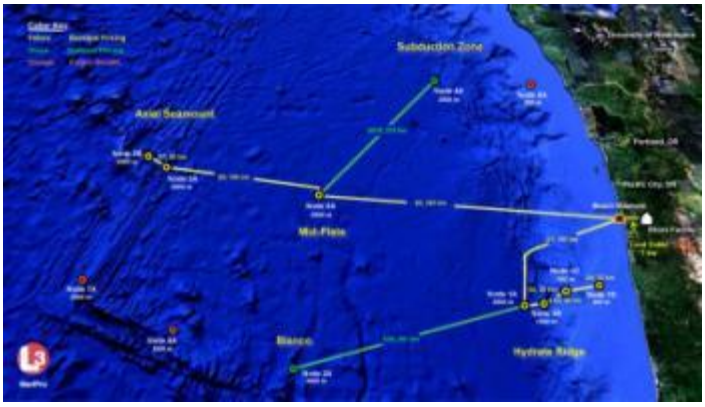
MariPro

REGIONAL SCALE NODES (RSN)

HDD CONDUIT INSTALLATION DRILLING, MONITORING AND RESPONSE PLAN - REV B



Prepared for

UNIVERSITY OF WASHINGTON
Attention: Pete Barletto
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DOCUMENT NUMBER: 21007018B
CONTRACT: RSN SYSTEM SUPPLY CONTRACT DATED 11/5/09
DATE: FEBRUARY 2011

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L-3 MariPro is certified to ISO9001:2008

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1.0 INTRODUCTION

In support of the installation of the RSN Submersible Plant, two HDD conduits will be installed at the planned shore landing in Pacific City, Oregon. The conduits will allow the cables for Segments 1 and 5 to be pulled ashore and terminated to the land cables running to the shore facility.

This plan will detail the effort to prepare, mobilize and install the HDD conduits as well as restore the site at the completion of the installation activities. The plan will adhere to the following valid permits for this work and all requirements stated in the permits. Copies of permit documents provided in Appendix A include:

- Oregon Department of State Land (ODSL)
  - Removal/Fill Permit (45663-RF)
- Oregon Parks and Recreation Department (OPRD)
  - Permit to Operate a Motor Vehicle on the Ocean Shore
  - Ocean Shore Alteration Permit (BA#667-10)
- Tillamook County
  - Foredune Grading Permit (FG-10-03)
  - Foredune Grading Permit Attachment A
  - Tillamook County Public Works Utility Permit (#4307)

Additional permits referenced in this document, but not reproduced, include:

- Findings of No Significant Impacts (FONSI)
- US Army Corp of Engineers (USACE)
  - Nationwide Permits #5 and #12 (NWP-2010-63-1)
- Oregon Department of Land Conservation and Development (ODLCD)
  - OCZM Consistency Determination

ODSL Removal/Fill, OPRD Ocean Shore Alteration Permit, and Tillamook County Public Works Utility Permit, must be on the work site prior to the start of HDD operations.

Prior to performance of the Foredune Grading, L-3 MariPro will notify the following parties 48-hours in advance of any onsite activity and their expected duration.

- Oregon Utility Notification Center _ (503) 232-1987
- Tillamook People's Utility District _ (800) 422-2535

- Oregon Parks and Recreation Department
  - Tony Stein _____(541) 265-9871
- Tillamook County Community Planning
  - Kristen Maze _____(503) 842-3408
- Tillamook County Public Works
  - Ron Newton _____(503) 842-3419
- Tillamook County Parks Department
  - Delbert Schleichert __(503) 322-2477
- CoastCom Inc.
  - Greg Palser _____(541) 574-4202

In addition, all parties listed above will be notified 48-hours prior to commencement of the HDD operations and upon completion of the operations.

Figure 1-1 shows the plan view of the HDD installation. Figure 1-2 shows the planned construction site layout for the HDD installation. The site plan is an approximation at this time, as the final layout will be assessed once the Foredune Grading is completed. The general guidelines provided below will be maintained in the final layout. The profiles of the HDD conduits relative to the shoreline and ocean bottom are shown in Appendix B, fold out Drawing 052810A, HDD Profile.

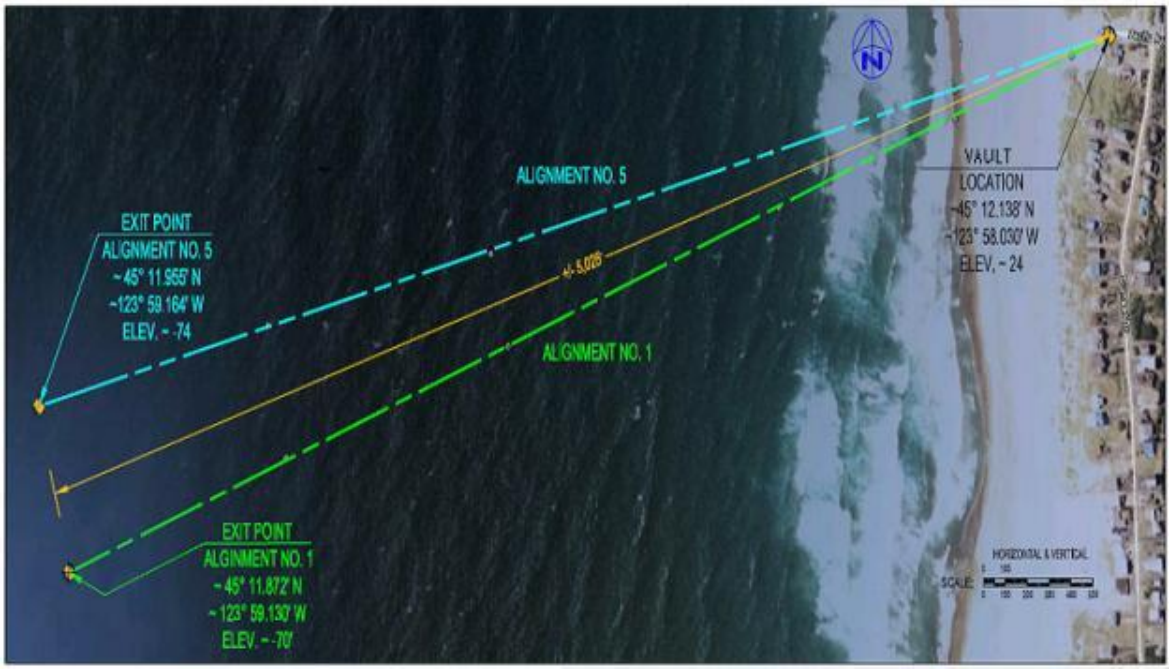


Figure 1-1 HDD Plan View

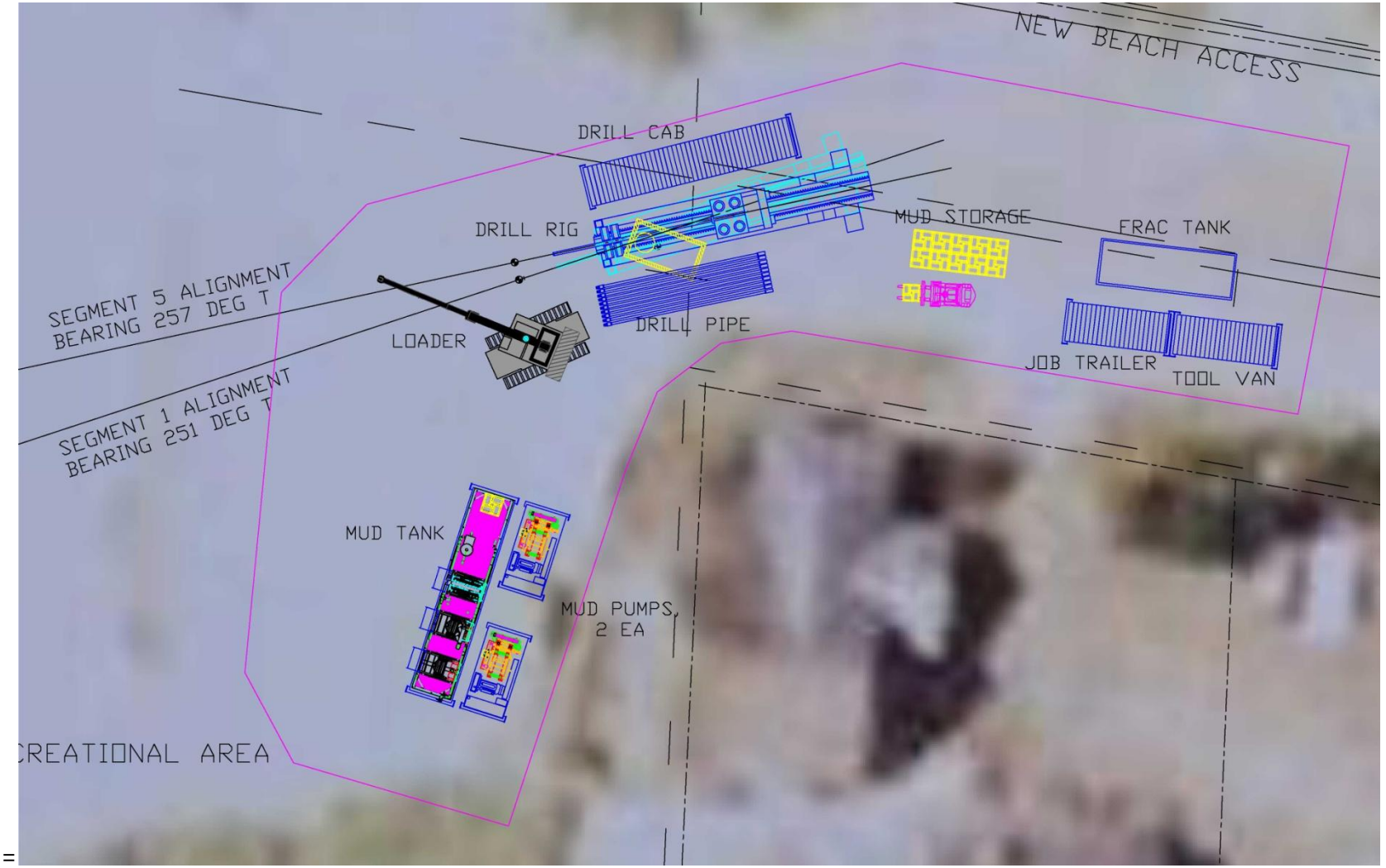


Figure 1-2 HDD Construction Site (Approximation)

2.0 SCHEDULE

The schedule in Figure 2-1 lists the major tasks for completing the HDD effort.

ID	Task Name	Duration	Start	Finish
1	**RSN PACIFIC CITY, OREGON HDD**	**67 days**	**Mon 2/7/11**	**Mon 4/25/11**
2	Complete Foredune Grading	6 days	Mon 2/7/11	Sat 2/12/11
3	Mobilize Drilling Equipment	3 days	Mon 2/14/11	Wed 2/16/11
4	Set up Drilling Equipment on Hole #1	3 days	Thu 2/17/11	Sat 2/19/11
5	Drill ~700' of Pilot hole #1	2 days	Mon 2/21/11	Tue 2/22/11
6	Forward Ream and Install 12" casing	2 days	Wed 2/23/11	Thu 2/24/11
7	Drill Balance of Pilot Hole #1	15 days	Fri 2/25/11	Mon 3/14/11
8	Trip Out of hole	1 day	Tue 3/15/11	Tue 3/15/11
9	Push Conduit (drill pipe) Into Hole	1 day	Wed 3/16/11	Wed 3/16/11
10	Remove 12" casing	1 day	Thu 3/17/11	Thu 3/17/11
11	Install Pull Cable	1 day	Fri 3/18/11	Fri 3/18/11
12	Re-Set Rig Alignment for Hole #2	2 days	Sat 3/19/11	Mon 3/21/11
13	Drill ~700' of Pilot Hole	2 days	Tue 3/22/11	Wed 3/23/11
14	Forward Ream and Install 12" casing	2 days	Thu 3/24/11	Fri 3/25/11
15	Drill Balance of Pilot Hole #2	15 days	Sat 3/26/11	Tue 4/12/11
16	Trip Out of Hole	1 day	Wed 4/13/11	Wed 4/13/11
17	Push Conduit (drill pipe) Into Hole	1 day	Thu 4/14/11	Thu 4/14/11
18	Remove 12" Casing	1 day	Fri 4/15/11	Fri 4/15/11
19	Install Pull Cable	1 day	Sat 4/16/11	Sat 4/16/11
20	Rig Down & Demobe Drilling Equipment	2 days	Mon 4/18/11	Tue 4/19/11
21	Connect Conduits to Vault	3 days	Wed 4/20/11	Fri 4/22/11
22	Final Cleanup	2 days	Sat 4/23/11	Mon 4/25/11

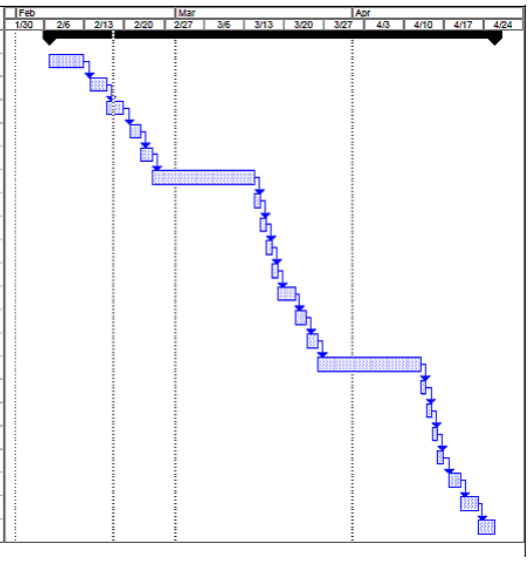


Figure 2-1 HDD Installation Schedule

3.0 DESCRIPTION OF INSTALLED COMPONENTS

The components will consist of the HDD conduits (drill pipes), the pulling messenger wire, the HDD end caps, and the conduit connections between the land end of the HDD and the existing cable vault.

3.1 Drill Pipe

The drill pipe will be double white band, drill pipe, grade G-105, with a nominal outside diameter of 5 inches and a minimum inside diameter of 3.75 inches. Figure 3-1 shows a drawing of one section of drill pipe. Each installed drill pipe will be about 5,031 feet in length as show in Drawing 052810A, HDD Profile, (Appendix B).

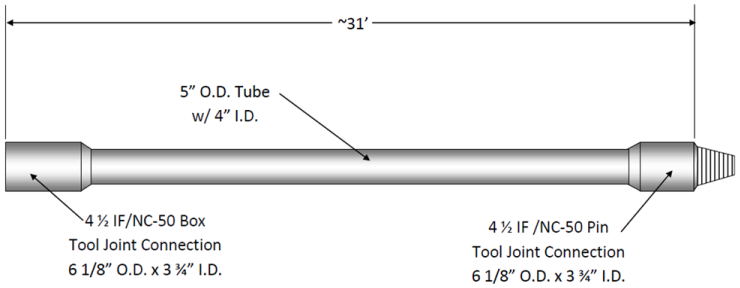


Figure 3-1 Drill Pipe Section

3.2 Pulling Messenger Wire

The installed pulling messenger wire will have a 0.25 inch outside diameter and be 7 strands of 19 gauge stainless steel construction. The rated safe working tension load of the cable will be 1,280 pounds and a breaking strength of 6,400 pounds.

3.3 HDD to Vault Conduit Connection

Two independent HDD conduits will be installed as shown in Figure 1. Both conduits will originate in approximately the same location with ~1 meter of horizontal separation. The connection between the land end of each HDD conduit and the cable vault will not be completed during the HDD installation as originally planned. At the end of the HDD installation, each HDD pipe will be fitted with a flange and mating blank flange to seal it. This flanged end will be less than 20 feet seaward of the cable vault (or as practical) depending on final HDD set up. The final position will address the need to accommodate the drill rig anchors without damaging the cable vault, as well as allow an acceptable cable course from the HDD entry point to the cable vault. The drill rig anchor is comprised of a 10,000 pounds section of steel, 23' long, 3' wide, and 2' deep. It will be set in the ground ~9" below grade to allow the drill rig setup to obtain an entry angle of 14 degrees from horizontal. Two 12" casings (spuds) will also be set at each end of the anchor to improve the anchors stability.

After the cable is pulled ashore, it will be protected by assembled split pipe that will be mechanically connected to the HDD pipe and the existing cable vault. Figure 3-2 shows a scaled profile view of this plan. Exact dimensions may deviate depending on conditions while drilling.

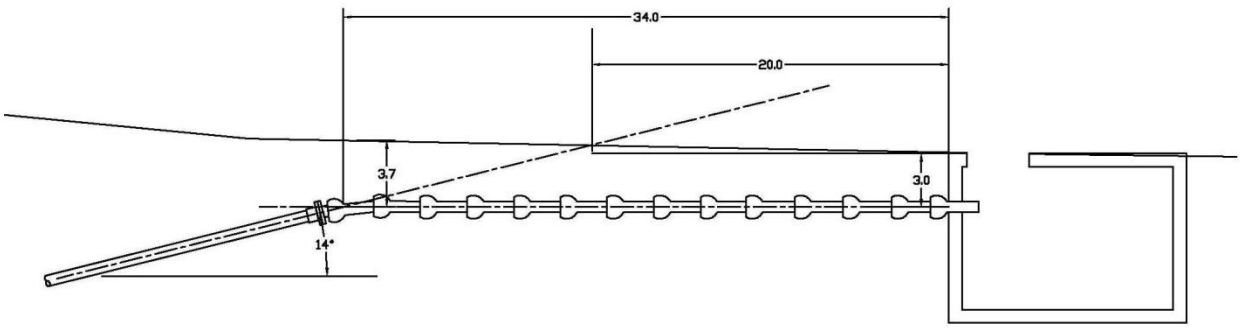


Figure 3-2 HDD to Vault Detail - Profile

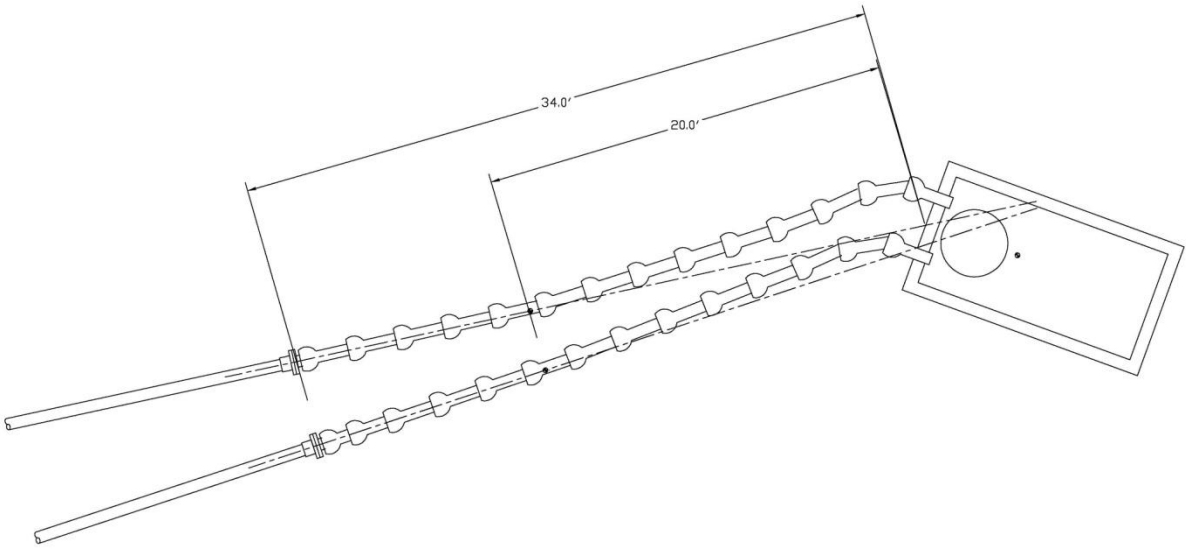


Figure 3-3 HDD to Vault Detail - Overhead

4.0 GENERAL WORK OPERATIONS

The HDD installation will be completed by The HDD Company based in Cameron Park, California. The HDD Company is under contract to L-3 MariPro. L-3 MariPro will have at least one onsite representative at all times. L-3 MariPro will also supply the offshore marine support required for the HDD installation. The following are general work operation plans and requirements that The HDD Company will meet:

- Adhere to all existing permits and permit conditions issued to L-3 MariPro and the Customer, University of Washington. This includes spill responses as detailed in Appendix C of this plan.
- Noise reduction measures will be taken to reduce the levels impacting surrounding residences. Work will be performed onsite 10-12 hours per day, 7 days a week.
- Transport of all drilling equipment, drill pipe, and consumables to and from the work site. Some equipment will be stored offsite.
- Provide all required 24/7 security requirements for the work site. Provide perimeter fencing around the worksite to retain debris and discourage pedestrian traffic. The worksite will allow for a designated pedestrian and vehicle passage corridor to the beach no less than 12 feet wide. Traffic control signs will be displayed to indicate ongoing construction and to direct vehicle and pedestrian traffic flow.
- Provide all consumables including fuel and drilling water.
- Removal and proper disposal of all material generated during the drilling process. This includes drilling mud, cuttings, and hazardous waste generated by the drilling equipment. Hazardous

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wastes will be typical petroleum products in use by heavy construction equipment – oil clean up materials, empty container receptacles, repaired parts, etc.

4.1 Daily Reports

A Daily Report will be generated by the HDD Company and the onsite L-3 MariPro representative and delivered to the University of Washington (UW) at the end of each day in draft format. Photographs will regularly accompany the daily report to support compliance of the site activities. Daily reports and photos should be sent to the following UW representatives:

Cecile Durand:	cdurand@uw.edu
Mike Mulvihill:	mdm33@u.washington.edu
Pete Barletto:	barletto@u.washington.edu
Brian Ittig:	bittig@u.washington.edu
Dennis Manning:	dmanning@uw.edu
Chris Hoyt:	bch4@u.washington.edu
Paul Hagstrom:	phagstrom@oceanleadership.org

The following 24 hours will allow for review by the customer. A final report will be delivered within that following 24 hours, if required. The daily reports shall include the following:

- Summary of daily activity for last 24 hours and activities planned for next 24 hours
- Record of materials consumed and removed for disposal
- Arrival, departure and significant activities of work crews and equipment
- Start, suspension (and reason for suspension), resumption and completion of work operations
- Drill progress, including pipe installation records and bottom hole assembly location
- Incidents pertaining to personnel safety, work operations and environmental issues
- Work delay due to equipment failures with repairs made and other delays for any reason
- Completion of HDD work milestones

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A sample Daily Report follows:

RSN HDD INSTALLATION DAILY REPORT (#1)	
Date:	**Prepared By:**
Location: **Local Weather Conditions:**	
Personnel On-Site: **MariPro:** **HDD Co:** **University of Washington:**	
Summary of Work Performed in Past 24 hrs:	
Drill Metrics: **Current Linear Position of furthest out portion of drill string:** **Forward Progress Completed today:**	
Summary of planned work for next 24 hrs:	
Resources Consumed	
Weather downtime:	
Vessel/Equipment downtime:	
Issues and Concerns: **HDD Co:** **MariPro:** **University of Washington:**	
Approval: **Draft or Final:** **MariPro Representative Approval: _____**	

4.2 General Operating Practices and Safety

This section contains details regarding:

- Personnel safety requirements
- Emergency procedures
- Environmental protection issues
- Communication procedures
- Diving procedures

L-3 MariPro is committed to providing a safe work environment for all employees and one that is in compliance with applicable local safety, health, and environmental protection regulations. This includes, but is not limited to, use of personal safety equipment such as hard hats, steel-toed shoes, safety glasses, flotation work vests, and hearing protection.

An L-3 MariPro supervisor will be onsite throughout all drilling operations. They will insure that all applicable safety regulations are being met and will insure there are no dangers to the public.

L-3 MariPro is responsible for administering an effective Environmental Compliance, Health and Safety Plan. This includes ongoing evaluation of safety performance for compliance with applicable requirements.

The HDD Company onsite supervisor will be responsible for the safety of all HDD Company personnel working at the construction site. The L-3 MariPro diving supervisor will be responsible for the safety of all diving personnel at sea.

4.3 Safety and Emergency Plan

Before commencing all major operations, such as Foredune grading, HDD and offshore dive operations, all operations personnel will assemble for a briefing from the participating subcontractors and the L-3 MariPro representative. Daily “tool box” meetings prior to shift will also be carried out during the HDD effort. A written log is kept to indicate that meetings are held daily.

In the event of a critical emergency, such as an accident, injury, or fire, dial 911. Other emergency numbers are located in Table 4-1.

