>
<th>MQL</th>
<th>Analyst</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coliforms (dw)</td>
<td>Negative</td>
<td></td>
<td>per 100mL</td>
<td>11/9/2017 11:50</td>
<td>Modified Colitag</td>
<td>1</td>
<td>1</td>
<td>WS</td>
</tr>
<tr>
<td>E. coli</td>
<td>Negative</td>
<td></td>
<td>per 100mL</td>
<td>11/9/2017 11:50</td>
<td>Modified Colitag</td>
<td>1</td>
<td>1</td>
<td>WS</td>
</tr>
</tbody>
</table>

CERTIFICATION
I certify that the data contained in this Final Report has been generated and reviewed in accordance with approved methods and White Water Associates Standard Operating Procedures. Exceptions, if any, are discussed in the accompanying sample narrative. Release of this Final Report is authorized by White Water Associates management, as is verified by the following signature.

Approved By: Electronically signed by Bette J. Premo

NOTES
ND = not detected, MDL = method detection limit, MQL = method quantitation limit
ppm = mg/L (liquid) or mg/kg (solid), ppb = ug/L (liquid) or ug/kg (solid)
Negative = No coliform bacteria detected, Positive = Coliform bacteria detected
B The analyte was found in the associated blank as well as in the sample.
H Indicates analytical holding time exceedance.
J The quantitation is an estimated value because the result is less than the sample quantitation limit but greater than the detection limit.
M A matrix effect was present.
V Insufficient sample volume received (100 ml is required by MDEQ).
* RPD exceeds limits.

MI DEQ Certification Number: 9306
**CHAIN-OF-CUSTODY RECORD**

<table>
<thead>
<tr>
<th>CLIENT NAME / BILL TO</th>
<th>EMAIL ADDRESS</th>
<th>ADDRESS</th>
<th>CITY</th>
<th>STATE</th>
<th>ZIP</th>
<th>CONTRACT / PO / PROJECT NAME / WSSN#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larson Pump Co LLC</td>
<td><a href="mailto:larsencp11c@gmail.com">larsencp11c@gmail.com</a></td>
<td>18132 2nd and Bouchard</td>
<td>Luce</td>
<td>MI</td>
<td>49946</td>
<td>Eagle Harbor marine</td>
</tr>
</tbody>
</table>

**SAMPLER NAME (print first/last name):** Curt Carson

**COUNTY OF LOCATION:** Huron County

**SAMPLE ID AND LOCATION:** Containers for each sample may be combined on one line.

**SAMPLE MATRIX**: Drinking water

<table>
<thead>
<tr>
<th>CONTAINERS / PRESERVATIVES</th>
<th>Aqueous</th>
<th>Sed.</th>
<th>Soil</th>
<th>Other</th>
<th>Nitr.</th>
<th>H2SO4</th>
<th>HNO3</th>
<th>HCl</th>
<th>NaOH</th>
<th>ZnAc2NaOH</th>
<th>Na Thio</th>
<th>Total Number of Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAMPLE DATE AND TIME:** Eagle H.M. 11-8-17 10:40 AM

**RELINQUISHED BY:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Received by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS/SAMPLE TEMP. ON RECEIPT:** 15°C

**PACKING:** Ice

**REMARKS:** (Note any special instructions provided by client or conditions of receipt noted by WWA lab staff. Also note any residual chlorine.)

**ANALYSIS TYPE REQUESTED:**

- Instructions to White Water
  - Send my report by: ___email ___mail

  Unless otherwise noted, drinking water report copies are sent to MDDEQ and Health Dept.

**LABELS:** #3434 $7.00

**WHITE - RETURN W/ REPORT**

**CANARY - W/ SAMPLES**

**PINK - CUSTOMER**

**UPS □ FedEx □ USPS □ Client □ Other □**
Appendix V:

Hazardous Materials Report
January 22, 2018

Mr. Daryl Veldman  
Civil Engineer  
Edgewater Resources, LLC  
518 Broad Street, Suite 200  
St Joseph, Michigan 49085

Re: Lead-Based Paint and Asbestos Containing Material Inspection  
Eagle Harbor Marina Office Building  
Eagle Harbor, Michigan

Dear Mr. Veldman:

Coleman Engineering Company (CEC) appreciates the opportunity to provide Asbestos and Lead Inspection services regarding the above-referenced project. Commencing on November 30, 2017, CEC conducted inspections and a sampling program for suspected Asbestos Containing Material (ACM) and Lead-Based Paint (LBP) at the Eagle Harbor Marina Office Building. This correspondence package contains one (1) electronic copy of the report. If you would like additional copies or a different electronic format, please contact us.

Should you have any questions or concerns, please feel free to contact either me in our Ironwood office at (906) 932-5048 or Kevin Trevillian, Principal, in our Iron Mountain office at (906) 774-3440.

