Demolition Plan

Revision: Rev 5

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LOWER DUWAMISH WATERWAY

Upper Reach Remedial Action

Contract KC001065

Prepared By:

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1.0 Purpose and Objective

This Demolition Plan outlines the approach for demolition, salvage, cutting, and patching activities as specified in Section 02 41 00. The plan includes methodologies for removing structures and pilings, protection measures for adjacent structures, and handling of debris, ensuring compliance with project specifications and environmental regulations. Demolition activities include removal of piling. Piling will include timber (whole pieces or fragments) and timber piles that will not be reinstated or reused (Section 02 41 00, para. 1.04).

2.0 General Approach

2.1 Scope of Work

Pacific Pile & Marine (PPM) is responsible for reviewing the materials to be encountered at the Work Site to stay informed on current conditions. If PPM comes across material not specified in the Specifications, the Project Representative is to be immediately notified. PPM is responsible for coordinating with the Project Representative to allow for structure monitoring during demolition and salvage. Trigger levels for monitoring are presented in the Instrumentation and Monitoring Plan. In the event that unacceptable structure movement occurs, PPM shall be prepared to immediately suspend demolition and salvage activities at the direction of the Project Representative.

PPM shall remove and dispose of structures and pilings as identified in the Project Drawings. All procedures in the Clean Water Act Sections 401/404 and Rivers and Harbors Act Section 10 Substantive Compliance Report (Basis of Design Report, Appendix C) (this document can be found in Section 01 13 00 of the Project Specifications) and in the Environmental Protection Agency (EPA) Region 10 “Best Management Practices for Piling Removal and Placement in Washington State,” dated February 18, 2016, included in this Plan as Attachment B, shall be followed for demolition activities.

The applicable permits for the Work in accordance with Section 01 41 26 (Permits, Easements, and Right-of-Entry Agreements) can be found in the Transloading, Upland Transportation, Waste Characterization, and Disposal Plan (Appendix K of the RAWP).

Dispose of removed piling and structures without damaging existing remaining Work or nearby facilities.

Install replacement piles as indicated on the Drawings or as directed by the Project Representative in the same location as surveyed, where applicable.

Cleanup and disposal of all debris, rubbish, and other miscellaneous materials resulting from demolition, cutting, or patching operations, and dispose of in the proper manner according to the Transloading, Upland Transportation, Waste Characterization, and Disposal Plan (Appendix K of the RAWP).

3.0 Proposed Equipment

The proposed equipment list is the same equipment that will be used for dredging activities. The only difference will be the addition of a vibratory hammer outfitted with a timber pile boot.

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3.1 Dredge Barges & Excavators

CONSTRUCTION BARGES

Lash 4

For demo and debris removal operations outside of SMA1-3, PPM will use the "Lash 4" barge. The Lash 4 barge is 160' long x 50' wide x 12' deep. It is a load lined barge and is equipped with 2 spuds that can be raised and lowered to allow the barge to be securely positioned. The Lash is also equipped with a 4-point anchoring system that can be utilized in areas where spuds are ineffective or not allowed (AC pilot areas, completed SMAs). The 1200-6 excavator will be located on Lash 4.

Flexi-Float

For SMAs 1 and 2 demolition and debris removal the "FlexiFloat" barge will be utilized. The FlexiFloat barge consists of 16ea 20' x 10' x 7' floats, which are combined to make a single float measuring 80' x 40' x 7'It is outfitted with two spuds for anchoring and stability once in its desired location. The FlexiFloat will have the 470 Excavator on the deck for dredging and debris removal operations.

DEMO EXCAVATORS

Hitachi 1200-6

PPM anticipates utilizing a Hitachi EX 1200-6 excavator for piling and debris removal. The excavator is a 2015 with a Net Power 760 Horsepower and Operating Weight of 265,000lbs. It is equipped with a custom boom from Jewell capable of digging 70-feet below the excavator or 36-feet below waterline. The hydraulic system on the excavator uses low toxicity biodegradable hydraulic fluid. The Hitachi EX 1200-6 excavator is equipped with eTrac servos on the boom and clamshell bucket, as well as on-board monitors and computer operating HYPACK & DREDGEPACK 2024 software. These sensors will allow bucket position will be continually monitored, in real-time to a 2-3-inch accuracy, through HYPACK & DREDGEPACK including bucket orientation, rotation and open/close position. In addition to the eTrac servos sensors, two GPS antennas mounted on the rear of the excavator will provide positioning and directional data.

