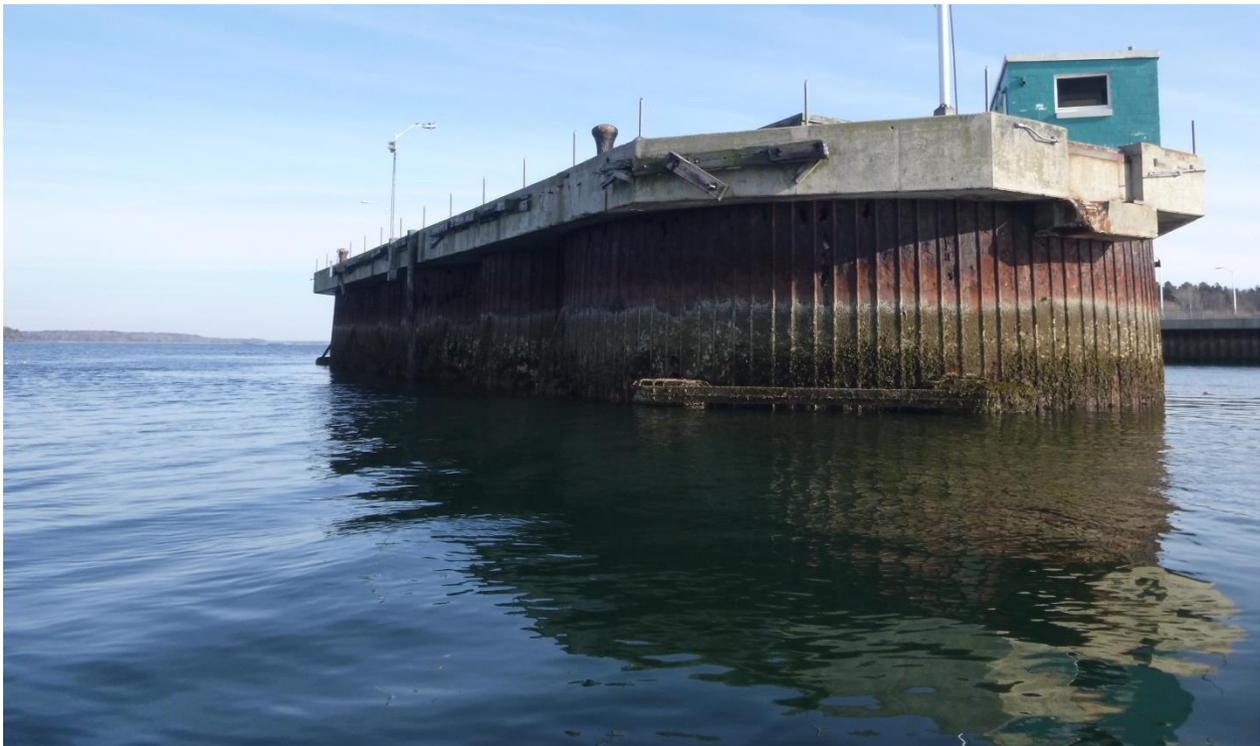


Mitchell Field Pier Removal Plan

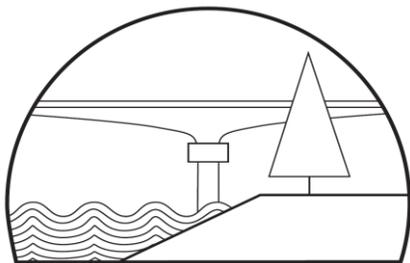
Harpswell, ME

February 28, 2017



Submitted To:

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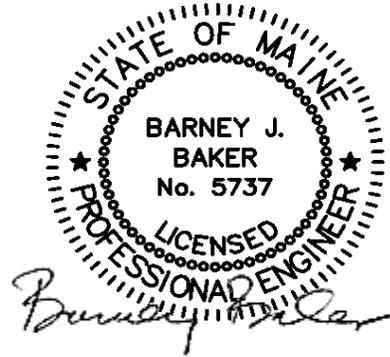


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1. Executive Summary

In December 2016 Baker Design Consultants (BDC) was retained by the Town of Harpswell to develop a detailed program for the demolition of the Mitchell Field Pier. All elements of the pier are in poor condition with the exception of the stone armored Causeway.

BDC was assisted on this project by Little River Land Surveying and TERRACALC for construction estimating. Town staff, the Mitchell Field Committee, regulatory agencies, contractors, material recyclers and suppliers were consulted in preparation for this report.

The report sections begin with background and history of the pier and an accounting of recent component failures. The main body of the report provides the reader with a discussion of options for pier removal, material disposal, shoreside impacts, timeframe for construction and cost for the work.

APPENDIX B-PROJECT DRAWINGS were prepared to define the magnitude and scope of the demolition program. These are based on field inspection, measurement and review of the original Navy plans for the pier. The key parameters that drive the pier demolition program cost and timeframe are regulatory considerations, handling of demolition materials, opportunities for material recycling and the use of upland property at Mitchell Field to support the work activity.

All this information was used to analyze options for pier demolition and material disposal. Leading to the following recommendation:

It is recommended that the Town entertain competitive bids for a pier demolition program that will take approximately 15 months to complete for an estimated cost of \$4.8 to \$4.9 Million dollars with the following attributes.

- The work clears the Mitchell Field waterfront of all functionally obsolete obstructions that are in poor condition. This includes the Mooring Dolphins, Breasting Platform, Approach Pier and Small Boat Dock only. The Causeway is left intact to support existing future access to deep water.
- The demolition program includes removal of pier elements to the seabed with upland disposal as supported by state and federal regulatory agencies.
- Demolition materials are to be transferred ashore at Mitchell Field instead of barged to an offsite location. In this way, handling and transportation costs are kept to a minimum and the opportunity for material recycling and reuse are greatest.
- A Laydown Area on site for stockpiling and processing materials has been configured with a new direct road connector to Causeway construction that segregates the project from other activities at Mitchell Field.

2. Introduction

The Mitchell Field fuel terminal pier facility is now 65 years old. It has been 25 years since the pier was actively used and operated as a fuel terminal. Ownership was transferred to the Town of Harpswell along with the entire Mitchell Field parcel 15 years ago. In the intervening years, no viable rehabilitation or redevelopment program has emerged for the structure. Today, the pier is a rapidly deteriorating relic of the past that serves no function or purpose. The window of opportunity for a controlled demolition of the pier is also rapidly closing. As elements of the structure deteriorate and collapse (North Dolphin-2012, Pump House-2015), the cost of demolition and removal rises.

Removal of the pier will allow safe navigation of the area and will open the door to redevelopment of the waterfront at a scale that complements current recreational use and ongoing plans for a multi-use municipal waterfront.

In December 2016 Baker Design Consultants was retained to prepare a detailed plan for the demolition of the pier that defines the permitting, cost, timeline, construction methodology and articulates the impacts to the Mitchell Field property. This report is the culmination of that work.



Figure 1 –Mitchell Field Property (Pier is in the foreground)

2.a. History and Condition of the Pier

The Mitchell Field property is a 120 acre shorefront parcel that was transferred to the Town of Harpswell in 2001 by the US Navy. The site includes a marine fuel terminal that was constructed by the Navy in the 1950's to serve as a landing for tanker ships and barges delivering fuel destined for Brunswick Naval Air Station. The complementary tank farm on the upland property was removed when the property was transferred to the Town. Today, with the Tanks removed, the property now provides low impact multi-use municipal recreation, development and open space that includes a popular beach area directly south and adjacent to the pier facility. The shorefront north of the pier has been designated as Marine Business District.

Figure 2 and Figure 3 on the next page points out key features of the pier facility and records the rapid deterioration to the structure that occurred between 2012 and 2015.

A Condition Survey of the entire pier was completed in 21Feb2013 by Baker Design Consultants. The survey included an underwater inspection by diver and considered options for repair or removal. None of the multi-million dollar options for removal or replacement presented in that report have been acted on by the Town because of the funding commitment and the need for a development vision and partner that has failed to materialize.

2.b. Task Assignment for Current Study

In December 2016 Baker Design Consultants was retained to prepare a detailed plan for the demolition of the pier that better defines the cost of the project and articulates the impacts on the site for the duration of the project. Specifically, the work has included the following tasks:

- Bathymetric survey of the waters around the pier to confirm water depths.
- A comprehensive review of the original Navy plans to develop an understanding of the pier structure and an appreciation of the magnitude of work required to dismantle the structure.
- Discussion with marine contractors and environmental scientists with experience on similar projects to determine physical and regulatory parameters for a viable demolition program.
- Preparation of a set of preliminary construction drawings to serve as the basis for a detailed materials quantity estimate and probable costs for the work.



Figure 2 – 2011 Mitchell Field Pier Aerial View



Figure 3 – 2015 Mitchell Field Pier Aerial View

2.c. Background Data Collection



Figure 4 –Pump House Removal -2016

A summary list of the background data collection and references used to complete this report is provided below:

2.c.i. Studies and Reports

- “AVGAS & Jet Fuel Storage Facilities Fuel Pier” Plans by Thomas Worcester Inc. Arch. & Engr., Boston, MA, 8/7/1952
- “Rehabilitation of Fuel Pier” Plans by Morrissey-Johnson Consulting Engineers, New York, NY, 1/3/1980
- “Mitchell Field Boat Launch Facility, Feasibility Study and Recommended Layout” by Baker Design Consultants, Yarmouth, ME, 12/29/2011.
- “Inspection of Navy Fuel Pier” by TEC Associates, South Portland, ME, 2/10/2012
- Mitchell Field Pier Condition Assessment, Options for Repair and Demolition” by Baker Design Consultants, Freeport, ME, 2/21/2013.
- Bid Documents for Mitchell Field Pump House Removal; Town of Harpswell-2016

2.c.ii. *Communication*

- Input on construction methodology, costs and permitting has been obtained from the design team and Contractors with respect to a demolition project being undertaken at the Cutler Naval Air Station Facility. This facility is of similar construction to the Mitchell Field Facility.
- Permit discussion has taken place with the environmental coordinator with the Cutler project to confirm permit requirements for the Harpswell Project.
- Regulatory Correspondence between Town of Harpswell, Maine DEP, and US Army Corps of Engineers, provided by the Town, 1/14/2013.
- Marine construction cost support and consultation has been made with the experienced contracting staff of Cianbro Corporation, Prock Marine and Terra Calc.
- Landside disposal of materials has been supported with discussion and input from several sources including Gorham Sand & Gravel, LP Murray & Sons, Ray Labbe & Sons, Triano Waste Services, and Terra Calc.

2.c.iii. *Base Mapping*

- Bathymetric and Topographic Survey of the site was completed by Little River Survey on 1/27/2017 to provide base mapping for the plans prepared for the project.
- Published data from Maine DEP, Maine GIS, FEMA and NOAA was used to supplement field survey and to establish tidal datum, flood elevations and regulatory setbacks.

3. Site Features Impacting Pier Removal Methodology

The following sections review site specific considerations that will impact pier removal methodology and cost.

3.a. Construction Access

Although the pier that extends from the Causeway was originally rated to handle truck traffic, the deterioration of the steel substructure elements is such that the existing pier structures cannot be expected to support any applied loading without first being temporarily braced. For this reason and the points made below, it is assumed that the Approach Viaduct, Breasting Platform and Mooring Platforms will need to be dismantled by barge mounted equipment.

- The Mooring Dolphins are isolated from shore in 40 feet of water at MLW.
- The pile-driving and falsework required to temporarily re-support the Approach Viaduct concrete deck to handle equipment and truck traffic is not believed to be cost effective.
- Without an effective link to shore the Breasting Platform is also isolated.

While there are off-site alternatives for disposal and recycling of pier materials, the most practical option brings materials ashore at the terminus of the Mitchell Field causeway where they is space to stockpile and separate the materials.

3.b. Pier Substructure Condition



Figure 5 –Viaduct Steel Piles- Significant section loss near MLW- 2012 TEC Associates

The substructure steel of all pier elements has been compromised with significant corrosion in the intertidal area. There is no field evidence or legacy plan reference of a cathodic protection system having been used to protect the underwater structure. Sections of the Viaduct (Pump House appendage) and the North Mooring Dolphin have collapsed (see Figure 3 and Figure 6). As shown in Figure 5 on the previous page, the Viaduct pile system has been compromised by significant section loss. The corrosion status of steel sheet pile system used for the Small Boat Dock is less documented, but also thought to be insufficient for any equipment loading.

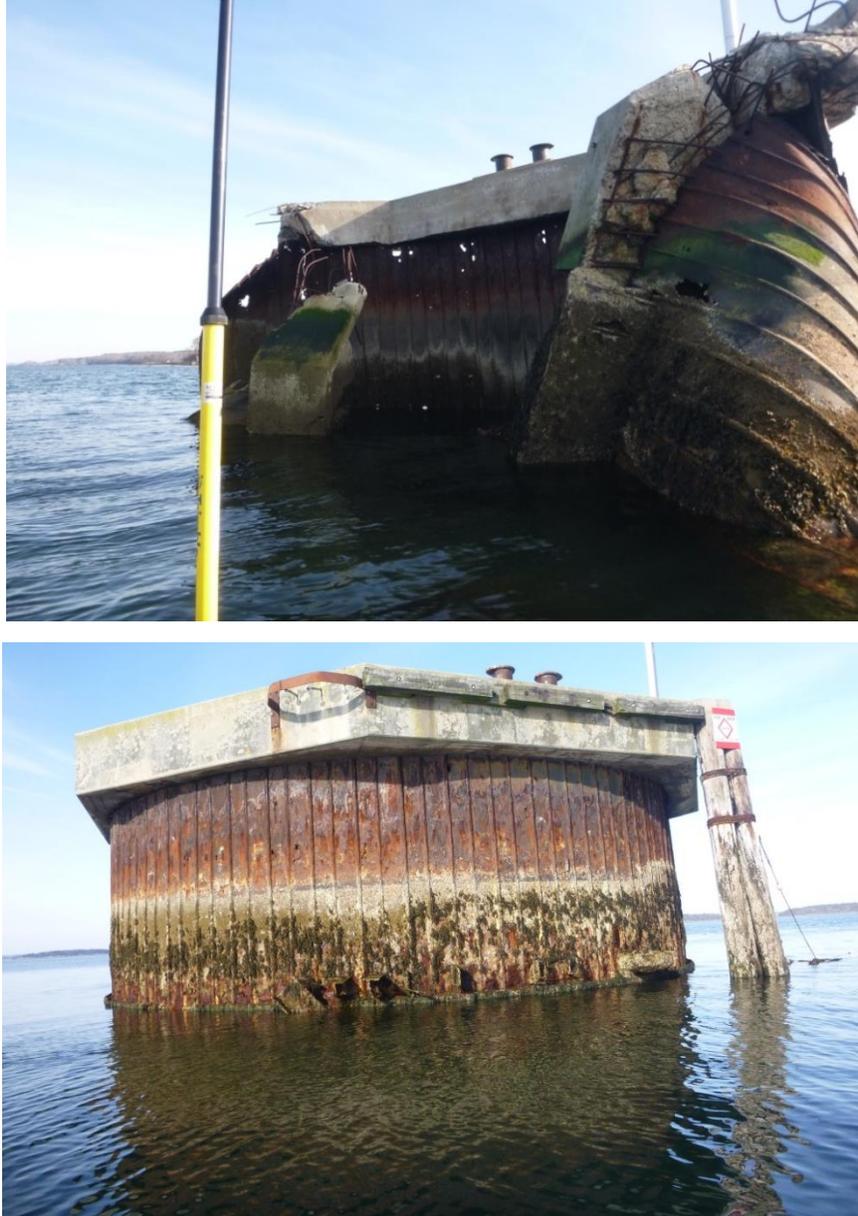


Figure 6 –North and South Mooring Dolphins 1-2017

3.c. Superstructure Condition

The reinforced concrete deck of the Breasting Platforms and the approach Viaduct has been found to be in good condition. However, because of the substructure condition, the respective decks will have to be temporarily supported to support any equipment or work crew activity.