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Table 4-1 Emergency Numbers

EMERGENCY SERVICE	DIAL
Fire	911
Ambulance	911
Police	911
Tillamook County General Hospital	503 842-4444
Tillamook County Sheriff	503 842-2501
Oregon State Police	503 842-4433
USCG	VHF - 16

When reporting an emergency, personnel should remain calm and be prepared to provide the following information while making every effort possible not to break communication:

- Nature of emergency
- Exact location
- Extent of injury, if any
- Name of injured person
- Name of person reporting incident

4.3.1 Emergency Preparedness

4.3.1.1 Medical Emergencies

In the event of medical emergencies, call 911. Pacific City has a medical clinic during normal business hours but does not provide emergency services. An ambulance is on call in Pacific City and can be reached by dialing 911. The closest emergency medical facilities are in Tillamook to the north and Lincoln City to the south. Following are addresses and phone numbers of the closest medical facilities:

Bayshore Family Medicine
Bayshore Professional Plaza
38505 Brooten Road
Pacific City, Oregon 97135
(503) 965-6555

Tillamook County General Hospital
1000 3rd Street
Tillamook, OR 97141-3498
(503) 842-4444

Samaritan North Lincoln Hospital Facility
3043 NE 28th Street, Lincoln City, OR

-

4.3.1.2 Emergency Incident Reporting

All accidents or incidents that result in an occupational injury or illness shall be reported and shall include the information in Table 4-2.

Table 4-2 First Aid Log

L- 3MariPro — First Aid Log
Date and time of injury
Employee name
Employee or identification (ID) number
Employee's supervisor
Location of accident
Nature and cause of injury/illness Exact location of injury and part of body involved
Treatment rendered
Log/Treatment completed by:

4.3.2 Equipment and Machinery Safety

The HDD Company shall ensure that all equipment is operated in a manner that will protect personnel, the public, the equipment, and the environment. Personnel operating deployment equipment and machinery shall receive training on proper equipment use, machine safety features, and operating precautions before use.

The entire work area will have a perimeter fence preventing access to the public. Access to and from the beach will be maintained throughout the project. Signs will be erected indicating the presence of heavy construction equipment and directing pedestrian and automotive traffic. All onsite personnel will be made aware that public traffic will be present throughout the project.

All major equipment shall have warning signs clearly posted to indicate potential hazards. All access panels shall have warning signs indicating the hazards inside. Operating voltages and maximum working parameters shall be clearly posted on all equipment. Lifting equipment shall have maximum lift amounts at given extensions stenciled in a highly visible location. Winches shall have maximum working loads and line speeds (in feet per minute) in a visible location at the winch and at the control panels.

4.3.3 Personal Protective Equipment

- The wearing of hard hats in identified areas of potential head injury is mandatory.
- All employees shall be required to wear approved protective eyewear in areas of potential eye hazard.

- Hearing protection shall be provided and is mandatory in designated areas or for specific tasks.
- Employees shall wear respiratory protection devices when engineering controls are not feasible and exposure to concentrations of toxic dust, fumes, or mists is possible.
- Sturdy leather work-shoes or boots with a substantial sole and sides that protect the foot are required for all employees. Steel-toed shoes will be required where a substantial risk of foot injury is present. Athletic type/design shoes, sandals, open-toed shoes, etc., are not acceptable.
- All employees shall wear clothing suitable for their work.

4.3.4 Fire Prevention

- For all operations involving a potential source of ignition, approved fire protection equipment required to protect personnel, property and facilities shall be provided.
- Particular care should be taken when welding and cutting in locations where combustibles are exposed. When such welding or cutting is done, the surrounding area shall be inspected. Combustible material shall be removed from the area or protected with fire resistant blankets, and an adequate number of fire extinguishers shall be available.
- In areas where fire protection equipment is not present, fire extinguishers or other temporary fire protection shall be made available.
- Flammable liquids shall be kept in appropriate safe containers.

4.3.5 Crane and Rigging Safety

Crane activitiy will be limited to three events; initial drill rig placement, repositioning of the drill rig from drill 1 position to drill 2 position, and final rig down. All crane operations and rigging will be performed in accordance with Oregon OSHA part 1926.

5.0 QUALITY CONTROL SYSTEM

The RSN HDD installation will be performed in accordance with L-3 MariPro's International Standards Organization (ISO) 9001 Quality System. The L-3 MariPro onsite representative will insure that all prescribed procedures are adhered to, detailed documentation is performed, and the activities are performed such that the conduits are installed in the manner in which they were planned. All drill pipes have been individually inspected to insure they are of the proper type and bore diameters meet specification. Periodic checks will be made on the estimated drill location insuring the drill pipe is being installed per the installation plan.

6.0 FOREDUNE GRADING OPERATION

The worksite area will require the Foredune area of Pacific City to be graded to allow access to the Beach Manhole (BMH), provide adequate flat space at the HDD work site and also allow for the public access corridor and required grade up and over the dunes. Dune sand will be transported across the dunes and deposited on the ocean side of the dunes. Sand placement will be in accordance with Management Unit F and the Foredune Grading Permit FG-10-03, located in Appendix A.

7.0 MOBILIZATION FOR HDD INSTALLATION

Prior to the Foredune grading and setting up the drilling equipment, as previously shown in Figure 1-2, Oregon Underground Service alert will be called and any utilities in the vicinity of the entry location and drill path will be potholed and positively identified. The bore alignments will be verified and established and this alignment will be staked.

During the setup process, a guidance wire will be installed along the beach in a shallow trench (8 – 12 inches deep). The purpose of the guidance wire is to assist in positioning the drill head as it passes underneath it. By generating an electro-magnetic field, the driller is better able to track the exact location of the drill head, thus insuring the drill tube is going in the planned direction and at the planned depth. Obtaining the planned depth at start of the drilling operation will reduce the likelihood that a frac-out will occur for the entire drill. The coil will be in a pyramid shape with the apex starting near the drill rig. Each leg will proceed westerly toward the beach mean low tide area. The base of the pyramid shape will be ~200 feet and parallel with the surf. The trenches will be dug with a walk behind Ditch Witch trencher. After the coil wire (6 ga insulated copper) is installed in the trench, the trench will be covered to eliminate any threat of public safety. The tracking coil's physical state will be monitored on a regular basis throughout the project to insure it is not exposed. A visual inspection will be made at the beginning and end of each day or more frequently if conditions merit (increased vehicle traffic, large surf). If it becomes exposed due to tides, shifting sands, or vehicle traffic, it will be reburied. The coil wire is comprised of insulated 6 gauge wire. The coil is energized with a low voltage DC source, typically a portable welding machine, for a period of ~15 seconds each time a pipe joint is installed. Due to the low current required for this application, the buried condition of the coil, the insulated nature of the wire, and the infrequent frequency of energizing, this operation is deemed to be a very low public safety hazard. This will continue until the drill head has passed seaward of the surf zone. Once the drill head is past the surf zone, the guidance wire will not be used and the drill head will be steered by electronic dead reckoning. After completion of drilling, the wire will be removed and the site restored.

With an established alignment in place the drill rig and support equipment will be rigged up within the area shown in Figure 1-2. This layout will leave a minimum 12 foot wide beach access road to the beach for the public as well as fire and rescue vehicles. The drill rig will be placed so that each drill pipe enters the ground less than 20 feet from the seaward side of the existing beach vault. The drill rig will sit on 4 anchors, above the BMH, in order to achieve proper drilling angle and azimuth, without damage to the

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existing vault. Protection will be provided to prevent damage of the BMH and existing conduits during drill operations. Plastic sheeting will be placed under the drill rig and any support equipment that could have a potential for a hydraulic, fuel or oil spill. Silt fence and erosion control and containment devices will also be implemented around the drilling equipment in order to ensure no run-off from the site will occur. The entire work area will be fenced and/or have a barrier in place for safe operations near a public corridor and private housing.

7.1 Equipment List

The following major equipment will be on site for drill operations:

- Drill Rig
- Drill Rig Hydraulic Power Unit
- Mud Tank with Solids Control Equipment (Mud Separator)
- 400KW Generator
- Triplex Mud Pump and Power Unit

NOTE: Available specification sheets for all HDD equipment are included in Appendix D

The following equipment will be on site as spare equipment or be available within 24-hr notice:

- One rebuilt Flender rotary motor
- One rebuilt Sundstrand 27 hydraulic pump
- Misc. Hydraulic, Fuel and Oil filters
- Misc. Hydraulic Hoses
- Misc. pressure reducing valves
- Spare tong dies

8.0 HDD INSTALLATION

The following procedures detail the installation steps for each HDD conduit.

8.1 Installation of 12-3/4 Conductor Casing

The pilot hole will be drilled using 5 inch, S-135, double white band drill pipe and a 6-¾ inch mud motor turning a 9-7/8 inch tri cone bit. After drilling the first ~700 feet (depending on soil conditions encountered) of pilot hole, the drill pipe will be tripped out of the hole and the drilling assembly removed. An ~18 inch reamer utilizing a “bullnose’ to guide the reamer through the pilot hole, will be used to forward ream and open the pilot hole to allow the installation of a 12-¾ inch steel conductor pipe. Once reamed this assembly will be tripped out of the hole and the 12-¾ inch pipe, with a rounded concrete casing shoe welded onto the end, will be pushed into the reamed hole. The conductor casing will prevent the hole from collapsing, provide a guaranteed hole through the first radius and adding stability in the event that

the last 1000 feet of drilling becomes difficult to push. It will also prevent the loss of circulation, reduce torque and prevent key seating in the bore hole. The hole will be filled with drilling mud throughout the above processes. This hydraulic pressure will help prevent collapsing of the hole during removal and prior to insertion of the drill pipe.

8.2 Pilot Hole Installation

With casing in place, the drilling assembly, with the mud motor and tri cone bit will be pushed back through the casing and the concrete casing shoe will be drilled out. While drilling the pilot hole, wire-line spiders will be placed in the drill string a minimum of every 10 joints, as well as immediately behind the non magnetic bottom hole assembly. This will mitigate the occurrence of wire-line breakages and electrical shorts. During the drilling process it may be necessary to make periodic "trips" out of the bore hole in order to condition the hole and maintain circulation. We would expect to make a minimum of at least one trip out of the hole back into the 12-inch conductor pipe for this purpose.

8.3 Drilling Navigation

A steering technician will be in charge of deciphering and logging data generated and sent to the surface from the Tensor Steering Tool. He will make recommendations to the drill rig operator as to desired changes in direction (right and left) and inclination (up or down). The rig operator will have what is called a "Drillers Remote" located in front of him on the driller's console. This remote will give the operator details on:

a) The Azimuth; which is a magnetic heading, relative to magnetic North, supplied by a north seeking magnetometer in the steering tool. The display will read in tenths of a degree and will tell the driller if the tool is progressing on the desired magnetic heading.

b) The inclination; which is the slope of the tool relative to horizontal (90°). This data is supplied by a three axis accelerometer in the steering tool. This display also reads to tenths of a degree.

c) A dial face that represents the orientation of the bent housing in the drill string, located behind the bit, which facilitates deviation in the hole, by rotating the entire drill string in order to orient the bent housing in the direction of the desired deviation. After orienting the bent housing, the drill string is advanced non-relatively (sliding) until the desired deviation has been achieved and then the entire string is rotated to achieve a straight hole. Data is being transmitted to the surface every three to five seconds as the drill string is being pushed down-hole, which allows the operator the make changes as necessary as the data is displayed on the remote screen in front of him.

As the pilot hole is being drilled, surveys are typically taken following the completion of drilling each joint of drill pipe. The pumps are shut off in order to reduce vibration and "noise" to the steering tool and all magnetic data is recorded, including azimuth and inclination. The location of the bit is ***calculated*** based on this data. The Tru Track coil will then be energized using current from a welding machine. The steering

L-3 COMMUNICATIONS MARIPRO PROPRIETARY
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tool senses the known magnetic field above it and locates itself underneath it by triangulation. The Tru Track software will give the location and depth of the steering tool relative to the entry point.

The Tru Track information is then compared to the magnetic data in order to more clearly define what the correct magnetic heading should be.

As the steering tool passes out from underneath the coil, the steering technician will rely solely on the magnetic data to determine and calculate the position of the bit relative to the proposed centerline of the bore. The depth will be continually calculated using the inclination data. Past experience has proven this dead reckoning navigation to be very effective. Figure 8-1 provides a conservative maximum error expected for punch out location.

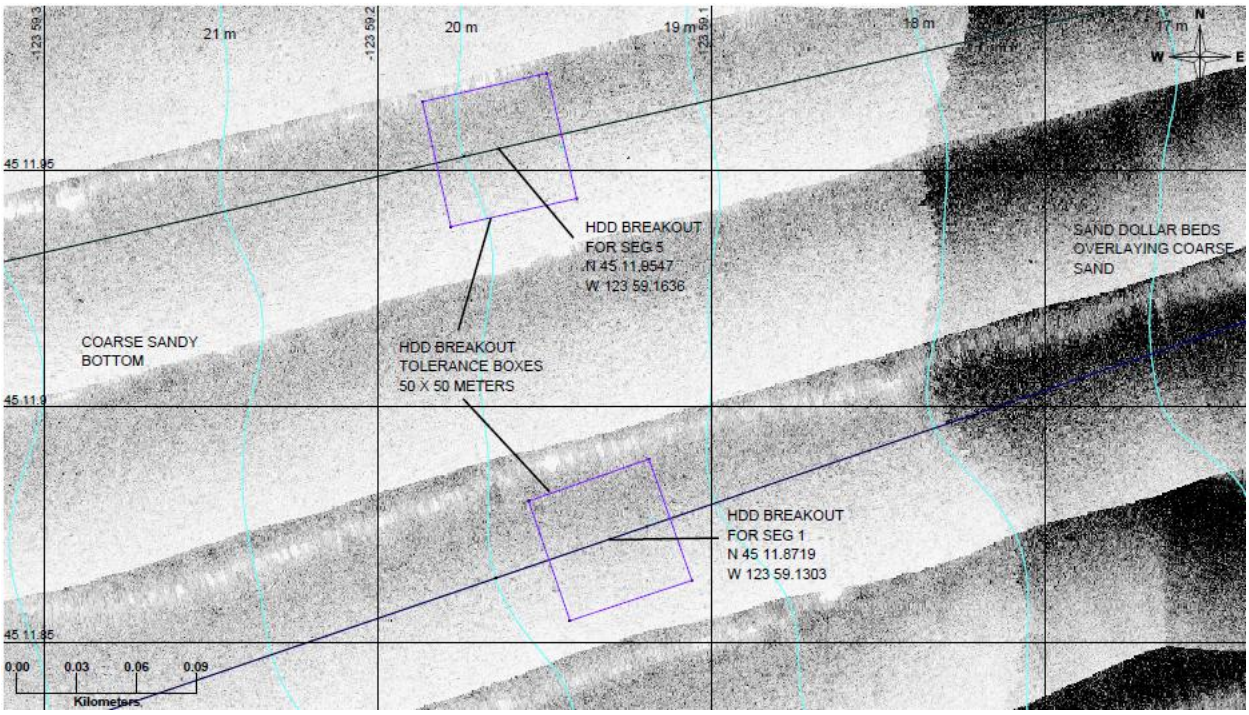


Figure 8-1 HDD Exit Tolerances

8.4 Final Conduit Installation

Prior to exiting the seafloor, the work string and drilling assembly will be tripped completely out of the hole. Clean, high viscosity drilling fluids will be pumped into the hole as the drill pipe is withdrawn. The volume of drilling fluids being pumped will be calculated to only fill the evacuated hole, in order to minimize fluids exiting to the seafloor. Once the work string, mud motor, non mag and steering tool have been disassembled it will be replaced with a ~8-¾ inch barrel reamer and a specially designed rounded end cap. This smooth, non aggressive assembly will then be pushed back through the cased pilot hole to the seafloor using Grade E, double white band drill pipe. All drill pipe (final conduit) will be bottle brushed, gauged and inspected on site. Prior to delivery The HDD Company will also assure that the purchased

drill pipe conduit will be rattled to remove any scale in the pipe, and inspected by a qualified inspection company. Drill pipe will be numbered and an inspection report will be available for each pipe.

Prior to exiting onto the seafloor, the mud in the pipe will be replaced with water to minimize mud discharge into the ocean. Once the pilot hole has exited the sea floor, air will be pumped through the drill string in order to assist the divers locating the drill head. The distance, location and depth of the drill head will be verified by a diver. Drill head position will be marked by a diver by placing a buoy on the drill head end. The diver will take as much slack out of the buoy line as possible and the surface vessel will take a GPS fix. It should be expected that this method will carry an inaccuracy due to the GPS reading and horizontal distance of buoy relative to pipe end.

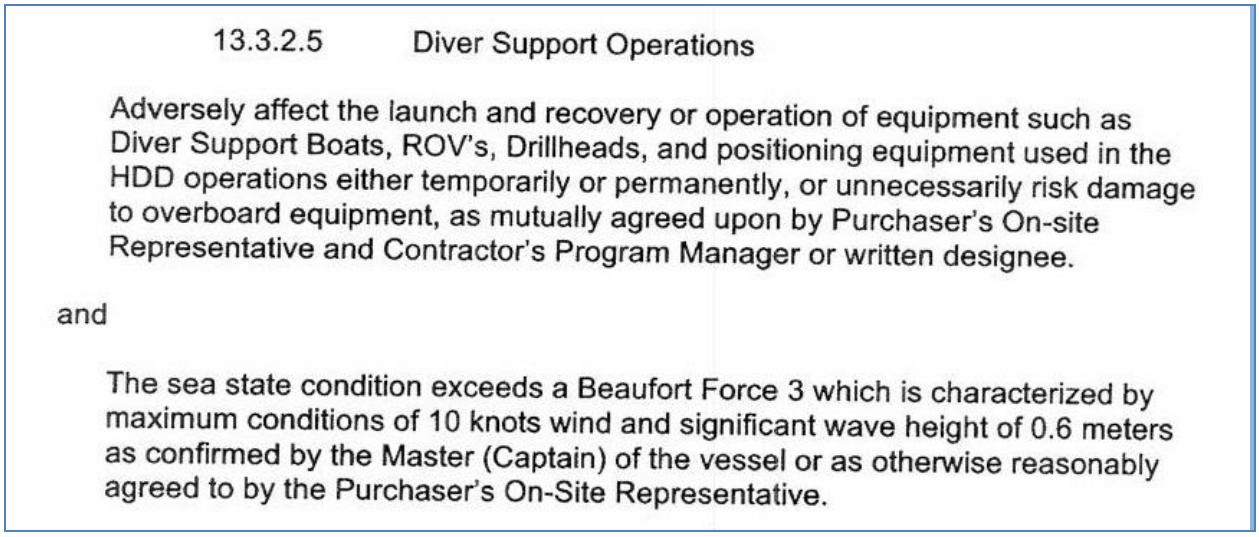
8.5 Installation of Messenger Wire and Marine Operations

When the bull nose assembly has exited the sea floor and the position is confirmed by a diver, the diver will be able to unscrew the bull nose assembly by hand after removing two recessed allen-head bolts. The barrel reamer will be sacrificial and remain in place. The barrel reamer will act as a plug on the seaward end of the pipe to prevent the intrusion of sand and debris into the conduit that would occur between the time the conduit is installed and eventual cable installation A poly pig with the stainless steel cable attached will then be pumped from shore out to the sea end of the pipe and will pull the stainless cable through the length of the conduit.

Once the stainless steel cable is installed a diver will remove the poly pig, attach the cable to the end cap and re-install the end cap. Once the cap is installed, the divers will bury, or verify burial depth, of the end of the pipe to a depth of 0.5 meters below the sea floor. A subsurface buoy with a break away line will be installed with a 1.5 meter tether to assist in relocating the pipe end for the eventual cable installation. This method will allow for easy location of the pipe ends during the cable landing process. If the subsurface buoy breaks away, divers will be able to locate the pipe with a handheld magnetometer. It is not intended to complete a full burial of the HDD sea end at this time in order to assist with the cable landing effort and hopefully eliminate the need for a large scale excavation in order for the divers to work with the sea end of the HDD during the cable landing. The HDD pipe will be buried to required depth along with the trunk cable by the divers after the cable landing.

The drilling rig will be re-positioned on the second alignment and the process repeated.

The MariPro dive team will consist of four commercially licensed divers and surface supplied dive equipment operating out of a locally chartered dive boat. The dive boat will be operated out of Garibaldi Bay and be nominally 30+ feet in length. Dive operations will be weather limited and subject to the weather limitations in the contract with customer. The weather limitation clause for diver operation is reproduced below in Figure 8-2.



13.3.2.5 Diver Support Operations

Adversely affect the launch and recovery or operation of equipment such as Diver Support Boats, ROV's, Drillheads, and positioning equipment used in the HDD operations either temporarily or permanently, or unnecessarily risk damage to overboard equipment, as mutually agreed upon by Purchaser's On-site Representative and Contractor's Program Manager or written designee.

and

The sea state condition exceeds a Beaufort Force 3 which is characterized by maximum conditions of 10 knots wind and significant wave height of 0.6 meters as confirmed by the Master (Captain) of the vessel or as otherwise reasonably agreed to by the Purchaser's On-Site Representative.

Figure 8-2 Weather Limitation Clause

8.6 Final Clean Up and Tie In

The Drilling equipment will be rigged down and the 12-inch casing will be either removed completely from the hole or cut off below grade depending on the ability to pull it out of the ground. All drilled spoil and excess drilling fluid will be hauled and disposed of at approved disposal sites. Following the completion of the HDD installation, the work site will be left completely clean and restored to the conditions set forth by the permits.

L-3 COMMUNICATIONS MARIPRO PROPRIETARY
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APPENDIX A

Permits

1. Oregon Department of State Land (ODSL): Removal/Fill Permit (45663-RF)
2. Oregon Parks and Recreation Department (OPRD): Ocean Shore Alteration Permit (BA#667-10)
3. Oregon Parks and Recreation Department (OPRD): Permit to Operate a Motor Vehicle on the Ocean Shore
4. Tillamook County: Foredune Grading Permit (FG-10-03)
5. Tillamook County: Foredune Grading Permit Attachment
6. Tillamook County: Public Works Utility Permit #4307

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
☎ 503-986-5200

NOTICE This Permit Must Be On Work Site

Permit No.:	**45663-RF**
Permit Type:	**Removal/Fill**
Waterway:	**Pacific Ocean**
County:	**Tillamook**
Expiration Date:	**December 10, 2011**

CONSORTIUM FOR OCEAN LEADERSHIP

IS AUTHORIZED IN ACCORDANCE WITH ORS 196.800 TO 196.990 TO PERFORM THE OPERATIONS DESCRIBED IN THE ATTACHED COPY OF THE APPLICATION, SUBJECT TO THE SPECIAL CONDITIONS LISTED ON ATTACHMENT A AND TO THE FOLLOWING GENERAL CONDITIONS:

1. This permit does not authorize trespass on the lands of others. The permit holder shall obtain all necessary access permits or rights-of-way before entering lands owned by another.
2. This permit does not authorize any work that is not in compliance with local zoning or other local, state, or federal regulation pertaining to the operations authorized by this permit. The permit holder is responsible for obtaining the necessary approvals and permits before proceeding under this permit.
3. All work done under this permit must comply with Oregon Administrative Rules, Chapter 340; Standards of Quality for Public Waters of Oregon. Specific water quality provisions for this project are set forth on Attachment A.
4. Violations of the terms and conditions of this permit are subject to administrative and/or legal action, which may result in revocation of the permit or damages. The permit holder is responsible for the activities of all contractors or other operators involved in work done at the site or under this permit.
5. Employees of the Department of State Lands and all duly authorized representatives of the Director shall be permitted access to the project area at all reasonable times for the purpose of inspecting work performed under this permit.
6. Any permit holder who objects to the conditions of this permit may request a hearing from the Director, in writing, within twenty-one (21) calendar days of the date this permit was issued.
7. In issuing this permit, the Department of State Lands makes no representation regarding the quality or adequacy of the permitted project design, materials, construction, or maintenance, except to approve the project's design and materials, as set forth in the permit application, as satisfying the resource protection, scenic, safety, recreation, and public access requirements of ORS Chapters 196, 390, and related administrative rules.
8. Permittee shall defend and hold harmless the State of Oregon, and its officers, agents, and employees from any claim, suit, or action for property damage or personal injury or death arising out of the design, material, construction, or maintenance of the permitted improvements.
9. Authorization from the U.S. Army Corps of Engineers may also be required.

CREATORS COPY

NOTICE: If removal is from state-owned submerged and submersible land, the applicant must comply with leasing and royalty provisions of ORS 274.530. If the project involves creation of new lands by filling on state-owned submerged or submersible lands, you must comply with ORS 274.905 to 274.940. This permit does not relieve the permittee of an obligation to secure appropriate leases from the Department of State Lands, to conduct activities on state-owned submerged or submersible lands. Failure to comply with these requirements may result in civil or criminal liability. For more information about these requirements, please contact the Department of State Lands, 503-986-5200.

Lori Warner-Dickason
Northern Region Manager
Wetlands & Waterways Conservation Div.
Oregon Department of State Lands

Authorized Signature

December 10, 2010
Date Issued

ATTACHMENT A

Permittee: Consortium for Ocean Leadership

Special Conditions for Removal/Fill Permit No. 45663-RF

READ AND BECOME FAMILIAR WITH CONDITIONS OF YOUR PERMIT.