Sincerely,

COLEMAN ENGINEERING COMPANY

Michael G. Gotham  
Environmental Project Manager  
MI&MI State Licensed Asbestos Inspector #AII-239255

MGG/ras

Enclosure

F:\Data\1700017585 - Edgewater Resources - Eval Septic Field Locations\Lead & Asbestos Inspection\Report
POTENTIAL LEAD BASED PAINT AND ASBESTOS CONTAINING MATERIAL INSPECTIONS

FOR

EDGEMAR RESOURCES

EAGLE HARBOR MARINA OFFICE BUILDING

JANUARY 2018

Prepared By:

COLEMAN ENGINEERING COMPANY
200 E Ayer St.
Ironwood, Michigan 49938

CEC Project #EC-17585C

Prepared By: Mike Gotham, Environmental Scientist,
Michigan/Wisconsin State Licensed Asbestos Inspector# All-239255
Michigan/Wisconsin State Licensed Lead Sampling Tech# LST-239255

Signature:  
Date: 1/22/2018
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APPENDIX D – PHOTOGRAPHS

APPENDIX E – QUALIFICATIONS
1.0 INTRODUCTION

1.1 Background

Coleman Engineering Company (CEC) has been retained by Edgewater Resources, LLC to perform a limited inspection for potential Lead-Based Paint (LBP) and Asbestos Containing Material (ACM) on the Eagle Harbor Marina Office Building in Eagle Harbor, Michigan. The work was completed on November 30, 2017, for purposes of renovating the Marina Office Building to comply with American Disability Act (ADA) specifications. Project location and site maps are included in Appendix A.

1.2 Lead-Based Paint Information

Lead is a naturally occurring toxic heavy metal. Prior to 1978, lead was introduced in paints for color purposes and also to increase the durability and longevity of paint, especially as it applies to exterior surface coatings. Due to the toxicity of lead, the Consumer Products Safety Commission banned the sale of LBP for residential use in 1978. Federal standards define LBP as any paint or surface coating that withholds concentrations of lead equal to or greater than 1.0 milligram per square centimeter or more than 0.5 percent by weight of a paint chip sample. However, paints with lead concentrations below the aforementioned definition may still cause health problems. In fact, children under the age of 6 as well as the fetus of a pregnant woman are subject to high risk from exposures to low concentrations of lead. Health risks in children include damage to the nervous system and kidneys, learning disabilities (e.g., attention deficit disorder), decreased intelligence, as well as language and behavioral problems. In pregnant women, exposures of lead may lead to miscarriage, premature birth, brain damage, and low birth weight. Additionally, lead exposures to workers or other adults may result in elevated blood pressure, reproductive issues in both men and women, digestive problems, nerve disorders, memory problems or a lack of concentration, and muscle or joint pain.

1.3 Lead Inspection Procedures

On November 30, 2017, CEC conducted inspections for sampling LBP among building materials present at the Marina Office Building. Paint chip samples (1-inch square) were collected from the facility to represent each homogenous area. Sample locations and quantities were decided in-field by the Inspector according to the surface area, date placed, and color of each homogenous material. Figures portraying each sample location are provided in Appendix A.

Representative samples of potential LBP were collected and shipped under chain-of-custody (COC) protocol to International Asbestos Testing Laboratories, Inc. (iATL) in Mount Laurel, New Jersey, a National Voluntary Laboratory Accreditation Program (NVLAP) approved laboratory. The sample lists and descriptions are presented in Table 1 of Section 3.1, below. The analytical results are attached in Appendix B.
1.4 Asbestos Containing Material (ACM) Information

ACM is a material containing naturally occurring minerals such as chrysotile, amosite, and crocidolite. These minerals have been used in fire-proofing building materials for its insulating properties and also in many other building materials for its structural properties. ACM becomes a hazard when friable particles are released into the atmosphere from mechanical damage. Inhalation of friable particles has resulted in various respiratory issues, such as asbestosis, lung cancer, and mesothelioma. Although these diseases have 15-40 year latency periods, in extreme cases, they have led to death. ACM may include, but is not limited to, floor and ceiling tile and mastic, drywall, transite paneling, roofing and siding shingles, felt paper, insulation, and pipe wrap. Production of most ACM was discontinued in the United States in 1977. However, existing stockpiles were used in construction thereafter, and other countries continued integrating building materials with asbestos. Therefore, the potential remains for some stockpiled building materials, or ACM from other nations, to be incorporated into current premises. In non-construction materials, such as brake pads in vehicles, the use of asbestos is still common ground for its desirable qualities.

The facility inspected would potentially be subject to two Federal Regulations: Occupational Safety and Health Administration (OSHA) 29 CFR Part 1926.1101 Occupational Exposure to Asbestos, also known as the Construction Standard, and the Environmental Protection Agency (EPA) National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR, Part 61, Subpart M. OSHA pertains to any work performed on ACM, while NESHAP applies to demolition or renovation of any institutional, commercial, industrial, or residential structure, but excludes residential structures of four (4) dwelling units or less. The renovation must include 160 square feet or 260 linear feet of friable or potential friable ACM for NESHAP to apply. The definition of an ACM, as used by NESHAP is, “any material containing more than 1 percent asbestos as determined by using Polarized Light Microscopy (PLM).

There are two basic types of ACM: friable and non-friable. Non-friable is any non-Category I material consisting of more than 1 percent asbestos determined by PLM and, when dry, cannot be crushed or reduced to powder material by hand pressure. Friable ACM is any material containing more than 1 percent asbestos by PLM and can be reduced to a fine powder by hand pressure when dry. Because friable ACM is more easily damaged, it is more susceptible to release asbestos fibers and, therefore, is generally of greater concern.

NESHAP breaks non-friable ACM into two categories; Category I includes packing, gaskets, resilient floor coverings, and asphalt roof products, while ACM Category II includes all other non-friable ACM.

ACM, which is of concern and is regulated ACM (RACM) under NESHAP, includes all “friable ACM, Category I non-friable ACM that has become friable, Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by forces expected to act on the material in the course of demolition or renovation operations”
This definition of RACM implies a high potential for occupants or operators to inhale airborne fibers.