470 Hitachi

A Hitachi 470 excavator will be used for demo and debris removal in SMA 1, 2, and 3. The Hitachi 470 excavator will be operated from the deck of the FlexiFloat barge. It has a 37-foot dredge arm and is powered by a 450-horsepower diesel engine and weighs 108,952lbs. The 470 was built in 2005 and uses low toxicity biodegradable hydraulic fluid.

3.2 Support Equipment

Vibratory Hammer

The hammer utilized for pile removal assistance and installation will be an APE 150. The Ape 150 Vibratory hammer has a drive force of 85 tons, and a total weight of 8,330 lbs.

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Hydraulic Buncher Shear

The Densco Buncher Shear is a robust tool designed for efficient timber piling removal. With dimensions of 75 inches in width, 98 inches in height, and 68 inches in depth, it has a base weight of 6,040 pounds. The shear boasts a single cut capacity of 20 inches for softwood and 16 inches for hardwood, with an accumulating area of 5.4 square feet. It features two identical threaded, hardened steel, bolt-on blades, making it a powerful and reliable choice for heavy-duty piling removal tasks, if piling can't be extracted.

3.3 Tugboats & Workboats

Halle H. Tugboat

The Halle H. tugboat will be used to transport the barges to and from the jobsite to the Waste Management transload facility (DRF) located at 7400 8th Ave S, Seattle, WA 98108as well as move the dredge barges from each SMA. The Halle H. is an 800-horsepower tug that is 63-feet long by 22-feet wide with a 7.5-foot draft. Boyer Towing will use secondary boats as needed to assist with barge movements or transfers. PPM will also utilize its workboat skiffs to assist in moves from each SMA.

Fog Dog Survey Boat

The Fog Dog survey boat will be used to perform the bathymetric surveying to identify any additional debris not identified in the drawings. It is a 27' Almar Aluminum hulled jet drive, powered by a Cummins diesel engine.

The survey equipment consists of Norbit iWBMS multibeam head and processor, with positioning provided by an Applanix Wavemaster II RTK GPS system. The Multibeam head is mounted on the starboard side and pivots up and out of the water for travel/transport. The vessel has dual displays for the operator and survey tech, inverter, extra-large battery bank and auxiliary generator for ample power capacity. It also has on board cellular internet access and wifi connectivity so that surveys or troubleshooting can be done remotely.

3.4 Contaminated Sediment/Demolished Material Barges

KP-1 through KP-4

Contaminated sediment barges used for the demo materials will consist of four identical barges each 180-foot long by 50-foot wide by 12-foot deep. The barges are equipped with concrete wear decks and 4-foot high steel fences around the perimeter that will be sealed to capture all demo water for collection and treatment avoiding an overflow situation. The barges are capable of holding approximately 2,000 tons of material. Approximately 1,200 tons of material will be generated before the barge is transported to Seattle and offloaded. This will give the barge 24"of freeboard to top of barge deck to minimize spillage during transport to the transload facility. Material will be stacked in such a way as to ensure that material cannot be lost from the barge during transport. The current barges planned for use are named the "KP-1" and "KP-2".

Porpoise

The Porpoise will be utilized as a contaminated sediment barge in SMA 1A, 1B, 2A, and 2B in tandem with the P2 Hopper barge. The Porpoise barge dimensions are 140 feet long by 35 feet wide by 8.5 feet deep. The barge is equipped with a concrete wear deck and 4-foot high steel

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fence around the perimeter, which will be sealed to capture all dredge water for collection and dewatering, thereby avoiding overflow situations. Please refer to the Water Quality Control and Water Management Plan for details regarding dredge water collection, dewatering, and treatment. This barge can hold approximately 530 tons of material, with about 250 tons generated before the material is transloaded on to the KP barge and or to be offloaded at DRF. This will provide the barge with 24 inches of freeboard above the deck, minimizing the risk of spillage during transport to the transload location. Material will be stacked to ensure that it cannot be lost from the barge during transport.

Poseidon P2 Hopper Barge

For SMA 1 and 2 the Poseidon P2 Hopper barge will be used for demolished material storage and transport. The barge is 40’ x 20’ wide and consists of two 40’ Long x 10’ Wide x 8’ 5-3/4” Tall modular barges pinned together. The barge has two hoppers, one on each 40x10 unit. The hopper is set inside of the hull of the barge, it is 26’x 8’ x 8.5’ and capable of holding 50cubic yards. The hopper box has a 1.5’ tall fence extending above the deck of the barge to mitigate spillage during transport. With both units pinned together the 40’x20’ barge is capable of hauling 100 cubic yards per load.