The project site may be inspected by the Department of State Lands (DSL) as part of our monitoring program. DSL has the right to stop or modify the project at any time if you are not in compliance with these conditions. A copy of this permit shall be available at the work site whenever authorized operations are being conducted.

1. **Responsible Party:** By proceeding under this permit, Consortium for Ocean Leadership agrees to comply with and fulfill all terms and conditions of this permit. Consortium for Ocean Leadership is responsible for carrying out the terms and conditions of this permit unless the permit is officially transferred to another party as approved by DSL.

2. **Authorization to Conduct Removal and/or Fill:** This permit authorizes the placement of up to 14,583 cubic yards and removal of up to 14,583 cubic yards of material in T4S R11W Section 25AA, Tax Lot 500TC, Pacific Ocean, Tillamook County, as described in the attached permit application, map and drawings, received August 12, 2010. In the event information in the application conflicts with these permit conditions, the permit conditions prevail.

3. **Changes to the Project or Inconsistent Requirements from Other Permits:** It is the permittee's responsibility to ensure that all state, federal and local permits are consistent and compatible with the final approved project plans and the project as executed. Any changes made in project design, implementation and/or operating conditions to comply with conditions imposed by other permits must be approved by DSL prior to implementation.

4. **DSL May Halt or Modify:** DSL retains the authority to temporarily halt or modify the project in case of unforeseen damage to natural resources.

5. **DSL May Modify Conditions Upon Permit Renewal:** DSL retains the authority to modify conditions upon renewal, as appropriate, pursuant to the applicable rules in effect at the time of the request for renewal or to protect waters of this state.

General Construction Conditions

6. **Water Quality Certification:** The Department of Environmental Quality (DEQ) may evaluate this project for a Clean Water Act Section 401 Water Quality Certification (WQC). If the evaluation results in issuance of a Section 401 WQC, that turbidity condition will govern any allowable turbidity exceedance and monitoring requirements.

7. **Hazardous, Toxic, and Waste Material Handling:** Petroleum products, chemicals, fresh cement, sandblasted material and chipped paint, wood treated with leachable preservatives or other deleterious waste materials shall not be allowed to enter waters of this state. Machinery refueling is to occur at least 150 feet from waters of this state and confined in a designated area to prevent spillage into waters of this state. Barges shall have containment system to effectively prevent petroleum products or other deleterious material from entering waters of this state. Project-related spills into waters of this state or onto land with a potential to enter waters of this state shall be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311.

8. **Federally Listed Endangered or Threatened Species:** When listed species are present, the authorization holder must comply with the Federal Endangered Species Act. If previously unknown listed species are encountered during construction, all construction activity shall immediately cease and the permit holder must contact DSL.

9. **Archaeological Resources**: If any archaeological resources and/or artifacts are encountered during construction, all construction activity shall immediately cease. The State Historic Preservation Office shall be contacted (phone: 503-986-0674).

10. **Hazards to Recreation, Navigation or Fishing:** The activity shall be timed so as not to interfere with or create a hazard to recreational or commercial navigation or fishing.

11. **Temporary Ground Disturbances:** All temporarily disturbed areas shall be returned to original ground contours at project completion.

Issued: December 10, 2010

RECEIVED
OCT 29 2010
DEPARTMENT OF STATE LANDS

RECEIVED
AUG 12 2010
DEPARTMENT OF STATE LANDS
DATE STAMP

Joint Permit Application Form

US Army Corps Of Engineers (Portland District)

Corps Action/ID Number | AGENCIES WILL ASSIGN NUMBERS | Oregon Department of State Lands No: Revised 45606

SEND ONE SIGNED COPY OF YOUR APPLICATION TO EACH AGENCY

US Army Corps of Engineers:		DSL - West of the Cascades:		DSL - East of the Cascades:		Send DSL Application Fees to:
District Engineer ATTN: CENWP-OD-GPPO Box 2946 Portland, OR 97208-2946 503-808-4373	AND	State of Oregon Department of State Lands 775 Summer Street, Suite 100 Salem, OR 97301-1279 503-986-5200	OR	State of Oregon Department of State Lands 1645 NE Forbes Road, Suite 112 Bend, Oregon 97701 541-388-6112	AND	State of Oregon Department of State Lands PO Box 4395, Unit 18 Portland, OR 97208-4395 **(Attach a copy of the first page of the application)**

(1) APPLICANT INFORMATION

Applicant Name and Address	Jeanine Hubler Consortium for Ocean Leadership 1201 New York Avenue, NW 4th Floor Washington, D.C. 20005	Business Phone # Home Phone # Fax # Email	(202) 787-1631 jhubler@oceanleadership.org
Authorized Agent Name and Address Check one Consultant ☐ Contractor ☒	Cecile Durand University of Washington School of Oceanogrpghy 909 Boat Street Seattle, WA 98195	Business Phone # Home Phone # Fax # Email	206-685-9677 206-221-6771 edurand@u.washington.edu
Property Owner Name and Address If different from above[1]	OR State Lands (offshore) and OR Depart of Parks & Recreation (beach/dunes)	Business Phone # Home Phone # Fax # Email	

(2) PROJECT LOCATION

Street, Road or Other Descriptive Location		Legal Description (attach *tax lot map**)			
The proposed horizontal directional drilling (HDD) entry point is located at the western terminus of Pacific Avenue in Pacific City (OR), with the exit holes further to the west, approximately 1 mile offshore (Figures 1 and 2). Two cables will be installed off the coast of Oregon.		Township	Range	Section	Quarter/Quarter
		T4S	R11W	S25	
In or near (City or Town)	County	Tax Map #		Tax Lot #[2]	
Pacific City	Tillamook	4S1125AA Pacific City		500TC County Recreation Area	
Wetland/Waterway (pick one)	River Mile (if known)	Latitude (in DD.DDDD format)		Longitude (in DD.DDDD format)	
Pacific Ocean		45.2082° N		123.9672° W	

[1] If applicant is not the property owner, permission to conduct the work must be attached.
[2] Attach a copy of all tax maps with the project area highlighted.

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

Tony Stein

Directions to the site	The Landing Site is located at the end of Pacific Ave. in Pacific City. From I-5 South, take Exit 260A. Merge onto OR-99E BR S. Turn right onto Marion St NE. Turn left onto Little Nestucca River Rd. Turn right onto US-101/Oregon Coast Hwy. Turn left onto Brooten Rd. Turn left onto Pacific Ave..

(3) PROPOSED PROJECT INFORMATION

Type: Fill ☐ Excavation (removal) ☒ In-Water Structure ☒ Maintain/Repair an Existing Structure ☐

Brief Description: This project will include the installation and operation of the Regional Scale Nodes component of the Ocean Observatories Initiative. This seafloor-based scientific device includes a network of ocean infrastructure, mobile platforms, and chemical, biological, and geological sensors. The system will be located off the coast of Oregon and linked to an onshore facility by submarine cables. These cables will provide power and internet connectivity.

Fill

Riprap ☐ Rock ☐ Gravel ☐ Organics ☐ Sand ☐ Silt ☐ Clay ☐ Other: ☐

Wetlands	Permanent (cy)	Temporary (cy)							Total cubic yards for project (including outside OHW/wetlands)	
	Impact Area in Acres	Dimensions (feet)								
		L'		W'		H'				
Waters below OHW	Permanent (cy)	Temporary (cy)							Total cubic yards for project (including outside OHW/wetlands)	14,583
		14,583								
	Impact Area in Acres	Dimensions (feet)								
		L'	26,250	W'	±3	H'	±5			

Removal

Wetlands	Permanent (cy)	Temporary (cy)							Total cubic yards for project (including outside OHW/wetlands)	
	Impact Area in Acres	Dimensions (feet)								
		L'		W'		H'				
Waters below OHW	Permanent (cy)	Temporary (cy)							Total cubic yards for project (including outside OHW/wetlands)	14,583
		14,583								
	Impact Area in Acres	Dimensions (feet)								
		L'	26,250	W'	±3	H'	±5			

Total acres of construction related ground disturbance (If 1 acre or more a 1200-C permit may be required from DEQ) 0.21 acres

Is the disposal area upland? Yes ☐ No ☒ Impervious surface created? 0<1 acre ☐ 0>1 acre? ☒

	Yes	No
Are you aware of any state or federally listed species on the project site?	X	
Are you aware of any Cultural/Historic Resources on the project site?	X	
Is the project site within a national Wild & Scenic River?		X
*Is the project site within a State Scenic State Scenic Waterway?**		X

If yes, please explain in the project description (in block 4)

(4) PROPOSED PROJECT PURPOSE AND DESCRIPTION

Purpose and Need:

*Provide a description of the public, social, economic, or environmental benefits of the project along with any supporting formal actions of a public body (e.g. city or county government), as appropriate.**

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

The Ocean Observatory Initiative (OOI) of the National Science Foundation (NSF) is leading an effort to construct long-term, cutting-edge ocean observatories oriented to research and education. Off the Coast of Oregon, the cabled power (up to 200 kW) and bandwidth (up to 240 Gb/s) component of the OOI is called the Regional Scale Nodes (RSN). It will consist of a network of seabed sensors, undersea cables and instrumented moorings. The work associated with this project will focus on the construction and operation of the RSN network, including installation of various chemical, biological and geological seabed sensors, and submarine cables linking the sensors to shore.

The RSN network consists of two primary submarine cable routes running offshore the Oregon Coast from a landing at Pacific City (Figure 2). On shore, an existing terminal station and beach manhole (BMH) will be used for the landing of the two RSN cables at Pacific City. Between the BMH and the station, the cables will be pulled through existing conduit that link eight manholes located along the western side of Cape Kiwanda Drive.

The work will include horizontal direction drilling (HDD) and the placement two submarine conduits from the existing BMH in Pacific City to approximately 0.9 miles (or 5,000 feet) offshore to a water depth of about 65 feet. HDD will provide the terrestrial-to-marine interface to minimize possible disturbances to the beach area near the landing site. It will also provide maximum protection to the cables in the surf zone. From the HDD exit holes, cables will be either trenched (~5 feet below seabed) or laid on the seafloor to water depths up to ~5,000 feet, i.e. the cables will be entirely buried within Oregon state waters.

Project Description:

Please describe in detail the proposed removal and fill activities, including the following information:

- Volumes and acreages of all fill and removal activities in waterway or wetland separately
- Permanent and temporary impacts
- Types of materials (e.g., gravel, silt, clay, etc.)
- How the project will be accomplished (i.e., describe construction methods, equipment, site access)
- *Describe any changes that the project may make to the hydraulic and hydrologic characteristics (e.g., general direction of stream and surface water flow, estimated winter and summer flow volumes.) of the waters of the state, and an explanation of measures taken to avoid or minimize any adverse effects of those changes.*
- Is any of the work already complete? Yes ☒ No ☐ If yes, please describe the completed work. A marine cable route survey was completed.

In addition, for fish habitat or wetland restoration or enhancement activities, complete the information requested in supplemental Fish Habitat or Wetland Restoration and Enhancement form.

Project Drawings

State the number of project drawing sheets included with this application: 5 drawings (Figure 1 through 5) and 1 text document

A complete application must include a location map, site plan, cross-section drawings and recent aerial photo as follows and as applicable to the project:

- **Location map** (must be legible with street names)
  - Site plan including;
  - Entire project site and activity areas
  - Existing and proposed contours
  - Location of ordinary high water, wetland boundaries or other jurisdictional boundaries
  - Identification of temporary and permanent impact areas within waterways or wetlands
  - Map scale or dimensions and north arrow
  - Location of staging areas
  - Location of construction access
  - Location of cross section(s), as applicable
  - Location of mitigation area, if applicable
- **Cross section drawing(s) including;**
  - Existing and proposed elevations
  - Identification of temporary and permanent impact areas within waterways or wetlands
  - Ordinary high water and/or wetland boundary or other jurisdictional boundaries
  - Map scale or dimensions
- **Recent Aerial photo** (1:200, or if not available for your site, the highest resolution available)

Will any construction debris, runoff, etc., enter a wetland or waterway? Yes ☒ No ☐

If yes, describe the type of discharge and show the discharge location on the site plan.

To avoid disturbing the beach, sand dunes, and nearshore environment, horizontal directional drilling (HDD) will be used. Drilling will start from an existing manhole at Pacific City and extend to approximately 0.9 miles offshore.

The seabed will be disturbed during HDD activities at the location of the bore exit points and during trenching along the cable routes seaward of the exit points (Figure 2). Up to 1 cubic yard of sand/silt material could be disturbed during the HDD exiting at each hole. During trenching, sediment will either slough back into the trench immediately after the cable is laid; be pushed to the sides to refill the trench from current action over time; or be suspended in the water column to settle out a varying distances from the trench.

Overall, both activities will be temporary in nature and there will be no long-term or ongoing discharge of construction materials once the cable is installed. Turbidity levels of the impacted area will not significantly change during and after the installation of the cable system.

Estimated project start date:	02/2011	Estimated project completion date:	08/2014

(5) PROJECT IMPACTS AND ALTERNATIVES

Alternatives Analysis:

Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterway or wetland. (Include alternative design(s) with less impact and reasons why the alternative(s) were not chosen. Reference OAR 141-085-0565 (1) through (6) for more information).*

The aim of the Proposed Action (the installation of the RSN component) is to study ocean processes off the coast of Oregon, therefore no other location for this cable system is feasible. The "No-Action" Alternative was omitted as a reasonable alternative because it does not meet the purpose and need for the Proposed Action.

Measures to Minimize Impacts

Describe what measures you will use (before and after construction) to minimize impacts to the waterway or wetland. These may include but are not limited to the following:

- *For projects with ground disturbance include an erosion control plan or description of other best management practices (BMP's) as appropriate. (For more information on erosion control practices see DEQ's Oregon Sediment and Erosion Control Manual)*
- *For work in waterways where fish or flowing water are likely to be present, discuss how the work area will be isolated from the flowing water.*
- *If native migratory fish are present (or were historically present) and you are installing, replacing or abandoning a culvert or other potential obstruction to fish passage, complete and attach a statement of how the Fish Passage Requirements, set by the Oregon Department of Fish and Wildlife will be met.*

The installation of the RSN component of the OOI project could have a temporary negative impact on the fish population due to noise and/or sediment disturbance caused by the plowing equipment in areas where the cable burial is planned. However, due to the temporary nature of the installation process and ocean currents in the region, turbidity impacts will be negligible. Close to shore, HDD will be used to avoid impacting the nearshore habitat. To reduce potential impacts at the HDD entry and exit points, the following measures will be utilized:

- The water exit points for HDD will be sited in sandy bottom areas.
- Containment structures will be used around the onshore drilling platform to control any mud leakage to the surroundings.
- An HDD Monitoring and Spill Contingency Plan will be prepared and submitted to the USACE and the ODEQ prior to drilling. The plan will include, but not necessarily be limited to the following:

1) A description of superficial and bedrock geological conditions and the proposed bore profile at each HDD location;
2) An assessment of the likelihood of a "frac-out" involving the release of drilling fluids from the bore hole into the overlying ocean waters;
3) Procedures to monitor drilling fluid returns, regulate drilling pressure, and add or reduce circulation materials, as necessary, to plug fractures along the bore path and minimize the possibility of a frac-out;
4) To minimize the release of drilling mud when the drill punches through on the seabed, operators will switch from drilling mud to water only to lubricate the bore during the last stage of the operation before the drill reaches its exit point;
5) Procedures will be in place to detect a release of drilling muds between the bore entry and the planned exit points; and
6) A Contingency Plan will be in place for the containment and cleanup of a discharge of drilling muds around either the entry or exit points.

See Figures 3 and 4 for Typical Staging Area Set-up and HDD Profile.

All onshore cable installation will occur in existing conduits and be connected to an existing cable station. There will be no crossings or work in adjacent waters containing native migratory fish during this onshore installation.

Description of resources in project area

Ocean ☒ Estuary ☐ River ☐ Lake ☐ Stream ☐ Freshwater Wetland ☐

Describe the existing **physical and biological characteristics** of the wetland/waterway site by area and type of resource (Use separate sheets and photos, if necessary).

For wetlands, include, as applicable:

- *Cowardin and Hydrogeomorphic(HGM) wetland class(s)**
- *Dominant plant species by layer (herb, shrub, tree)**
- Whether the wetland is freshwater or tidal
- *Assessment of the functional attributes of the wetland to be impacted**
- Identify any vernal pools, bogs, fens, mature forested wetland, seasonal mudflats, or native wet prairies in or near the project area.)

For waterways, include a description of, as applicable:

- *Channel and bank conditions**
- *Type and condition of riparian vegetation**
- *Channel morphology (i.e., structure and shape)**
- *Stream substrate**
- Fish and wildlife (type, abundance, period of use, significance of site)
- *General hydrological conditions (e.g. stream flow, seasonal fluctuations)**

The cable system is located off the Oregon coast, landing at Pacific city, via horizontal directional drilling (HDD). On land, no sensitive areas, such as wetlands or streams, occur near the existing beach manhole (BMH)/HDD entry point. Both Regional Scale Nodes (RSN) cables will be pulled through existing conduit linking eight manholes along the edge of Cape Kiwanda Drive. The areas around these manholes are graveled and devoid of vegetation. The area surrounding the Pacific City cable station is paved. The HDD entry hole, construction site, staging areas and the terrestrial cabling will occur on paved areas with no vegetation. Sand removal above the BMH may be required; however, the terrestrial operations will be limited to an area of less the one acre (approximately 0.21 acres), including the setting up a drilling rig next to the existing BMH at the western terminus of Pacific Avenue. Therefore, there would be no significant impacts to terrestrial biological resources as a result of the Proposed Action.

The HDD exit holes will be approximately 0.9 miles off the Oregon coast, in approximately 65 feet of water. Eight marine mammals, four sea turtles, and six fish species are federally listed as threatened or endangered under the Endangered Species Act and may potentially be present in the area of the RSN network. These include:

Marine Mammals
Blue whale (Balaenoptera musculus) - Endangered
Fin whale (Balaenoptera physalus) - Endangered
Humpback whale (Megaptera novaeangliae) - Endangered
Southern Resident Killer whale (Orcinus orca) - Endangered
North Pacific right whale (Eubalaena japonica) - Endangered
Sei whale (Balaenoptera borealis) - Endangered
Sperm whale (Physeter macrocephalus) - Endangered
Steller sea lion (Eumetopias jubatus) - Threatened

Sea Turtles
Green (Chelonia mydas) - Endangered
Leatherback (Dermochelys coriacea) - Endangered
Loggerhead (Caretta caretta) - Threatened
Olive Ridley (Lepidochelys olivacea) - Endangered

Fish
Green sturgeon (southern DPS) (Acipenser medirostris) - Threatened
Lower Columbia River Chinook ESU (Oncorhynchus tshawytscha) - Threatened
Lower Columbia River Coho ESU (O. kisutch) - Threatened
Oregon Coast Coho Salmon (O. kisutch) - Threatened, Critical Habitat
Lower Columbia River Steelhead ESU (O. mykiss) - Threatened
Columbia River Chum ESU (O. keta) - Threatened
Key:
ESU = Evolutionary Significant Unit, DPS = Distinct Population Segment

A Site Specific Environmental Assessment (SSEA) is currently being prepared as part of the NEPA process. This SSEA will include detailed information regarding the potential presence of endangered species and cultural resources in the project area, and will assess impact of the project activities as well as mitigation measures.

The RSN cable routes have been designed to avoid all known shipwreck locations compiled from public and private sources. In addition, no shipwrecks were identified during the marine geophysical survey conducted along the proposed RSN routes in April/May 2010. Avoidance is a generally-accepted protection strategy for the preservation of potentially significant cultural resources, including shipwrecks. Should a wreck be discovered during the RSN cable installation, it will be immediately reported to the appropriate entity and the cable will be re-routed accordingly.

The closest protected areas to the proposed cable route is the Haystack Rock Marine Garden, which is located approximately 1,900 to 2,300 feet north of Segment 5 (at the nearest point).

Describe the existing navigation, fishing and recreational use of the waterway or wetland.*

The main socioeconomic resource along the Oregon coast is commercial and recreational fishing. The closest major fishing port to the Pacific City landing site is the port of Garibaldi, approximately 25 miles north. Major ports are also located at the northern and southern extents of the cable route in Astoria, OR, and Newport, OR, respectively. The RSN cable system falls within two North Pacific ecosystems; the Gulf of Alaska Large Marine Ecosystem (LME) and the California Current LME. Seasonal upwellings of cold, nutrient rich water in each of these LMEs support localized areas of high productivity and result in successful and socio-economically important pelagic fisheries. Major species harvested from the California Current LME include salmon, albacore tuna, mackerel, sardines, anchovies, and various groundfish. Important fisheries in the Gulf of Alaska LME include shellfish, walleye, pollock, salmon, and various groundfish.

Major traffic routes used by large vessels (other than related to fishing or recreational) occur well offshore of Oregon state waters and will not be impacted by this project.

Site Restoration/Rehabilitation

- *For temporary disturbance of soils and/or vegetation in waterways, wetlands or riparian areas, please discuss how you will restore the site after construction including any monitoring, if necessary**

The terrestrial portion of the cable installation will involve pulling cable through existing conduits under paved and graveled areas (devoid of vegetation) between an existing beach manhole and an existing cable station. No trenching will occur onshore, and therefore no vegetation will be disturbed.

Horizontal directional drilling (HDD) will start at the existing manhole and will end at two exit holes approximately 0.9 miles offshore (5,000 feet), therefore, no vegetation will be disturbed. Trenching along the seafloor will commence at the HDD exit holes, at a water depth of about 65 feet, i.e. deeper than where seaweeds are typically found. Sediments will be disturbed during the cable laying process and then fill in behind the plow by the action of currents or by gravity; therefore disturbance will be only temporary.

Mitigation

*Describe the reasonably expected adverse effects of the development of this project and how the effects will be mitigated.**

- *For permanent impact to wetlands, complete and attach a Compensatory Wetland Mitigation (CWM) Plan. (See OAR 141-085-0705 for plan requirements)**
- *For permanent impact to waters other than wetlands, complete and attach a Compensatory Mitigation (CM) plan (See OAR 141-085-0765 for plan requirements)**
- *For permanent impact to estuarine wetlands, you must submit a CWM plan.**

No permanent impacts to wetlands or waters of the State/U.S. are expected to occur as a result of this installation. Prior to the project construction, a "Notice to Mariners" will be issued by the Coast Guard to mitigate impacts to navigation, fishing and/or recreational activities.

Mitigation Location Information (Fill out only when mitigation is proposed or required)

Proposed mitigation (Check all that apply):

- ☒ *Onsite Mitigation*
- ☐ *Offsite Mitigation*
- ☐ *Mitigation Bank*
- ☐ *Payment to Provide*

Type of mitigation:

- ☐ *Wetland Mitigation*
- ☐ *Mitigation for impacts to other waters*
- ☒ *Mitigation for impacts to navigation, fishing, or recreation*

Street, Road or Other Descriptive Location	*Legal Description (attach tax lot map*)*			
	Quarter/Quarter	*Section*	*Township*	*Range*
Offshore, along cable route (see Figure 2). No long term impacts, but a "Notice to Mariners" will be issued by the Coast Guard for vessels to temporarily avoid the project area during HDD and trenching activities.				

In or near (City or Town)	*County*	*Tax Map #*	*Tax Lot #*[3]
Wetland/Waterway (pick one)	*River Mile (if known)*	*Latitude (in DD.DDDD format)*	*Longitude (in DD.DDDD format)*
Name of waterway/watershed/HUC		*Name of mitigation bank (if applicable)*	

[3] Attach a copy of all tax maps with the project area highlighted.

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

(6) ADDITIONAL INFORMATION

Adjoining Property Owners and Their Address and Phone Numbers *(if more than 5, attach printed labels*)*

Taxlot 200: Faye Jensen
650 Liberty Street SE
Salem, OR 97301

Taxlot 500: Tillamook County
201 Laurel Ave.
Tillamook, OR 97141

Taxlot 600: R & M Properties
7806 SE Alta Verde Drive
Portland, OR 97266

Taxlot 700: R & M Properties
7806 SE Alta Verde Drive
Portland, OR 97266

See Figure 5.

Has the proposed activity or any related activity received the attention of the Corps of Engineers or the Department of State Lands in the past, e.g., wetland delineation, violation, permit, lease request, etc.?

Yes ☒ No ☐

If yes, what identification number(s) were assigned by the respective agencies:

Corps #	NWP-2010-63	State of Oregon #	44126-AA

Has a wetland delineation been completed for this site? *Yes* ☐ *No* ☒

*If yes by whom?**	

Has the wetland delineation been approved by DSL or the COE? *Yes* ☐ *No* ☒

*If yes, attach a concurrence letter. **

- ***Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.***

(7) CITY/COUNTY PLANNING DEPARTMENT AFFIDAVIT
*(TO BE COMPLETED BY LOCAL PLANNING OFFICIAL) **

I have reviewed the project outlined in this application and have determined that:

- ☐ This project is not regulated by the comprehensive plan and land use regulations.
- ☑ This project is consistent with the comprehensive plan and land use regulations.
- ☐ This project will be consistent with the comprehensive plan and land use regulations when the following local approval(s) are obtained.
  - ☐ Conditional Use Approval
  - ☐ Development Permit
  - ☐ Other

This project is not consistent with the comprehensive plan. Consistency requires a

- ☐ Plan Amendment
- ☐ Zone Change
- ☐ Other

An application has ☐ has not ☐ been filed for local approvals checked above.