1.5 ACM Inspection Procedures

On November 30, 2017, CEC conducted a limited inspection for sampling suspect ACM among building materials present at the Marina Office Building. Samples of building materials, with potential to contain asbestos, were collected from the facility to represent each homogenous area. Sample locations and quantities were decided in-field by the Inspector according to the surface area, date placed, and type of building material. Figures portraying each sample location are provided in Appendix A.

Representative samples of potential ACM (PACM) were collected and shipped, under COC protocol, for analysis by iATL in Mount Laurel, New Jersey; an NVLAP approved laboratory. The sample lists and descriptions are presented in Table 2 of Section 3.2, below. The analytical results can be found in Appendix C.

2.0 SITE SUMMARY

The Marina Office Building is located at the northern tip of Keweenaw County in Eagle Harbor, Michigan, situated along Marina Road. The approximate coordinates of the Marina Office Building are 47.459012, -88.148966. General location maps and site plans are attached in Appendix A.

Constructed in 1967, the Marina Office Building was built with concrete block walls, is based on a concrete foundation, and the roof is comprised of asphalt shingles. The exterior walls are painted white, whereas the window sills, exterior doors, and fascia boards are painted green. A sidewalk, which encompasses the building, was once painted gray but has become bare as the paint has eroded with time. Furthermore, it is understood that the shingle roof was replaced in approximately 2014. The Office Building stands approximately 8 feet tall (excluding the roof), is uninsulated, and has an area of roughly 465 square feet. Photographs of the Building are attached in Appendix D.

The interior of the building is separated into four (4) rooms by partition walls: the Marina Office (MO), a Well Pump/Utility Room (WR), a Men’s Bathroom (MB), and a Women’s Bathroom (WB). Refer to Figure 3 in Appendix A for a visual of the building layout. The floor of each room is coated with tan paint, whereas the ceiling of each room is painted white. However, the walls and ceiling trim of the Marina Office and the Well Pump Room are painted beige, but the exterior, concrete block walls of both bathrooms are coated with white paint. For a description of the materials used to form the walls, see Figure 4 through Figure 7 in Appendix A. Additionally, a scuttle hole in the east corner of the Well Pump Room acts as an entrance to the attic. The floor of the attic is coated with black tar between the joists. It appeared as if the attic is uninsulated, but due to visual obstructions and safety hazards, a full attic inspection was not feasible.
3.0 RESULTS

3.1 Lead-Based Paint Inspection Results

Results listed below in bold are defined as lead-based paint by the federal government (i.e., greater than 0.5% lead per weight of paint chip sample). The location of where each sample was collected is portrayed in Figure 4 through Figure 7 in Appendix A.

Table 1. Lead-Based Paint Sample Results Summary

<table>
<thead>
<tr>
<th>Sample I.D.</th>
<th>Sample Description</th>
<th>Result (% by Weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP-1</td>
<td>White Paint - interior MO door frame</td>
<td>&lt;0.0059</td>
</tr>
<tr>
<td>WP-2</td>
<td>White Paint - ceiling in WR</td>
<td>&lt;0.0063</td>
</tr>
<tr>
<td>BP-1</td>
<td>Beige Paint - wall in MO</td>
<td>&lt;0.0064</td>
</tr>
<tr>
<td>BP-2</td>
<td>Beige Paint - wall in WR</td>
<td>&lt;0.0065</td>
</tr>
<tr>
<td>TP-1</td>
<td>Tan Paint - floor of MO</td>
<td>0.24</td>
</tr>
<tr>
<td>TP-2</td>
<td>Tan Paint - floor of WR</td>
<td>0.42</td>
</tr>
<tr>
<td>GP-1</td>
<td>Green Paint - Roof fascia</td>
<td>1.6</td>
</tr>
<tr>
<td>GYP-1</td>
<td>Gray Paint - Stoop to WB</td>
<td>0.17</td>
</tr>
</tbody>
</table>

3.2 Asbestos Inspection Results

All samples were tested by iATL, using the analytical method US EPA 600, R93-116. Samples were analyzed via PLM. If asbestos fibers were not observed in a sample, none detected (ND) is listed as the corresponding result. Where L2 (Layer 2) is noted after the sample I.D., two (2) different layers were adhered together in the suspect sample and were analyzed separately. Results listed in bold signify that the corresponding material is ACM. The location of where each sample was collected is portrayed in Figure 4 through Figure 7 in Appendix A.

Table 2. Asbestos Containing Material Sample Results Summary

<table>
<thead>
<tr>
<th>Sample I.D.</th>
<th>Sample Description</th>
<th>Results (% by PLM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT-1</td>
<td>Black Attic Tar</td>
<td>ND</td>
</tr>
<tr>
<td>AT-2</td>
<td>Black Attic Tar</td>
<td>ND</td>
</tr>
<tr>
<td>WG-1</td>
<td>Window Glaze - NE window of WR</td>
<td>ND</td>
</tr>
<tr>
<td>WG-2</td>
<td>SE window of WR</td>
<td>ND</td>
</tr>
<tr>
<td>WG-3</td>
<td>SW window of MO</td>
<td>ND</td>
</tr>
<tr>
<td>DW-1</td>
<td>Drywall – NE wall of MO</td>
<td>ND</td>
</tr>
<tr>
<td>DW-2</td>
<td>SW wall of WR</td>
<td>ND</td>
</tr>
<tr>
<td>SC-1</td>
<td>Sink Caulk in MB</td>
<td>ND</td>
</tr>
<tr>
<td>DC-1</td>
<td>Door caulk in MB</td>
<td>15 Chrysotile</td>
</tr>
<tr>
<td>VB-1</td>
<td>Vinyl Baseboard in WB</td>
<td>ND</td>
</tr>
<tr>
<td>VB-1(L2)</td>
<td>VB Mastic in WB</td>
<td>ND</td>
</tr>
</tbody>
</table>
4.0 SUMMARY