Figure 7 –View of Approach Viaduct and Breasting Platform from Causeway 1-2017



Figure 8 –Approach Viaduct at Breasting Platform Connection from boat 1-2017

3.d. Causeway Connection to Shore

The condition of the Causeway is suitable for truck traffic. The existing track could be widened to provide a passing lane. Currently there is no 3-point turn-around, but it is believed this could be constructed without encroaching into the coastal wetland resource.



Figure 9 –View Along of Causeway from Shore 1-2017



Figure 10 –View towards shore from end of Causeway 1-2017

3.e. Laydown Area/Stockpile Location Options

A Laydown Area is shown on Sheet G-4 located in APPENDIX B-PROJECT DRAWINGS. This location was selected because it is set back from the 250-ft Shoreland Overlay. In this location large truck traffic will have direct access from the Causeway along a route that does not conflict with recreational beach access. This location will require that the Contractor construct a temporary road as shown on Sheet G-4.



Figure 11 –Looking Down slope from proposed Laydown Area 1-2017

4. Processing of Pier Demolition Material

Disposal of the pier at sea is not considered to be a viable solution because of regulatory issues. Therefore the materials will need to be brought ashore. The most cost effective way to effectively dispose of materials will be for the Contractor to separate and provide minimal processing so they can be transferred and recycled or disposed of off-site.

As the material is taken ashore, a stockpile site is needed to handle, separate and process the materials before they are hauled off site. Because the offsite trucking operation can be accomplished faster than the materials can be transferred ashore from a barge, the stockpile area also provides temporary storage and the time needed to accumulate the materials that need to be processed.

Material would be delivered to the Laydown Area by large site trucks from a crane positioned at the end of the Causeway. The materials would then be separated and processed as outline below.

4.a. Material Recycling

The following materials can be recycled and therefore have some value that effectively reduces disposal cost.

- **Ballast Material**- Rock and Gravel fill material from the Breasting Dolphin and Mooring Platform could be crushed and graded in the Laydown Area if the Contractor elected to bring in temporary plant for this operation. Another possibility is one where the material is hauled to another location where a permanent crushing operation is located.
- **Steel** can be recycled, but must be separated from other materials. Loose mangled steel would be taken to the stockpile area, cut into 4-ft sections and stockpiled until it could be transferred to a recycle facility.
- **Steel Sheet-Pile**. The Contractor may be able to stack and bundle the steel sheeting as the pier is dismantled. The bundles could then be loaded onto trucks and hauled directly off site.
- **Steel Pipe Piles** would need to be cut in half to remove any concrete fill and bundled or cut into 4-ft sections.
- **Reinforced Concrete**- The reinforcement would need to be separated from the concrete matrix. The concrete pieces would be brought to the stockpile area. The material would then be chopped and pulverized to separate the steel reinforcement. The reinforcement would be cut into 4-ft lengths and hauled to a recycle facility. The concrete would likely be hauled away, crushed and graded for resale. The equipment to pulverize and crush the concrete would not be

needed for the duration of the project. The operation would be most efficient if the concrete sections were stockpiled at the facility to complete the steel separation and crushing operation efficiently in a short timeframe. The Contractor could be required to do this in a window (say winter) to minimize disruption to other activities at the site.

- **Aluminum-** There are some light poles that can be recycled.
- **Miscellaneous-** Miscellaneous small volume material would include wiring, piping, plastics, that would be recycled or added to the general waste stream.

4.b. Materials that will require disposal at a licensed facility

- **Timber Piles and Fendering-** It is known that fendering was installed on the pier when it was originally constructed and in a 1980 maintenance contract. Some material remains fastened to the pier and some sections are sitting on the seabed. Because the material is treated with preservatives it is classified as a special waste. The Contractor will be required to place the material in dedicated containers on site for transfer to a licensed disposal facility.
- **Asbestos-** While there is no indication that Asbestos is present on the pier a survey will need to be completed by the Contractor prior to construction.

4.c. Items set aside for the Town

The pier has several cast-iron ship bollards and cleats that are in good condition. They would be very expensive to replace and could serve as historical markers at the Mitchell Field site or at other Town locations. The Contractor will be required to carefully remove these and set them aside for the Town.

5. Recommended Demolition Program

Table 1 provides a summary of the options for pier removal considered and parameters that were used to evaluate these options as outlined in this section. Option 2, the recommended demolition program transfers all demolition materials ashore at the Mitchell Field site for initial processing before trucking off site. It is considered the most practical option.

Evaluation Parameter	Demolition Programs Considered			
	OPTION A	OPTION B	OPTION C	OPTION D
	DO NOTHING	ONSITE TRANSFER of demolition material	BARGING demolition material OFFSITE	ARTIFICIAL REEF from demolition material
Cost	MINIMUM Direct Costs (Security, Monitoring). HIDDEN costs reduce desirability of onsite Business Development.	MEDIUM DISPOSAL COST. Maintains all activity on site.	HIGH DISPOSAL COST of Barging demolition material to offsite upland location. Reduces number of Contractors able to bid on the project.	Potential LOW to MEDIUM DISPOSAL COST depends on regulatory permission to leave inert demolition materials on the seabed.
Construction Window	Not Applicable	10 to 15 months	15 to 20 months	6 to 9 months
Regulatory Issues	No apparent regulatory requirement to remove. Abandonment does not reduce Town liability.	MINIMAL Precedent set by MF Pumphouse removal and similar project in Cutler.	MINIMAL Precedent set by MF Pumphouse removal and similar project in Cutler.	EXTENSIVE permitting required with no guarantee of success.
Construction Timing	Removal cost increase with continued deterioration and collapse	Project requires 3 months for permitting final design and competitive Bid once funding is secured	Project requires 3 months for permitting final design and competitive Bid once funding is secured	Permitting could delay project 1- 2 years
Onshore Construction	No Direct Upland Impact	Onsite Crane & Truck Traffic to remove timber, reinforced concrete and steel components.	Onsite Crane & Truck traffic to remove Small Boat Dock. Limited truck traffic.	Onsite Crane & Truck traffic to remove and process timber, reinforced concrete and steel components.
Neighborhood Impacts	Long-term Visual Impact of Derelict Waterfront	Short-term NOISE associated with pier demolition and onsite material processing.	Short-term NOISE associated with pier demolition with limited upland activity.	Short-term NOISE associated with pier demolition and onsite material processing.
Onsite Upland Space Requirements	No Laydown Area Required	ADD designated area and access road in Lower Field for material handling and processing.	Limited material handling near Causeway approach using commercial dumpsters,	Area required for Contractor parking, trailer, portable toilets and service equipment near Causeway approach.
Future Waterfront Development Opportunities	Restricted by liability of activity in vicinity of pier.	Removal of existing pier opens area for boat ramp, municipal landing, mooring field, etc.	Removal of existing pier opens area for boat ramp, municipal landing, mooring field, etc.	Reef would reduce water depth for large commercial vessels/ships.
Secondary Benefits	Minimum Capital Expenditure	-Visual Impact Improved -Boat Ramp Material -Beach Bypass Route -Drainage Improvements	-Visual Impact Improved	-Visual Impact Improved

Table 1 –Summary of Demolition Options Considered

5.a. Material Disposal OPTIONS considered

Options B, C & D all require the use of barge mounted equipment because the condition of the pier structure is such that it will not support any applied loading. (Refer to Section 3.a Construction Access). The difference between these options is how the demolition material disposal is handled.

5.a.i. *OPTION A -Do Nothing*

The Do Nothing option leaves the pier to deteriorate. Eventually the substructure will fail and structure will end up in a tangled mass on the seabed.

In the 15 years that the Town has owned the facility no viable adaptive reuse of the pier has been identified by a development partner. The pier has been closed to any access since the North Dolphin collapsed in 2012.

There has been a cleanup cost associated with this option:

- In 2012 the connecting catwalks were removed and a float boom added at a cost to the Town of several thousand dollars.
- In 2016 the Pump House separated from the Approach Pier and collapsed. Subsequent removal by Prock Marine cost the Town \$86,000 in construction and engineering fees

The pier has now deteriorated to the point where it is no longer practical to be rehabilitated. In its deteriorated state it prevents safe navigation in the waterfront area. As it continues to collapse, the cost to remove it becomes higher as the amount of underwater work increases.

Based on conflicting feedback with the regulatory authorities, it could be argued that there is no well-defined regulatory mandate that requires the Town to remove the pier. However, all agree that removal will make the area safe for navigation. Liability concerns with respect to activity around the dilapidated pier have put a boat launch ramp project on hold and have likely influenced development interests in the adjacent Marine Business District.

5.a.ii. *OPTION B -On site Transfer of Demolition Material*

This is the recommended Option with consideration of the key parameters that drive the pier demolition program. These include regulatory considerations, handling of demolition materials, opportunities for material recycling and the use of upland property at Mitchell Field to support the work activity.

In this option, barges loaded with demolition materials are unloaded using a landside crane positioned at the end of the causeway. This allows pier demolition using crane mounted barges to proceed uninterrupted.

Once the demolition materials are transferred ashore, they are stockpiled in the Laydown Area for separation and processing before being trucked off site. Some materials, such as stone ballast, may not require any Laydown Area processing and could be loaded directly onto waiting trucks from the Causeway crane. Refer to Sheet G-4 PROJECT SCOPE OF WORK located in APPENDIX B-PROJECT DRAWINGS for the proposed location of the Laydown Area. A temporary road is proposed with a direct connection to the Causeway that bypasses the beach area to separate the construction activity from this area.

5.a.iii. *OPTION C -Barging Demolition Material to an Offsite Transfer Facility*

All material with the exception of timber and steel components that can be transferred directly to waiting trucks or placed in a dumpster will be barged to an offsite location. This option minimizes any upland disturbance on the Mitchell Field site but adds the costs of barging the demolition materials to another site where they can be transferred ashore and processed.

The added costs to the project are considerable. A pier demolition project in Cutler Maine is transferring all demolition materials to a facility in Rockland. This requires a 24 hour barge haul. The barge then needs to be offloaded and returned to the site for the next load. It is estimated that a similar requirement for the Mitchell Field project could add \$2 Million to the project cost and delay the project by several months.

5.a.iv. *OPTION D -Creation of an Artificial Reef at the pier site*

There are significant regulatory hurdles associated with the placement of any fill material on the seabed. Regulatory considerations aside, placement of demolition material on the seabed significantly reduces the cost and timeframe required to handle and transfer material. However, applications are rarely successful and no precedent could be found for artificial reef construction in Maine waters.

This option of creating an artificial seabed at the Mitchell Pier Site was originally conceived in the Pier Condition Assessment that was completed by Baker Design Consultants in 2013. The plan was to place inert pier demolition material in a controlled berm at the pier site with the justification that the area had already been disturbed by original pier construction and the berm could enhance the sea life at the site. More recently, the concept of the artificial reef was evaluated by Darcie Couture of Resource Access International, LLC. Based on discussion with regulatory agencies, she concluded that unless the artificial reef could be confined to the current seabed footprint of the pier components, the regulatory authorities are unlikely to issue a permit

for the work. The volume of pier ballast (gravel/stone) is so great, that this provision cannot be achieved. Consequently, seeking approval for a larger impact footprint would require extensive site assessment and regulatory negotiation from which permit approval is unlikely. The potential for added permitting costs and further timeframe delays to the project have effectively eliminated potential cost benefits of this solution.

5.b. Demolition Program Evaluation Criteria

Table 1 –Summary of Demolition Options Considered on page 14 considers the following parameters to evaluate the Options considered. The Table notes are supplemented with additional text below.

5.b.i. Cost

Cost is a key consideration in option selection as the entire project will need to be funded by the Town. In the 15 year period that the Town has owned the Mitchell Field property, a waterfront development partner has never materialized. Town staff has searched diligently for Federal and State funding support for demolition or repair without success for many years. Money is generally available for new development, but not to support demolition of existing facilities.

There is more discussion and detail on Option costs provided in Section 6-Construction Program Cost Estimates located on page 22. Although there are potential savings associated with less material handling requirements for OPTION D-Artificial Reef these would likely be offset by the costs of added site assessment and monitoring. In addition, current regulatory feedback is such that the artificial reef would not likely be permitted by the regulatory agencies.

5.b.ii. Construction Window

The Construction Window is the length of time required to complete the project. For the pier demolition project, it is determined by an evaluation of each construction activity. The critical path of interrelated and consecutive activities will dictate the manpower and equipment that is needed to get the work done within a specified construction window. It is in the Town's interest to set a realistic construction window for the work so that each Contractor bidding on the project will have an opportunity to optimize their work production and schedule based on available equipment and manpower resources.

Restrictions can also be placed on the Construction Window to reduce the shoreside impacts of the project. This should not create a hardship or add significant costs to the pier demolition project because the critical path activity is the slow and methodical

dismantling of the pier by barge mounted equipment. For the pier demolition project, the following restrictions on shoreside activity could be implemented.

- No truck hauling offsite to occur during the spring and fall when roads would typically be posted.
- No processing of reinforced concrete (crushing and pulverizing) during weekends or high use periods during the summer.

A realistic approximation of the production rates of critical path construction items is provided in the Table below. The recommended OPTION B- Transfer of Material Ashore includes Steps I, II and III. Option C (Barging material to an offsite transfer facility) adds Step IV to the work program.

Production Rate Summary		Days	Weeks	Months
Step I Pier Demolition				
	Diver Production	161.7	32	8
	On Site Barge Mounted Crane	239	48	12
Step II Land Based Crane/ Trucking to Laydown Area				
	Trucking Material to Laydown Area	30	6	1
Step III OffSite Transfer to Recycling Facility				
	Trucking Material Offsite	33	7	2
	Onsite Land Cutting Crew	14.7	3	1
Step IV Barging Material Offsite				
	Cumulative Barge Turnaround Time	193.0	39	10

Table 2 –Production Rates

5.b.iii. Regulatory Issues

Based on discussion with regulatory authorities and the precedent set by a similar project in Cutler, Maine, the permitting requirements for Options A and B would be minimal provided all elements of the existing pier were removed to the seabed. Any foundation or pile elements that are currently below the seabed would remain in place. Permits would be required from the following agencies. The recommended solution which transfers materials ashore at the site would also require a Shoreland permit from the Town. The primary permits are listed below.