4.0 Work Sequence and Timing

Due to the intertidal nature of most of the piling and debris locations PPM will utilize the day-time high tides to remove the piling to avoid grounding the construction barges. The piling removal located near SMA 7 is estimated to take 1 day and removal near SMA 1 is estimated to take 2 days.

4.1 Pre-Demolition Activities

Prior to any demolition Work the following shall occur:

- Notify the Project Representative 21 days prior to the start of demolition Work so that observation and monitoring for demolition can be properly coordinated.
- Conduct a survey of the location of the piles.
- Conduct Pre-Construction Structural Inspections per Section 31 09 00 (Geotechnical Instrumentation and Condition Inspections) and the Instrumentation and Monitoring Plan (Appendix P of the RAWP). Submit Pre-Construction Structural Condition Reports, for Project Representative acceptance, at least 14 calendar days prior to the passage of Contractor equipment or materials by a structure identified for inspection, or the start of any In-Water Work proximate to the identified structure.
- Obtain all necessary permits for transloading, transport, and disposal of materials.

4.2 Demolition Sequence

- Start and complete work in the order of precedence established by the Project Schedule. The Draft Project Schedule can be found in the RAWP plan.
- At the beginning of each demolition event, check each pile designated for removal to see if it has a number on it. If there is a number on it, immediately notify the Project Representative before removal of the numbered pile.

- Coordinate with the Project Representative to ensure adherence to the schedule and regulatory requirements.
- Debris and piling removal shall occur before the start of dredging and capping activities.
- After removal of all debris and completion of SMA dredging and capping, all steel replacement piles as indicated on the Drawings or as directed by the Project Representative shall be installed in the same location as surveyed by the PLS survey and where recorded in Hypack by the operator during initial pile removal, where applicable. Please reference the Survey and Positioning Plan for additional information on survey and machine positioning procedures.
- Remove the debris, trash, and materials resulting from cutting, demolition, or patching operations and transport and dispose of them according to the Transloading, Upland Transportation, Waste Characterization, and Disposal Plan.

5.0 Methods and Procedures

5.1 Protection of public, adjacent structures, and utilities

PPM shall protect all utilities and other structures not designated for removal from damage during Work Site demolition activities. Coordinate with the Project Representative for acceptable protection measures prior to the start of Work as necessary. PPM shall perform all Work in compliance with Section 01 35 29 (Health and Safety) to avoid exposing the workers and the public to harmful substances. If damage occurs to any utilities or structures aforementioned, PPM is responsible for repair and replacement of the damaged property to restore it to similar function to the satisfaction of the property owner and Project Representative.

5.2 Piling and Debris Demolition

Piling

Prior to commencement with pile removal activities, PPM and the County's Project Representative will assess the condition of the identified piling, and determine which piling will be removed using the following the EPA Region 10 BMPs methods:

1. Vibratory Extraction
2. Direct Pull
3. Clamshell Bucket
4. Pile Cutting

Once a removal methodology is selected with the County's Project Representative's approval, the removal process will begin. If the selected method is unsuccessful (e.g., the pile is broken during vibratory extraction), then the next numerical method will be selected (e.g., direct pull) and performed. This process will continue until the piling is extracted. If the piling cannot be extracted utilizing methods 1-3, pile cutting will be utilized but only in coordination with the Project Representative, the EPA, and all other required resource agencies.

PPM will utilize the Hitachi 1200-6 and 470 excavators to remove the identified piling. Both the excavators are capable performing vibratory extraction (hanging the vibratory hammer from the excavator boom), direct pull (using chokers from the excavator boom), and utilizing their clamshell buckets for removal (Figure 1). For pile cutting, the 1200-6 will use a pile shear (Figure

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2) to cut the piling 2’ below mudline, whereas the 470 Hitachi excavator would utilize its clamshell bucket to make the cut.