4.1 ACM and LBP Material Quantities

The quantities of all materials constituted as an ACM or LBP are approximate and listed in square feet (sq. ft.).

\[ LBP \]
- Green Paint: 170 sq. ft.
  - Fascia Boards
  - Exterior Window Sills
  - Exterior Doors

\[ ACM \]
- Door Caulk: 2 sq. ft.
  - Exterior Door – Wall Voids

4.2 Recommendations

Based upon the samples analyzed, personnel should wear the appropriate Personal Protective Equipment (PPE) during any renovation activities, especially while sanding, cutting, or grinding on or near the exterior doors and materials that are painted green. PPE includes, but is not limited to, safety glasses, proper air respiration equipment, disposable Teflon coveralls, and disposable gloves. Door caulk is a non-friable Category II ACM (i.e., it cannot be crushed, crumbled, or pulverized by hand pressure) so it is generally of less concern. However, precautionary measures should still be taken during renovation activities.

Care should be taken to avoid dispersing any dust beyond the immediate work area via facility air handling systems (i.e., HEPA Filter), and/or proper suppression techniques (i.e., wetting) for Asbestos and Lead removal. Lead and Asbestos Safe Work practices should be followed by trained and qualified contractors.
APPENDIX A

FIGURES
FIGURE 1 - PROJECT LOCATION MAP
EAGLE HARBOR MARINA OFFICE BUILDING
LEAD AND ASBESTOS INSPECTION
EAGLE HARBOR, MI

DATE 1/17/2018
JOB NO 17585
CADD FILE 17585-C-WIW-WIQ.DWG
PDF FILE 17585-C-WIW-WIQ.PDF

PROJECT LOCATION

SITE LOCATION
FIGURE 2 - AERIAL SITE MAP
EAGLE HARBOR MARINA OFFICE BUILDING
LEAD AND ASBESTOS INSPECTION
EAGLE HARBOR, MI

DATE 1/17/2018
JOB NO 17585
CADD FILE 17585-C-AERIAL.DWG
PDF FILE 17585-C-AERIAL.PDF
FIGURE 5 - WELL PUMP ROOM PLAN
EAGLE HARBOR MARINA OFFICE BUILDING
LEAD AND ASBESTOS INSPECTION
EAGLE HARBOR, MI

DATE 1/17/2018
JOB NO 17585
CADD FILE 17585-C-BLDG-SAMPLES.DWG
PDF FILE 17585-C-WELL-SAMPLES.PDF
FIGURE 6 - WOMEN'S ROOM PLAN
EAGLE HARBOR MARINA OFFICE BUILDING
LEAD AND ASBESTOS INSPECTION
EAGLE HARBOR, MI

DATE 1/17/2018
JOB NO 17585
CADD FILE 17585-C-BLDG-SAMPLES.DWG
PDF FILE 17585-C-WOMEN-SAMPLES.PDF
FIGURE 7 - MEN'S ROOM PLAN
EAGLE HARBOR MARINA OFFICE BUILDING
LEAD AND ASBESTOS INSPECTION
EAGLE HARBOR, MI

DATE 1/17/2018
JOB NO. 17585
CADD FILE 17585-C-BLDG-SAMPLES.DWG
PDF FILE 17585-C-MEN-SAMPLES.PDF
APPENDIX B
LEAD BASED PAINT ANALYTICAL RESULTS
CERTIFICATE OF ANALYSIS

Client: Coleman Engineering  
635 Circle Drive  
Iron Mountain MI 49801  

Client: COL394

LEAD PAINT SAMPLE ANALYSIS SUMMARY

<table>
<thead>
<tr>
<th>Lab No.:</th>
<th>Description</th>
<th>Location</th>
<th>Result (% by Weight):</th>
<th>Result (ppm):</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6404451</td>
<td>White Paint</td>
<td>Main Office (MO) Northeast Wall, 11/30/17</td>
<td>&lt;0.0059</td>
<td>&lt;59</td>
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<tr>
<td>WP-1</td>
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</tr>
<tr>
<td>6404452</td>
<td>White Paint</td>
<td>Well Room (WR) Southwest Wall, 11/30/17</td>
<td>&lt;0.0063</td>
<td>&lt;63</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6404453</td>
<td>Beige w/Blue Paint</td>
<td>MO Northeast Wall, 11/30/17</td>
<td>&lt;0.0064</td>
<td>&lt;64</td>
<td></td>
</tr>
<tr>
<td>BP-1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6404454</td>
<td>Beige w/Blue Paint</td>
<td>WR Southeast Wall, 11/30/17</td>
<td>&lt;0.0065</td>
<td>&lt;65</td>
<td></td>
</tr>
<tr>
<td>BP-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6404455</td>
<td>Tan Paint</td>
<td>Floor Of MO, 11/30/17</td>
<td>0.24</td>
<td>2400</td>
<td></td>
</tr>
<tr>
<td>TP-1</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>6404456</td>
<td>Tan Paint</td>
<td>Floor Of WR, 11/30/17</td>
<td>0.42</td>
<td>4200</td>
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<td>TP-2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6404457</td>
<td>Green Paint</td>
<td>Exterior On Roof Eave, 11/30/17</td>
<td>1.6</td>
<td>16000</td>
<td></td>
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<td>GP-1</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>6404458</td>
<td>Grey Paint</td>
<td>On Exterior Sidewalk, 11/30/17</td>
<td>0.17</td>
<td>1700</td>
<td></td>
</tr>
<tr>
<td>GYP-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 12/11/2017  
Date Analyzed: 12/18/2017  
Signature: Chad Shaffer  
Analyst: Chad Shaffer  