- | | |
|---------------------------|--|
| NRPA Permit by Rule | Maine Department of Environmental Protection |
| Category 2 Permit | Army Corps of Engineers |
| Navigation Notices | US Coast Guard |
| Shoreland/Building Permit | Town of Harpswell |

More extensive permitting would be required if the work were combined with other development on the waterfront such as the proposed boat ramp.

5.b.iv. Construction Timing

A target project timeline for the recommended solution; Option B that removes the pier and transfers demolition materials ashore through the Mitchell Field site is provided below. The dates provided will need to be adjusted as the project moves forward with input from the Town, Mitchell Field Committee and regulatory agencies.

March 2017	Town Approval
April 2017 to May 2017	Demolition Program Construction Documents
May 2017 to June 2017	Project Permitting
July 2017	Project Bid
August 2017	Construction Contract Award
October 2017	Onsite Construction Startup
December 2018	Onsite Construction Completion (Option B)
April 2018	Onsite Construction Completion (Add for Option C)

5.b.v. Onshore Construction

It is recognized that Mitchell Field is used for a wide variety of activities and that the pier demolition will impact upland use of the site. To minimize these impacts the proposed work plan incorporates the following provisions.

- The Causeway would be closed off from public access. This is needed for construction equipment and access for all Options.
- Any construction activity on site will be subject to Town oversight and communication. The Mitchell Field Committee will be kept informed and consulted.

The Laydown Area associated with Option B will be fenced off and provided with separate road links to the Causeway and to the main site access route. This is intended to segregate construction activity from other site activities. Refer to Sheet G-4 PROJECT SCOPE OF WORK in APPENDIX B-PROJECT DRAWINGS.

5.b.vi. Neighborhood Impacts

Barge mounted construction equipment (crane barge, scow/towing barges, tug and small work boats) will be in operation next to the pier throughout the construction period. Divers will be in the water much of the time. A landside crane will be required at the end of the Causeway to dismantle the Small Boat Dock and transfer materials ashore.

During construction, there will be daily traffic by construction staff, equipment deliveries, service vehicles, etc. A parking area will need to be designated next to the causeway for use by the Contractor.

There will be noise and dust associated with the pulverizing and crushing of concrete in the Laydown Area. This work is not on the critical path and could be relegated to occur before Memorial Day and after Labor Day to avoid conflict with other site activities.

Trucking of materials to locations offsite will occur throughout the project but can be restricted to periods

5.b.vii. Onsite Upland Space Requirements

The Mitchell Field property is unique in that it has large sections of open space that can be used for a construction staging and stockpile area. In addition the Causeway can be reserved for construction traffic only during construction.

In the recommended solution (Option B with demolition material transfer ashore), the Laydown Area is set back from the Shoreland Zone Boundary in an area that is clear of existing buildings. A temporary access road provides a direct connection for construction trucks coming off the causeway.

The amount of space required will ultimately depend on the speed and timeframe required to process the material. To make this work efficient, the Contractor will likely allow material to stockpile before setting up the equipment needed to crush/pulverize the concrete and separate the steel reinforcement. That way the faster time taken for this activity can proceed at its own pace and not be subject to barge crane or diver production rates.

5.b.viii. Future Waterfront Development Opportunities

Removing all elements of the pier seaward of the Causeway from the site opens up the area to safe navigation. The existing Causeway reaches out to deep water and is a good point of access for municipal public waterfront development to serve recreational and fishing interests. A boat ramp design developed for the site could move forward. The Causeway is also able to support any commercial development that occurs onshore.

5.b.ix. Secondary Benefits

This attributes considers the secondary benefits that may occur with pier removal options. As listed below, the recommended solution (Option B) has the greatest potential benefit, but all options that remove the pier will enhance the site.

- Visual Impact- All options that remove the pier will remove a derelict structure from the seascape that will allow for unrestricted views of Broad Sound and islands.
- Retain Existing Abutment- The existing abutment that anchors the approach pier into the Causeway is mostly below grade and thought to be in good condition. This is retained to provide an abutment for future structures that are built at the site at considerable cost savings to these future structures.
- Site Circulation- The temporary access road to the Laydown area can be designed to provide a permanent route that effectively segregates the beach area from other traffic at the waterfront. This increases site safety by separating users and improves the experience of those using the property.
- Site Drainage- When the temporary access road is installed, the Contractor will be required to address existing stormwater runoff that ponds on the site.
- Laydown Area- The Laydown Area could be re-graded as part of the project in anticipation of future development or parking.
- Road Improvements- The volume of truck traffic on the main site road that will occur with Option B will strain an existing asphalt surface which currently shows signs of deferred maintenance. As part of the Construction Budget, an Allowance of \$100,000 has been allocated for cleanup and repairs on the site. This could be used for pavement patching and resurfacing to ensure reinstatement and improvements to the existing roadway infrastructure.
- Recycled pier demolition materials- The boat ramp project requires substantial fill that is likely an appropriate application for the stone ballast material that will come out of the Mooring Dolphins and Breasting Platform. This will not be known until a significant portion of the material is stockpiled as the material may need to be crushed and graded to be suitable.

6. Construction Program Cost Estimates

6.a. Cost Comparison of OPTIONS considered

Table 3 –Program Costs Summary provides a summary of the costs associated with Option A- Do Nothing, Options B- Pier Removal with Onsite Disposal, and Option C- Pier Removal with Barging Offsite. No costs are provided for Option D-Artificial Reef, which is not considered a viable option because of regulatory constraints.

A more detailed estimate for Option B is provided in APPENDIX A- RECOMMENDED PROGRAM COST ESTIMATE.

CONSTRUCTION COMPARISON COSTS BY OPTION		OPTION A	OPTION B	OPTION C
		DO NOTHING	ONSITE TRANSFER of demolition material	BARGING demolition material OFFSITE
MOBILIZATION/GENERAL ITEMS			\$ 562,000	\$ 562,000
Step I -DEMOLITION OF PIER with Barge Mounted Equipment				
	Dismantle BREASTING & MOORING PLATFORMS Place material on barge		\$ 1,873,475	\$ 1,873,475
	Dismantle VIADUCT (Approach Pier) Place material on barge		\$ 651,441	\$ 651,441
Step II -Transfer of Material to shore using Crane on Causeway		Town has historically stabilized or removed pier sections after collapse occurs.		
	Site Preparation and Cleanup		\$ 145,000	\$ 145,000
	Transfer material from Barge to Haul Truck on Causeway		\$ 568,331	\$ 568,331
	Dismantle SMALL BOAT DOCK Direct transfer to truck on Causeway		\$ 176,970	\$ 176,970
Step III -PROCESSING MATERIAL ON SHORE and Transfer to a Recycling Facility			\$ 488,261	\$ 488,261
Step IV -ADDED BARGE HAUL Material Offsite (48hr Turnaround - 24hr Load/Unload, 24hr Steaming)			\$ -	\$ 1,993,346
	2019 Construction Subtotal		\$ 4,465,478	\$ 6,458,824
	Engineering and Contingencies	Unknown	\$ 401,893	\$ 598,728
	Project Total		\$ 4,867,371	\$ 7,057,551

Table 3 –Program Costs Summary by Option

6.b. Opportunities to Reduce the Cost of the project

6.b.i. *Reduction in Scope*

Table 3 –Program Costs Summary by Option on the previous page provide some indication of the separate costs associated with removal of each major pier element. However, the potential costs associated with reducing the scope of the project by eliminating elements of the pier structure would not be cost effective or advised for the following reasons.

- Short-term cost savings would not be in proportion to the reduction in material quantities because of the high Mobilization and setup costs associated with this project.
- Any short-term savings would be offset by the higher long-term costs associated with future structure removal.
- Liability for remaining pier elements would continue even if elements were separated from shore.

6.b.ii. *Combining the work with Other Projects*

There may be opportunities for combining the project with other work or anticipating later construction which may be more realistic when considering available funding and grant participation timeframes. Savings that could result are outlined below.

- Recycled pier demolition materials could be set aside on site to be incorporated in the new construction. For example the boat ramp project requires substantial fill that is likely an appropriate application for the stone ballast material that will come out of the Mooring Dolphins and Breasting Platform.
- Construction Mobilization of Marine Equipment is expensive. Any projects added during pier demolition would benefit from the Mobilization that has already occurred.
- It is unlikely that combining the design development or permitting of new work with the Pier demolition project will have any benefits because the permitting standards for the new structures will be different.

APPENDIX A- RECOMMENDED PROGRAM COST ESTIMATE

Mitchell Field Pier Removal Plan Harpswell, Maine

OPTION B Pier Removal with Onsite Processing of Demolition Material		UNIT	UNIT \$Cost	Quantity	TOTAL COST
GENERAL ITEMS					\$ 562,000
1-1	MOBILIZATION/ DEMOBILIZATION	LS	\$ 400,000	1	\$ 390,000
1-2	BONDS AND INSURANCE	%	3%	4000000	\$ 120,000
1-3	PRE/POST CONSTRUCTION CONDITION SURVEY	EA	\$ 5,500.00	2	\$ 11,000
	EROSION CONTROL ALLOWANCE				
1-4	DEBRIS BOOMS	LF	\$ 20.00	1400.00	\$ 28,000
1-5	LANDSIDE MEASURES	LS	\$ 10,000.00	1	\$ 13,000
Step I -DEMOLITION OF PIER with Barge Mounted Equipment					\$ 2,524,915
	Dismantle BREASTING & MOORING PLATFORMS Place material on barge				\$ 1,873,475
A.1	Gravel/Stone 12-inch minus	CY	\$ 23.30	22257	\$ 518,596
A.2	Rock D50 <3-ft	CY	\$ 47.00	440.00	\$ 20,680
A.3	Boulders D50 >3-ft	CY	\$ 70.00	440.00	\$ 30,800
A.4	Steel Sheet	TONS	\$ 132.00	1050.0	\$ 138,600
	Pipe Pile	TONS	\$ 3,025.00	18.0	\$ 54,450
A.5	Barge Crew (Cutting Piles at LW)	LF	\$ 80.00	1148.00	\$ 91,840
A.6	Dive Team (Cutting Piles at Seal)	LF	\$ 575.00	1529.00	\$ 879,175
A.7	Deck Reinforced Concrete	CY	\$ 90.00	1269.33	\$ 114,240
A.8	Timber Piles and Fendering	CY	\$ 345.00	72.74	\$ 25,094
	Dismantle VIADUCT (Approach Pier) Place material on barge				\$ 651,441
A.9	Steel Pipe piles	TONS	\$ 610.00	303.68	\$ 185,245
A-10	Deck Reinforced Concrete	CY	\$ 550.00	759.41	\$ 417,674
A-11	Timber Piles and Fendering	CY	\$ 380.00	127.69	\$ 48,522
Step II -Transfer of Material to shore using Crane on Causeway					\$ 890,301
	Site Preparation and Cleanup				\$ 145,000
B.1	Laydown Area Preparation	LS	\$ 25,000	1	\$ 25,000
B.2	Haul Road and Drainage	LF	\$ 100.00	200	\$ 20,000
B.3	Site Cleanup and Repair Escrow	LS	\$ 100,000	1	\$ 100,000
	Transfer material from Barge to Haul Truck on Causeway				\$ 568,331
B.4	Gravel/Stone/Rock/Boulders	CY	\$ 18.25	23137	\$ 422,257
B.5	Steel Sheet/Pipe Piles/Handrail (5%)	TONS	\$ 16.35	1440	\$ 23,544
B.6	Deck Reinforced Concrete	CY	\$ 52.00	2029	\$ 105,494
B.7	Timber Piles and Fendering	CY	\$ 85.00	200	\$ 17,036
	Dismantle SMALL BOAT DOCK Direct transfer to truck on Causeway				\$ 176,970
B.8	Gravel/Stone 18-inch minus	CY	\$ 21.30	676	\$ 14,396
B.9	Rock D50 <3-ft	CY	\$ 34.00	55	\$ 1,870
B.10	Boulders D50 >3-ft	CY	\$ 44.00	55	\$ 2,420
B.11	Steel Sheet/Pipe Piles/Handrail	TONS	\$ 170.00	386	\$ 65,658
B.13	Deck Reinforced Concrete	CY	\$ 276.00	310	\$ 85,523
B.14	Timber Piles and Fendering	CY	\$ 133.00	53	\$ 7,103
Step III -PROCESSING MATERIAL ON SHORE and Tranfer to a Recycling Facility					\$ 488,261
C.2	Processing Stone/Gravel	CY	\$ 13.80	23923	\$ 330,140
C.3	Processing Scrap Steel	TONS	\$ 244.00	100	\$ 24,400

Mitchell Field Pier Removal Plan Harpswell, Maine

OPTION B Pier Removal with Onsite Processing of Demolition Material		UNIT	UNIT \$Cost	Quantity	TOTAL COST	
C.4	Processing Reinforced Concrete	CY	\$ 50.00	2339		\$ 116,930
C.5	Processing Timber Debris	TON	\$ 70.00	240		\$ 16,791

		2019 Construction Subtotal	\$	4,465,478
Engineering, Bid Phase, Constructon Oversight, Testing		4%	\$	178,619
Contingency		5%	\$	223,273.88
Construction Complete		2 %/yr Inflation Markup	0.00%	\$ -
		Construction Estimate (Onsite Material Handling)		\$ 4,867,371

OPTION C Add Barging to Offsite Facility		UNIT	UNIT \$Cost	Quantity	TOTAL COST	
Step IV -ADDED BARGE HAUL Material Offsite (48hr Turnaround - 24hr Load/Unload, 24hr Steaming)					\$	1,993,346
D.1	Mobilization/Demobilization for Barge Haul	LS	\$ 25,000	1		\$ 25,000
D.2	Barge Steaming Time- See Note)	Hours	\$ 850.00	2316		\$ 1,968,346
	Deduct 75% Site Preparation and Cleanup	LS	\$ 125,100	-75%		\$ (93,825)

		2019 Construction Subtotal	\$	1,899,521
		Contingency	10%	\$ 196,834.60
Construction Complete		2 %/yr Inflation Markup	0.00%	\$ -
		Construction Estimate (Onsite Material Handling)		\$ 2,096,356

Notes

- STEP IV Barge Haul Only includes Steaming Time- Load/Unload time factored in Steps I & II