Local planning official name (print)	Signature	Title	City / County	Date
Kristen Maze	[redacted]	Coastal Resource Planner	Tillamook	7-28-10

Comments:

As per the describe project the existing flood zone AO depth 1 percent, it is consistent with land use regulations and the comprehensive plan. FIRM Panel 410196 0855 F

(8) COASTAL ZONE CERTIFICATION *

If the proposed activity described in your permit application is within the Oregon coastal zone, the following certification is required before your application can be processed. A public notice will be issued with the certification statement, which will be forwarded to the Oregon Department of Land Conservation and Development for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program, contact the department at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Name	Title
CECILE DURAND	MAINTENANCE OPERATIONS MANAGER / AUTHORIZED AGENT
Applicant Signature	**Date**
[redacted]	08 AUGUST 2010

* *Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.*

NOTES TO USERS



LEGEND

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0000F

FIRM

FLOOD INSURANCE RATE MAP

TILLAMOOK COUNTY, OREGON AND INCORPORATED AREAS

PANEL 000 OF 1000

MAP NUMBER
41057C0000F

EFFECTIVE DATE

Federal Emergency Management Agency

(9) SIGNATURES FOR JOINT APPLICATION

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or Dept. of State Lands staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. *I understand that payment of the required state processing fee does not guarantee permit issuance. The fee for the state application must accompany the application for completeness.*

Amount enclosed	$1,291

Print /Type Name	Title	Print /Type Name	Title
Jeanne Hubler	Director, Contracts and Grants	Cecile Durand	Maintenance Operations Manager
Applicant Signature	**Date**	**Authorized Agent Signature**	**Date**
[redacted]	7/23/10	[redacted]	07/23/10

Landowner signature is required for projects and for mitigation work proposed on land not owned by the applicant, including state-owned submerged and submersible lands, please provide signatures below. A signature by the Department of State Lands for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for authorization to conduct removal/fill activities on such lands. This signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied.

Print /Type Name	Title	Print /Type Name	Title OPRD
Nancy A Pustis	Western Region Mgr.	CLIFF HOUCK	PROPERTY MANAGER
Property Owner Signature	**Date**	*Property Owner Signature*	**Date**
[redacted]	9/07/10	[redacted]	10/28/2010

*OREGON PARKS & RECREATION DEPARTMENT will require a permit & its approval for the installation & construction of this proposed cable crossing. Signature on this application should not be considered the Permit/Approval/or intent of the Department to issue such a permit. Issuance of a permit could contain conditions regarding construction, repair,maintenance,access and other elements affecting OPRD's management.

- *Italicized areas are not required by the Corps for a complete application, but may be necessary prior to final permit decision by the Corps.*

Section 4: Project Description

At the landfall site, a horizontal directional drilling (HDD) rig will be set up at the western terminus of Pacific Avenue. The Avenue is located on public land and runs through a single family residential area. All site access will be provided via Brooten Road and Pacific Avenue or Cape Kiwanda Drive and Pacific Avenue. No upland construction is proposed.

The HDD staging area will be limited to an area of less the one acre (approximately 0.21 acres). Operations will involve setting up the HDD drilling rig next to an existing beach manhole (BMH) at the western terminus of Pacific Avenue, and drilling two (2) bores under the beach and seabed from the BMH to two exit points approximately 0.9 mile offshore.

The construction will begin by removing a small area (up to 2 cubic yards) of underlying soils (sands) around the BMH to clear the site for the drilling operation. Steel planks or other protective material will be placed on the road to protect the surface from heavy equipment and materials. A truck-mounted HDD rig will be brought to the site, including power generators, drill pipe and racks, storage tanks for the drilling muds, and clean water storage tanks (Figure 3). Water for the drilling operation will most likely come from a municipal source. Equipment to be used in the staging area will include:

- A frac-out tank
- Mud tank
- Drilling rig
- Control cab with power unit
- Mud pumping units
- Job trailer
- Crane
- Equipment storage area

The drilling operation will begin by drilling a pilot hole using a drill bit and a drill head, and pressure injection of drilling fluid. The drilling will be carried out continuously in intervals of approximately 30 feet, equivalent to one length of drill pipe. Location of the drill bit will also be continuously monitored using an electronic transmitter in the drill head to send information to the drill operators. From this monitoring information, the operator will know the location of the drill head at all times and will use the information to maintain the pre-planned path of each bore. Each HDD hole will be approximately 12.5 inches in diameter for the first 700 feet and then reduce to 8 inches in diameter for the remaining 4,300 feet. The HDD activities will take up to 60 days to complete. To avoid disturbing the beach, sand dunes, and nearshore environment, a total of 200 cubic yards will be permanently removed as a result of the HDD operations.

The local geology at the Pacific City landing site is dominated by unconsolidated sand. The sand is fine to medium grained, sub-rounded to rounded, composed primarily of quartz grains with a considerable portion of chert, plagioclase, and basalt grains. A well drilled approximately 0.8 miles north of the BMH indicates the presence of at least 120 feet of unconsolidated sediments beneath the beach surface. Due to the similarity between the beach conditions at the well site and the RSN landing site, a comparable thickness of sand is anticipated to be present at the BMH.

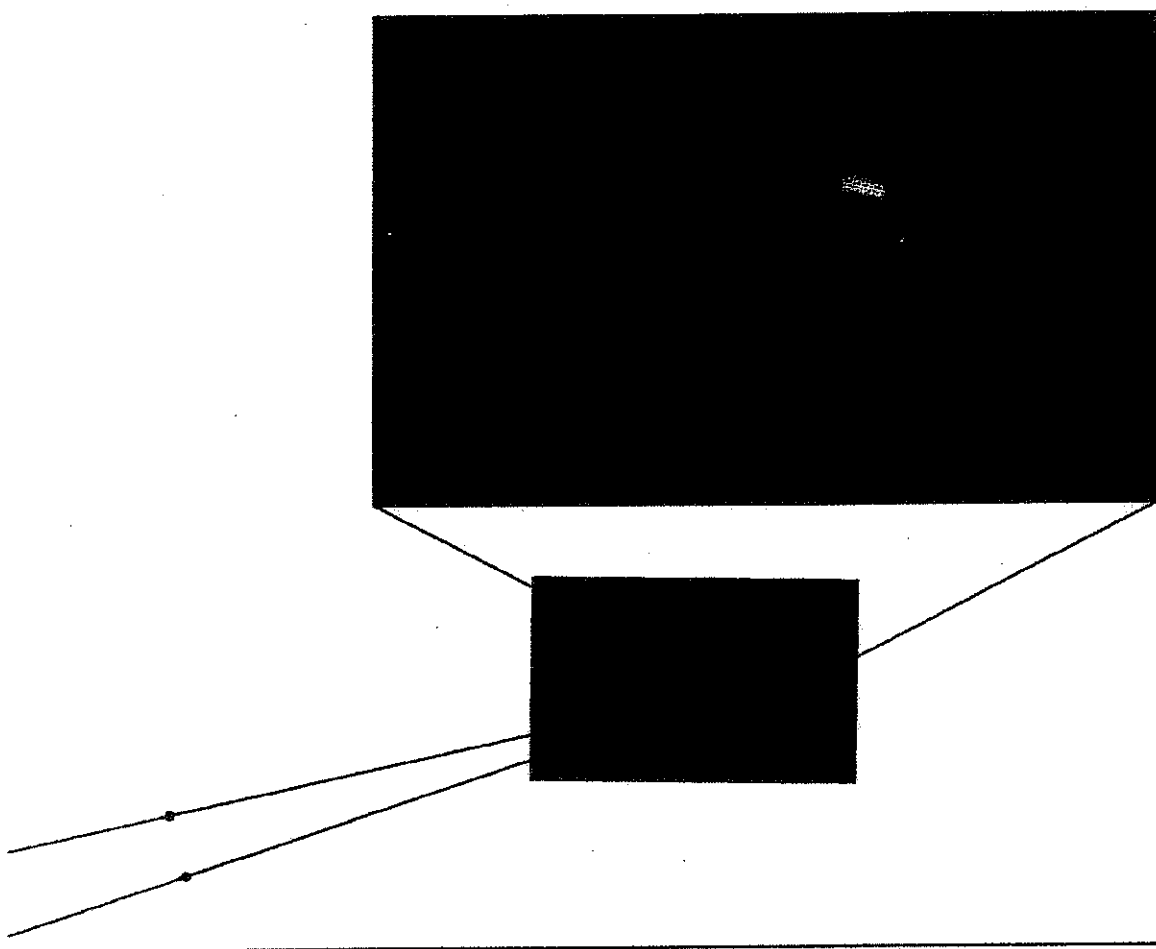
From the exit holes, the cable will be laid and simultaneously buried by a towed sea plow to a depth of about 4 to 5 feet below seabed. The trench created will be of a triangular shape approximately 3 feet wide and 5 feet deep, with most of the excavated materials displaced adjacent to the trench. Slumping of the side walls and displaced material is likely to occur once

the cable has been installed. A total of 13,600 cubic yards will be temporarily displaced in state waters as a result of the cable burial process.

As the proposed activities will occur in the Pacific Ocean, construction activities will not alter hydraulic or hydrologic characteristics of this water body. However, potential water quality impacts could include the following:

- HDD operation will result in the release of drilling fluids and cuttings at the HDD exit.
- HDD operation could result in frac-out, suspension of potentially contaminated sediments at the HDD exit, and accidental spills of petroleum products.
- Trenching will temporarily disturb sediments on the seafloor.

Appropriate measures will be in place to reduce any potential impact from trenching and HDD activities (see Section 5 of JPA).

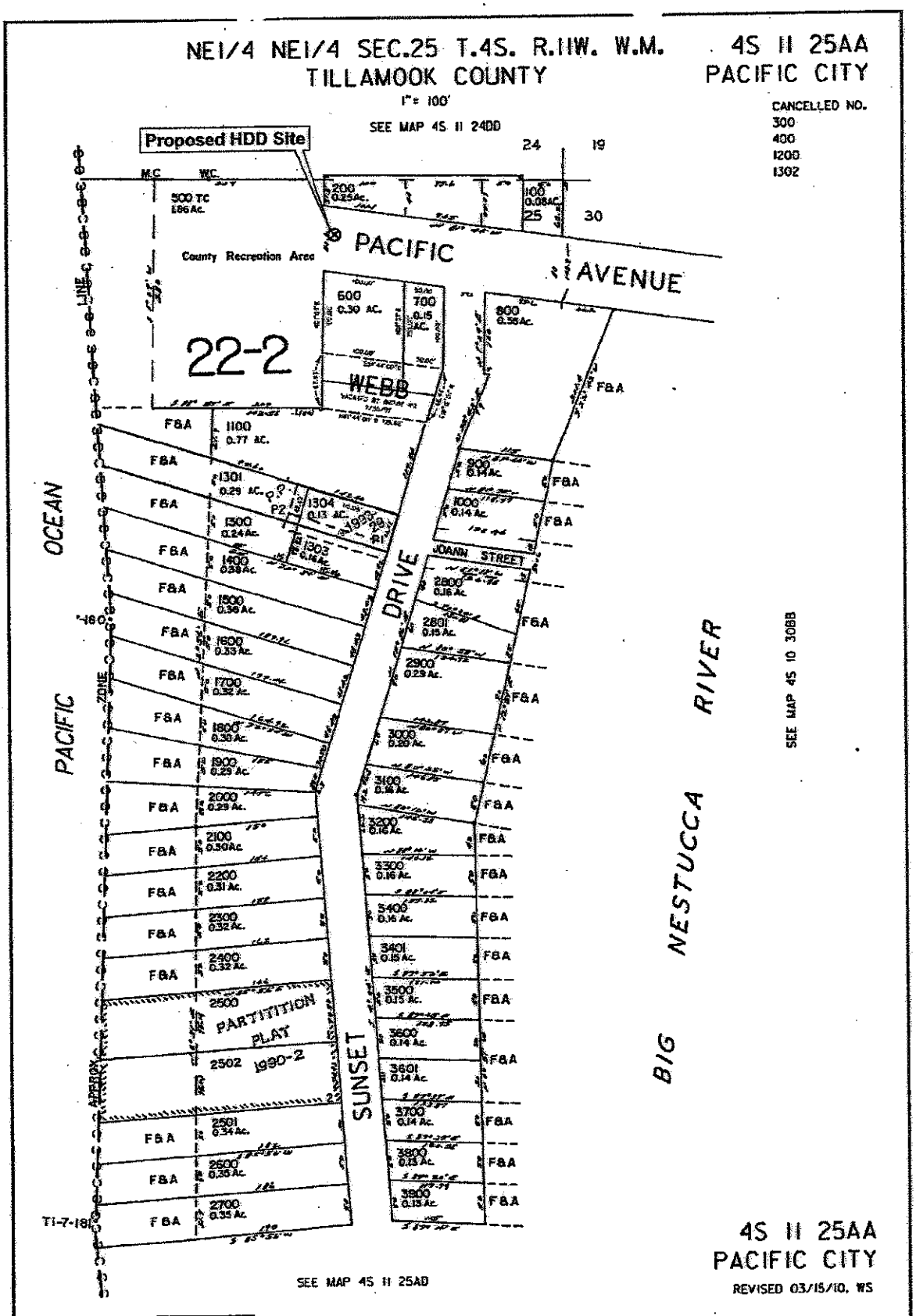


RSN Shore Landing Construction Site Coordinates										
location description	Label	Locations						borehole and terrestrial data summary	
		UTM (ref WGS 84)		Geodetic (ref WGS 84)				tube exit depth	Approx length of pipe
		Northing	Easting	Latitude		Longitude		(meters	(meters)
Terrestrial	Bch Vault	5005879	424043	45	12.1390	-123	58.0290		
Segment 1	HDDIN	5005879	424039	45	12.1361	-123	58.0317		
Bore Tube	HDDOUT	5005403	422595	45	11.6719	-123	59.1303	20	1524
Segment 5	HDDIN	5005879	424039	45	12.1361	-123	58.0317		
Bore Tube	HDDOUT	5005557	422553	45	11.9547	-123	59.1636	20	1524

RSN Component of the OOI

Pacific City, Oregon

Figure 3
Typical HDD Staging Area Setup



RSN Component of the OOI

Pacific City, Oregon

Figure 5
Tax Assessor Map

OCEAN SHORE
ALTERATION PERMIT

Application Approved with Conditions: ☒ **Application Denied:** ☐

Date: October 29, 2010 **Applicant:** Consortium for Ocean Leadership

OPRD File Number: BA-667-10 **County:** **Tillamook**

Project Location: Seward of the terminus of Pacific Avenue, Pacific City
Tillamook County Assessor's Map # 4S-11W-25, Tax Lots 200, 500, 600, and 700.

OPRD's review included a staff inspection of the site and evaluation of the project against the Ocean Shore Permit Standards, OAR-736-020-0005 through 736-020-0030.

☒ Additional Oregon Administrative Rules and Revised Statutes Apply: **OAR 736-020-0040**

Project Description:
The project involves the installation of two (2) 5,000 feet long, 5" steel pipes by horizontal directional drilling (HDD) from the North Pacific Cable beach vault at the western end of Pacific Avenue to a water depth of 20 meters offshore, a distance of approximately 0.9 miles. The conduit will be bored to obtain a depth of 43 feet below beach level from the upland site behind the beach dunes and the ocean shore to a point approximately 4,910 feet offshore and therefore within OPRD's jurisdiction to make a decision on your application.

The project is proposed to be located:

☒ seaward of the statutory vegetation line ☒ Seaward of the line of established upland shore vegetation

Submitted plans: Attached ☒ Not Applicable ☐

Based on the evaluation of the above standards, staff inspections of the site, and consideration of public and agency comments, the Oregon Parks and Recreation Department:

☒ approves your application ☐ denies

for steel conduit pipes and fiber optic cable crossing on the ocean shore.

ORS.390.605 (2) defines the "ocean shore" to mean the land lying between extreme low tide of the Pacific Ocean and the statutory vegetation line as described by ORS 390.770 or the line of established upland shore vegetation, whichever is farther inland. In the location of the proposed project the statutory vegetation line is located farther inland.

Conditions:

1. The Permittee shall finalize an agreement with the Oregon Fisherman's Cable Committee (OFCC) prior to construction.
2. The project shall be completed in accordance with the submitted plans. As described in the permit application materials, the cable and conduit will be directional-bored beneath the beach and foredune, so that no visible alteration, or excavation will be required within the ocean shore boundaries.
3. The permittee shall be responsible for obtaining permit approvals and/or easements from the U.S. Army Corps of Engineers, Division of State Lands, and State Land Board for cable installation on the ocean seafloor prior to construction.
4. The permittee shall be responsible for obtaining permit approvals and/or easements from the Tillamook County Department of Community Development for use of County right-of-ways and utility installation. A Foredune Grading Permit for moving sand at the North Pacific Cable beach vault for construction purposes will be required by Tillamook County.
5. The contractor or applicant shall notify OPRD prior to commencing work and when the project is completed. Contact Tony Stein (541-265-9871)
6. This permit is only valid upon receipt of $10,000 to OPRD for just compensation for use of the ocean shore.
7. The permit shall expire on October 29, 2011. Prior to that date the permittee or authorized representative may request a permit extension if it appears that due to unforeseen circumstances the project cannot be accomplished by the expiration date.
8. If an unseen erosion event or other phenomena occurs that causes the cable or conduits to be exposed, constitutes a hazard to the public or is in any way detrimental to the preservation of the economic, scenic, and recreational value of the ocean shore, the permittee or subsequent owner of the cable and related facilities shall, at the request of the Department, re-install the cable to an adequate depth to eliminate such exposure, hazard or detrimental condition.
9. In no event shall the issuance of this permit be construed as a sale, lease, granting of easement or any form of conveyance of the state recreation al area, ocean shore or submerged lands.
10. If the permittee shall fail to comply with the conditions provided herein and otherwise imposed by the Oregon Parks and Recreation Department, the subject permit may be revoked without any liability on the part of the Oregon Parks and Recreation Department.
11. The permittee shall save and hold harmless the State of Oregon, the State Parks and Recreation Commission and its members, and all officers, agents and employees of the State Parks Department, from any claim, suit or action whatsoever for damages to property, or injury or death to any person or persons due to negligence of permittee, their officers, agents or employees, and arising out of the performance of any work or project covered by the granting of a permit.

_____

John Allen, Coastal Region Manager, Oregon Parks and Recreation Department

Cc: Butch Parker, Tillamook County
Laren Woolley, DLCD
Karla Ellis, U.S. Army Corps of Engineers
OPRD Area 1 Office

Appeal Process, OPRD Review

Any person aggrieved or adversely affected by the grant of a permit or the conditions imposed on the permit may file a written request for a hearing with the Parks and Recreation Director. The request must be received within 30 days of the date of the permit. The hearing shall be conducted as a contested case in accordance with ORS 183.415 to 183.430, 183.440 to 183.460 and 183.470

OREGON PARKS & RECREATION DEPARTMENT
Application and Permit to Operate a Motor Vehicle on the Ocean Shore Under the Authority of ORS 390.678

Nature HISTORY *Discovery*

Ocean Shore) File Code: BEA 4.4

(For any Class 1 all-terrain vehicles use Application and Permit to Operate a Class 1 ATV on the

Name and Address of Applicant: THE HDD COMPANY 3161 Cameron Park Drive Suite 215 Cameron Park, CA 95682	**Date of Application:** January 07, 2011 **Contact Number:** Phone: 530-676-5705 Cell: **Fax:** 530-676-3605
Dates of Proposed Use: Begin: 2/7/11 End: 4/4/11	**Ocean Shore Vehicle Entrance and Departure Location:** Pacific Avenue in Pacific City, Oregon

Area of Vehicle Operation on Ocean Shore (may be limited to one specified area per permit - use local landmarks or mileage):

Northern street or landmark: Immediately west of the Pacific Avenue and Sunset Drive Intersection in Pacific City, Or.
Southern street or landmark:
County: Tillamook

Reason for Operation of Vehicle on Ocean Shore:

☐ Driftwood collection (For personal use)

☐ Disabled Access (Disabled Person defined by ORS 174.107) **(Attach copy of physicians letter; DMV disabled placard; Veteran's Letter; or Oregon State Parks Special Access Pass)**

☒ Ocean Shore Construction (describe): Guidance Wire for drilling under beach area. Dig shallow 8" to 12" trenches and place a 6 gauge insulated copper wire in the trench and backfill it. The trenches will be in a pyramid shape with the apex of the pyramid starting at the end of the Pacific Avenue. Each leg will proceed westerly toward the beach areas mean low tide. The base of the pyramid shape will be approximately 170'-200'and almost parallel with the surf. The trenches will be dug with a walk behind Ditch Witch trencher. The wire will be removed and the trenches restored to original within a six to eight week period.

☐ Other, including Scientific Research (describe): (OPRD Research or Collection Permit may be Required)

Make and Color of Vehicle to be Used: Ditch Witch walk behind trenching machine	**Body Type:** N/A
Operator (if other than applicant):	**Vehicle License Number:** N/A
	Operator's Driver's License Number: N/A

Permit must be displayed in /on vehicle and shown upon request.

I have read and understand the conditions of this permit. I agree to abide by the regulations on both sides of this application. Any violation of said regulations shall invalidate the permit and may result in my disqualification for future permits.

Applicant's Signature: Larry Pettinger	**Authorized by:** T. Stein
Date: 1/07/2011	**OPRD Office:** Coastal Region

Special Conditions:
See Attached Conditions

cc: Pete Marvin, CLSP
63400-2075 (6-09)
Tillamook Sheriff's Dept.

Attachment A:
PERMIT CONDITIONS:

APPLICANT:	HDD Company, Inc., on behalf of the Consortium for Ocean Leadership Inc., (BA# 667-10)
CONTRACTOR:	The HDD Company
DATE OF ISSUANCE:	January 11, 2011
JOB SITE:	West of Pacific Avenue, Pacific City
DESCRIPTION OF PROJECT:	Trench and Place Temporary Locate Wires for a Directional Drill Bore Operation.

Installation of steel pipes and fiber optic lines will require the installation of temporary "locate wires" buried (8"-12" inches) beneath the ocean shore. The locate wires will set up a magnetic field to guide a directional bore hole drilled below the surface beach level.

This permit shall be subject to the following conditions:

1. All work shall be conducted in accordance with the submitted permit application and work descriptions.

2. As described, the work shall not require heavy equipment, with the exception of a "Ditch Witch" trencher to excavate a small trench 8" to 12" inches below the beach surface.

3. The contractor shall be responsible for monitoring the potential exposure of the locate wires after high tides and high surf conditions have occurred on the ocean shore. Any exposure of the wires may present a public safety hazard on the beach, and HDD Company employees shall take immediate action to remove or relocate the wires to alleviate the hazard.

4. The contractor shall be responsible for monitoring the potential exposure of the locate wires due to vehicle traffic over the foredune to access the ocean shore at Bob Straub State Park. Any exposure of the wires may present a public safety hazard on the beach, and the HDD Company employees shall take immediate action to remove or relocate the wires to alleviate the hazard. Beach access shall not be blocked or restricted for pedestrians and/or vehicles at this public access.

5. Beach areas shall be restored after the completion of the operation, with all foreign debris and materials removed, and the beach returned to pre-existing conditions.

Tony Stein
Coastal Land Use Coordinator

Tillamook County

DEPARTMENT OF COMMUNITY DEVELOPMENT
BUILDING, PLANNING & ON-SITE SANITATION SECTIONS

201 Laurel Avenue
Tillamook, Oregon 97141

Land of Cheese, Trees and Ocean Breeze

Building (503)842-3407
Planning (503)842-3408
On-Site Sanitation (503)842-3409
FAX (503)842-1819
Toll Free 1 (800)488-8280

FOREDUNE GRADING PERMIT FG-10-03
ADMINISTRATIVE REVIEW

Approved with Conditions
December 30, 2010

Prepared by: Kristen Maze, Coastal Resource Planner

I. GENERAL INFORMATION

Description of Request: A request for a Foredune Grading Permit at the County Parking Facility and Pacific Avenue turnaround in Management Unit F of the Pacific City Foredune Management Plan.

Location: The central portion of the management area that contain the Turnaround and associated County parking lot in Pacific City, specifically identified as: Township 4 South, Range 11 West, Section 25AA, Tax Lot 500, Management Unit F.