Approved By: Frank E. Ehrenfeld, III  
Laboratory Director
Appendix to Analytical Report:

Customer Contact: Ward Mitchell
Analysis: ASTM D3335-85a

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers.

Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: cdavis@iatl.com
iATL Account Representative: House Account
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Paint

Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:
General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:
Analysis by ASTM D3335-85a by AAS

Certification:
- National Lead Laboratory Program (NLLAP): AIHA-LAP, LLC No. 100188
- NYSDOH-ELAP No. 11021

Regulatory limit is 0.5% lead by weight (EPA/HUD guidelines). Recommend multiple sampling for all samples less than regulatory limit for confirmation. All results are based on the samples as received at the lab. iATL assumes that appropriate sampling methods have been used and that the data upon which these results are based have been accurately supplied by the client.
Method Detection Limit (MDL) per EPA Method 40CFR Part 136 Appendix B.
Reporting Limit (RL) based upon Lowest Standard Determined (LSD) in accordance with AIHA-ELAP policies.
LSD=0.2 ppm MDL=0.005% by weight. RL= 0.010% by weight (based upon 100 mg sampled).

Disclaimers / Qualifiers:
There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a complete list with highlighted disclaimers pertinent to this project. For a full explanation of these and other disclaimers, please inquire at customerservice@iatl.com.

* Insufficient sample provided to perform QC reanalysis (<200 mg)
** Not enough sample provided to analyze (<50 mg)
*** Matrix / substrate interference possible.

Dated : 12/18/2017 4:06:02
Chain of Custody
– Environmental Lead –

Contact Information
Client Company: Coleman Engineering Company
Office Address: 200 E Ayer St.
City, State, Zip: Ironwood, MI 49938
Fax Number: (906) 932-3213
Email Address: mgotham@coleman-engineering.com

Project Number: EC# 17585-B
Project Name: Edgewater Resources - Eagle Harbor Inspection & Lab Analysis
Primary Contact: Mike Gotham
Office Phone: (906) 932-5048
Cell Phone: (606) 384-3225

iATL is accredited by the National Lead Laboratory Accreditation Program (NLLAP) to perform analytical testing of environmental samples for lead (Pb). The accreditation is through AIHA-LAP, LLC and several other nationally recognized state programs.

Matrix/Method:
☑ Paint by AAS: ASTM D3335-85a, 2009
☐ Wipe/Dust by AAS: SW 846: 3050B: 700B, 2010
☐ Air by AAS: NIOSH 7082, 1994
☐ Soil by AAS: EPA SW 846 (Soil)
☐ Water by AAS-GF: ASTM D3559-03D, US EPA 200.9
☐ Other Metals (Cd, Zn, Cr) by AAS
☐ Toxicity Characteristic Leaching Procedure (TCLP) by AAS: US EPA 1311
☐ Other

Special Instructions:
Analyze each paint layer.

Turnaround Time
Preliminary Results Requested Date: ____________________________
Specific date / time
☐ 10 Day ☐ 5 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day* ☐ 12 Hour** ☐ 6 Hour** ☐ RUSH**
* End of next business day unless otherwise specified. ** Matrix Dependent. ***Please notify the lab before shipping***

Chain of Custody
Relinquished (Name/Organization): Mike Gotham, Coleman Engineering Co.
Received (Name / iATL): ____________________________
Sample Login (Name / iATL): ____________________________
Analysis(Name(s) / iATL): ____________________________
QA/QC Review (Name / iATL): ____________________________
Archived / Released: QA/QC InterLAB Use: ____________________________
Date: 12/6/17 Time: 12:00
Date: ____________________________
Time: ____________________________
Date: ____________________________
Time: ____________________________
Date: ____________________________
Time: ____________________________

Celebrating 25 years... one sample at a time
www.iatl.com
# Sample Log

---

**Environmental Lead**

**Client:** Coleman Engineering Company  
**Project:** Edgewater Resources - Eagle Harbor Inspection and Lab Analysis  
**Sampling Date/Time:** 11/30/2017 8:00-13:45

<table>
<thead>
<tr>
<th>Client Sample #</th>
<th>iATL #</th>
<th>Location/Description</th>
<th>Flow Rate</th>
<th>Start</th>
<th>End</th>
<th>Sampling time (min)</th>
<th>Area (ft²)</th>
<th>Volume (L)</th>
<th>Results</th>
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<tbody>
<tr>
<td>WP-1</td>
<td>6404451</td>
<td>White Paint - Hall/Office (HQ) northwall</td>
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<td></td>
<td></td>
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<tr>
<td>WP-2</td>
<td></td>
<td>White Paint - West Room (WR) southwest wall</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>BP-1</td>
<td>6404452</td>
<td>Beige (w/ Blue) Paint - MO northwest wall</td>
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<td>BP-2</td>
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<td>Beige (w/ Blue) Paint - WR southeast wall</td>
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<td>TP-1</td>
<td>6404455</td>
<td>Tan Paint - floor of MO</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP-2</td>
<td>6404456</td>
<td>Tan Paint - floor of WR</td>
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<tr>
<td>GP-1</td>
<td>6404457</td>
<td>Exterior Green Paint on roof eave</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GYP-1</td>
<td>6404458</td>
<td>Gray Paint on exterior sidewalk</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