Figure 1- Pile Extraction w/ Clamshell Bucket

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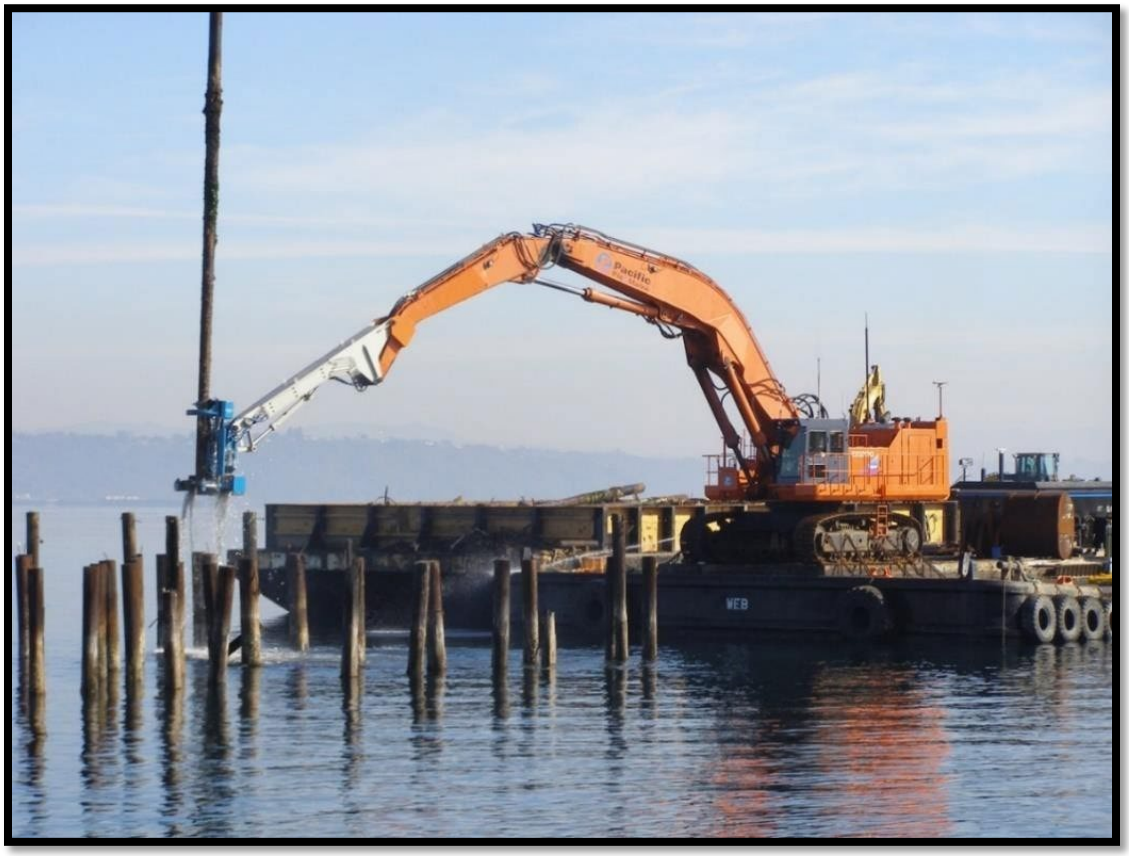

Figure 2- Pile Cutting w/ Hydraulic Shear

5.3 Barge to Barge Transloading

For SMA 1A, 1B, 2A and 2B the P2 Hopper bargethat will be utilized at those locations is too small for Waste Management to offload at the DRF. PPM will instead transfer the demolished material from the P2 Hopper barge or the Porpoise barge and place it onto the KP barge for disposal at Waste Management. The Porpoise barge is intended to be offloaded at the DRF; however, to provide project flexibility, PPM will include the Porpoise in the barge to barge transloading plan. Below are the steps for this process:

- The projected capacity for the P2 Hopper barge is loaded to 100 CY and the Porpoise barge is loaded to 179 CY, by the FlexiFloat construction barge.
- The P2 Hopper barge or the Porpoise barge will then be towed by Boyer utilizing their tugs to whichever SMA the Lash or WEB barge is dredging in, as approved by Project Representative. Transfer outside that SMA footprint is not allowed
- The P2 Hopper barge or the Porpoise barge will be rafted to either side of the KP barge.
- The 1200 excavator on the construction barge will then proceed to remove the demolished material from the P2 Hopper barge or the Porpoise barge and place it into the KP barge. The swing path will be over both contaminated sediment barges so that in the event that material is lost in the transloading process it will land on the deck of one of the barges for easy retrieval and disposal. Please refer to Water Quality Control Plan for barge dewatering details. Spill

prevention measures for transfers between the P2 Hopper barge or the Porpoise barge to the KP will be managed consistent with requirements of barge offloading at the transload facility.

- Once the P2 Hopper barge or the Porpoise barge was completely offloaded it will be transported back to the FlexiFloat barge to continue with demolition operations.

This process will be repeated 2 to 3 times per day depending on the SMA location. If this process proves to be too inefficient then PPM will elect subject to Project Representative approval to have the WEB or LASH construction barges perform the work at 2A-B. The demolition activities at 1A-B must use this process due to the restricted nature of those SMAs. This process is also the same for contaminated sediment transfer, please refer to Section 4.4 of the Dredge Plan (Appendix J)of the RAWP.

