DREDGING AND DISPOSAL PLAN
PORT OF GOLD BEACH

GOLD BEACH, OREGON

Attn: Mr. Jim Clemons, Port Manager
PO Box 1126
Gold Beach, OR 97444

By Jack Akin, EMC, Engineers/Scientists, LLC

9/21/15

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Attached: Figures A – M (Details)

1.0 Introduction

EMC, Engineers/Scientists, LLC (EMC) has been contracted by the Port of Gold Beach (Port) to propose for permit, and to provide engineering, labor, materials and equipment to conduct dredging and disposal of about 80,000 yds^3 total of sediment from areas as shown below (Page).

All work will be conducted under the submitted Joint Permit and is purposed to remove a backlog of accumulated sediments that have shoaled into these boat service areas for the last several decades, threatening to damage boat traffic and mooring.

Since an annual sediment shoaling rate of about 5500 yds^3 is assumed[1], this project is expected to introduce a recurring program designed to maintain basin floor depths at the Port of Gold Beach. In addition to the plan view of the proposed dredging areas shown in this report, cross-sectional views (prisms) have been constructed at key locations, which have been provided to the USACE, and are inserted into this report. If there are any questions or need for additional information, please contact the engineer (Jack Akin, Engineer of Record, cell: 541-261-9929, emc@emcengineersscientists.com).

Design dredging depths are shown in the inserted dredge volume drawings and on Table A below.

2.0 Dredge and Disposal Plan

2.1 Dredging

The Port of Gold Beach requests that it may dredge a total of about 80,000 yds^3 of basin sediments that have shoaled into these boat service areas for the last several decades. The Plan proposes that the dredging be accomplished by hydraulic suction dredge with cutter head.

The Port plans to employ an Ellicott dredge for this project, as described within the Section below entitled **Equipment List for Plan**. The dredge would be deployed in the order as listed in the Dredge Area Table A below, unless Port management finds, during operations, that market and operational considerations dictate revisions in the order.

All runs of dredge pipe when dredging would be entirely contained within the basins and upland and, where floating or surfaced, would be marked with flashing yellow lights during any night operations if traffic concerns exist. After operations are completed in each area the dredge will be moved to the next area in sequence. The sediments would be pumped from the dredge and piped to upland disposal as described below.

[1] Based on USACE sediment removals in the Federal Channel within the Port Basin

2.2 Operational Summary

a. Existing survey data shown has been supplied by Oregon State Marine Board – Basin Survey, Roberts Surveyors (Brookings), EMC data, and by the Port of Gold Beach, combined with USACE post dredging elevations. This data will be converted to State Planar coordinates for dredge navigational purposes by EMC.
b. Interpolated elevation data was used at several locations on this drawing in order to extend beyond the proposed dredging boundary.
c. All areas of the Sport Basin (West, DMMU1) are to be dredged to 10.5 feet MLLW (includes 2 foot overdredge), or to other depths as dictated by conditions, whichever is shallower.
d. All areas of the Commercial Basin (East, DMMU2) are also to be dredged to 10.5 feet MLLW (includes 2 foot overdredge), or to other depths as dictated by conditions, whichever is shallower.
e. Disposal pipe is specified to be 10-12 inch, SDR 11, 17 or 21 HDPE (see Figure C), with the total of pipe sections to be about 3000 feet, and subsequent engine horsepower and pump (centrifugal, slurry) characteristics are based on production rate capacity of the available dredge.
f. The system is designed assuming a 440 hp hydraulic suction dredge, supplied with a rotating cutterhead/ladder system capable of pumping about 10-12 feet/second, 3000 GPM of 15-30% slurry as specified by the project manager, providing an approximated 160 to 250 $yd.^3$ per hour production rate. Utilizing these production rate assumptions, this project is expected to be completed in about 80-90 days, including mobilization/demobilization. Horsepower is specified as the movement of mass against head per unit of time.
g. Pipe sections will be welded from 50' segments (see Figures A, D & M)within the Port will be sunken by sediment only, and therefore will have potential to float when filled only with seawater. This can occur during purging, and safety precautions to avoid collisions with boaters must be taken during purging (pipe cleanout).
h. Anchoring of the pipe will be completed as specified by the project engineer/manager to prevent uncontrolled horizontal drifting of pipe sections.
i. All anchors (see attached Figure H), if used within navigable waters, will be marked by buoys and lighted as specified by the project engineer/manager.
j. The end of the pipe will be managed so as to provide even loading of designated upland disposal area (see attached 2015 9-21-Gold Beach C3 Upland Storage drawing). Piping will begin to the most distal end of the upland disposal site and moved side to side, shortened as required, layered as determined by the Project Manager/Engineer during the project.
k. An outlet pipe will be placed to allow return water to flow back into the shoaled in areas, and the pipe will direct the return waters to stilled areas.