* = Insufficient Sample Provided to Perform QC Reanalysis (<200mg)  
** = Insufficient Sample Provided to Analyze (<50mg)  
*** = Matrix / Substrate Interference Possible  
FB = Method Requires the submit of blank(s). ML = Multi Layered Sample. May result in inconsistent results.

These preliminary results are issued by iATL to expedite procedures by clients based upon the above data. iATL assumes that all of the sampling methods and data upon which these results are based, has been accurately supplied by the client. These results may not have been reviewed by the Laboratory Director. Final Certificate of Analysis will follow these preliminary results. The signed COA is to be considered the official results. All EPA, HUD, and NJDEP conditions apply.
APPENDIX C

ASBESTOS CONTAINING MATERIAL ANALYTICAL RESULTS
<table>
<thead>
<tr>
<th>Lab No.</th>
<th>Client No.</th>
<th>Analyst Observation</th>
<th>Client Description</th>
<th>Location</th>
<th>Facility</th>
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<tbody>
<tr>
<td>6404441</td>
<td>AT-1</td>
<td>Black Tar</td>
<td>Black Attic Tar Above Well Rm (WR) Ceiling</td>
<td>Marina Office Bldg</td>
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<td>6404444</td>
<td>WG-2</td>
<td>Off-White Glazing</td>
<td>Exterior Window Glaze-Southeast Window Of WR</td>
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<td>6404445</td>
<td>WG-3</td>
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<td>Exterior Window Glaze-Southwest Window Of Main Office (MO) Rm</td>
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<td>Percent Asbestos: None Detected</td>
<td>Percent Non-Asbestos Fibrous Material: None Detected</td>
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<td>6404446</td>
<td>DW-1</td>
<td>White Drywall</td>
<td>Drywall On East Wall Of MO Rm</td>
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Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Received: 12/11/2017
Date Analyzed: 12/18/2017
Signature: Jyotika Shah

Approved By: Frank E. Ehrenfeld, III
Laboratory Director
<table>
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<td>White Caulk</td>
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<td>6404449</td>
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<td>Grey Caulk</td>
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<td>White/Tan Vinyl Sheet Flooring</td>
<td>Vinyl Baseboard And Mastic In Women's Bathroom</td>
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<td>640450(L2)</td>
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</table>

Analytical Method - US EPA 600, R93-116. Please refer to the Appendix of this report for further information regarding your analysis.

Date Analyzed: 12/18/2017

Date Received: 12/11/2017

Signature: Jyotika Shah

Approved By: Frank E. Ehrenfeld, III
Laboratory Director
Appendix to Analytical Report

This appendix seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers.

Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: cdavis@iatl.com
iATL Account Representative: House Account
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Bulk Building Materials
Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government. This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Certifications:

- NIST-NVLAP No. 101165-0
- NY-DOH No. 11021
- AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)
Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

Asbestos in Surface Dust according to one of ASTM’s Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:
There may be some samples in this project that have a “NOTE:” associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a list with highlighted disclaimers that may be pertinent to this project. For a full explanation of these and other disclaimers, please inquire at customerservice@iatl.com.

1) Note: No mastic provided for analysis.
2) Note: Insufficient mastic provided for analysis.
3) Note: Insufficient material provided for analysis.
4) Note: Insufficient sample provided for QC reanalysis.
5) Note: Different material than indicated on Sample Log / Description.
6) Note: Sample not submitted.
7) Note: Attached to asbestos containing material.
8) Note: Received wet.
9) Note: Possible surface contamination.
10) Note: Not building material. 1% threshold may not apply.
11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
12) Note: Asbestos detected but not quantifiable.
13) Note: Multiple identical samples submitted, only one analyzed.
14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.

Recommendations for Vermiculite Analysis:
Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gange, homogeneous exfoliated books of mica, or mixed mineral composites). Please contact your client representative for pricing and turnaround time options available.

iATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure “Current Best Practices for Vermiculite Attic Insulation” EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

1) Analytical Step/Method: Initial Screening by PLM, EPA 600/R-93/116
   Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.

2) Analytical Step/Method: Wet Separation by PLM Gravimetric Technique, EPA R-04/004
   Requirements/Comments: Minimum 50g** of dry sample. Analysis of “Sinks” only.

3) Analytical Step/Method: Wet Separation by PLM Gravimetric Technique, EPA R-04/004
   Requirements/Comments: Minimum 50g** of dry sample. Analysis of “Floats” only.

4) Analytical Step/Method: Wet Separation by TEM Gravimetric Technique, EPA R-04/004
   Requirements/Comments: Minimum 50g** of dry sample. Analysis of “Sinks” only.