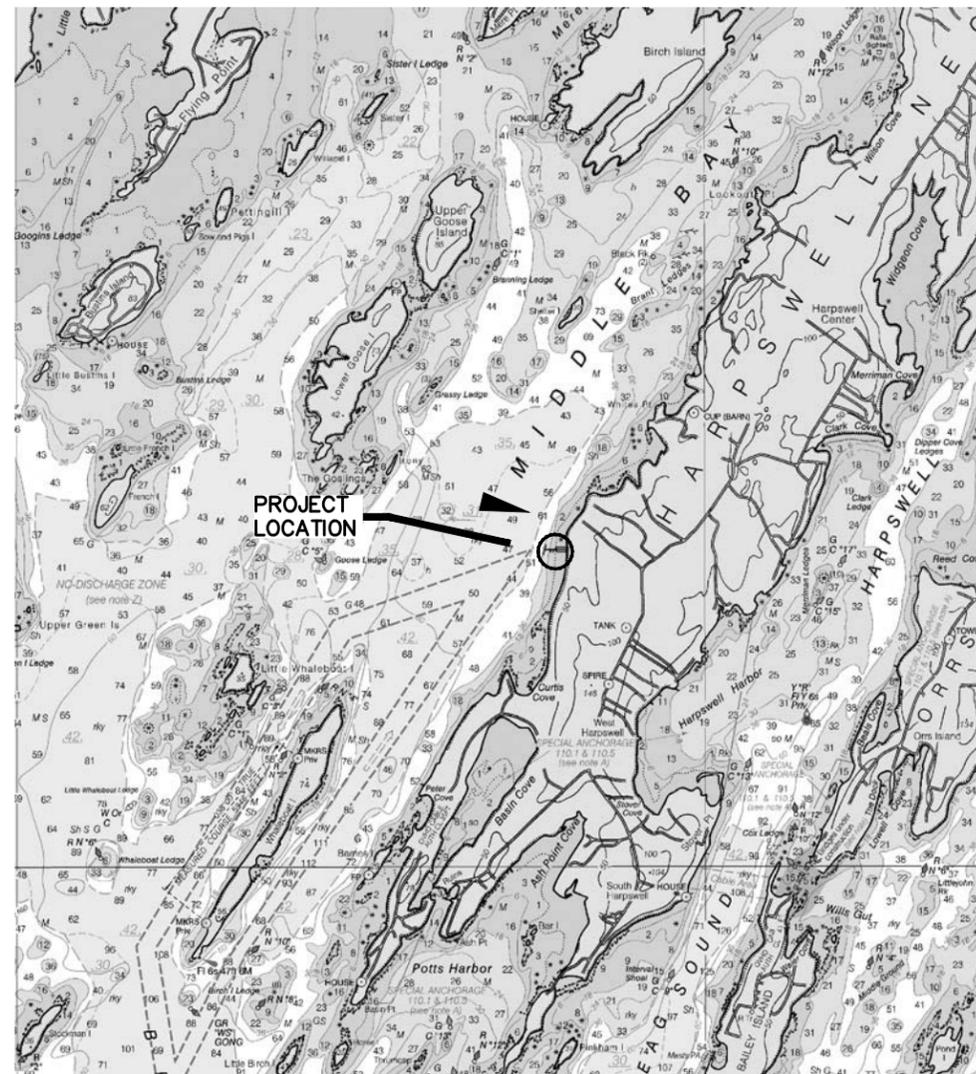
APPENDIX B-PROJECT DRAWINGS

- G-1 COVERSHEET
- G-2 NOTES & SCHEDULES
- G-3 BID ITEM SCHEDULE
- G-4 PROJECT SCOPE OF WORK

- C-1 PIER DEMOLITION PLAN
- C-2 MOORING AND FUEL PLATFORMS
- C-3 APPROACH PIER (VIADUCT)
- C-4 SMALL BOAT DOCK
- C-5 EMBANKMENT RIPRAP REPAIR
- C-6 EROSION CONTROL DETAIL
- C-7 ABUTMENT SECTIONS

MITCHELL FIELD PIER REMOVAL

HARPSWELL, MAINE
PROJECT NO. 16-70

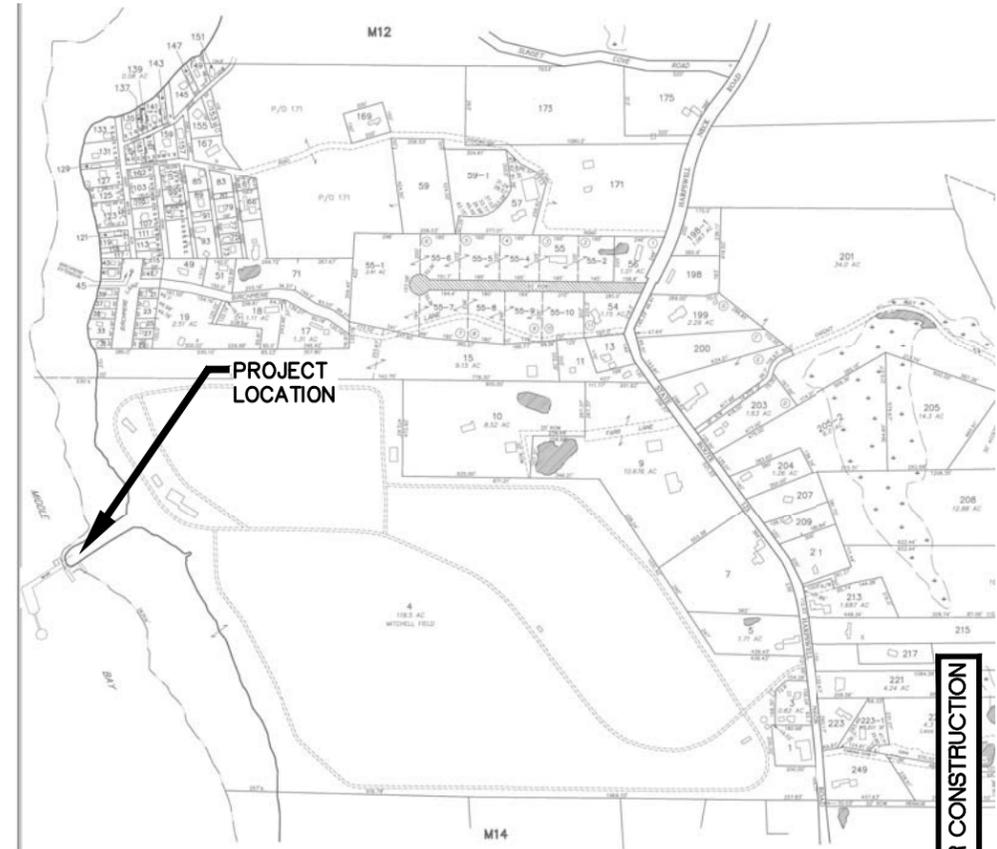


USGS LOCATION MAP



INDEX OF SHEETS

SHEET NO.	DESCRIPTION
G-1	COVERSHEET
G-2	NOTES & SCHEDULES
G-3	BID ITEM SCHEDULE
G-4	PROJECT SCOPE OF WORK
C-1	PIER DEMOLITION PLAN
C-2	MOORING AND FUEL PLATFORMS
C-3	APPROACH PIER (VIADUCT)
C-4	SMALL BOAT DOCK
C-5	EMBANKMENT RIPRAP REPAIR
C-6	EROSION CONTROL DETAIL
C-7	ABUTMENT SECTIONS



TAX MAP #13



NOT FOR CONSTRUCTION

PRELIMINARY FOR REVIEW ONLY

PROPERTY INFORMATION

OWNER: TOWN OF HARPSWELL
ADDRESS: PO BOX 39
HARPSWELL, ME 04079
MAP/LOT: 13-04
ZONING: SOD-SHORELAND OVERLAY ZONE
MFMB- MITCHELL FIELD MARINE BUSINESS
SETBACKS: NO CHANGE

NO.	DATE	DESCRIPTION
BUB	01.10.17	PROGRESS REVIEW SET
BUB	01.05.17	PROGRESS REVIEW SET
BUB	12.30.16	PROGRESS REVIEW
INT.		SUBMISSION



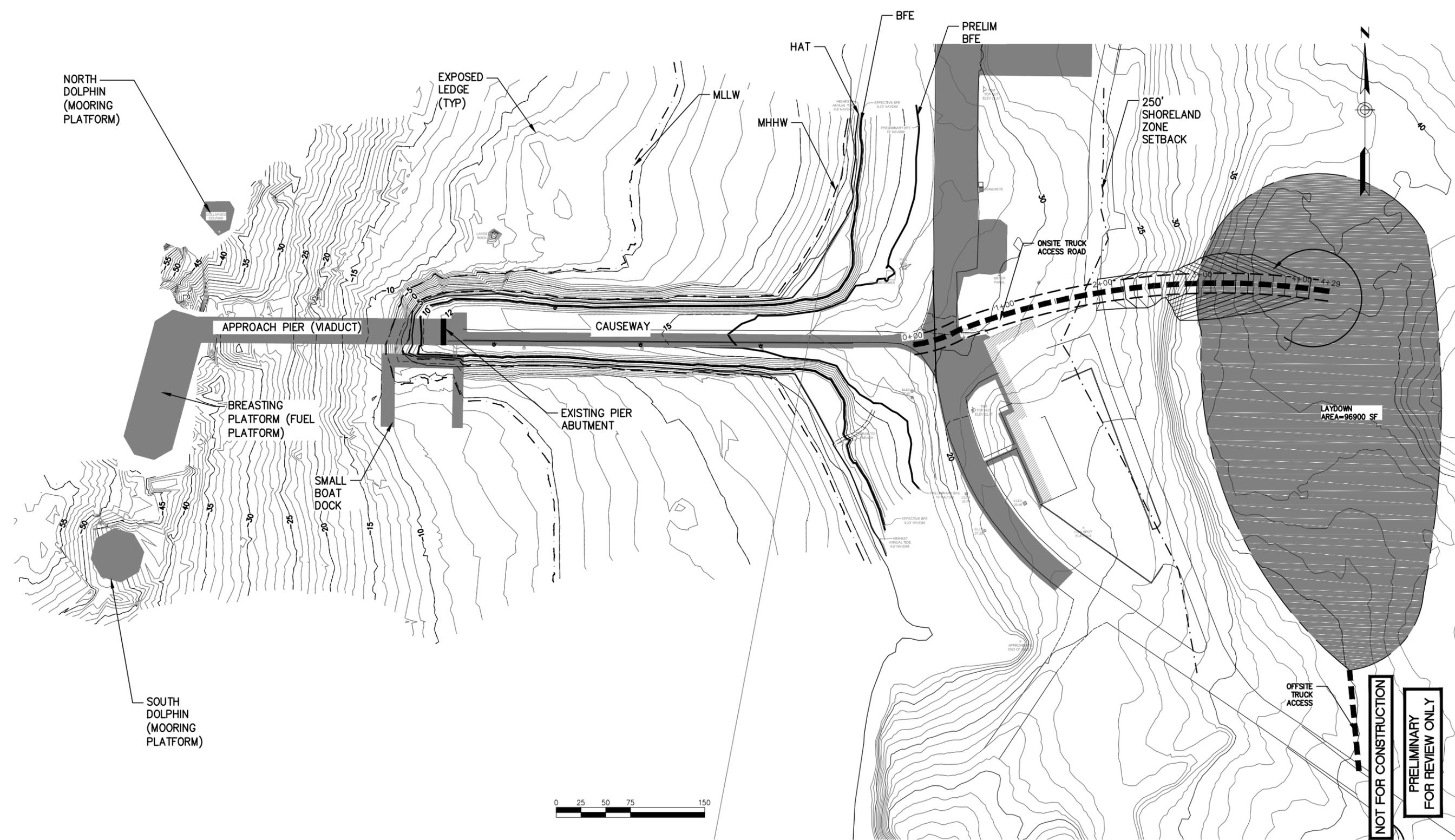
DESIGNED BY: BUB
DRAWN BY: SRD
CHECKED BY: BUB
SCALE: AS SHOWN

SHEET TITLE: **COVERSHEET**
PROJECT: TOWN OF HARPSWELL
MITCHELL FIELD PIER REMOVAL
Harpswell, Maine

DATE: December 2016
CONTRACT NO.: 16-70

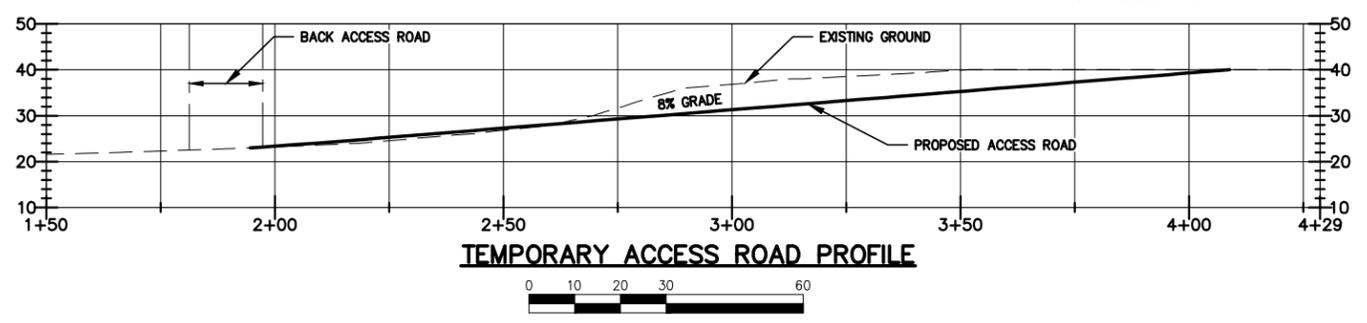
SHEET NO. **G-1** REV. **C**

\\bdc-srv\projects\16\16-70 mitchell field pier removal\cad\16-70 mitchell field pier removal civil 3d.dwg 2/28/2017



LEGEND

[Symbol]	BUILDING
[Symbol]	PAVEMENT
[Symbol]	CONTOURS - MAJOR
[Symbol]	CONTOURS - MINOR
[Symbol]	PIER POLE LIGHT
[Symbol]	CATCH BASIN
[Symbol]	SANITARY SEWER STRUCTURE
[Symbol]	UTILITY POLE AND ANCHOR
[Symbol]	SHUTOFF VALVE
[Symbol]	HYDRANT
[Symbol]	MONITORING WELL



SCOPE OF WORK

NO.	TASK	SHEET REF.
1	CONSTRUCT LAYDOWN AREA AND ACCESS ROAD. INSTALL EROSION CONTROL. SET LANDSIDE CRANE.	G-4,C-1
2	REMOVE BREASTING PLATFORM AND MOORING PLATFORMS TO TREME SEAL (CELL CORE). TREME SEAL CAN BE LEFT IN PLACE	C-1, C-2
3	REMOVE APPROACH PIER TO MUDLINE	C-1, C-3
4	REMOVE SMALL BOAT DOCK TO 2-FT BELOW GROUND ELEVATION	C-1, C-4
5	REINSTATE RIPRAP SLOPE	C-1, C-5
6	PREPARE ABUTMENT FOR FUTURE WORK	C-1, C-6
7	SITE CLEANUP	C-2

NOT FOR CONSTRUCTION
PRELIMINARY FOR REVIEW ONLY

BAKER DESIGN CONSULTANTS
Civil, Marine, and Structural Engineering
7 Spruce Road • Freeport • Maine • 04032 • 207-866-9724 • info@bakerdcs.com

DESIGNED BY:	BJB
DRAWN BY:	SRD
CHECKED BY:	BJB
SCALE:	AS SHOWN

STATE OF MAINE
BARNEY J. BAKER
No. 5737
LICENSED PROFESSIONAL ENGINEER

PROJECT SCOPE OF WORK
Town of Harpswell
MITCHELL FIELD PIER REMOVAL
Harpswell, Maine

DATE	DEC 2016
CONTRACT NO.	16-70
SHEET NO.	G-4
REV.	C

PROGRESS REVIEW SET	01.10.17	BJB	INT.
PROGRESS REVIEW SET	01.05.17	BJB	INT.
PROGRESS REVIEW	12.30.16	BJB	INT.
SUBMISSION			

GENERAL NOTES

1. THE CONTRACTOR SHALL BE GOVERNED BY THE CONSTRUCTION SAFETY RULES AS ADOPTED BY THE STATE BOARD OF CONSTRUCTION SAFETY, AUGUSTA, MAINE.
2. THE PROJECT IS SUBJECT TO THE SAFETY AND HEALTH REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) AS PROMULGATED BY THE US DEPARTMENT OF LABOR.
3. ALL PAVED AREAS DISTURBED SHALL BE PATCHED WITH BITUMINOUS UNLESS OTHERWISE SPECIFIED.
4. ALL NON-PAVED AREAS DISTURBED DURING CONSTRUCTION SHALL BE LOAMED, SEEDED, FERTILIZED AND MULCHED UNLESS OTHERWISE DIRECTED BY THE OWNER OR THEIR REPRESENTATIVE.
5. THE CONTRACTOR SHALL INCLUDE IN THEIR BID, COSTS FOR COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATORY REQUIREMENTS.
6. THE CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF ALL CONSTRUCTION DEBRIS AT AN APPROVED FACILITY IN ACCORDANCE WITH ALL APPLICABLE LOCAL STATE AND FEDERAL REGULATORY REQUIREMENTS.