Zone: Section 3.330: Pacific City/Woods Park Zone PCW-P
Section 3.085: Beach and Dune Overlay

Applicant and Property Owner: MariPro Inc.
1522 Cook Place
Goleta, CA 93117

Tillamook County
201 Laurel Ave.
Tillamook, OR 97135

Description of project: The purpose of the project is to perform foredune grading at the County parking facility and turnaround in Pacific City management unit F for the Horizontal Directional Drilling for the Regional Scale Nodes (RSN) project component of the National Science Foundations Ocean Observatories Initiative. The RSN project will consist of a series of chemical, biological, and

geological sensors linked with over 900km of submarine cable to shore, which will proved internets connectivity to the science community and the public. The project consists of three elements occurring in this area. The first activity to occur is the Horizontal Directional Drilling (HDD) being performed, the dune will be graded to provide access to the manhole in the County parking area and the necessary staging area required to perform the HDD operations. This activity is planned for a 60 day period to start in approximately February of 2011. Two 5" steel pipe conduits, each ~5,000 feet in length, are planned to be installed by Horizontal Directional Drilling (HDD) from the existing beach manhole located at the seaward terminus of Pacific Avenue in Pacific City (Oregon) to exit points located offshore at a water depth of ~20 meters. Each conduit will provide a protected path for a single underwater power/fiber optic cable connecting the Ocean Observatory off the coast of Oregon and the beach manhole.

HDD would be used for the system's terrestrial-to-marine transition to minimize possible disturbances to the beach area near Pacific City, Oregon. It would also provide maximum protection to the cables in the surf zone, therefore reducing maintenance activities close to shore throughout the lifetime of the cable system.

The grading and sand redistribution activities are to be performed in a manner consistent with the Pacific City Foredune Management Plan (the Plan) for Management Unit F. All sand will be moved seaward. The Department has determined that Foredune Grading permits will be valid for a period of five-years.

Management Unit F extends from just north of the Turnaround, the line between tax lots 9200 and 9300, to just south of the Turnaround, the lines between tax lots 1300 and 1400. This segment of shoreline received a net accumulation of sand during the period 1967 to 1997 and continues to experience periodic sand build-up on the foredune that encroaches onto the County parking lot at Pacific Avenue. The highest priority management objective for Management Unit B is: To minimize inundation brought about by excessive accumulation of wind-blown sand and correspondingly maintain or enhance ocean views and maintain and enhance ocean flood/erosion protective functions of the natural foredune area.

II. ANALYSIS OF APPLICABLE ORDINANCE CRITERIA

A. Land Use Ordinance Section 3.085: Beach and Dune Overlay Zone, (C) Special Activities Permitted With Standards (2) Foredune Grading,

a. Definition: Foredune grading means the alteration of a foredune, by mechanical redistribution or removal of sand, which results in a lower or more uniform dune height. Foredune grading, unlike foredune breaching, does not increase the potential for ocean flooding at the site.

Findings: The MariPro Company is proposing to grade the County owned parking area and turnaround in the Foredune Management Unit F to allow access to the manhole and for their staging area to be set up for the HDD being performed from the manhole out into the Pacific Ocean. The sand removal and redistribution shall be moved seaward which is

consistent with the management objectives of the Pacific City Foredune Management Plan.

b. Foredune grading shall be permitted only in Foredune Management Areas or in Developed Beachfront Areas. In these areas, grading shall be allowed only for siting a permitted use, for removing sand that is inundating a structure allowed by the underlying zone, or for dune restoration purposes where recommended in Foredune Management Plans. Sand graded from foredune lots shall be relocated either to the beach, to low and narrow dune areas on the site, or to alternative beach and dune areas as specified in an approved Foredune Management Plan.

Findings: The applicant is requesting a Foredune Grading Permit to access the County parking facility and turnaround describe above within Management Unit F. The applicant and their contractor have been informed that the sand cannot be removed from the foredune management area, but must be redistributed on the beach or on low and narrow portions of the dune, or alternative beach and dune areas subject to approval by the Oregon State Parks & Recreation Department (OPRD). Both the County and the OPRD have been consulted regarding this application.

c. Foredune grading to remove inundating sand shall be permitted only if there is no feasible or reasonable alternative method of sand removal, or as specified in an approved Foredune Management Plan. Inundating sand shall be disposed of seaward of existing structures and distributed in a manner that shall not impact adjacent dwellings or adversely impact the public beach. Areas graded between November and April shall be replanted with beachgrass or other appropriate vegetation approved by the Department. If grading occurs between the months of May and October, approved temporary stabilization measures, such as mulching with ryegrass straw or matting shall be employed.

Findings: The top priority management objective in Management Unit F is: to minimize inundation brought about by excessive accumulation of wind-blown sand and correspondingly maintain or enhance ocean views, and to maintain or enhance access to recreational uses associated with the open sand beach. In this management unit, the Plan notes that this segment of shoreline is zoned Neighborhood Commercial-C1. The foredune area is poorly vegetated, with vegetation coverage on the backslope, crest and foreslope. Those efforts to use vegetation to establish a wide foredune in this area are likely to be thwarted by high wave run-up and erosion during winter storms. Because of this, planting the entire foredune in this area is likely to result in primarily upward growth of the foredune. The Plan recommends that the upper portion of the foredune area in this unit remain as mostly open sand in order to maintain beach access. Because limited vegetative stabilization is part of the proposed strategy for this unit, the Plan envisioned that remedial grading would frequently be warranted. The applicants are proposing foredune grading to be done only in the area of the County parking facility. In accordance with the Plan, an effort should be made to establish

stand-stilling grasses along the lower portion of the foredune area, on each side of the county parking area in this management unit. Any sand that can be captured and held in this area will enhance flood/erosion protection potential as well as reduce the potential for sand inundation. Following the foredune grading at the proposed site, if planting is required, it should be done immediately after grading. Plant shall be carried out to mimic natural vegetation patterns as much as possible. Specific planting recommendations are provided in the Plan.

In Foredune Management Areas, grading to remove inundating sand may occur on a parcel by parcel basis. An Administrative Review of a Remedial Grading Plan is required, as described in e., below.

Findings: The management unit F identifies this area of beachfront dune as experiencing heavy recreational use. The Plan also states the need to maintain the turnaround and county parking area with remedial grading on an "as needed basis".

d. Foredune grading to maintain ocean views shall be permitted only in Foredune Management Areas, according to Foredune Grading Plans included in the Goal 18 Element of the Comprehensive Plan.

Grading in foredune crest areas shall only be allowed where the dune elevation is more than four feet above the base flood elevation. At a minimum, Foredune Grading Plans shall describe standards for redistribution of graded sand by identifying low and narrow dune areas suitable for dune restoration, define the appropriate timing for grading actions, and outline requirements for future monitoring.

Findings: The proposed grading includes the county parking area and Pacific Avenue turnaround described in the Pacific City Foredune Management Plan. The Plan prescribes standards for redistribution of graded sand, appropriate timing, and monitoring requirements and identifies specific management objectives and strategies for Management Unit F. This area has been identified as a public pedestrian-vehicular beach access which shall be maintained during the grading and drilling process of the proposed HDD project.

e. *All foredune grading and other activities in foredune management areas may only be conducted as part of an approved grading plan developed as described below. A grading plan shall contain the following elements:*

1. *Description of the proposed work, including location and timing of activities, and equipment to be used;*
2. *Plan view and elevations of existing conditions in the grading area;*
3. *Plan view and elevations of proposed modifications in the grading area; and*
4. *Identity of the individual(s) responsible for supervising the project, and for conducting monitoring and maintenance activities.*

All grading plans shall cover all or at least a 500 foot portion of a Management Unit plan contained in the Management Strategy and shall have approval of 60% of the property owners in the area covered, except for remedial grading which may be approved for a single parcel. The grading plan shall be submitted to the County for administrative review. Administrative Review of the plan shall be confined to determining consistency with the approved Foredune Management Plan. A review fee as determined by the County shall accompany the plan. The approval may be revoked and citations issued for noncompliance with the approval.

Findings: The proposed foredune grading permit includes the County parking area and the Pacific Avenue turnaround identified above in Management Unit F. This permit is intended to cover all sand grading, removal from the parking area and turnaround, and redistribution activities within Management Unit F. All of these activities shall be consistent with the Plan. Prior to any grading work, the Department shall be notified of the impending work, the contractor, equipment employed for the job, and the approximate dates of activity. Updated plan views and elevations shall be submitted to the department no less than once a year during which grading activity has occurred.

VI. CONCLUSION

Approved with Conditions: Staff concludes that the requirements for Foredune Grading permit are met, subject to the following Conditions of Approval. All sand grading and redistribution activities shall be carried out in a manner consistent with the applicable management objectives and strategies for the Management Unit F as prescribed in the Pacific City Foredune Management Plan. This Permit shall be valid for a period of five years from the date of this approval.

CONDITIONS OF APPROVAL

1. The applicant(s) shall ensure that posts are in place with markers identifying the acceptable height of the finished grading for the benefit of the contractor(s). The grading shall not result in a foredune height of less than the base flood elevation plus 4 feet (34 feet).

2. The post-grading foredune profile shall be generally consistent with the plan included with the application. Before and after-grading profiles shall be submitted to the Department of Community Development throughout the active permit period to maintain a record of grading activity.

3. The removal of sand from the foredune management area (including all of Management Unit F) is prohibited.

4. Graded sand is to be transferred seaward from high areas behind the foredune crest to low areas elsewhere along the crest and foreslope. It is recommended that the lot be remedially graded to facilitate recreational access to the beach and the proposed project work to occur. This will allow more even growth of the foredune area and thereby reduce the potential for sand inundation.

5. An effort should be made to establish stand-stilling grasses along the lower portion of the foredune area on each side of the County parking area in the management unit. Any sand that can be captured in this area will enhance flood-erosion protection potential as well as reduce the potential for sand inundation. Planting should be carried out to mimic natural vegetation patterns as much as possible and should occur immediately after view grading. The specific planting recommendations for the management unit should be followed as appropriate. In all cases, planting should be carried out during rainy months (November through April) before and/or after winter storms, when temperatures are between 32 and 60 degrees F and the sand is wet at a depth of 3 inches.

6. Because limited vegetative stabilization is part of the strategy for Management Unit F, remedial grading is warranted and shall be allowed as needed.

7. To maintain the beach access in Management Unit F, it is recommended that the upper portion of the foredune area remain as primarily open sand. Foredune grading is permitted on a regular basis to accomplish the clearing of the County parking and turnaround area.

8. Prior to commencing any grading activity, the applicant's is responsible for ensuring that the contractor notifies the Department of Community Development of the dates grading is going to occur, the equipment to be used, and contact information. It is also the applicant's responsibility to ensure that the grading and sand redistribution activities are carried out in a manner that is consistent with these conditions of approval and with the management objectives and strategies prescribed for Management Units F, as applicable, in the Pacific City Foredune Management Plan.

9. The applicant/property owner shall coordinate grading and sand redistribution activities with the Oregon Parks and Recreation Department (contact Tony Stein at 541-265-9871).

VI. EXHIBITS

A. Assessor's Maps

Exhibit A

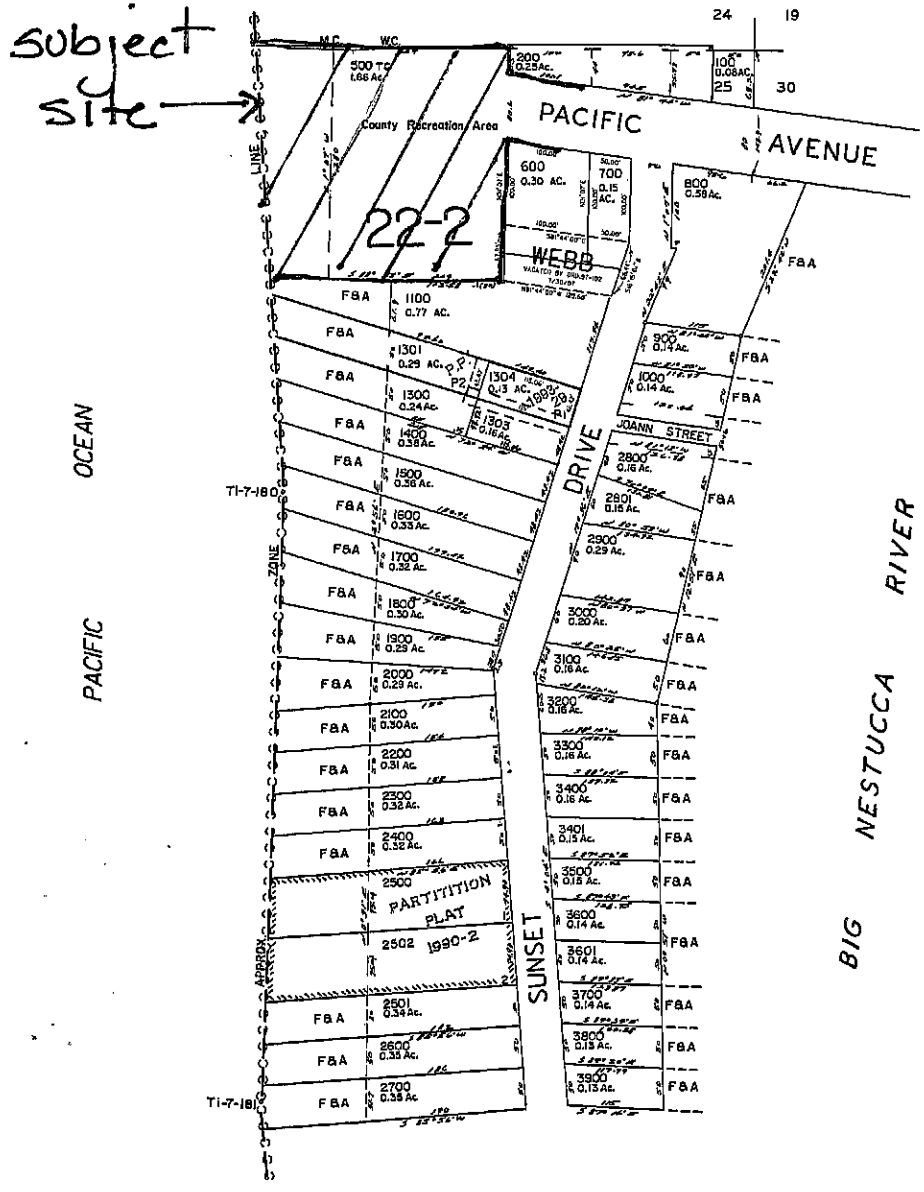
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

NE1/4 NE1/4 SEC.25 T.4S. R.11W. W.M.
TILLAMOOK COUNTY

1"= 100'

4S 11 25AA
PACIFIC CITY

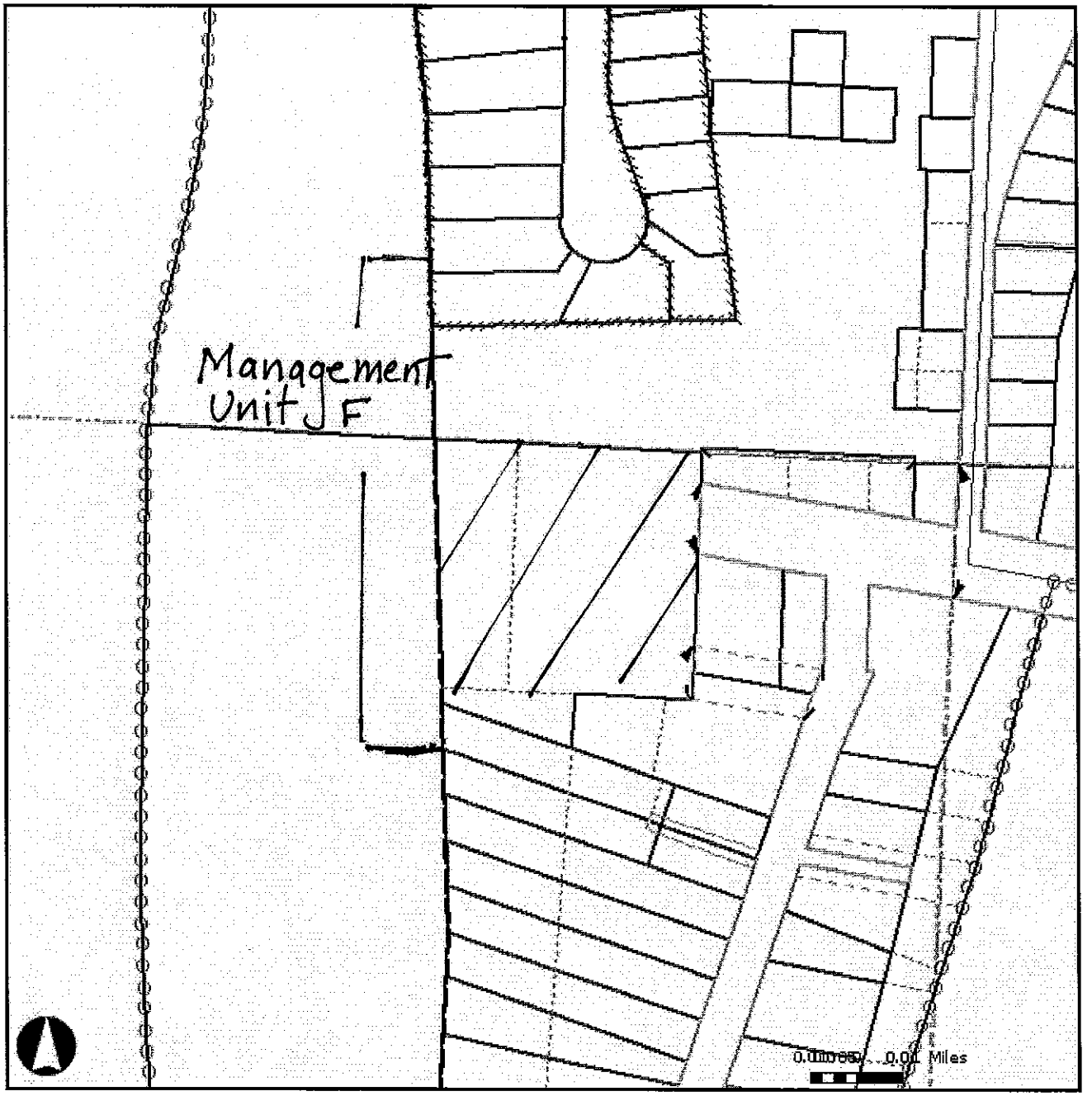
CANCELLED NO.
300
400
1200
1302



4S 11 25AA
PACIFIC CITY
REVISED 03/15/10. WS

Exhibit A

Map



Tax Code Lines

Corner

CartographicLines

Pointers

Pointers

ReferenceLines

ReferenceLines (continued)

11- PRIVATE RD ROW

12- PRIVATE RD C/L

15- RAILROAD C/L

17- EASEMENT ROW

18- EASEMENT C/L

30

33- HISTORIC TL LINES

Taxlot

PLSS Corners

PLSSLines

2; 32; 33

47-DLC LINES

FOREDUNE GRADING PLAN FOR L–3 MARIPRO, INC.

TAX LOT 500, 4S 10 25AA, TILLAMOOK COUNTY, OREGON

SURVEY AND MAP BY: KELLOW LAND SURVEYING
P.O. BOX 335
PACIFIC CITY, OR 97135–0335
(503)965–4664

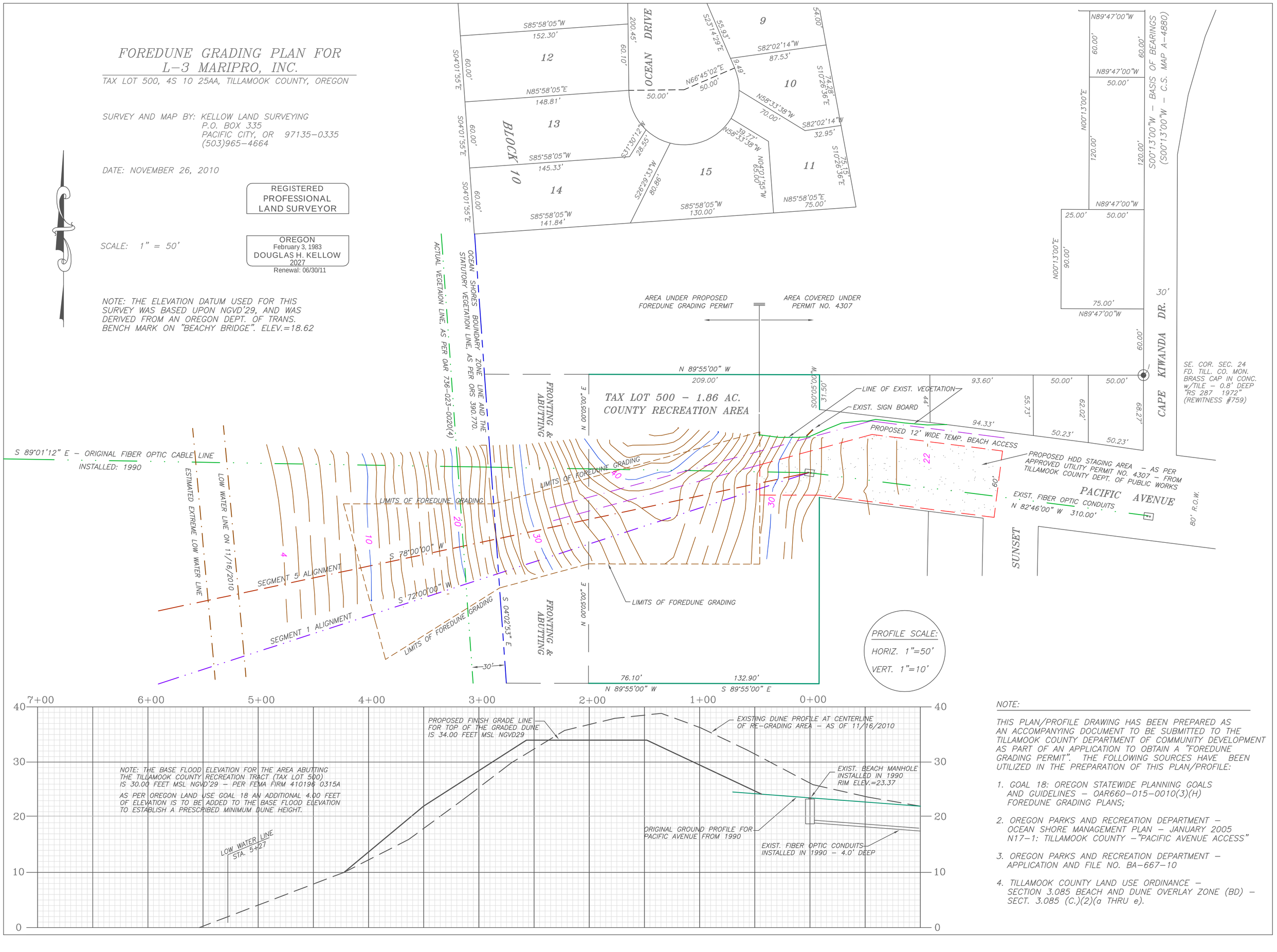
DATE: NOVEMBER 26, 2010

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
February 3, 1983
DOUGLAS H. KELLOW
2027
Renewal: 06/30/11

SCALE: 1" = 50'

NOTE: THE ELEVATION DATUM USED FOR THIS SURVEY WAS BASED UPON NGVD'29, AND WAS DERIVED FROM AN OREGON DEPT. OF TRANS. BENCH MARK ON "BEACHY BRIDGE". ELEV.=18.62



PROFILE SCALE:
HORIZ. 1"=50'
VERT. 1"=10'

NOTE:

THIS PLAN/PROFILE DRAWING HAS BEEN PREPARED AS AN ACCOMPANYING DOCUMENT TO BE SUBMITTED TO THE TILLAMOOK COUNTY DEPARTMENT OF COMMUNITY DEVELOPMENT AS PART OF AN APPLICATION TO OBTAIN A "FOREDUNE GRADING PERMIT". THE FOLLOWING SOURCES HAVE BEEN UTILIZED IN THE PREPARATION OF THIS PLAN/PROFILE:

1. GOAL 18: OREGON STATEWIDE PLANNING GOALS AND GUIDELINES – OAR660–015–0010(3)(H) FOREDUNE GRADING PLANS;
2. OREGON PARKS AND RECREATION DEPARTMENT – OCEAN SHORE MANAGEMENT PLAN – JANUARY 2005 N17–1: TILLAMOOK COUNTY –"PACIFIC AVENUE ACCESS"
3. OREGON PARKS AND RECREATION DEPARTMENT – APPLICATION AND FILE NO. BA–667–10
4. TILLAMOOK COUNTY LAND USE ORDINANCE – SECTION 3.085 BEACH AND DUNE OVERLAY ZONE (BD) – SECT. 3.085 (C.)(2)(a THRU e).