5) Analytical Step/Method: Wet Separation by TEM Gravimetric Technique, EPA R-04/004

Dated : 12/18/2017 5:47:16
# CERTIFICATE OF ANALYSIS

**Client:** Coleman Engineering  
635 Circle Drive  
Iron Mountain MI 49801

**Client:** COL394

<table>
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<th>Description</th>
<th>Details</th>
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<td><strong>Report Date:</strong></td>
<td>12/18/2017</td>
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<tr>
<td><strong>Report No.:</strong></td>
<td>553526 - PLM</td>
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<td><strong>Project:</strong></td>
<td>Edgewater Resources - Eagle Harbor Inspection &amp; Lab Analysis</td>
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<tr>
<td><strong>Project No.:</strong></td>
<td>EC# 17585-B</td>
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**Requirements/Comments:** Minimum 50g** of dry sample. Analysis of "Suspension" only.  
LOQ, Limit of Quantitation estimates for mass and volume analyses.  
*With advance notice and confirmation by the laboratory.  
**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).
Chain of Custody
— Bulk Asbestos —

Contact Information
Client Company: Coleman Engineering Company
Office Address: 200 E Ayer St.
City, State, Zip: Ironwood, MI 49938
Fax Number: (906) 932-3213
Email Address: mgotham@coleman-engineering.com

Project Number: EC# 17585-B
Project Name: Edgewater Resources - Ensign Harbor Inspection & Lab Analysis
Primary Contact: Mike Gotham
Office Phone: (906) 932-5048
Cell Phone: (906) 364-3225

PLM Instructions:
☐ PLM: Bulk Asbestos Building Materials EPA 600 R-93/116, 1993
☐ PLM: Bulk Asbestos Building Materials EPA 600 M-4/82-020, 1982
☐ PLM: Bulk Asbestos Building Materials NIOSH 9002, 1985
☐ PLM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.1, 2002
☐ PLM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.6, 2010
☐ TEM: Bulk Asbestos Building Materials NYSDOH-ELAP 198.4, 2009

☐ PLM: Point Counting
☐ PC: via ELAP 198.1
☐ PC: 400 Points
☐ PC: 800 Points *
☐ PC: 1600 Points *

☐ PLM: Instructions for Multi-Layered Samples
☐ Analyze and Report All Separable Layers per EPA 600
☐ Report Composite for Drywall Systems per NESHAP
☐ Report All Layers and Composite Where Applicable
☐ Only Analyze and Report Specifically Noted Layer

Special Instructions:
☐ PLM: Analyze Until Positive (Positive Stop)
☐ AUP: by Homogenous Area as Noted
☐ AUP: by Material Type as Noted
☐ PLM: NOB via 198.6
☐ PLM: Friable via EPA 600 2.3
☐ If <1% by PLM, to TEM via 198.4 *
☐ If <1% by PLM, Hold for Instructions
☐ PLM: Non-Building Material *** (Dust, Wipe, Tape)
☐ Soil or Vermiculite Analysis *
☐ CARB 435

* Additional charge and turnaround may be required  ** Alternative Method (ex: EPA 600R-04/004) may be recommended by Laboratory

Turnaround Time
Preliminary Results Requested Date: _____________________________  Specific date / time: _____________________________
☐ Verbal  ☐ Email  ☐ Fax
☐ 10 Day  ☐ 5 Day  ☐ 3 Day  ☐ 2 Day  ☐ 1 Day*  ☐ 12 Hour**  ☐ 6 Hour***  ☐ RUSH***

* End of next business day unless otherwise specified. ** Matrix Dependent. *** Please notify the lab before shipping***

Chain of Custody
Relinquished (Name/Organization): Mike Gotham, Coleman Engineering Co.
Received (Name / iATL): _____________________________ Date: 12/6/17 Time: 12:00
Sample Login (Name / iATL): _____________________________ Date: _____________________________ Time: _____________________________
Analysis(Name(s) / iATL): _____________________________ Date: 12/18/17 Time: _____________________________
QA/QC Review (Name / iATL): _____________________________ Date: _____________________________ Time: _____________________________
Archived / Released: QA/QC Interlab Use: _____________________________ Date: _____________________________ Time: _____________________________

Celebrating 25 years...one sample at a time
www.iatl.com
# Sample Log

- **Bulk Asbestos** -

**Client:** Coleman Engineering Company  
**Project:** Edgewater Resources - Eagle Harbor Inspection and Lab Analysis

**Sampling Date/Time:** 11/30/2017 8:00-13:45

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<th>iATL #</th>
<th>Location/Description</th>
<th>Notes</th>
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<td>AT-1</td>
<td>6404441</td>
<td>Black Attic Tar above Well Room (WR) Ceiling</td>
<td>Marina Office Building</td>
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<tr>
<td>AT-2</td>
<td>6404442</td>
<td>Black Attic Tar above Well Room (WR) Ceiling</td>
<td>Marina Office Building</td>
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<tr>
<td>WG-1</td>
<td>6404443</td>
<td>Exterior Window Glaze - Northeast window of WR</td>
<td>Marina Office Building</td>
</tr>
<tr>
<td>WG-2</td>
<td>6404444</td>
<td>Exterior Window Glaze - Southeast window of WR</td>
<td>Marina Office Building</td>
</tr>
<tr>
<td>WG-3</td>
<td>6404445</td>
<td>Exterior Window Glaze - Southwest window of Men’s Office (MO) room</td>
<td>Marina Office Building</td>
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<td>DW-1</td>
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<td>Drywall on east wall of MO room</td>
<td>Marina Office Building</td>
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<tr>
<td>DW-2</td>
<td>6404447</td>
<td>Drywall on west wall of WR</td>
<td>Marina Office Building</td>
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<td>SC-1</td>
<td>6404448</td>
<td>Sink Caulk in Men’s Bathroom (MB)</td>
<td>Marina Office Building</td>
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<tr>
<td>DC-1</td>
<td>6404449</td>
<td>Door Caulk in MB</td>
<td>Marina Office Building</td>
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<tr>
<td>VB-1</td>
<td>6404450</td>
<td>Vinyl Baseboard &amp; Mastic in Women’s Bathroom</td>
<td>Marina Office Building</td>
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APPENDIX D