CONSTRUCTION SEQUENCE & COORDINATION

1. SCHEDULE FOR ALL CONSTRUCTION ACTIVITIES SHALL BE COORDINATED WITH THE TOWN OF HARPSWELL SO AS TO MINIMIZE IMPACT TO MITCHELL FIELD ACTIVITIES.
2. THE CONTRACTOR MAY RESTRICT UNAUTHORIZED ACCESS TO THE CAUSEWAY DURING CONSTRUCTION.
3. PARKING AND LAYDOWN AREAS TO BE COORDINATED WITH THE TOWN OF HARPSWELL.

EROSION CONTROL NOTES

1. APPLICATION OF TEMPORARY AND PERMANENT EROSION CONTROL MEASURES FOR THE PROJECT SHALL BE IN ACCORDANCE WITH PROCEDURES AND SPECIFICATIONS OF THE CURRENT MAINE EROSION AND SEDIMENT CONTROL HANDBOOK FOR CONSTRUCTION; BEST MANAGEMENT PRACTICES.
2. SILTATION FENCE SHALL BE INSTALLED BEFORE ANY UPLAND EXCAVATION TAKES PLACE.
3. INSTALL EROSION CONTROL MESH ON ALL PROPOSED SLOPES 2:1 OR STEEPER, UNLESS SHOWN OR NOTED OTHERWISE.
4. ALL EROSION CONTROL MEASURES, SEEDING AND MULCHING SHALL BE INSPECTED WEEKLY, AFTER RAINSTORMS AND DURING RUNOFF EVENTS. ALL MEASURES SHALL BE REPAIRED OR REPLACED WHEN NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION OR DAMAGE.
5. SEEDED AND MULCHED AREAS SHALL BE MAINTAINED UNTIL FINAL ACCEPTANCE OF THE WORK
6. TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED UPON COMPLETION OF GRADING OPERATIONS AND ESTABLISHMENT OF ACCEPTABLE GROUND COVER.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING EROSION CONTROL MEASURES DURING CONSTRUCTION.

UTILITY NOTES

1. NO DISRUPTION TO THE EXISTING UTILITIES ADJACENT THE PROJECT SITE SHALL BE ALLOWED DURING CONSTRUCTION.
2. ANY TEMPORARY ELECTRIC SERVICE, IF REQUIRED DURING THE DURATION OF CONSTRUCTION, IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE CONTRACTOR SHALL NOT MAKE ANY OPENING OR EXCAVATION WITHIN THE PROJECT AREA UNTIL CONTACT HAS BEEN MADE WITH 'DIG SAFE' AND ALL UTILITIES TO LOCATE ANY EXISTING POWER, TELEPHONE, CABLE TV, WATER OR OTHER UNDERGROUND SERVICES.
4. THE UTILITY LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE AND ARE PROVIDED AS A GUIDE TO THE CONTRACTOR. NO GUARANTEE IS MADE THAT UTILITIES WILL BE ENCOUNTERED WHERE SHOWN OR THAT ALL UTILITIES ARE SHOWN. THE CONTRACTOR SHALL VERIFY ALL LOCATIONS IN THE FIELD AND BE RESPONSIBLE FOR REPAIR OF UTILITIES DISTURBED DURING CONSTRUCTION.

DEMOLITION NOTES

GENERAL SCOPE

1. THE CONTRACTOR IS RESPONSIBLE FOR DEMOLITION AND REMOVAL OF ALL EXISTING PIER COMPONENTS FROM THE SITE THAT ARE NOT SPECIFIED FOR REUSE OR SELECTED FOR RETAINAGE BY THE OWNER.
2. AT THE COMPLETION OF WORK ON SITE, THE DISTURBED PIER FOOTPRINT AREA SHALL BE CLEARED OF ALL DEBRIS AND 'LEVELED' WITH A STEEL BEAM TO ENSURE A STABLE SURFACE FREE OF PROTRUDING ELEMENTS.
3. DISPOSAL OF ALL MATERIALS REMOVED FROM THE SITE SHALL BE AT AN APPROVED FACILITY IN ACCORDANCE WITH ALL APPLICABLE REGULATORY REQUIREMENTS.

MEANS AND METHODS

4. THE CONTRACTOR IS RESPONSIBLE FOR DEMOLITION PLANNING AND EXECUTION IN A SAFE MANNER.
5. IT IS RECOGNIZED THAT THE EXISTING FACILITY IS IN POOR CONDITION WITH SOME ELEMENTS OF THE STRUCTURE HAVING COLLAPSED.
6. THE PROJECT PLANS AND SPECIFICATIONS AND LEGACY MATERIALS ARE PROVIDED FOR REFERENCE AND GUIDANCE.

SEABED IMPACTS

7. IT IS RECOGNIZED THAT THE PROJECT CANNOT BE COMPLETED WITHOUT IMPACTING THE SEABED WITHIN THE AREA OF THE EXISTING PIER.
8. THE PIER FOOTPRINT AND PERIMETER AREAS DISTURBED DURING THE DEMOLITION SHALL BE SUBJECT TO A PRE AND POST CONSTRUCTION DIVE INSPECTION TO ENSURE THAT ALL STEEL AND CONCRETE DEBRIS HAS BEEN REMOVED AND THE AREA GRADED TO MATCH EXISTING SURROUNDING CONTOUR ELEVATIONS.

SURVEY & DATUM NOTES

1. ALL ELEVATIONS PROVIDED ON THE PLANS ARE TO NGVD29 DATUM UNLESS OTHERWISE NOTED.
2. PLANIMETRICS, TOPOGRAPHY, AND BATHYMETRIC SURVEY TAKEN FROM NAVY LEGACY DRAWINGS AND SUPPLEMENTED AS NOTED ON THE PLANS.
3. BASE FLOOD/TIDAL INFORMATION TAKEN FROM MEDEP, FEMA AND NOAA PUBLISHED DATA FOR PORTLAND.

ELEVATION	CHART (ft)	NAVD88 (ft)	Notes
FEMA Base Flood	14.50	9.25	FEMA Zone A3
Highest Annual Tide	11.70	6.45	2016 MEDEP Predictions
MHHW	9.91	4.66	BASED ON NOAA TIDAL BM 8418150 "Portland"
MHW	9.45	4.20	
NAVD88	5.25	0.00	
NGVD29	4.50		
MLW	0.34	-4.91	
MLLW	0.00	-5.25	

***REFERENCE DOCUMENTS**

1. LEGACY PLANS: DEPARTMENT OF NAVY, BUREAU OF YARDS & DOCKS, JOB NO. 572, 1952, SPEC 31260, THOMAS WORCESTER INC. - ARCH. & ENGR.
2. REFER TO BAKER DESIGN CONSULTANTS DROPBOX ACCOUNT LINK <https://www.dropbox.com/s/zx02txqddqsxhgg/16-70%20LEGACY%20PLANS%20MASTER%20SETGS.PDF?dl=0> FOR LEGACY PLANS OF THE PROJECT.
3. SEE LEGACY PLAN TABLE OF CONTENTS AND GUIDANCE SCHEDULE THIS SHEET.

LEGACY PLANS TABLE OF CONTENTS

SHEET TITLE	PAGE NO.	DRAWING NO.	NOTES
AREA AND SOUNDING PLAN	127	573122	GENERAL PLAN - BATHYMETRY
PLOT PLAN	128	573123	GENERAL PLAN - LAYOUT
BORING LOGS E100 & E150 LINES	129	573124	BORING LOG 1 OF 2
BORING LOGS N4000, E200, E250, & E300 LINES	130	573125	BORING LOG 2 OF 2
DREDGING PLAN	131	573126	GENERAL PLAN - FOUNDATION CONDITIONS
FOUNDATION PLAN	132	573127	
FUEL PLATFORM	133	573128	FUEL PLATFORM
MOORING PLATFORM	134	573129	
CATWALK PLAN & DETAILS	135	573130	**CATWALKS HAVE BEEN REMOVED FROM THE STRUCTURE
FENDER SYSTEM	136	573131	
FENDER & BOLLARD, BITT, CLEAT DETAILS	137	573132	
VIADUCT FOUNDATION PLAN	138	573133	VIADUCT
VIADUCT FRAMING PLAN	139	573134	VIADUCT
VIADUCT DETAILS	140	573135	VIADUCT
FIRE PUMP HOUSE	141	573136	**PUMP HOUSE (REMOVED IN 2016)
FIRE PUMP HOUSE	142	573137	**PUMP HOUSE (REMOVED IN 2016)
SMALL BOAT DOCK FOUNDATION PLAN	143	573138	SMALL BOAT DOCK
SMALL BOAT DOCK PLAN & DETAILS	144	573546	
SMALL BOAT DOCK DETAILS	145	573547	
SMALL BOAT DOCK DETAILS	146	573548	
STRIPPER PUMP PIT	147	573142	
CHECKER HOUSE	148	573143	
HOSE RACK	149	573144	
CAUSEWAY APPROACH & PLAN PROFILE	150	573145	
CAUSEWAY APPROACH DETAILS	151	573146	
FIRE PUMP HOUSE (MECHANICAL)	152	573147	MECHANICAL
STRIPPER PUMP PIT (MECHANICAL)	153	573148	MECHANICAL
PIER PIPING & DETAILS	154	573149	MECHANICAL
PIER PIPING DETAILS	155	573150	MECHANICAL
FUEL PIER LAYOUT PLAN	156	573151	ELECTRICAL
GROUNDING DETAILS	157	573152	ELECTRICAL
FIRE PUMP HOUSE (ELECTRICAL)	158	573153	ELECTRICAL
CHECKER HOUSE AND STRIPPER PUMP PIT (ELECTRICAL)	159	573154	ELECTRICAL
SMALL BOAT DOCK PROFILES	160	573155	

LEGACY PLAN GUIDANCE

ITEM	THIS SET	SHEET		NOTES
		LEGACY PLANS		
		PAGE NO.	DRAWING NO.	
SITE PLAN				
GENERAL	C-1	127	573122	AREA AND SOUNDING PLAN
		128	573123	SITE
NORTH DOLPHIN (MOORING PLATFORM)				
PLAN	C-2	132	573127	
ELEVATION	C-2	132	573127	
DETAIL	N/A	134	573129	DECK PLAN; REINFORCEMENT PLAN
FENDERING	C-2	136	573131	PLAN
		137	573132	DETAIL
SOUTH DOLPHIN (MOORING PLATFORM)				
PLAN	C-2	132	573127	
ELEVATION	C-2	132	573127	
DETAIL	N/A	134	573129	DECK PLAN; REINFORCEMENT PLAN
FENDERING	C-2	136	573131	DETAIL
		137	573132	DETAIL
BREASTING PLATFORM (FUELING PIER)				
PLAN	C-2	132	573127	
ELEVATION	C-2	132	573127	
DETAIL	N/A	133	573128	DECK PLAN; REINFORCEMENT PLAN
FENDERING	C-2	136	573131	PLAN
		137	573132	DETAIL
APPROACH PIER (VIADUCT)				
PLAN	C-3	138	573133	PILE PLAN
ELEVATION	C-3	139	573134	FRAMING PLAN
		138	573133	PILE DETAIL
DETAIL	N/A	139	573134	REINFORCEMENT DETAIL
		140	573135	REINFORCEMENT DETAIL
RIPRAP	C-5		N/A	
SMALL BOAT DOCK				
PLAN	C-4	143	573138	PILE PLAN
ELEVATION		144	573546	DECK AND FRAMING PLAN
		143	573138	SHEET PILE DETAIL
DETAIL	N/A	144	573546	FRAMING DETAIL; MAIN FLOAT DECK PLAN
		145	573547	SHEET PILE DETAIL; FENDERING DETAIL; GANGWAY DETAIL
		146	573548	FRAMING DETAIL
UTILITIES				
	N/A	154	573149	PIER PIPING PLAN; DETAILS
		155	573150	PIER PIPING DETAILS
		156	573151	ELECTRICAL PLAN; DETAILS
		157	573152	GROUNDING DETAILS
BORING LOGS				
	N/A	129	573124	
		130	573125	