6.0 Means and Methods to Minimize Waste

Due to the contaminated nature of the site PPM intends to dispose of all debris and piling removed from the site at Waste Management's Columbia Ridge Landfill. The only debris that could be removed from the waste stream would be any large recyclable metal. PPM will segregate any encountered metal from the demolition materials, decontaminate per the process detailed in the Decontamination Plan, and then placed into scrap bins for recycling at PPM's 700 S Riverside Dr yard.

7.0 Means and Methods to Control Dust

Dust will not be an issue for debris removal due to the materials being located within the water column or still saturated from recent submersion and being removed during wet weather months. In the unlikely event dust was generated from the materials, a 3" submersible pump would be utilized to wet the material down on a daily or hourly basis depending on atmospheric conditions.

8.0 Handling and Disposal of Materials

Once the Piling and other debris are removed from the substrate, the materials shall be moved expeditiously into the KP barges. The KP barges are watertight and will have the ability to dewater any excess water generated during debris activities. For details on the barge dewatering process please refer to the Water Management Plan (Appendix Y of the RAWP) and Water Quality Protection Plan (Appendix V of the RAWP).

Once demolition activities are completed to the Project Representative's approval, the barge will be transported up to the Transload Facility. The Transload Facility used for this Project has been designated as the Duwamish Reload Facility (DRF) located at 7400 8th Avenue South, Seattle, WA 98108. The debris and Piling shall be processed at DRF and sent to the Disposal Facility at the Waste Management (WM)-operated Columbia Ridge Landfill. Additional details regarding marine transportation and Transloading-Disposal activities can be found in the Vessel Management Plan (Appendix S of the RAWP) and Transloading, Upland Transportation, Waste Characterization, and Disposal Plan (Appendix K of the RAWP).

9.0 Environmental Protection

The below Best Management Practices will be utilized during demolition activities to maintain environmental protection and compliance:

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- **Slow Removal**: The operator will remove piling slowly to minimize turbidity and sediment disturbance.
- **Minimize Damage to Treated Wood**: The operator shall minimize overall damage to treated wood piling during removal. Treated wood piling will not be broken off intentionally by twisting, bending, or other deformation.
- **Containment Handling**: Upon removal from the substrate and water column, the piling shall be moved expeditiously into the material barge for processing and disposal.
- **No Cleaning or Shaking**: The piling will not be shaken, hosed off, stripped, scraped off, or left hanging to drip. Any sediment associated with removed piling must not be returned to the waterway.
- **Multiple Removal Attempts**: The operator shall make multiple attempts, using different methodologies to remove a pile before resorting to cutting.
- **Sediment Excavation**: Excavation of sediment, utilizing the clamshell buckets, from around the base of a pile will be required to gain access to sound portions of the pile and allow for extraction using direct pull methods. The decision to excavate or to abandon the piling will be closely coordinated with the Project Representative for approval.
- **Clamshell Extraction Precautions**: Because clamshell extraction has a higher capacity to generate debris, a debris boom will be deployed in the work zone. If treated wood piling is being removed, extracted piles shall be transferred to the material barge without leaving the boomed area to prevent loss of treated wood chemicals and debris to the water column and sediments.
- **Minimize Pinching**: The operator will minimize pinching of treated wood and overall damage to treated wood piling during removal by visually determining where the pile appears to be most structurally competent and applying the extraction methodology there.
- **No Grubbing for Broken Piling**: No grubbing for broken piling will be utilized.
- **Experienced Operators**: PPM will utilize experienced operators with 5 years of demolition experience in a marine environment.
- **Turbidity and Water Quality Standards Compliance**: If piling removal results in exceedance of turbidity or other water quality standards at the compliance boundary, PPM will reconsider the timing of removal to a more restricted time frame, such as the lowest practical tide condition or around slack water.

10.0 Compliance and Quality Control

Pile Removal Verification

To ensure the complete removal of piles, a thorough verification process will be implemented. Where feasible the hydrographic survey boat will be utilized verify that no residual piling material remain. If piling material is identified a plan will be developed with the Project Representative to determine the removal processes. Documentation of these surveys will be compiled into a report for review by the Project Representative.

After Piling removal is completed, PPM will conduct a Post-Construction Structural Condition Inspection.

Please refer to the Construction Quality Control Plan (Appendix N of the RAWP) for all reporting and documentation requirements.

Please refer to the Instrumentation and Monitoring Plan (Appendix P of the RAWP) for all details on the structure monitoring and condition inspections.