PHOTOGRAPHS
EAGLE HARBOR MARINA OFFICE BUILDING
PHOTOS WERE TAKEN ON NOVEMBER 30, 2017

Northerly view
Photo 1 – Northerly view of the Marina Office Building

Southerly view
Photo 2 – Southerly view of the Marina Office Building
Photo 3 – Easterly view of the Marina Office Building

Photo 4 – Westerly view of the Marina Office Building
Photo 5 – View of the southern corner of the Marina Office

Photo 6 – View of the northern corner of the Marina Office, with the Well Pump Room in the background
Photo 7 – View of the western corner of the Well Pump Room.

Photo 8 – View of the northern corner of the Well Pump Room
Photo 9 – View of the Southern corner of the Well Pump Room

Photo 10 – View of the eastern corner of the Well Pump Room
Photo 11 – View of the tan painted floor in the Well Pump Room

Photo 12 – View of the groundwater well in the Well Pump Room
Photo 13 – View of the scuttle hole in the Well Pump Room

Photo 14 – View of the Women’s Bathroom
Photo 15 – Sewer vent stack in wall between Men’s and Women’s Bathrooms
Photo 16 – BP-1 sample location on northeast wall in the Marina Office
Photo 17 – WP-1 sample location on door frame between the Marina Office and Well Pump Room
Photo 18 – DW-1 sample location on door frame between the Marina Office and Well Pump Room
Photo 19 – TP-1 sample location on floor in southern corner of the Marina Office
Photo 20 – TP-2 sample location on floor in the center of the Well Pump Room
Photo 21 – WP-2 sample location ceiling in southern corner of the Well Pump Room
Photo 22 – BP-2 sample location on southeastern wall in Well Pump Room
Photo 23 – DW-2 sample location on southwest wall in Well Pump Room

Photo 24 – AT-1 sample location near the southeastern wall in attic above Well Pump Room
Photo 25 – AT-2 sample location near southwest edge of scuttle hole in attic above the Well Pump Room

Photo 26 – VB-1 sample location in eastern corner of the Women’s Bathroom
Photo 27 – SC-1 sample location along southwest wall in the Men’s Bathroom

Photo 28 – DC-1 sample location in void between door frame and northwest wall in the Men’s Bathroom
Photo 29 – WG-1 sample location on the exterior, northeast window of the Well Pump Room
Photo 30 – WG-2 sample location on exterior, southeast window the Well Pump Room
Photo 31 – WG-3 sample location on exterior, southwest window of the Marina Office
Photo 32 – GP-1 sample location on northwest fascia board of the roof eave

Photo 33 – GYP-1 sample location on the northwest sidewalk and stoop to the Women’s Bathroom
APPENDIX E

QUALIFICATIONS
MICHAEL G. GOTHAM, Environmental Scientist


Experience: 2015 – Present Coleman Engineering Company

Certifications: 40-hour Hazwoper & 8-hour Annual Refreshers
2017 Enbridge Environmental Orientation US MLP
Liquid Pipelines Safety, US MLP
Ground Disturbance Awareness
Confined Space Training
2017 OQ Pipeline Training
Lead Sampling Technician
Asbestos Containing Materials Inspector
2017 MSHA 24 Hour New Miner Training (Surface Mining)

Mr. Gotham’s experience with Coleman Engineering Company includes road construction projects, specifically Wisconsin Department of Transportation projects, as well as geotechnical drilling, soil investigation, and environmental projects. His roles have included Road Construction Inspector, Driller’s Assistant, Environmental Sampling Technician, and Project Manager’s Assistant on Environmental Projects. As a Construction Inspector, he was responsible for recording all pay items as well inspecting all traffic control and erosion control items for Wisconsin Department of Transportation projects. As a Driller’s Assistant, Mr. Gotham assisted in geotechnical investigation borings, environmental borings, sediment borings, and boring ratio tests. As an Environmental Sampling Technician, Mr. Gotham’s roles included sediment sampling, providing sediment descriptions, and proper procurement of samples for laboratory analysis. As an Environmental Scientist, Mr. Gotham’s responsibilities have included investigating the cause and magnitude of releases, oversight of Trade Contractors for site construction activities, soil and groundwater sampling, and site safety. He has also conducted subsurface investigations which are included, but not limited to, stratigraphic descriptions, aquifer analysis through hydraulic conductivity testing (slug and pump tests), and well logging. Mr. Gotham has managed a Phase I environmental site assessment and assisted the Project Manager in Phase II environmental site assessments. He has been responsible for managing budgets for private clients. Mr. Gotham’s responsibilities involve planning, analysis, cost tracking, and project management.

More recently, Mr. Gotham was certified as an Asbestos and Lead Inspector and performed inspections on numerous buildings, houses, vault toilets and lodges.
Appendix VI:

Existing Conditions Site Photos