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DESIGNED BY: BUB

DRAWN BY: SRD

CHECKED BY: BUB

SCALE: AS SHOWN

SHEET TITLE: NOTES AND SCHEDULES

PROJECT: TOWN OF HARPSWELL
MITCHELL FIELD PIER REMOVAL
Harpowell, Maine

DATE: December 2016

CONTRACT NO.: 16-70

SHEET NO. G-2

REV. C

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Mitchell Field Pier Removal Quantity Estimate			PIER SECTION	North DOLPHIN (MOORING PLATFORM)	South DOLPHIN (MOORING PLATFORM)	BREASTING (FUEL) PLATFORM	APPROACH PIER (VIADUCT)	SMALL BOAT DOCK	QUANTITY TOTAL	UNIT	
ITEM	DESCRIPTION	UNIT	Notes	QTY	QTY	QTY	QTY	QTY	QTY	UNIT	
DEMOLITION ITEMS											
1-1	MOBILIZATION/ DEMOBILIZATION	LS				1				1	LS
EROSION CONTROL											
1-2	DEBRIS BOOMS	LF				1400				1400	LF
1-3	LANDSIDE MEASURES	LS				1				1	LS
BARGE WORK											
BALLAST MATERIAL REMOVAL											
2-2.1	SELECTED GRAVEL FROM CELL	CY		960.1	960.1	3010.2	0	614		5545	CY
2-2.2	SELECTED ROCK OR GRAVEL FROM CELL	CY		2976.4	2790.5	8922.2	0	0		14689	CY
2-2.3	CLASS B ROCK RETRIEVAL FROM SEABED	CY		100	100	100	100	50		450	CY
2-2.4	CLASS A ROCK SALVAGE FOR CAUSEWAY RIPRAP	CY		100	100	100	100	50		450	CY
SEABED CLEANUP											
2-3	REINSTATEMENT OF THE SEABED	SY				4555.6				4556	SY
2-4	MISC. TIMBER	MBF		0.0	0.0	0.0	0	0		0.0	MBF
2-5	MISC. STEEL (NON-SHEET PILE ELEMENTS)	TON		0.0	0.0	0.0	0	0		0.0	TON
CAUSEWAY REPAIR											
2-6	CLASS A ROCK	SF		0	0	0	2000	0		2000	SF
REINFORCED CONCRETE											
3-1	CELL CORE (Tremie Seal)	CY		588.5	247.8	1130.1	0	0		1966	CY
3-2	DECK	Avg T (ft)		2.5	2.5	2.5	3.0	3			
TIMBER ELEMENTS DISMANTLE/REMOVAL											
4-1	LADDERS*	EA		0	0	1	0	0		1	EA
4-2	FENDERING*	MBF		0.35	1.0	2.5	0.72	1.1	6	6	MBF
4-3	PILES*	LF	TOTAL LF	120	80	200	1056	396		1852	LF
STEEL ELEMENTS DISMANTLE/REMOVAL											
5-1	RAILING	LF		0	0	314.0	487.3	221.7		1023	LF
5-2	PILES PIPE 10STD (BRACING) Approach Pier	TON	TOTAL TON	0	0	0	Per PILE TABLE	0	19	19	TON
		LF	TOTAL LF	0	0	0	925.2	0		925	LF
5-3	PILES PIPE 14STD (CONCRETE FILLED) Breasting Platform Interior	TON	TOTAL TON	0	0	76.13	0	0	76	76	TON
		LF	TOTAL LF	0	0	732	0	0		732	LF
5-4	PILES PIPE 14STD (CONCRETE FILLED) Approach Pier	TON	TOTAL TON	0	0	0	303.7	0	304	304	TON
		LF	TOTAL LF	0	0	0	2920	0		2920	LF
5-5	PILES 15"x3/8"x35 PLF SHEET PILES -"UNIT A" Dolphins and Breasting Platform	LF	TOTAL LF	8236.0	7656.0	19008	0	0		34900	LF
		TON	TOTAL TON	144.1	134.0	332.6	0	0	611		611
5-6	PILES 15"x1/2"x40 PLF SHEET PILES -"UNIT B" Breasting Platform Connectors	LF	TOTAL LF	0	0	7656	0	0		7656	LF
		TON	TOTAL TON	0	0	153.12	0	0	153		153
5-7	PILES 16"x3/8"x42.7 PLF SHEET PILES -"UNIT D" Small Boat Dock	LF	TOTAL LF	0	0	0	0	18090		18090	LF
		TON	TOTAL TON	0	0	0	0	386.2	386		386
PROTECTED ELEMENTS (REMOVE AND SET ASIDE FOR TOWN USE)											
6-1	BOLLARDS	EA		1	1	2	0	0		4	EA
6-2	CAST IRON CLEAT	EA		0	0	6	0	5		11	EA
6-3	DOUBLE BITT	EA		1	1	2	0	0		4	EA
6-4	VIADUCT/CAUSEWAY ABUTMENT	LS		0	0	0	1	0		1	LS
UTILITIES REMOVAL											
7-1	LIGHT POSTS	EA		1	1	2	2	0		6	EA
7-2	CONDUIT CABLE	LF		0	0	0	0	0		0	LF
7-3	PIPING	LF		0	0	0	0	0		0	LF

- BOLDED ITEMS ARE TO BE USED IN TOTAL QUANTITY/BUDGET ESTIMATES. ITEMS IN GREY ARE PROVIDED FOR REFERENCE AND ARE NOT INCLUDED IN TOTAL ESTIMATES.
- *LADDER, FENDERING, AND PILE DIMENSIONS/QUANTITIES HAVE BEEN ESTIMATED BASED UPON VISUAL INSPECTION OF EXISTING PIER SECTION CONDITIONS. FENDERING AND PILE DETAILS IN THE US NAVY LEGACY PLANS ARE VOIDED, AND DO NOT REPRESENT CURRENT FENDERING CONDITIONS AT THE SITE.

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SCALE:	AS SHOWN

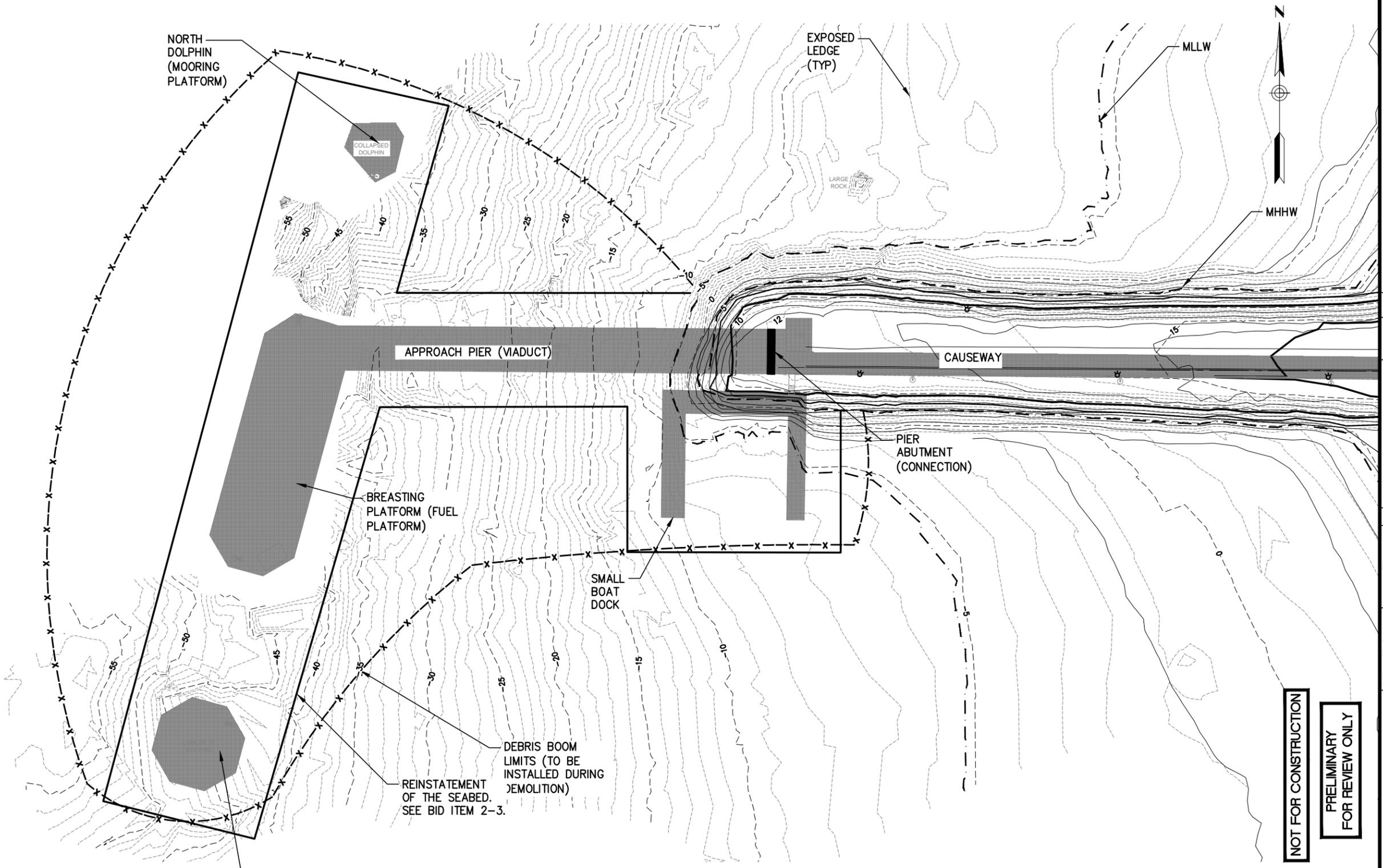


PROGRESS REVIEW SET	01.10.17	BUB
PROGRESS REVIEW SET	01.05.17	BUB
PROGRESS REVIEW SUBMISSION	12.30.16	BUB
NO.	DATE	INT.

SHEET TITLE:	BID ITEM SCHEDULE
PROJECT:	TOWN OF HARPSWELL MITCHELL FIELD PIER REMOVAL
DATE:	December 2016
CONTRACT NO.:	16-70
SHEET NO.:	9-3
REV.:	C

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LEGEND

	BUILDING
	PAVEMENT
	CONTOURS - MAJOR
	CONTOURS - MINOR
	PIER POLE LIGHT
	CATCH BASIN
	SANITARY SEWER STRUCTURE
	UTILITY POLE AND ANCHOR
	SHUTOFF VALVE
	HYDRANT
	MONITORING WELL

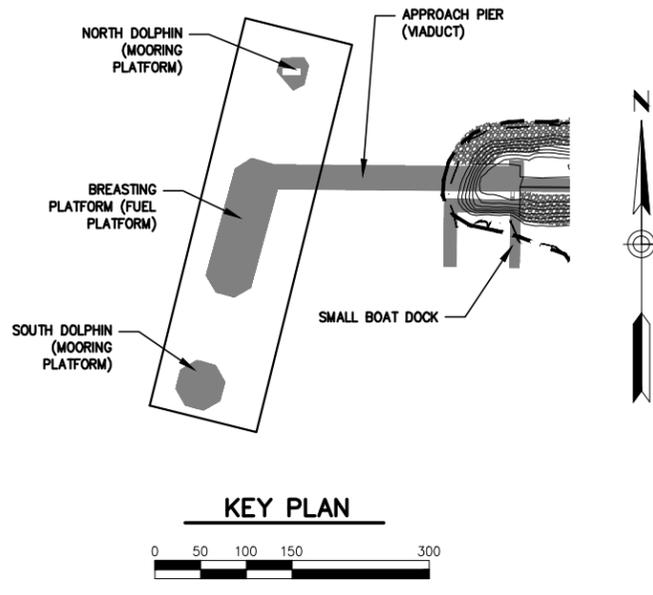
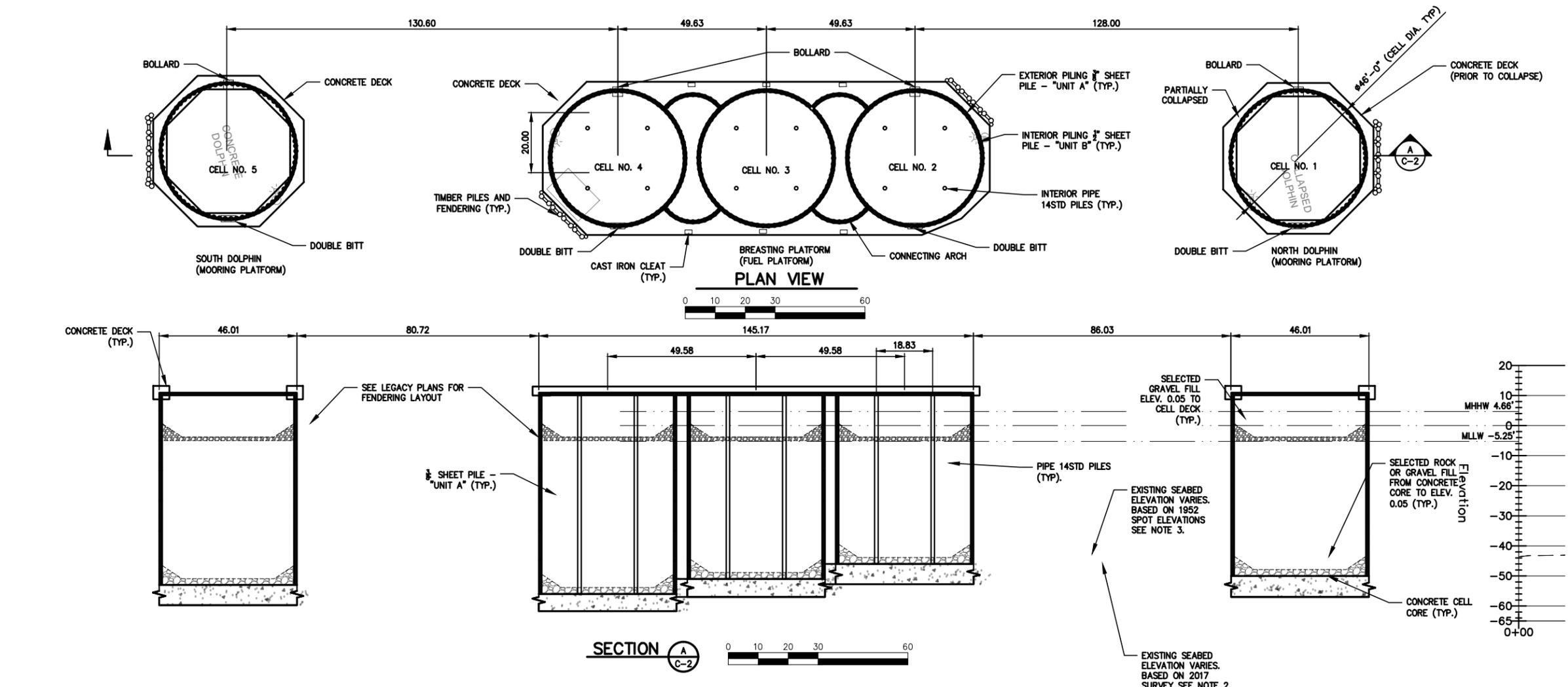
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CHECKED BY:	BUB	
SCALE:	AS SHOWN	
<p>PIER DEMOLITION PLAN</p> <p>Town of Harpswell MITCHELL FIELD PIER REMOVAL Harpswell, Maine</p>		
SHEET TITLE:	PIER DEMOLITION PLAN	
PROJECT:	MITCHELL FIELD PIER REMOVAL	
DATE:	DEC 2016	
CONTRACT NO.:	16-70	
SHEET NO.:	C-1	
REV.:	C	
NO.	DATE	SUBMISSION
A	12.30.16	BUB
B	01.05.17	BUB
C	01.10.17	BUB