Tillamook County

PUBLIC WORKS DEPARTMENT

503 Marolf Loop Road
Tillamook, Oregon 97141
Roads (503) 842-3419
Solid Waste (503) 815-3975
FAX (503) 842-6473
Email: pubwks@co.tillamook.or.us
TTY Oregon Relay Service

Land of Cheese, Trees and Ocean Breeze

August 19, 2010

Greg Palser
CoastCom Inc.
151 E. Olive St.
Newport, OR 97365

RE: Utility Permit # 4307
Pacific Ave., Tillamook County Road #C930
Tillamook County Assessor's Map #T4SR11W Sec. 25AA

Dear Greg:

Tillamook County Engineering staff review of your Utility Permit Application and a field site evaluation is complete with the following conclusion. This application requests approval to occupy the public right of way of Pacific Ave. in the community of Pacific City to access the "On Shore" manhole adjacent to the public beach access. Occupation is for the purpose of construction of a Regional Scale Node associated with the Ocean Observatory Initiative. Occupation will include equipment and support facilities required to complete the Horizontal Directional Drilling portion of the Joint Permit Application described in Department of State Lands review #APP00045663.

By this reference your signed application, the Joint Permit Application and maps provided are incorporated into this permit.

Utility permit #4307 is **Approved** with the following conditions for all work performed in Tillamook County public right of way:

1. Approval of this permit in no way relieves the applicant of responsibility to satisfy permitting requirements of all other agencies with jurisdiction over location or activities associated with the work described in this application.
2. The applicant is required to maintain a minimum 12' access available to the general public to safely reach the beach from Pacific Ave.
3. The applicant is responsible for 24 hour public safety and security within the work zone for the duration of the work approved by this permit.
4. The applicant is responsible for removal of all drill cuttings, slurry, and petroleum products that may be required to operate and maintain equipment within the work zone.
5. This permit is for occupation of the public right of way of Pacific Ave. only. Occupation of adjacent private or public land requires written authorization from other parties with signatory authority over those properties.
6. This permit authorizes removal or relocation of dune sand within the right of way of Pacific Ave. as may be required to access the subject manhole and maintain equipment associated with the subject project.
7. Traffic control in all county Rights of Way shall be as indicated in the Manual on Uniform Traffic Control Devices (M.U.T.C.D.) for work in the Public Right of Ways under County jurisdiction.
8. There shall be a copy of this permit on the job site while work is in progress.

As the permit holder it is your responsibility to coordinate with all other utilities and the O.U.N.C. as noted below.

Please notify me 48 hours prior to commencing construction, and within 48 hours after the project is complete to establish the maintenance agreement start date. Please contact this office if the job can not be done according to permit requirements.

IT IS YOUR RESPONSIBILITY AS THE PERMITTEE TO ARRANGE FOR ANY NECESSARY UTILITY LOCATES PRIOR TO EXCAVATION.

ATTENTION: 2007 Oregon Revised Statutes Chapter 757, requires you to follow rules adopted by Oregon Utility Notification Center (OUNC). Those rules are set forth in Oregon Administration Rules Chapter 952, Division 1. You may obtain copies of the rules by calling 811 or logging on to the O.U.N.C. website at http://www.digsafelyoregon.com/

The site will be inspected for restoration and clean up upon completion. The one-year maintenance responsibility shall start after field inspection and acceptance of restoration. If you have questions regarding this permit approval or are ready for field inspection, please feel free to contact or leave a message for me at 503.842.3419 Monday thru Friday 8:00 a.m. to 4:30 p.m. or the direct line to my desk is 503.842.2032 ext. 3110.

Sincerely,

Ron Newton
Engineering Technician

Cc: Grant Graves, Tillamook County District #3 Road Foreman
James Amen, Chris Jewette, T.P.U.D., by email
Scott Schimineski, Brad Shely, Charter Communications, by email
Tony Owen, P.C.J.W.S.A., by email
Cris Cristianson, L-3 Communications MariPro, by email
Pete Kalnins, Tillamook Lightwave, by email
File

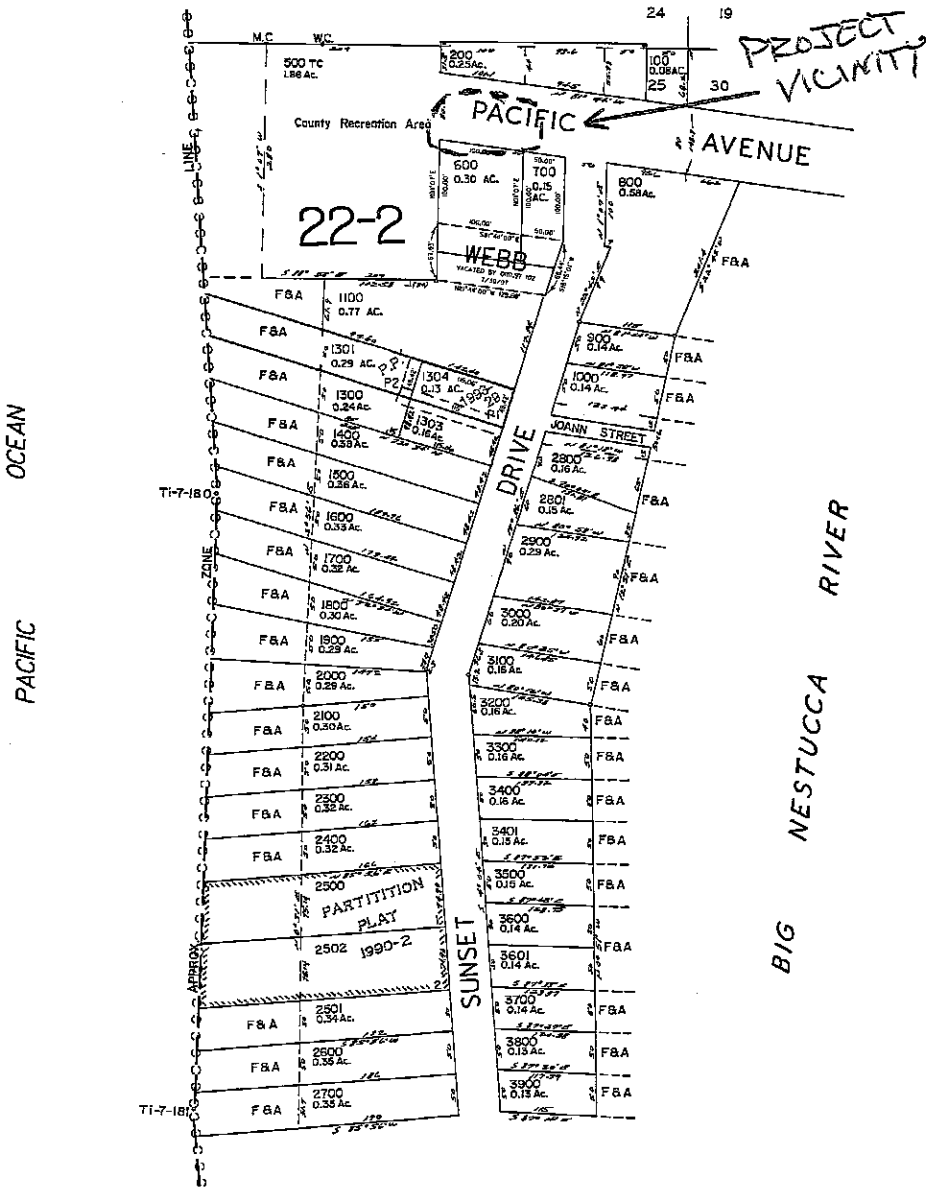
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

NE1/4 NE1/4 SEC.25 T.4S. R.11W. W.M.
TILLAMOOK COUNTY

1" = 100'

4S 11 25AA
PACIFIC CITY

CANCELLED NO.
300
400
1200
1302



4S 11 25AA
PACIFIC CITY
REVISED 03/15/10, WS

Application Permit No. 4307 Road No. C930

TILLAMOOK COUNTY APPLICATION AND PERMIT FOR UTILITY

PLEASE PRINT

CoastCom, Inc. (Utility Agency Name)

151 E. Olive St. (Address)

(541) 574-9999 (Telephone No.)

Newport, OR 97365 (City)

The Applicant hereby applies to install the following facilities upon the right-of-way of (West terminus of) Pacific Avenue Road. Mile Post _____ to Mile Post _____ Project start _____ feet from _____ street intersection.

TAX LOT DESCRIPTION

Township 4S Range 11 West. W.M. SEC. 25AA Tax Lot 500

The permit is for the construction, operation and maintenance of the following type of utility: Water _____ Sewer _____ Cable X If cable specify; Aerial ____ Underground X Underground, specify construction method; Trenching _____ Plow _____ Bore X Push _____ Proposed Location 40 feet from centerline on the Right side _____ Left side X As shown on the map or plan attached hereto and by this reference made a part of this permit.

CONSTRUCTION MATERIAL INFORMATION

Diameter and Type of Pipe/Material to be used Double white band grade E 5" drill pipe

Length Two bores each 5025 feet

Backfill Material Proposed n/a, drill cuttings permanently removed and pipe to be left in place

PLANS MUST SHOW LOCATION AND DISTANCES FROM EXISTING PROPERTY PINS, MANHOLES, CENTERLINE OF ROAD AND/OR EDGE OF ASPHALT).

CONTRACTOR INFORMATION

CONTRACTOR NAME L-3 Communications MariPro

ADDRESS 1522 Cook Place

CITY Goleta STATE CA ZIP 93117 PHONE (805) 683-3881

All activities allowed by this permit are subject to the "REGULATIONS FOR UTILITIES in Tillamook County Public Road Rights-of-Way (Ordinance #28)", which by this reference are made a part of this permit.

Contractor Signature and Date

8/9/10

Utility Agency Signature and Date

Per 5-5-10

PROPOSED PROJECT START DATE _____

CERTIFICATE OF INSURANCE FOR WORKING IN ROAD RIGHT-OF-WAY

ALL CONTRACTORS OR UTILITY AGENCIES SHALL HAVE ON FILE A CERTIFICATE OF INSURANCE NAMING TILLAMOOK COUNTY AS CERTIFICATE HOLDER.

ON FILE WITH TILLAMOOK COUNTY In Process

SPECIAL PROVISIONS TO BE COMPLETED BY COUNTY ROAD DEPARTMENT

1. A performance bond in the amount of $ _____ shall be required prior to the issuing of this permit.

2. A certificate of liability insurance has been verified.
_____ YES _____ NO

3. Trenching, plowing or tunneling parallel to the roadway shall be at least n/a feet from the edge of pavement.

4. Open cutting of paved or surfaced portion of the highway is [ ] is not [ ]

5. Asphaltic concrete patches shall be _____ inches in compacted depth _____ lift(s). Asphalt patch to be completed by CONTRACTOR: _____
DATE TO BE COMPLETED BY: _____

6. Phone No. of person responsible for traffic control _____

7. Maintenance of construction area for all new installations is the responsibility of the utility agency for one year after completion. Project completed _____, as notified by agency.

   FIRST INSPECTION DATE _____ INSPECTION BY _____

   FINAL INSPECTION DATE _____ INSPECTION BY _____

   PERMIT # _____

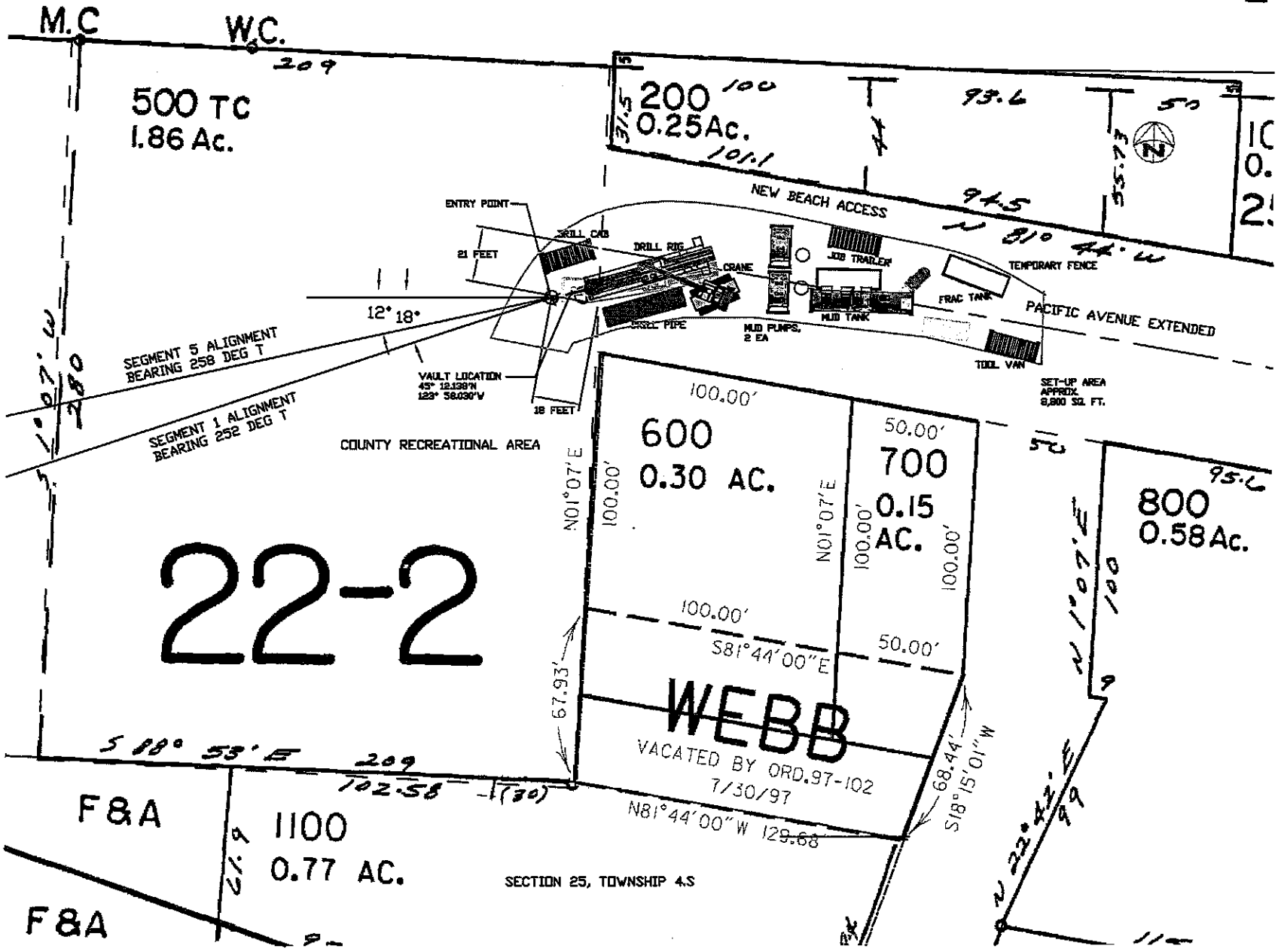
8. Letter or requirements attached. YES _____ NO _____

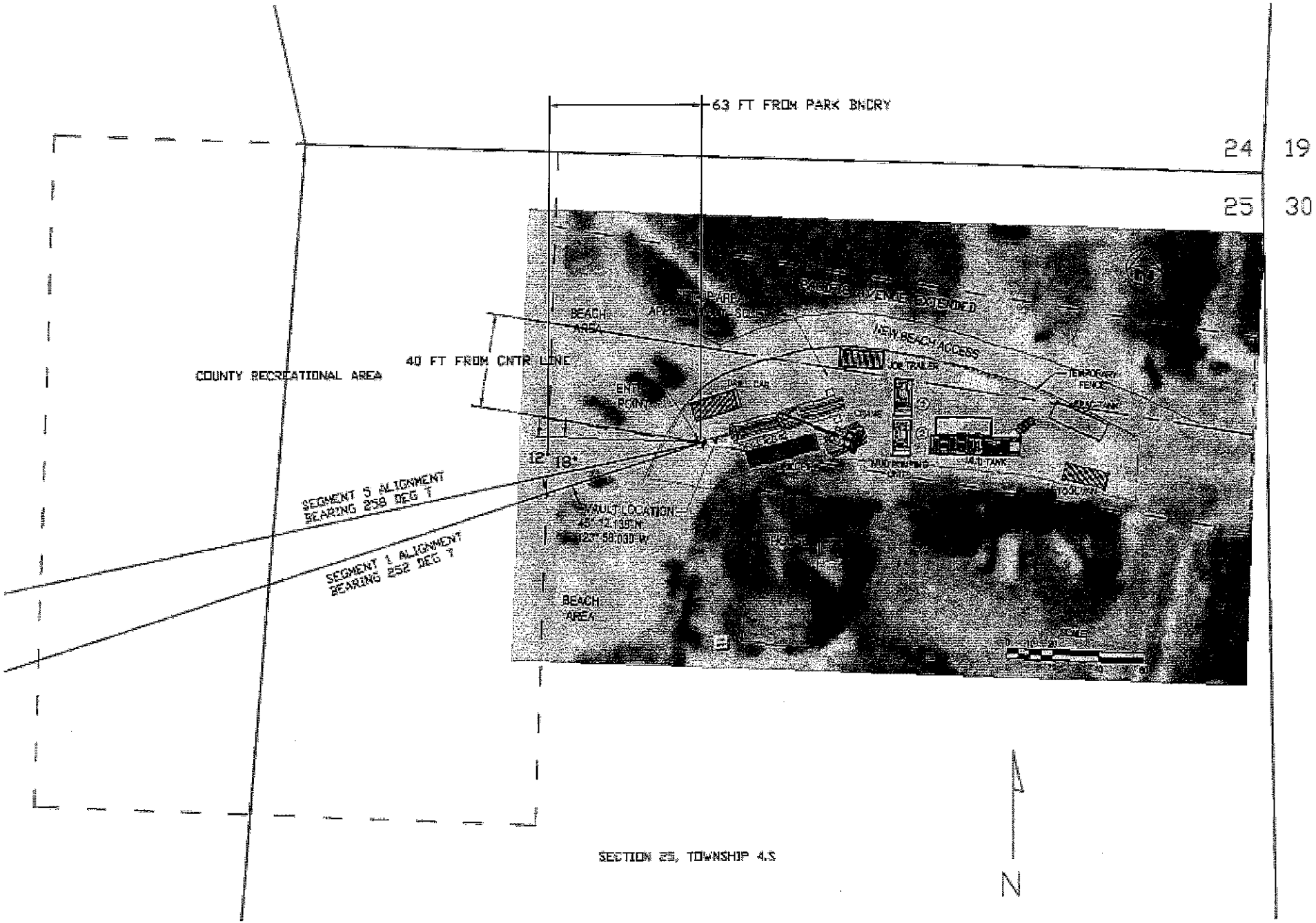
Public Works Administrator Signature of Permit Approval

08-19-10
Date

g:/roaddepartment/form/utility

SEE MAP 4S 11 24DD

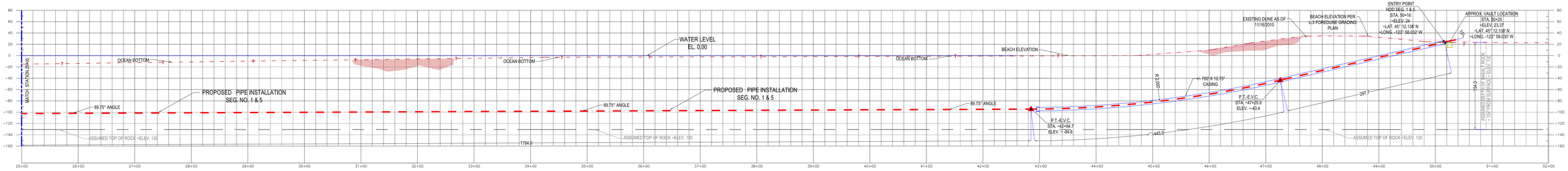


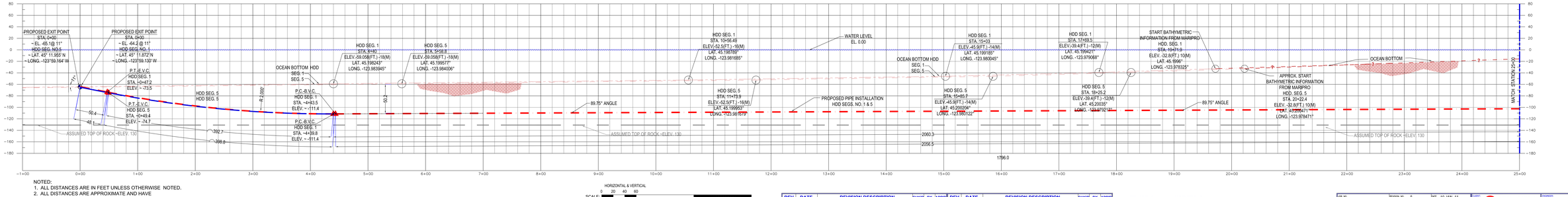

63 FT FROM PARK BNDRY
24
19
25
30
40 FT FROM CNTR LINE
COUNTY RECREATIONAL AREA
BEACH AREA
NEW BEACH ACCESS
JOB TRAILER
TEMPORARY FENCE
ENTRY POINT
CRANE
12"
18"
SEGMENT 5 ALIGNMENT
BEARING 258 DEG T
SEGMENT 1 ALIGNMENT
BEARING 252 DEG T
VAULT LOCATION
45° 12' 139"N
123° 58' 030"W
BEACH AREA
SECTION 25, TOWNSHIP 4 S
N

APPENDIX B

HDD Profile Drawing 052810A

(Fold out plotted drawing)





NOTED:

1. ALL DISTANCES ARE IN FEET UNLESS OTHERWISE NOTED.
2. ALL DISTANCES ARE APPROXIMATE AND HAVE BEEN TAKEN FROM GOOGLE EARTH.
3. ALL BATHYMETRIC INFORMATION FROM STATION 20+22 HAS BEEN TAKEN FROM L-3 MARIPRO INFORMATION.
4. ALL BEACH ELEVATIONS HAVE BEEN TAKE FORM L-3 MARIPRO'S FORDUNE GRADING PLAN FROM STATION 44+80 TO STATION 51+25

REV	DATE	REVISION DESCRIPTION	CHK'D	BY	APP'D
REV.1	7 JULY 10	CHANGE BOTTOM ELEVATIONS TO -70 AND -74.			
REV.1	7 JULY 10	CHANGE HDD PROFILE TO REFLECT EXIT AT -70 AND -74.			
REV.2	8 JULY 10	CHANGE OCEAN BOTTOM ELEVATIONS ACCORDING TO BATHYMETRIC INFORMATION PROVIDED BY L-3 MARIPRO.			
REV.2	8 JULY 10	CHNG. HDD PROFILE TO REFLECT OCEAN BOT. ELEV. CHNG.			
REV.3	9 JULY 10	CHNG. WORDING ON OCEAN BOTTOM.			

REV	DATE	REVISION DESCRIPTION	CHK'D	BY	APP'D
REV.4	8 DEC. 10	ADD DUNE PROFILE ORIGINAL GRADE AND PROPOSED GRADE PER L-3 GRADING PLAN/PERMIT AND CHANGE THE PIPE INSTALLATION ELEVATION.			
REV.5	10 JAN. 11	REVERSE PROFILE: ENTRY TOP EXIT AT BOTTOM			

HDD SEG. 1	EXIT - CURVE DATA
EXIT ANGLE = 11°	
EXIT TAN = 48.1'	
EXIT CURVE = 398.6'	
HORIZ. - TAN = 3,841.1'	
RADIUS = 2,000'	
∠ 1/1 = .89°	

HDD SEG. 5	EXIT - CURVE DATA
EXIT ANGLE = 11°	
EXIT TAN = 50.4'	
EXIT CURVE = 392.7'	
HORIZ. - TAN = 3,844.9'	
RADIUS = 2,000'	
∠ 1/1 = .89°	

PROJECT INFORMATION	
PIPE DIAMETER =	
HORIZ. DISTANCE = 5,016'	
CURVE DISTANCE = +/- 5,030.3'	
RUN CASING = 700'	
POOL DISTANCE =	
ROCK DISTANCE =	

ENTRY - CURVE DATA	
ENTRY ANGLE = 10°	
ENTRY TAN = 297.7'	
ENTRY CURVE = 445.0'	
HORIZ. - TAN =	
RADIUS = 2,000'	
∠ 3/1 = .89°	

JOB NO. | REVISION NO. 5 | DATE 10 JAN. 11
SAMPLE LAB | SHEET AS NOTED | SHEET 1 OF 1 | DWG NO. 09281SA

TEST WIRE

- ☐ FOR DISCUSSION ONLY
- ☒ SUBMITTAL APPROVAL
- ☐ AS - BUILT SUBMITTAL

THE HDD COMPANY INC
700 CANADA PARK DRIVE
SUITE 1
CORNETT PARK, N.S. B6H4P
Phone: (902) 670-4700
Fax: (902) 670-4701
www.hddcompany.com

THE HDD COMPANY INC

CLIENT: COMMUNICATIONS MARIPRO, INC.

ENGINEER:

L-3 COMMUNICATIONS MARIPRO INC.
REGIONAL SCALE NODES PROGRAM
HDD INSTALLATION
OCEAN OUTFALL LINE (PROFILE VIEW DETAIL)

APPENDIX C

HDD Frac Out and Spill Response Plan

1.0 PLAN OBJECTIVES

HDD uses a bentonite slurry, a fine, non-toxic clay material, as a drilling lubricant. A "frac-out" is the inadvertent escape of drilling lubricant through the bore-hole wall during the HDD drilling process.