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LOCATION	CELL NO.				
	5	4	3	2	1
DECK ELEVATION	13.5	12.8	12.8	12.8	13.5
TOP OF SHEET PILE	11	10	10	10	11
TREMBLE ELEVATION	-53	-56	-51	-46	-50
SHEET PILE LENGTH (FT)	64	66	61	56	61

ALL ELEVATIONS ARE TO NAVD88 UNLESS OTHERWISE NOTED

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SCALE: AS SHOWN

STATE OF MAINE
BARNEY J. BAKER
No. 5737
LICENSED PROFESSIONAL ENGINEER

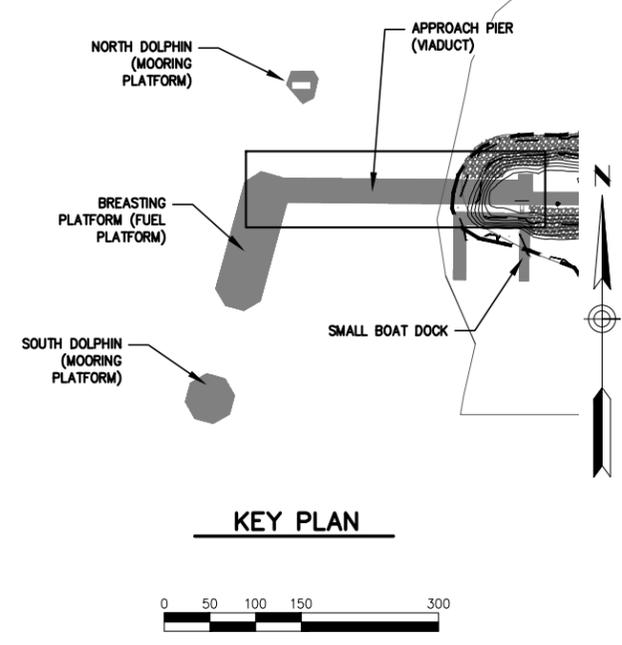
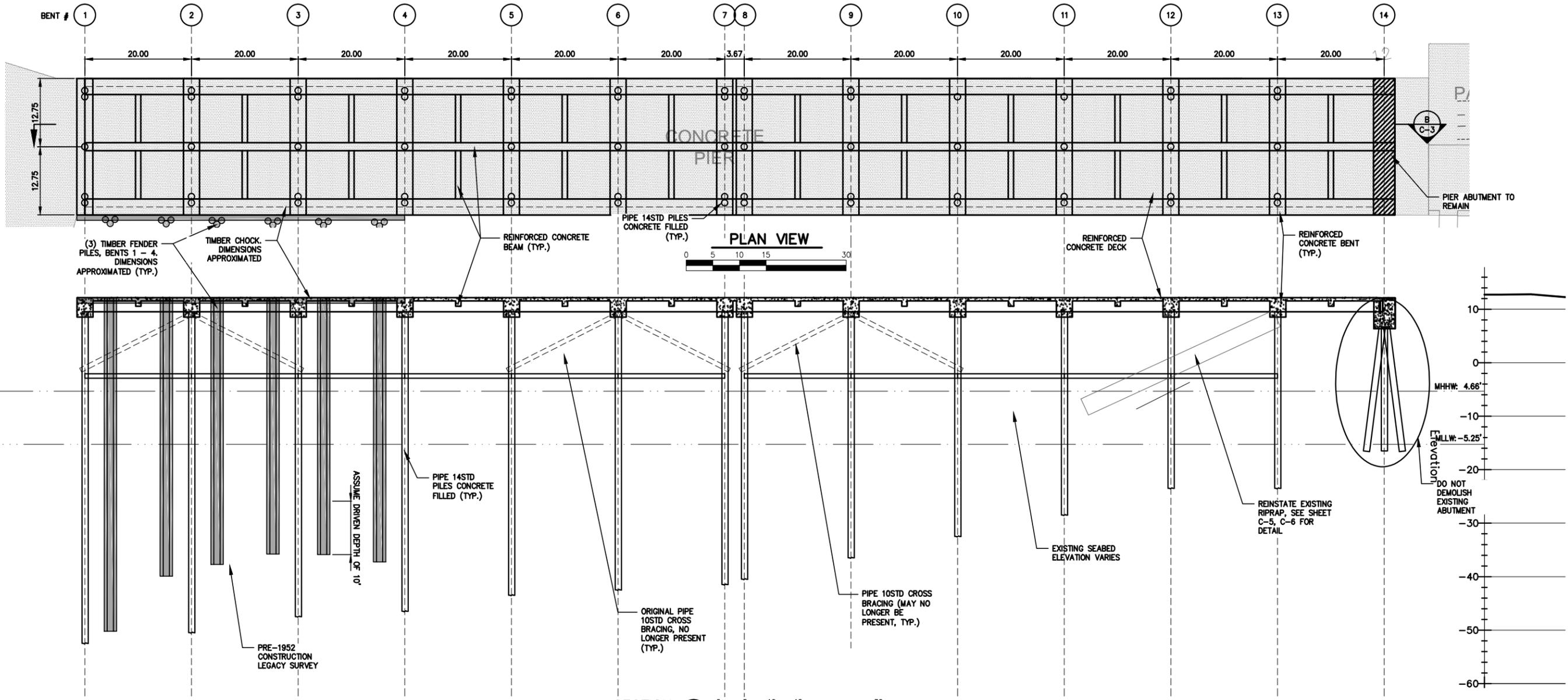
MOORING & FUEL PLATFORMS
PROJECT: MITCHELL FIELD PIER REMOVAL
Town of Harpswell
Harpswell, Maine

DATE: DEC 2016
CONTRACT NO.: 16-70
SHEET NO.: C-2
REV.: C

NO.	DATE	DESCRIPTION
A	12.30.16	PROGRESS REVIEW
B	01.05.17	PROGRESS REVIEW SET
C	01.10.17	PROGRESS REVIEW SET

NOTES:
1. ALL SURVEY INFORMATION TO NAVD88 (MLLW=-5.25') UNLESS OTHERWISE NOTED.
2. BATHYMETRY, CAUSEWAY AND SHOREFRONT TO ELEV. 20.0' BY LITTLE RIVER LAND SURVEYING DATED JANUARY 27, 2017.
3. X SPOT ELEVATIONS FROM 1950'S SURVEY FROM ORIGINAL NAVY PIER CONSTRUCTION.
4. REFER TO SHEET G-3 FOR DEMOLITION NOTES AND REFER TO LEGACY PLANS.

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BENT	NO. VERTICAL PILES	PILE LENGTH (FT) TO SEABED	TOTAL PILE LENGTH (FT)	TOTAL CROSS BRACING LENGTH (FT)	TOTAL STEEL CASING (LF)	TOTAL PILE WEIGHT - STEEL (TON)	TOTAL BRACING WEIGHT - STEEL (TON)	CONCRETE (CY)	TOTAL CONCRETE WEIGHT (TON)
1	5	61	305	82.1	387.1	8.6	1.6	11.4	23.2
2	5	60	300	82.1	382.1	8.4	1.6	11.3	22.8
3	5	57	285	82.1	367.1	8.0	1.6	10.7	21.6
4	5	56	280	82.1	362.1	7.9	1.6	10.5	21.3
5	5	53	265	82.1	347.1	7.4	1.6	9.9	20.1
6	5	52	260	82.1	342.1	7.3	1.6	9.8	19.7
7	5	51	255	22.1	277.1	7.2	0.4	9.6	19.4
8	5	50	250	82.1	332.1	7.0	1.6	9.4	19.0
9	5	46	230	82.1	312.1	6.5	1.6	8.6	17.5
10	4	42	168	82.1	250.1	4.7	1.6	6.3	12.8
11	4	38	152	82.1	234.1	4.3	1.6	5.7	11.5
12	5	33	165	82.1	247.1	4.6	1.6	6.2	12.5
TOTAL			2915	925.2	3840.2	81.8	18.5	109.3	221.4

BENT	NO. PILES	AVG. PILE LENGTH (FT)	TOTAL PILE LENGTH (FT)
1	6	62	372
2	6	49	294
3	6	48	288
CHOCK	1	60	60
TOTAL			1014

- NOTES:**
- ALL SURVEY INFORMATION TO NAVD88 (MLLW=-5.25')
 - BATHYMETRY, CAUSEWAY AND SHOREFRONT TO ELEV. 20.0' BY LITTLE RIVER LAND SURVEYING DATED JANUARY 27, 2017.
 - X SPOT ELEVATIONS FROM 1950'S SURVEY FROM ORIGINAL NAVY PIER CONSTRUCTION.
 - DIAGONAL CROSS-BRACING IS NO LONGER IN PLACE AND IS NOT INCLUDED IN CROSS-BRACING QUANTITY ESTIMATES. LOCATIONS ARE SHOWN FOR REFERENCE ONLY. HORIZONTAL CROSS-BRACING IS ASSUMED TO BE INTACT AND IS INCLUDED IN CROSS-BRACING QUANTITY ESTIMATES. REFER TO LEGACY PLANS.
 - DRIVEN DEPTHS OF TIMBER FENDER PILES IS UNKNOWN. A CONSERVATIVE DEPTH ESTIMATE OF 10' BELOW THE SUBSURFACE IS USED IN QUANTITY ESTIMATES.

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SCALE: AS SHOWN

SHEET TITLE: **APPROACH PIER (VIADUCT)**

PROJECT: **MITCHELL FIELD PIER REMOVAL**
Town of Harpswell
Harpswell, Maine

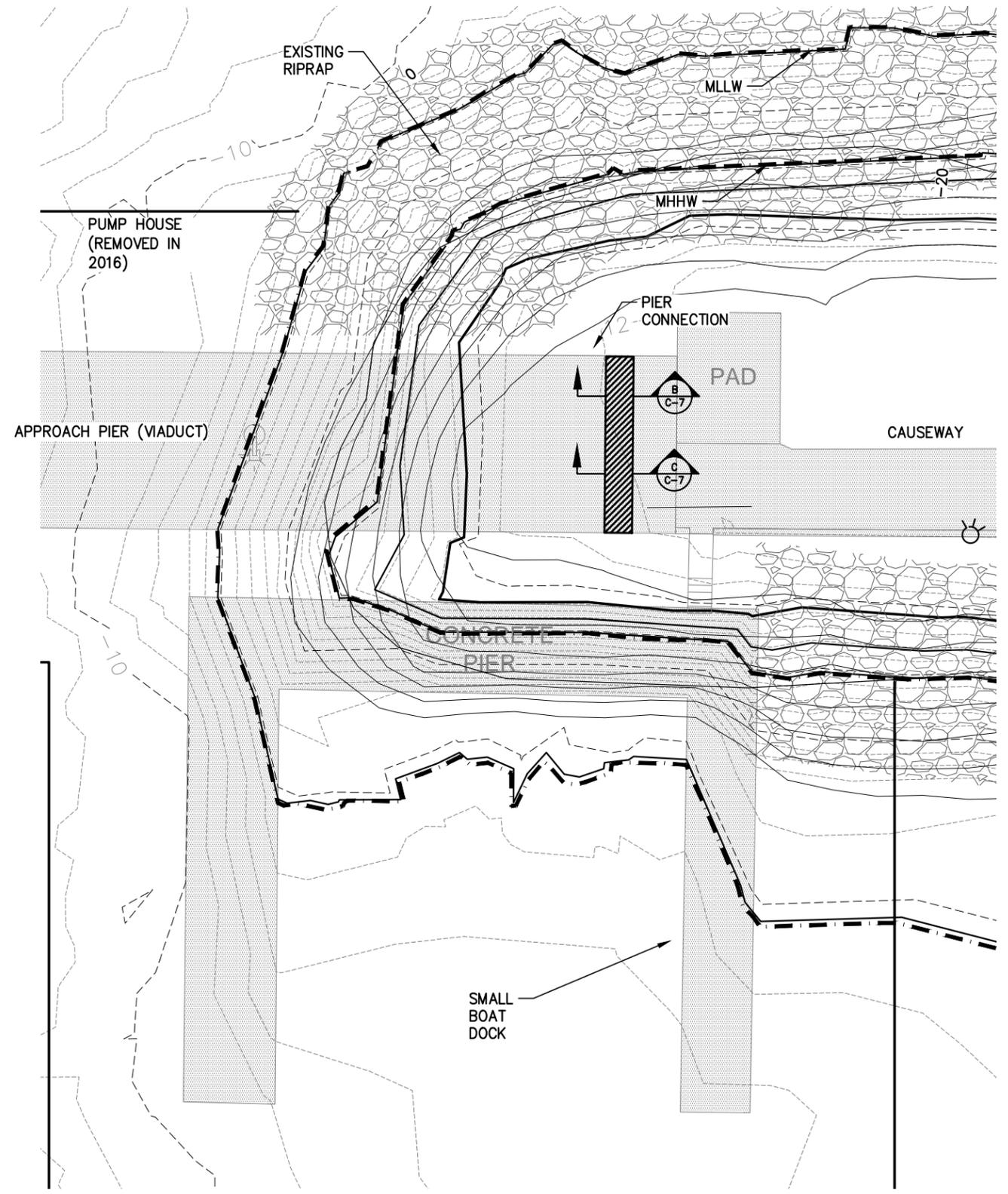
DATE: DEC 2016
CONTRACT NO.: 16-70

SHEET NO. **C-3** REV. **C**

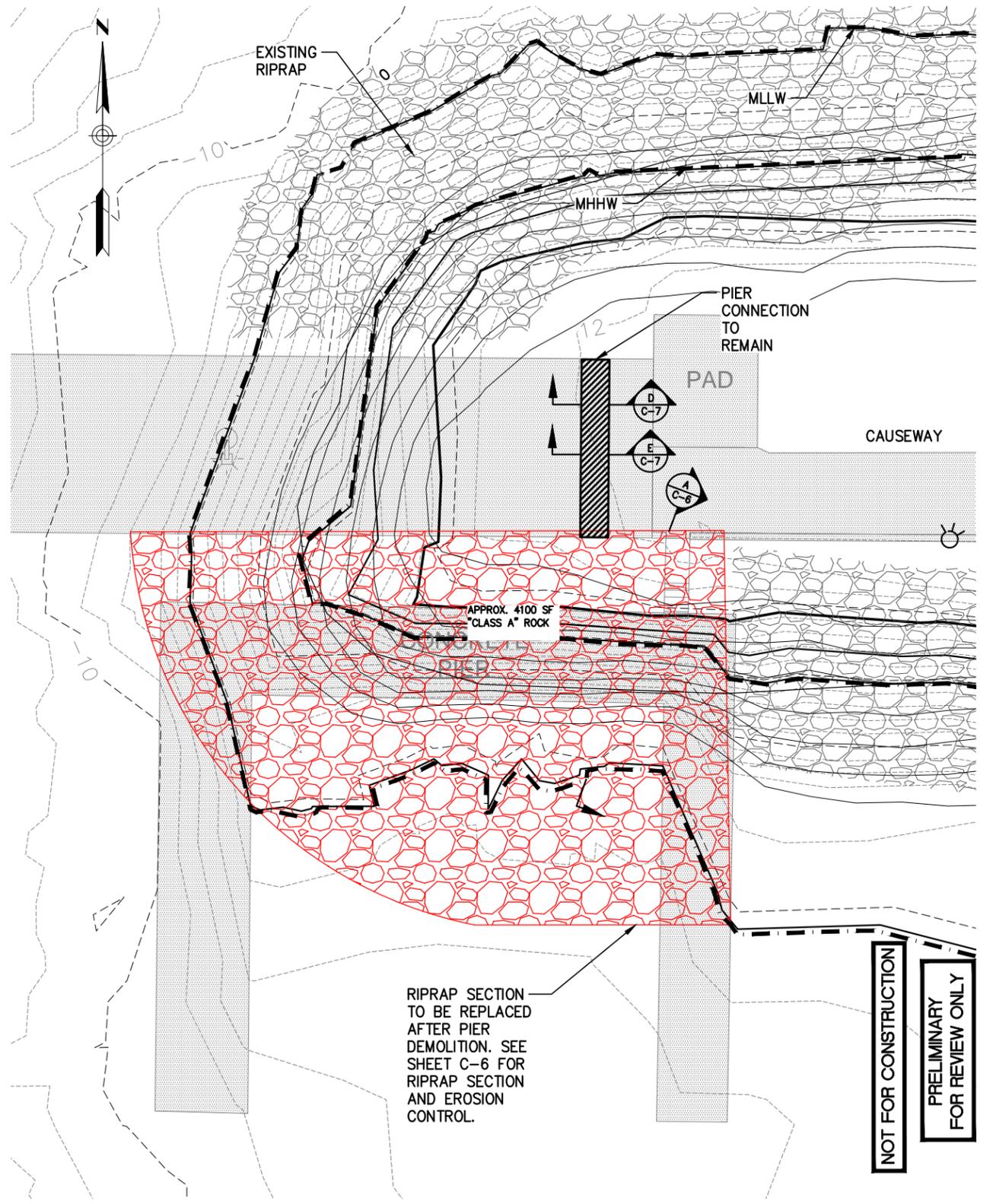
PROGRESS REVIEW SET: 01.10.17
PROGRESS REVIEW SET: 01.05.17
PROGRESS REVIEW: 12.30.16
SUBMISSION DATE: INT.

STATE OF MAINE
BARNEY J. BAKER
No. 5737
LICENSED PROFESSIONAL ENGINEER

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EXISTING CONDITIONS PLAN



POST-PROJECT SLOPE STABILIZATION

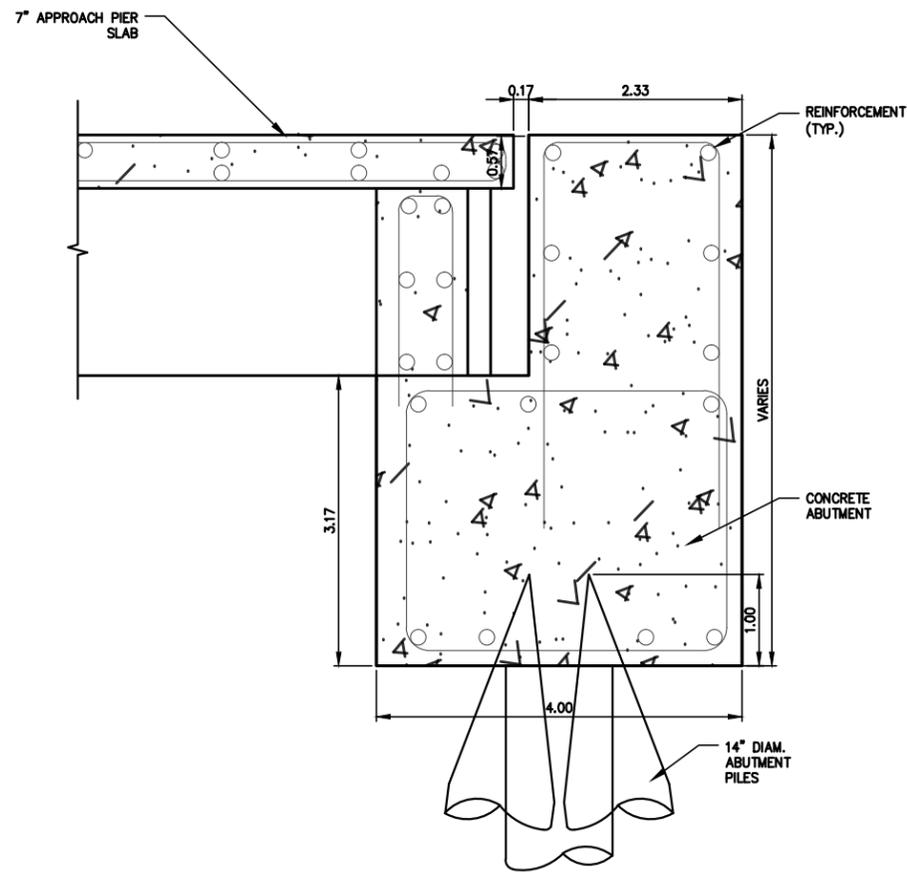
RIPRAP SECTION TO BE REPLACED AFTER PIER DEMOLITION. SEE SHEET C-6 FOR RIPRAP SECTION AND EROSION CONTROL.

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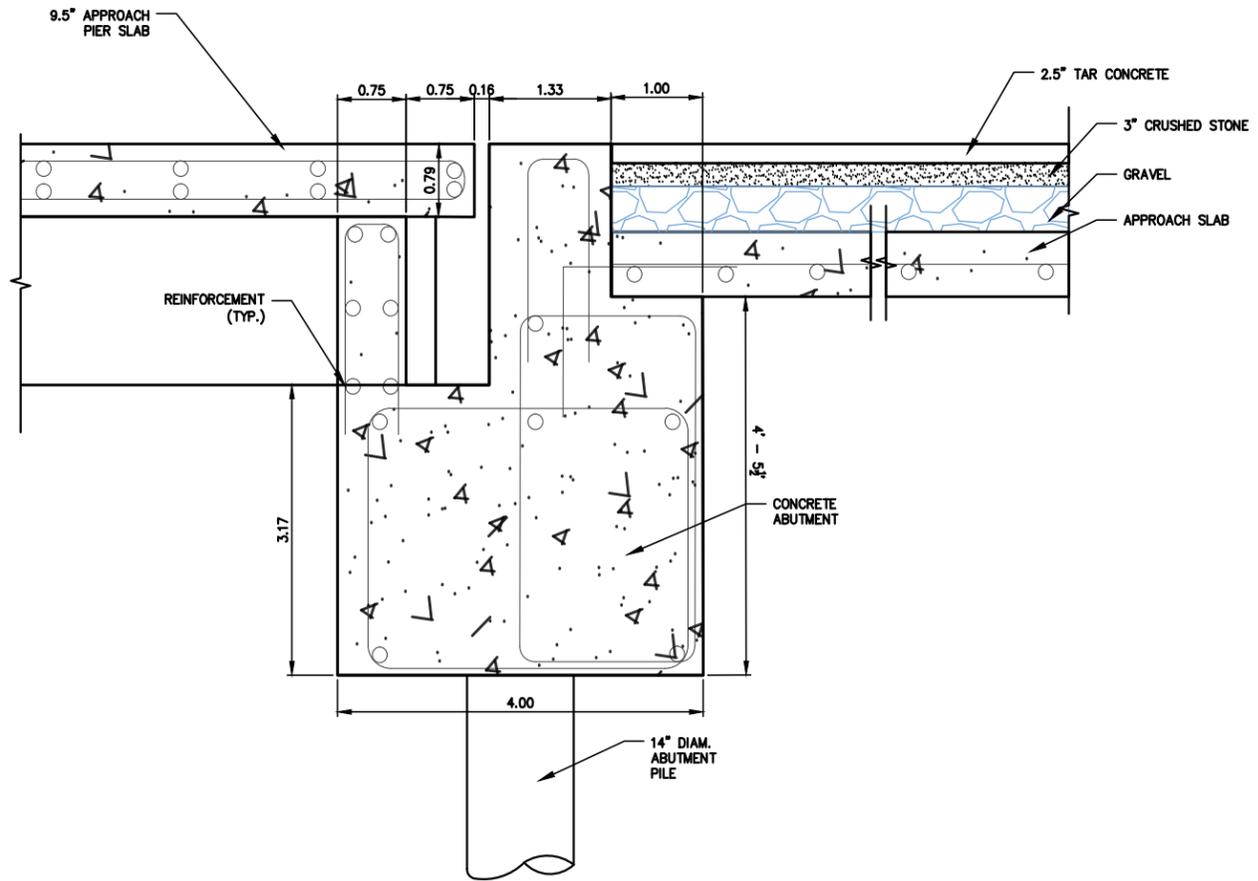
- NOTES:**
1. ALL SURVEY INFORMATION TO NAVD88 (MLLW=-5.25') UNLESS OTHERWISE NOTED.
 2. BATHYMETRY, CAUSEWAY AND SHOREFRONT TO ELEV. 20.0' BY LITTLE RIVER LAND SURVEYING DATED JANUARY 27, 2017.
 3. X SPOT ELEVATIONS FROM 1950'S SURVEY FROM ORIGINAL NAVY PIER CONSTRUCTION.
 4. UPLAND ELEVATIONS FROM MEGIS GEOREFERENCED DATA 2' CONTOURS HARPSWELL.

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CHECKED BY:	BJB
SCALE:	AS SHOWN
<p>EMBAKMENT RIPRAP REPAIR</p>	
<p>PROJECT: Mitchell Field Pier Removal</p>	
DATE:	DEC 2016
CONTRACT NO.:	16-70
SHEET NO.:	C-5
REV.:	C

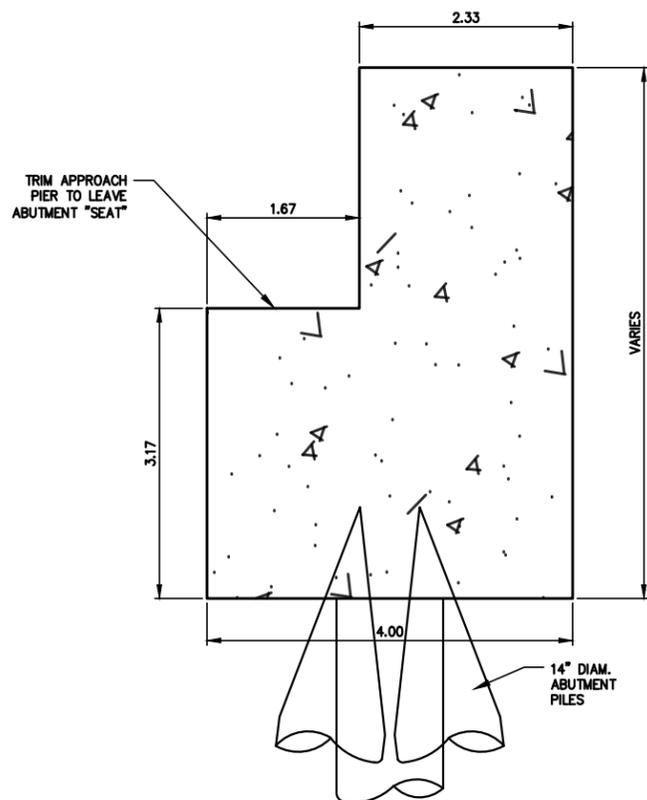
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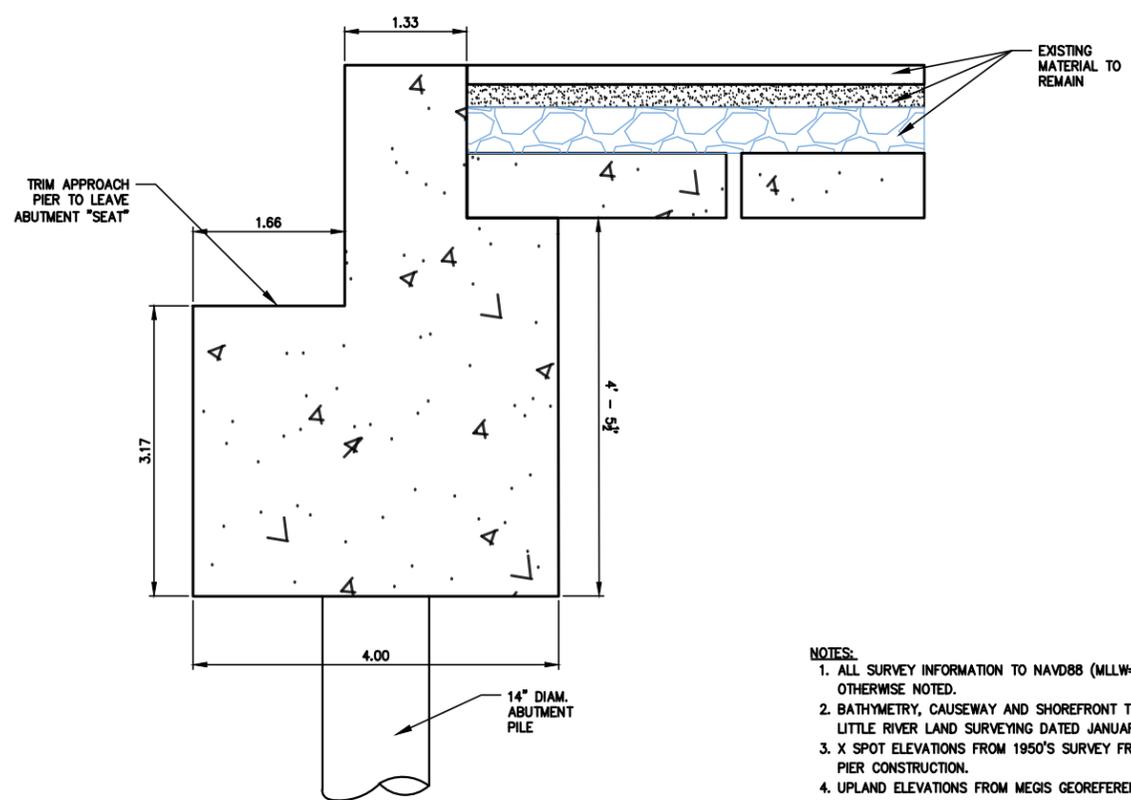
SECTION B
C-5



SECTION C
C-5



SECTION D
C-5



SECTION E
C-5



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 5. REFER TO SHEET G-3 FOR DEMOLITION NOTES AND REFER TO LEGACY PLANS.

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SCALE:	AS SHOWN
<p>STATE OF MAINE BARNEY J. BAKER No. 5737 LICENSED PROFESSIONAL ENGINEER</p>	
<p>ABUTMENT SECTIONS</p>	
<p>PROJECT: Town of Harpswell MITCHELL FIELD PIER REMOVAL Harpswell, Maine</p>	
DATE:	DEC 2016
CONTRACT NO.:	16-70
SHEET NO.:	C-7
REV.:	C