The purpose of the frac-out contingency plan is:

- Minimize the potential for a frac-out
- Provide the timely detection of any frac-outs that could enter or impact any sensitive cultural, environmental or biological resources, surface facilities or features between the HDD entry point and the water's edge
- Facilitate notification of all appropriate agencies immediately, and document any incident(s)
- Facilitate proper response, containment and cleanup in the event a frac-out occurs

2.0 RESPONSIBILITIES

- Monitoring for hydraulic fracturing during the performance of the work
- Minimize potential for a frac-out
- Detection of any frac-outs
- Containment of the frac-out
- Cleanup of the frac-out
- Documentation of the frac-out
- Notification of the frac-out to the permitting agencies and stakeholders

3.0 INITIAL FRAC-OUT PREVENTION

Frac-out prevention operations begin well before the mobilization of the drilling equipment to the project site. To this end the HDD Company Inc. employs skilled, competent workers, who are familiar with HDD construction. They have performed many HDD projects of multiple complexities and are well versed in monitoring for frac-out's and monitoring the warning signs that are often a precursor to a frac-out.

The existing geological conditions at Pacific City and offshore, encompassing the HDD drill path, are not specifically known or provided as project information. However, past jobs completed in the north Oregon coast have not had problems with frac-outs and is assumed to be a low risk at Pacific City. Nevertheless, the following plan will be implemented to monitor and correct any conditions to prevent a frac-out from occurring. Should a frac-out occur, this plan provides clean up and mitigation solutions.

Drilling fluids will consist of water and bentonite clay. Lost Circulation Material (LCM) may be used in case of a frac-out or loss of circulation; however, it is generally found to be ineffective in softer alluvial formations which are expected to be found under the beach. The Material Safety Data Sheet (MSDS) for

L-3 COMMUNICATIONS MARIPRO PROPRIETARY
Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this document.

the bentonite that will be used will accompany this plan. The basic drilling fluid properties of concern include:

- Viscosity
- Fluid density
- Sand (solids) content

The HDD Company maintains drilling fluid monitoring equipment on-site, and crew members who are proficient in its use, to evaluate fluid properties and adjust fluid quality as necessary during drilling operations. Adjustments of the basic drilling fluid properties may be desired in certain circumstances to match the slurry properties with the soil type to: achieve a more stable bore-hole, improve cuttings return, and/or to reduce frac-out potential during difficult drilling circumstances.

In addition, approximately 700 feet of 12" steel casing will be installed in the top end of the bore-hole before pilot hole drilling continues. This will provide bore-hole stability and insure that circulation flows through the annulus and cannot migrate to the surface in this shallow section of the hole.

4.0 PROJECT SITE MONITORING

Monitoring of the project site provides the primary HDD good practices necessary to minimize frac-out potential. The monitoring schedule proposed for the start of the project is summarized in Table C4-1. The frequency of monitoring may be increased or decreased depending on the conditions of the work and phase of the work (i.e. increased monitoring during period of lost circulation, or reduced when HDD activities have been demonstrated to consistently produce anticipated results).

Table C4-1 Proposed Monitoring Schedule

Phase	Item	Description	Normal Monitoring Frequency	Increased Monitoring Frequency
Pilot Hole	A1	Boring Fluid Recovery	Hourly	Near Continuous
	A2	Mud Properties	Every 4 hours	Every joint
	A3	HDD penetration rate	Every Joint	Every joint
	A4	Pump rate and pressures	Every joint	Every joint
	A5	Fluid return volume	Every joint	Every joint
	A6	Bore path position	Every joint	Every joint
	A7	Frac-out in site area	Every 3 joints	Continuous
	A8	Mud tank level	Every joint	Near continuous
Pre-Reaming for 12" Casing	B1	Fluid recovery	Hourly	Near Continuous
	B2	Mud properties	Hourly	Every joint
	B3	HDD penetration rate	Every Joint	Every Joint
	B4	Pump rate and pressures	Occasionally	Every joint

Phase	Item	Description	Normal Monitoring Frequency	Increased Monitoring Frequency
	B5	Fluid return volume	Infrequent	Frequent
	B6	Frac-out in site area	Every 3 joints	Near Continuous
	B7	Mud tank level	Every joint	Every joint
Tripping Back	C1	Fluid recovery	Hourly	Near Continuous
	C2	Pull Force	Every joint	Near Continuous
Other	D3	Frac-out Counter measure implementation	Near Continuous	Near Continuous
Mud Recovery Equipment	E3	Spill Containment Measures	Near Continuous	Near Continuous

5.0 LOSS OF FLUID RECOVERY

Good HDD practices dictate monitoring fluid recovery during the progression of work. In many cases, the loss of or sudden changes in fluid recovery provide an early indication that down-hole conditions are suitable for the occurrence of a frac-out. Fluid recovery is therefore monitored on a near continuous basis.

Plugging of the bore-hole annulus, very soft alluvial formations or the presence of a major formation fracture can typically lead to partial or full loss of drilling fluid circulation. Crew members will monitor fluid loss by watching for significant differences between the fluid rate being pumped down-hole and the rate of returns flowing into the surface containment pits and mud tank. The presence of back pressure in the drill pipe while unscrewing from the down-hole work string is a warning of a plugged annulus that can create abnormally high down-hole pressures and could lead to a frac-out. In accordance with this plan, HDD Company will monitor the drilling fluid pump rate, the solids control tank level, and visually observe the rate of drilling fluid returns to the containment pits and back pressures as identified in Table C4-1.

As drilling progresses, the driller will be kept appraised if back pressure is present or unusually high volumes of drilling fluid are being lost down-hole, taking into consideration the volume of fluid needed to fill the drilled hole. Should the driller feel that fluid circulation is slowing, is about to stop, or back pressure in the string is present, he will implement the following procedures:

1. Temporarily cease drilling operations and shut off the mud pumps.
2. Dispatch observers as required, to monitor the area along the bore alignment on the beach. Although offshore conditions in the proposed HDD area are not optimal for visual detection (high surf, poor water visibility), observers will also be dispatched to determine if any visual indication is present.
3. If no drilling fluids are seen on the ground surface or in the water, the mud pumps will be started and volumes gradually increased as the drill pipe is pulled back to wipe the bore-hole annulus and encourage flow.

L-3 COMMUNICATIONS MARIPRO PROPRIETARY
Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this document.

Depending on the success of this procedure, the properties of the drilling fluid may be altered to aid in restoring circulation. Observers will continuously monitor the alignment on the beach and offshore for frac-outs as long as the mud pumps remain on.

If circulation is re-established, drilling will proceed as usual and monitoring for frac-outs will become more routine as long as circulation is maintained. If circulation is not re-established, monitoring will continue while the pumps are on.

Typically lost circulation has the highest probability of occurring while the pilot hole is being drilled. This is due to the smaller bore-hole annulus and the relatively large amounts of cuttings being carried in the drilling fluids. This risk will be mitigated by drilling a 9 7/8" pilot hole, creating a relatively large annulus for fluids to flow through. Often times in the course of drilling the pilot hole, circulation may be temporarily lost as the pilot bit is advanced through more permeable sections of the formation and fluid pressures are at a maximum. Under these circumstances, the loss of fluid may not indicate that a frac-out has occurred. As the pilot bit advances beyond the zone of lost circulation it is possible for fluid pressure to return to normal and circulation within the bore-hole will be re-established. Often times drilled cuttings generated as a result of the drilling process will naturally bridge and subsequently seal fractures or voids in the formation as drilling progresses, thus providing another means to re-established lost circulation.

It is also not uncommon for drilling fluids to leave the bore-hole and migrate in a direction other than to the surface and never be observed, even if lost for extended periods.

6.0 FRAC-OUT RESPONSE

If drilling fluid returns are observed on the beach, at a location other than the bore containment pits, the L3 MariPro and customer's onsite representative will be notified immediately. No further drilling will take place until notification to proceed has been received from the L3 MariPro representative. Following notification, the following procedures will be implemented:

1. Cease drilling operations.
2. Notify all required parties.
3. Document the event with photographs.
4. Contain the drilling fluid with sand or gravel bags, wattles or a pre-made light weight steel containment vessel so the fluid cannot migrate from the fracture location.
5. If possible, excavate a small sump pit at the fracture location to contain the fluid and pump back to the entry site for cleaning and re-use or to a vacuum truck for removal to an approved dump site.
6. Clean up the affected area using brooms, shovels etc.

7. Adjust drilling fluid properties to inhibit flow through the fracture and clean the hole by tripping out the drill pipe to wipe the bore-hole annulus.
8. Determine the suitability of placing LCM in the hole.
9. After allowing the formation to “rest” for a suitable period, continue drilling while monitoring the frac-out location and transferring fluids as necessary.
10. Forward ream the bore-hole up to the frac-out location to relieve annular pressures.

If a circulation is lost after the drill bit has traveled beyond the water line the following will be implemented;

1. Cease drilling operations.
2. Notify all required parties.
3. If practical, dispatch observers to shore line to visually look for any discoloration in ocean which would indicate frac-out material. If frac-out materials are detected, notify dive crew to respond for clean up.
4. Execute all reasonable measures within the limitations of the technology to re-establish circulation, including the following:
    a. Trip back the drill pipe to wipe the bore-hole annulus.
    b. Place LCM in the hole.
    c. Propose changes to drilling fluid properties.
    d. Consider running additional 12” casing as a means of containment, providing a clean annulus for circulation to return through the bore-hole annulus.
    e. Propose alternate drilling techniques.
    f. Forward ream the bore-hole up to the location that circulation was lost, to relieve annular pressures.
5. Propose an alternate bore plan that avoids the problematic area, grout the existing pilot hole and re-drill.
6. Document the event.

7.0 FRAC-OUT CONTROL EQUIPMENT

In accordance with good HDD practices, the following frac-out containment and cleanup equipment should be present on or near the project site.

- Heavy weight sealed plastic bags filled with sand or gravel

- Several 5 gallon plastic buckets
- One wide heavy-duty push broom
- Flat blade shovels
- Silt fence and t-posts
- Straw logs (wattles)
- Portable trash pumps

Offshore clean up equipment will be available on an on call basis:

- 4 man dive team
- Dive boat
- 2” suction dredge
- Filter bag fitted to dredge, to capture frac-out material

APPENDIX D

HDD Equipment Specifications

THE HDD COMPANY INC.
3161 Cameron Park Drive #215
Cameron Park, CA 95682
(530) 676-5705 Fax (530) 676-3605

Regional Scale Nodes Outfall

Drilling Equipment

Drill Rig

Built by**:** The HDD Company Inc. in 2008

- 900,000 lb push and pull
- 50,000 ft. #'s torque. (0-80 rpm)
- Hydraulics: 3 Sundstrand 27 Hydrostatic Pumps
- Powered by Caterpillar 475 HP, 3408
- Weight:79,500#



Mud Tank / Solids Control Equipment (all electric see Generator data below)

Manufacturer: The HDD Company Inc. in 2008

- Dimensions: 43’ X 8.5’
- Capacity: 6,500 gallons
- Centrifugal Pumps: Three 4”x5” and one 5”X6”
- Primary Shakers: Two O’Drill FS 300 three panel linear shakers
- Mud Cleaner: National Oilwell model DLMS-270, three panel linear shaker with ten 5” de-silting cones.
- De-Sander: National Oilwell DLMS-270, three panel linear shaker with two 10” de-sander cones.
- Weight: 55,000#

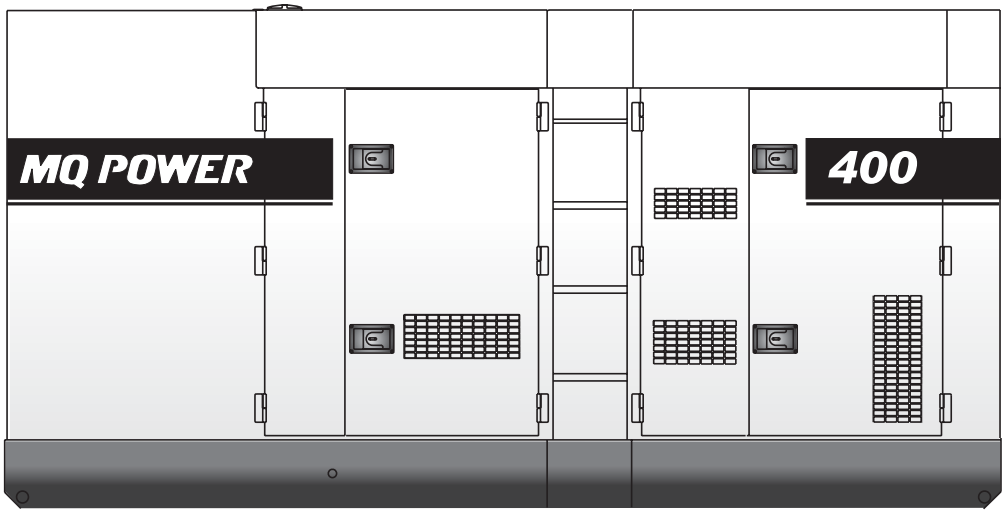


DCA400SSI

WhisperWatt™ Generator

WhisperWatt™ 400

Prime Rating: 320 kW (400 kVA)
Standby Rating: 352 kW (440 kVA)
60 Hertz



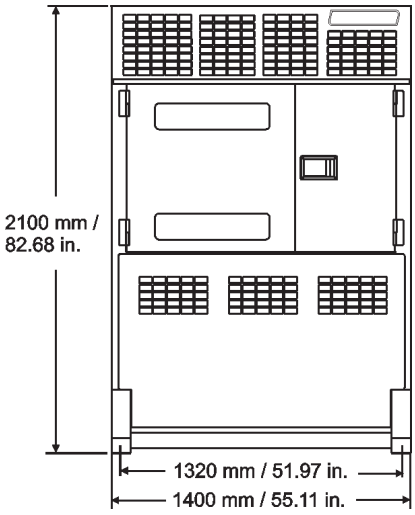
Standard Features

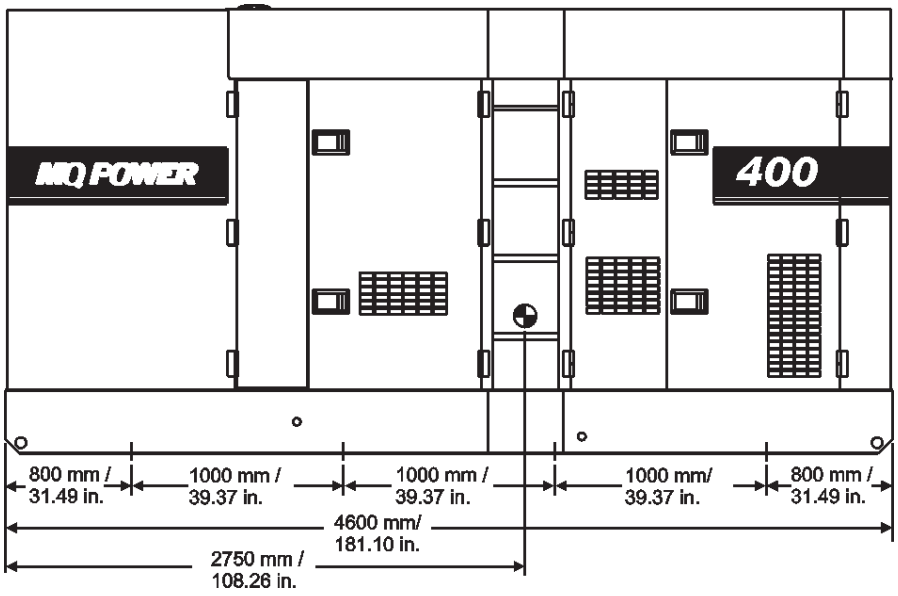
- **Heavy duty, turbocharged, direct injection, air to air intercooled diesel engine** provides maximum reliability.
- **Brushless alternator** reduces service and maintenance requirements and meets temperature rise standards for Class F insulation systems.
- **Open delta alternator design** provides virtually unlimited excitation for maximum motor starting capability.
- **Automatic voltage regulator** (AVR) provides precise regulation.
- **Electronic governor system** maintains frequency to ±0.25%.
- **Full load acceptance** of standby nameplate rating in one step (NFPA 110, para 5-13.2.6).
- **Sound attenuated, weather resistant, steel housing** provides operation at 74 dB(A) at 23 feet. Fully lockable enclosure allows safe unattended operation.
- **Internal fuel tank** with direct reading fuel gauges are standard.
- **Fuel / water separator** removes condensation from fuel for extended engine life.
- **E-Coat primer** with polyurethane enamel finish coat.
- **Simultaneous single and three phase power.**
- **EPA emissions certified. -** Tier 3 emissons compliant.
- **Complete engine analog instrumentation** includes DC ammeter, oil pressure gauge, water temp. gauge, fuel level gauge, tachometer/hour meter, preheat indicator, manual engine speed control, emergency shutdown monitors, and emergency stop button.
- **Complete generator analog instrumentation** includes voltage regulator control, ammeter phase selector switch, voltmeter phase selector switch, AC voltmeter, AC ammeter, frequency meter, panel light, and circuit breaker.
- **Automatic safety shutdown system** monitors the water temperature, engine oil pressure, overspeed, and overcrank. Warning lights indicate abnormal conditions.
- **Low coolant level shutdown system** provides protection from critically low coolant levels. Includes control panel warning light.
- **Auto start/stop control** allows generator to start automatically in the event of a commercial power failure.
- **Complete power panel.** Fully covered; three-phase terminals and single phase receptacles allow fast and convenient hookup for most applications including temporary power boxes, tools and lighting equipment. All are NEMA standard.
- **Emergency stop switch.**
- **Battery switch.**
- **Voltage change over board** allows easy to change voltages as your applications require. 240/480 Buss Bar.

DCA400SSI

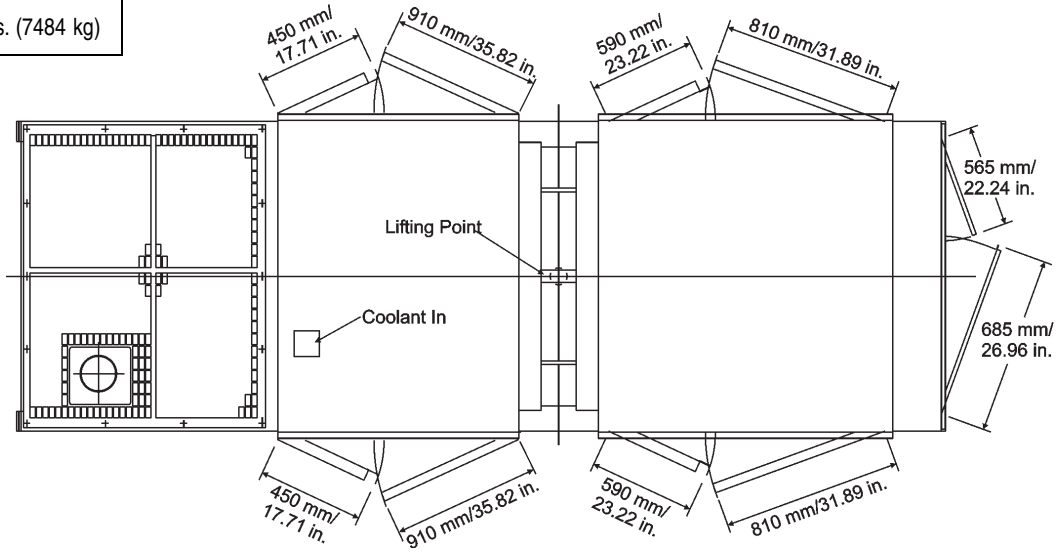
WhisperWatt™ Generator

Dimensions





Weight	
Dry Weight	11642 lbs. (5280 kg)
Wet Weight	12877 lbs. (5840 kg)
Max. Lifting Point Capacity	16500 lbs. (7484 kg)



Manufactured by Denyo Co.

Your MQ Power dealer is:

MQ POWER
POST OFFICE BOX 6254
CARSON, CA 90749
310-537-3700 • 800-883-2551
FAX: 310-604-3831
E-MAIL: mqpower@multiquip.com
WWW: mqpower.com

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Rev 2 (10-08) DCA400SSI

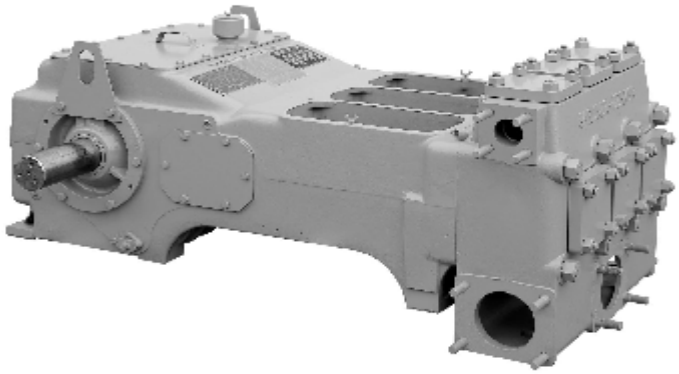
Triplex Mud Pump #1

- Gardner Denver THE
- 5” liners powered by a John Deere 9L, 250 hp diesel engine.
- Weight: 15,390#

Bulletin 07-01-212
Version 2

GARDNER DENVER

Model THE
HORIZONTAL DRILLING DUTY PUMP



SPECIFICATIONS:
Maximum BHP: 215 (160 kw)
Maximum RPM: 300
No. of Plungers: 3
Stroke Length: 5 in. (127 mm)
Plunger Load: 37,000 lbs. (16,965 kg)
Discharge Hydrostatic Test Pressure
3,600 psi (1,633 kg/cm2)
Oil Capacity: 12 gal. (45 liters)
Pump Weight: 3,990 lbs. (1,810 kg)

PERFORMANCE RATINGS

Piston/Liner Size		Displacement per Revolution		Displacement at Pump RPM											
				50				100				150			
In.	mm	GPR	LPR	GPM	LPM	PSI	kg/cm²	GPM	LPM	PSI	kg/cm²	GPM	LPM	PSI	kg/cm²
5" Cast Fluid End															
4	102	0.816	3.089	41	154	2944	206	82	309	2944	206	122	463	2718	191
4.5	114	1.032	3.907	52	195	2326	163	103	391	2326	163	155	588	2100	148
5	127	1.274	4.824	64	241	1884	132	127	482	1884	132	191	724	1700	120
5.5	140	1.542	5.837	77	292	1557	109	154	584	1557	109	231	876	1435	100
Input Power:			BHP	79				156				215			
			kW	59				116				160			

Piston/Liner Size		Displacement per Revolution		Displacement at Pump RPM											
				200				250				300			
In.	mm	GPR	LPR	GPM	LPM	PSI	kg/cm²	GPM	LPM	PSI	kg/cm²	GPM	LPM	PSI	kg/cm²
5" Cast Fluid End															
4	102	.816	3.089	163	618	2034	143	204	772	1625	114	245	927	1354	95
4.5	114	1.032	3.907	206	781	1600	112	258	977	1280	90	310	1173	1070	75
5	127	1.274	4.824	255	965	1300	91	319	1206	1040	73	383	1448	870	61
5.5	140	1.542	5.837	308	1167	1076	76	386	1460	860	60	462	1752	720	51
Input Power:			BHP	215				215				215			
			kW	160				160				160			

A lubrication system supplying oil at 50 psi, 12 gpm and 200 SUS (44cSt) minimum values is required. Oil cooling is recommended and may be required to maintain these values.
For operation in the Yellow shaded area expendable part life decreases and excellent NPSH is required to prevent cavitation.
Performance figures based on 100% volumetric efficiency and 90% mechanical efficiency. These figures are for use in directional drilling duty cycle.
*This equals full rod load 33% of the time, 60% rod load 50% of the time and 25% rod load 17% of the time, for a total of 1456 hours per year.


HDD

Triplex Mud Pump #2
Gardner Denver TEE
4” liners powered by a 9L 250 HP diesel engine.
Weight: 14,966#

TEED Triplex Well Service Pump *for Intermittent Service*

GARDNER DENVER



Specifications	Intermittent Well Service
Maximum BHP	165 BPH
Maximum Jackshift RPM	300 RPM
Stroke Length	5" (203 mm)
Oil Capacity	12 gal. (45 liters)
Maximum Rod Load	44,000 lbs. (19,960 kg)
Pump Weight	3,230 lbs. (1,451 kg)

TEED 4x5 for Well Servicing Performance Rating

Plunger/Piston* Diameter		Displacement per Revolution		Displacement at Pump RPM - Well Service Application																			
				50				100				200				250				300			
in.	mm.	Gal/ Rev.	Liter/ Rev.	GPM	LPM	PSI	kg/sq. cm	GPM	LPM	PSI	kg/sq. cm	GPM	LPM	PSI	kg/sq. cm	GPM	LPM	PSI	kg/sq. cm	GPM	LPM	PSI	kg/sq. cm
4.00	102	0.817	3.091	41	155	3500	246	82	309	2950	206	163	618	1475	104	204	773	1175	83	245	927	975	69
3.50	89	0.623	2.359	31	118	4600	321	62	236	3800	268	125	472	1925	135	156	590	1550	108	187	708	1300	90
3.00	76	0.460	1.741	23	87	6200	436	46	174	5250	368	92	348	2625	184	115	435	2100	147	138	522	1750	123
2.75	70	0.387	1.463	19	73	7400	521	39	146	6150	433	77	293	3125	220	97	366	2500	176	116	439	2075	146
2.50	63	0.319	1.206	16	60	9000	630	32	121	7550	532	64	241	3775	265	80	302	3025	212	96	362	2525	177
2.25	57	0.258	0.977	13	49	10000	703	26	98	9300	655	52	195	4650	328	65	244	3725	262	77	293	3100	218
2.00	51	0.204	0.722	10	39	10000	703	20	77	10000	703	41	154	5900	414	51	193	4725	332	61	232	3925	276
1.75	44	0.156	0.591	8	30	10000	719	16	59	10000	703	31	118	7700	542	39	148	6175	433	47	177	5125	360

Ratings are based on 90% mechanical efficiency and 100% volumetric efficiency.
Piston and liner construction available in 2 3/4", 3", 3 1/2" and 4" only.
The duty cycle of a pump rated for intermittent duty is not to exceed 30 minutes at loads above the maximum established for continuous running followed by an equal period at no load.
External pressure lubrication required below 75 RPM.
Note: Use plungers/packing for acid service or pressures in excess of 4,000 PSI. Pistons/liners are not recommended for these applications or any applications over 4,000 PSI.


888-777-2700
Hertz

STEERING TOOL SYSTEM

WITH SHOCK MONITORING AND SURVEY ACCURACY



INTERFACE UNIT

DRILLER'S CONSOLE

DOWNHOLE INSTRUMENT WITH SUPERPROBE BARREL & SHOCK BUFFERS

DEMANDING APPLICATIONS

- Short to long radius boreholes
- Kickoff and landing section drilling
- Re-entry drilling
- Drain hole drilling
- Microtunneling
- Trenchless construction
- Borehole surveying while drilling
- River crossings for pipelines

TOUGH • RELIABLE • ACCURATE

- Field-proven in hundreds of horizontal wells
- Survey quality accuracy – produces survey equal to electronic multi-shots
- Tool shock monitoring – extends bit and motor life, and steering tool reliability
- Large, high visibility, continuously displayed azimuth, inclination, and toolface – all updated every 0.8 second
- Steers in any orientation – straight down to straight up
- Simple set up and operation – light and compact
- Automatic and manually selectable toolface modes and toolface offset – no mechanical orientation adjustment needed
- Reliable data transmission with continous error checking

TENSOR

SENSORS AND SYSTEMS FOR BOREHOLE NAVIGATION

STEERING TOOL SYSTEM

WITH SHOCK MONITORING AND SURVEY ACCURACY

DESCRIPTION

The Tensor Steering Tool System has highest accuracy and is all-angle – now in new, second-generation form to meet the most demanding steering needs. It produces Tensor survey quality data in any orientation, from straight down to straight up. The overall system with software includes complete self-testing capabilities. Data quality measurements are displayed to the operator at all times for confirming proper downhole probe operation.

Shock level of the downhole tool is continuously monitored, telling the driller when drilling is rough so weight-on-bit and/or pump rate can be adjusted. If the high shock cannot be reduced to an acceptable level – motor, bit, or stabilizer problems are indicated.

The Tensor Steering Tool System consists of the Downhole Probe, an Interface Unit, a Driller's Console, a Computer with Printer, and the Steering Tool Software.

DOWNHOLE PROBE contains an orientation module with triaxial accelerometers and triaxial magnetometers for gravity and magnetic field measurements, a temperature sensor, signal digitizing circuitry, a frequency-shift-keying modulator for communication via the wireline, and power regulation and control circuitry.

INTERFACE UNIT contains power control, signal demodulating, and interface circuitry.

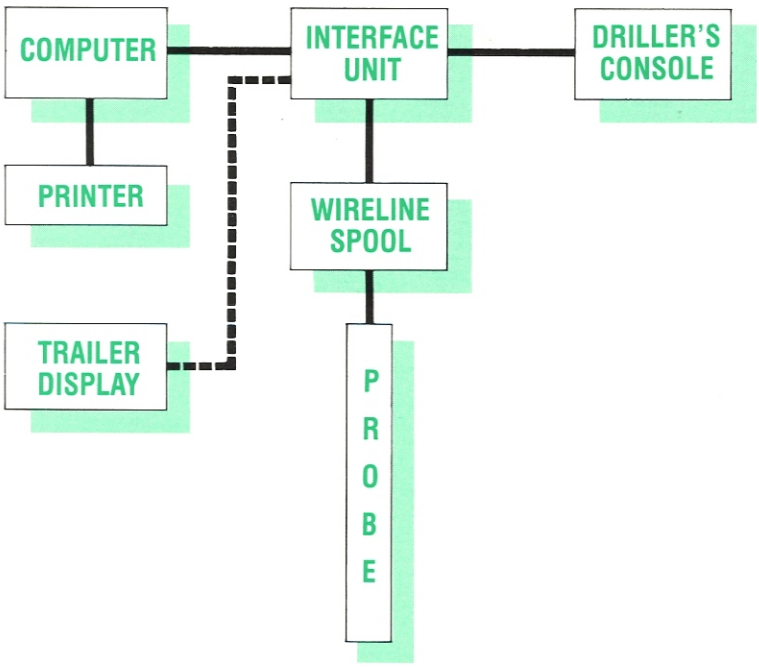
COMPUTER customer furnished choice of IBM compatible PC/XT/AT or 386, with 640K RAM, math coprocessor, two disk drives (one floppy and one hard drive preferred), one serial port and one parallel port.

DRILLER'S CONSOLE displays toolface angle with servo-driven pointer, plus two back-lighted liquid crystal displays – one for azimuth and azimuth mode, the other for inclination and toolface mode.

PRINTER customer furnished choice for producing surveys and hard copy records of directional information during steering tool run.

SOFTWARE provides steering tool operating programs, as well as routines for system configuration and start up, data recording, survey calculation and printout, Driller's Console and Interface Unit tests, probe diagnostics and Tensor Roll Test calibration check. The complete Operating Manual is included in the software for either on-screen reference or printing.

STEERING TOOL BLOCK DIAGRAM



SPECIFICATIONS

DIRECTIONAL PERFORMANCE
Maximum lateral displacement error: 2.6 feet per 1,000 feet, or conical uncertainty of ±0.15 degrees maximum. Survey resolution: 0.1 degree.

DOWNHOLE PROBE
Maximum operating temperature: +150°C (+302°F) within specifications; +175°C (+347°F) survival. 1.375 in. diameter, 48 in. long, 4 lbs.

INTERFACE UNIT
8″h × 11″w × 11″d; 12 lb.

DRILLER'S CONSOLE
9″h × 12″w × 11″d; 17 lb. with 50′ and 100′ cables.

SYSTEM INPUT POWER
60 watts maximum, 120 VAC, 50 to 60 Hz (excluding computer and printer).

WARRANTY
One year limited warranty against defects in material and workmanship.

TYPICAL SYSTEM

for one job capability:
2 or 3 Downhole Probes, 2 Driller's Consoles, and 2 Interface Units.

OPTIONAL FEATURES

SHOCK ISOLATED PROBE (SUPERPROBE)
four times greater shock and vibration survival, beryllium copper pressure barrel, maximum operating pressure: 12,000 psi, 1.75 inch diameter, 6 feet long, 25 lb.

TRUTRACKER® GUIDANCE SYSTEM
for shallow drilling such as pipeline river crossings and tunnels, accurate both laterally and vertically to 0.2 foot per 10 feet of borehole depth (2%).

SECOND DRILLER'S CONSOLE
for remote readout.

EXPLOSION PROOF HOUSING
for Driller's Console.

CUSTOMER LOGO AND COLORS
for Driller's Console and Interface Unit.

for additional details:

TENSOR INC.
1840 Royston Lane
Round Rock, Texas 78664
Tel: (512) 251-4131
Fax: (512) 251-5798
TELEX: (ITT) 4940124 (A/B TENSR)

The material contained herein is subject to change as improvements become available.

We are often asked about the accuracy of the steering tools used in HDD applications. The equipment used can be the same as that used in Oil and Gas exploration. Years ago the tools were all identical. As costs became more competitive, features needed in Oil and Gas drilling but not used in HDD applications were eliminated on some of the tools. For example the ability to withstand high temperatures and high pressures are not needed on HDD projects. The HDD tools utilize the same internal components, maintaining the same accuracy, as the more expensive tools at a much lower cost. In fact, accuracy in HDD applications is inherently more important than standard Oil and Gas drilling. There are three components, in addition to the steering tools themselves, which are required for accuracy. They are, an accurate land survey, experienced guidance personnel and proper set up of the surface coil.

The steering tools have the following accuracy specifications.

- Inclination +/- 0.1degree
- Azimuth +/- 0.5 degree
- Toolface +/- 0.1 degree

As you can see the tool itself is extremely accurate. However, because surveys are not continuous, taken usually as a joint of drill pipe is added and because the tool works off magnetics, which are affected by the earth's normal anomalies and magnetic interference, calculations accumulated at only these intervals result in less than accurate results. The steering software can only consider the input acquired during the survey and not the remainder of the bore path, therefore residual instrument errors are unavoidable. That is why surface tracking was developed. Surface tracking is an accurate technique used to locate the steering tool within a grid specifically placed on the surface. The accuracy is within 2% of the tools depth. Since the grid must be surveyed to insure its precise location, accurate land survey instruments and skills are a necessity.
There are precise specifications and techniques to laying out a proper coil. Only experience can determine the proper coil configuration, as each bore is uniquely different. Some will require 8 gage wire, others may require 6 or even 4. A coil could consist of 4 corners or have as many as 256. For these reason, and others too numerous to mention, an experienced Guidance Technician is a must to insure the accuracy and safety of a HDD project.

All steering tools, as well as land survey equipment should be accurately calibrated. However, that alone will not insure an accurate bore. Other important factors should be considered. They are surface tracking, an experienced land surveyor with a complete understanding of coil set up requirements and an experienced Guidance Technician (Preferably the same person to insure continuity). Perhaps the most important factor when considering accuracy is the drilling crew and specifically the driller. An experienced driller understands changing formations and the nuances of directing the bit. An experienced Guidance Technician will interpret data and determine the location of the bit. An experienced driller will have the ability to move the bit through projected points along the drill path. This experience, of how to recover when deflections occur, will have significant affect on the successful completion of a HDD project.

Surface (Tru Track) Coil

Surface tracking is a steering tool locator technique, utilized throughout the industry under different names, It is used as a redundant means of locating the steering probe because magnetic interference and residual instrument errors will cause calculated closures of the steering tool to be inaccurate. A magnetic field with known intensity is created from current flowing through a properly surveyed and placed wire coil. With geometry modeled to work in conjunction with the probe beneath it. The probe is positioned at the given away co-ordinate and the modeled values match the measured values resulting in the right, left and elevation closures of the probe.

COIL LAYOUT

The coil should be laid out using sufficient gage wire to allow a radial intensity of 2000 to 5000 gamma units. The higher the intensity, the more accurate the closure. If a coil uses 1000 to 2000 feet of wire, AWG 4 wire is recommended. If it uses 1000 feet or less, AWG 6 wire is recommended. AWG 8 wire is adequate if the coil is 500 feet or less in length or the vertical depth is shallow, less than 40 ft. Multiple strands of wire can be used if more current is needed- Congested areas and areas with existing electrical currents require maximum radial intensity for accuracy. Corners should be established at any change in direction of the wire, horizontally or vertically. A bore can have numerous coils but is limited to 256 corners. Keeping the number of corners to a practical minimum increases coil accuracy.

The coil should be at least as wide as the depth to the probe as it is advanced along the drill path. The width search area of the coil is three times the width of the coil. The accuracy, with the proper set up of the surface coil, is +/- 2% of the depth and distance of the probe from the coil. As the probe depth decreases the coil is narrowed, increasing the accuracy.

Coil corners are entered by imputing the "right" coordinate, the "away" coordinate and the "elevation" coordinate. Corners are perpendicular to the base line and use the connected away distance points as the base line. Corners left of the established line are designated by a negative number. The first corner is numbered #1 with the remainder of the corners numbered moving clockwise around the coil. In a curved crossing, corners are perpendicular to the path at each corners' specific away co-ordinate.

TAKING A SURVEY

With the probe stationary a DC current source applies forward current (positive polarity) to the coil. When the current reading stabilizes on a multi-meter the current value is entered in the computer as a positive value. When prompted by the software to reverse the current, a reverse current (negative polarity) is induced and a negative value is entered in the computer. Once the software has accepted the data and searches for closure the power source is removed from the coil. If more than one survey is accepted they will be averaged by the software. Repeats will result in more accurate closures. At least one repeat is recommended on every survey.

Problems or fallacies with a survey can be caused by the probe being outside the coil, the wrong coil being designated as active, the coil improperly surveyed, improper recorded corners, inaccurately measured current, a fluctuating DC source or the current measurement unit improperly connected.

OVERVIEW

Surface tracking, when set up properly, is an excellent locating system used as a secondary means to of locating and tracking the probe. The system is only as accurate as the land survey and data input. Users should be familiar with the parameters of magnetic steering tools and basic electric magnetic fields, coil criteria, topographic surveying techniques and have the ability and experience to troubleshoot problems.

APPENDIX E

RSN Dive Plan

L-3 Communications MariPro

RSN Dive Plan

Program Name: RSN HDD Installation, Pacific City, Oregon 2011

Dive Location: Pacific City, Oregon Ocean
Approximate dive site location:
45° 11.872' N 123° 59.130' W
45° 11.955' N 123° 59.164' W

Operational Objectives: MariPro Divers will be deployed to perform various tasks in support of the HDD conduit installation. Two HDD conduits about 5,000 feet long are planned. The conduits are expected to exit the seabed in about 66 feet water depth (20 meters). The diver's tasks are identified but not limited to the following:

- Survey the seabed at the planned HDD conduit exit points to verify the areas are unobstructed and available for the cable installation. This will be attempted during the drilling of the first drill string, weather permitting.
- Verify the exit of the bull nose and drill string (HDD conduit) .
- Remove the bull nose from the HDD conduit and recover the pig and ¼" pulling wire.
- Attach the pulling wire to the conduit cap and reinstall the cap on the HDD conduit.
- Connect a sub-surface float on each of the HDD conduit ends.
- Attach surface float with minimum line scope to mark each conduit end location. With hand held or dive boat GPS record each position. Remove surface floats.
- Photo documentation of the "as built" HDD conduit on the seabed.
- If necessary (not planned) recover the BHA (Bottom Hole Assembly) if the push back operation is unsuccessful. This will only occur if conditions are present such that the planned bull-nose reamer is not an option due to adverse drilling conditions

Dive Site Description (include regulatory jurisdiction): The diving activities will be accomplished in the bay at Pacific City, Oregon. The sea floor is reported to be mostly sandy with very little relief. The depth of diving activities is not expected to exceed 80 FSW. Diving activities will be conducted from a 43 ft charter vessel "NORWESTER" owned and operated by Garibaldi Charters. Garibaldi Charters have past experience providing diving charters in this area. The dive site is about a two hour transit from the port of Garibaldi. The USCG has jurisdiction over commercial diving operations at Pacific City.

L-3 MariPro diving safety procedures and operations meet or exceed the following referenced regulations, not included in this document:

Part 1910 – OSHA Subpart T Commercial Diving Operations.
Part 197 USCG 46 CFR Subpart B Commercial Diving Operations.
ADCI Consensus Standards for Commercial Diving Operations.

Diving Mode: Either surface supplied air diving or SCUBA will be used to perform the diving tasks. The diving mode is determined by the task being performed and the at-sea conditions at the time of the task.

Dive Tasks and Procedures: Divers will be deployed to perform various tasks identified above to support the HDD conduit installation. Each level of dive tasking will be discussed with all dive team members and surface support personnel before each dive. Debriefs by the divers will be made to keep all personnel current of the progress of each task whenever possible. The Diving Supervisor or appointee before each day's activities will conduct a safety briefing. Dive logs are maintained for all diving related activities.

Diving Equipment: All equipment will meet or exceed standards set forth by Part 197 USCG 46 CFR Subpart B Commercial Diving Operations. The Diving Supervisor or designee will conduct a safety check of the equipment before each dive.

Surface and Underwater Conditions and Other Hazards: Surface and underwater conditions can be severe for diving activities during this time of year. L-3 MariPro has not conducted dive operations in this area, currents and expected underwater visibility is unknown. Weather and offshore conditions will be closely monitored prior to and during diving activities. The vessel Master has ultimate authority in determining if safe boating conditions exist to continue operations. The diving supervisor is responsible to determine if conditions are safe to conduct dive operations.

No marine life hazards are suggested in the immediate planned dive areas. Very little boating traffic is expected in the dive site area. The Diving Supervisor before each day's activities will make onsite evaluations for the diving operations. Dive team members will be briefed on developing conditions or hazards.

Thermo Protection: The water temperature can range 49 - 54°F during this time of year. Wetsuits are required for thermo protection. Divers are reminded to hydrate themselves to protect against dehydration. Ambient temperatures can range in between 40 - 50 °F winds can be expected. Personnel involved in topside activities should dress to accommodate cooler conditions. Rain is expected. Fog and damp conditions are likely.

Training Requirements: No special requirements stated. No dive team member will be assigned to, or participate in operations beyond the scope of his training or experience. All dive tasks will be performed under the direct supervision of a qualified dive team member. L-3 MariPro divers have experience performing all of the tasks associated with the HDD conduit installation.

Special Medical Requirements: None stated. A comprehensive first aid kit will be available at the dive site. Emergency oxygen is also available.

Dive Decompression and Treatment: No decompression dives are planned. Treatment of any diving related emergency would follow strict adherence to US Navy treatment tables and procedures.

L-3 COMMUNICATIONS MARIPRO PROPRIETARY
Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this document.

No medicines or drugs shall be administered unless prescribed by a licensed physician trained in diving medical emergencies. The Pleasant Valley Hospital in Camarillo can provide emergency medical consultation. The closest Hyperbaric Facility is located in Portland, OR. The Dive Supervisor will instruct all L-3 MariPro personnel and direct all activities in the event of a diving emergency.

Breathing Gas Supply Requirements: The Diving Supervisor will be responsible to ensure that an adequate breathing supply and reserve is available prior to the commencement of all diving activities. SCUBA divers will be reminded to leave bottom with no less than 500-PSI pressure remaining in their cylinders. All SCUBA divers will carry a Spare Air ® emergency air supply system. 100%-regulated oxygen will be located at the dive site for emergency purposes.

Dive Team Assignments and Responsibilities: The Diving Supervisor will be responsible for establishing the assignments and responsibilities of the MariPro dive team. Other divers may be added as needed.

Table E-1 L-3 MariPro Dive Team

NAME	ASSIGNMENT
Geoff Ball	Diver
Cris Christianson	Diver
Randy Martinez	Diver
Mark Wardman	Dive Supervisor

Emergency and Evacuation Procedures: Trauma cases will be stabilized and immediately evacuated to the local hospital for medical treatment. Emergency evacuation of serious injury or decompression sickness will be coordinated with local authorities.

Emergency Response Numbers:

Table E-2 Emergency Response Numbers

FACILITY	TELEPHONE
Portland Hyperbaric Facility @ Providence Hospital	**503 215-6061 503 215-1111**
Fire	**911**
Ambulance	**911**
Police	**911**
Camarillo Hyperbaric Facility	**805 389-5944**
Tillamook County General Hospital	**503 842-4444**
Tillamook County Sheriff	**503 842-2501**
Oregon State Police	**503 842-4433**
Physician – routine, Pacific City	**503 965-6555**
USCG	**VHF - 16**

An emergency response briefing will be held with all personnel involved in the diving and diving support operations. Copies of the emergency response numbers will be posted on all support vessels. The L-3 MariPro Diving Supervisor will direct personnel responding to any medical emergencies involving L-3 MariPro dive personnel.

Diving Equipment List: The following top-level list identifies the diving equipment to support the HDD conduit installation:

- Diving safety equipment / First aid kit / Emergency oxygen
- Communication equipment / VHF radios / Cellular phone
- SCUBA equipment
- Surface supplied air diving equipment
- Diver's personnel equipment
- Administration / Dive plan / US Navy Dive Manual / Dive Operations Manual
- Dive support equipment for the HDD installation
- Equipment necessary to recover BHA if necessary

Job Hazard Analysis

The table below identifies possible hazards that might be encountered during the diving operations at Pacific City. Precautions to avoid hazards are also listed. The best way to avoid hazards is through early prevention. It is the responsibility of all diving personnel to continuously monitor the dive site for any possible hazards and to immediately report any unsafe condition to the diving supervisor. All personnel shall be reminded of their responsibilities to ensure a safe working environment exists at all times. Divers shall maintain a professional approach to work tasks and maintaining the dive site. Divers are responsible for inspecting their diving equipment prior to its use.

Table E-3 Potential Hazards and Precautions to Take

Hazard	Precaution	Person Responsible and Possible Actions
Boat traffic near dive site	Post dive flag on dive vessel. Use marine VHF radio to warn approaching traffic near dive site.	Topside personnel to maintain close watch for vessel traffic near dive site. Use marine VHF radio to warn approaching traffic near the dive site.
Unsafe sea state for diving operations.	Constantly monitor weather and sea state conditions.	All personnel should keep a close watch for changing conditions and report to the dive supervisor. The dive supervisor or Vessel Master can make the determination to cancel diving operations if the sea state is unsafe.
Diver loss of air	Each SCUBA diver to carry Spare Air emergency air supply system. Diver to monitor air supply and leave bottom with no less than 500 PSI	Dive Supervisor to ensure all divers carry Spare Air. Diver to monitor air supply and leave bottom with no less than 500 PSI reserve.
Loss Diver	SCUBA divers are to remain in close visual contact at all times.	Each diver is responsible to remain in close visual contact with their partner.
Being struck with wire and pig while under hydrostatic pressure	Divers should maintain a safe distance from the HDD conduit end and never position directly in front of HHD conduit end.	Each diver is responsible to maintain a safe position during the pigging operation. The dive supervisor will brief each diver prior to the dive.
Effects of differential pressure, HDD conduit and ambient sea pressure	A relief plug will be fitted on the bull nose so the diver can remove it prior to removing the bull nose.	Dive Supervisor will coordinate activities with HDD Supervisor. Divers will be briefed by the dive supervisor on the correct procedures t be followed.
Lift bag operations, blow ups and entanglement of the diver. Loads falling on diver.	Inflation of the lift bags to recover the BHA will be made after the diver leaves the water by the topside crew.	Dive Supervisor
Hydraulic hacksaw, diver injury	Ensure operator is experienced and the tool is never turned on until requested by the diver. Clear voice communications are required from diver and topside.	Dive Supervisor
Pulling BHA through surf	Calm conditions must exist prior to	Dive Supervisor and Vessel Master will be responsible to monitor the sea conditions and

Hazard	Precaution	Person Responsible and Possible Actions
zone, diver injury	attempting this operation.	determine if the operation can be safely completed.
BHA falling on diver or umbilical during cutting operation if HDD conduit is found proud off bottom	Divers should maintain a safe distance from the HDD conduit and never position any part of the body directly under the BHA while operating the saw. Ensure umbilical is clear of BHA at all times	Dive Supervisor will brief the diver and monitor activities via helmet camera during the cutting operation.

Emergency Response Plan

Pacific City, Oregon

RSN HDD Conduit Installation

Table E-4 Diving Accident Response Plan

Non-Diving Injury	EMBOLISM Chamber off site	BENDS Chamber off site	LOST DIVER
1. Treat injuries and stabilize victim. Make determination to transfer victim to local medical facility. Coordinate logistics with local authorities. Non-treating Bay Shore Medicine 503 965-6555 **Emergency or life treat** **911**	1. Put diver on 100% oxygen. 2. Call 911 to report the emergency, coordinate transfer of victim to nearest Hyperbaric facility. 3. Call for additional medical advice. **Hyperbaric Treatment Facility** **503 215-6061** Portland Providence 4805 NE Gleason Portland, OR	1. Put diver on 100% oxygen. 2. Call 911 to report the emergency, coordinate transfer of victim to nearest Hyperbaric facility. 3. Call for additional medical advice. **Hyperbaric Treatment Facility** **503 215-6061** Portland Providence 4805 NE Gleason Portland, OR	1. Notify support boat and crew and other involved vessels to actively look for lost diver(s) 2. Mark dive location with surface float or GPS. 3. Deploy standby diver (tethered) for search. 4. Notify USCG **USCG CH. 16 VHF** 5. Notify local authorities in Pacific City 911.

When notifying Search and Rescue agencies always be prepared to provide the following information:

1. Describe injuries and symptoms
2. Give present location of vessel
3. Description of vessel
4. Advise sea-state and weather conditions at your present site