This return outlet pipe or pipes, likely of 10" SDR 15.5 HDPE (see attached Figure C), would be constructed into a "spreader" by positioning it adequately upgradient to allow for occasional unplugging, and placing holes laterally on one or both sides of the pipe (perhaps 3" diameter), spaced to allow for even distribution of return water to flow along gentle slopes and through stilled sediments & algal growth (see attached 2015 9-21-Gold Beach C3 Upland Storage drawing)

2.3 Dredging Equipment List for Plan

Dredge – Ellicott SL (Swinging Ladder) 360, 68,000 lb. (w/o fuel), 16.3' wide X 58.8' long (assembled), custom-constructed hydraulic suction dredge with cutter head. The pump is expected to perform at about 75% efficiency, providing at least 150 feet of head and 3000 gallons per minute flow, up to an equivalent horsepower of 440, from which an estimated 40 – 50 hp is taken to drive the cutter head, spuds and swing anchor winches. The dredge is custom designed for single truck/trailer mobilization.

Tender Vessel – One-truck transported push boat dredge tender with a-frame, block and rigging, operating a winch.

Skiff – Small boat with outboard motor to assist with swing anchor, supplies, pipeline and other operations during project.

Fusion Welder - 10" – 12" self-aligning plastic (HDPE) pipe fusion welder.

Overhead Fork – Fork-over-cab material handling truck, with 3-section boom and carriage with forks for upland mobe/demobe loading and off-loading, and operations during the project.

Lowboy Trailer – Trailer with ramp for dredge mobe/demobe.

Crane – Adequately specified crane Boat Lift combination capable (capacity dependant upon required off/on-loading, reach and method considerations).

Pipe Dispersion Carriage – In-house constructed.

Pipe – Approximately 3000 feet of 10" or 12" HDPE pipe, pressure rated according to specified standard dimensional ratio (e.g. SDR 11, 17, 21), welded to specified lengths, with flanges placed as determined on-site, as determined by the consulting engineer (EMC). If the nearly infeasible Pacific Ocean disposal areas are the only open options then much more piping would be required.

Other – Various in-house and purchased anchoring, rigging, lighting, buoys, floats and signage, as determined during project equipment mobilization.

3.0 Sediment Disposal

The sediment, after removal by a hydraulic dredge system, would be piped at an estimated 9.7 – 14 feet per second, to location(s) at the proposed upland disposal site, as shown (see attached 2015 Gold Beach Sheet C1, C2 and 2015 9-21-Gold Beach C3 Upland Storage drawings).

Alternative dredging operations (e.g. clamshell/scow, submersible pump/pipeline) were considered for this project. But navigation and draft constraints (no reasonably accessible landings for crane/excavator, depth limitations for required barge drafts, maneuverability of clamshell operations between docks, etc.) quickly eliminated these as feasible alternatives.

However, a dredging operation utilizing equipment and materials as enlisted in Section 2.3 is feasible.

Sediment piping distances are well within the capabilities of the specified dredging equipment described above.

A pipeline (probably 10" or 12" diameter, plastic, welded) could be constructed, laid out along a nearby beachhead or basin embankment, towed to location, and anchored at crucial points to the West Basin floor or along the upland route shown (see Page 5). The pipe outlet (end) would lay over the disposal site wall or approach from points along the access road and moved or altered in length as dictated by settling characteristics of the slurry.

Advantages to the direct pipeline are efficiency, traffic reduction, fuel savings, turbidity reduction.

Regarding boat traffic: the Port is a busy Port, with daily commercial and sport vessels passing in and out of the inlet/outlets. An anchored, well-located, underwater pipeline would not impede this traffic.

The disadvantages include 1) operational difficulties during storm surges 2) piping pathway concerns.

Regarding operational difficulties during storm surges/waves: the Port has been advised by knowledgeable service providers that this option is rendered very difficult to impossible during storm surges/waves.

Regarding piping pathway concerns: Finding a pipe pathway that avoids incoming and outgoing draft concerns may require some overland piping.

4.0 Horizontal and Vertical Control of Dredging Equipment

Horizontal positioning will be accomplished by using GPS positioning with differential GPS and Windows-driven HYPACK software, and assisted by line of sight positioning from the numerous visual reference points in the harbor. This is feasible because all planned dredging will occur within the harbor where reference landmarks (i.e. boat slips, floating and permanent docks) are readily available. Vertical positioning is also accomplished by HYPACK, assisted via a ladder gauge on the dredge. This gauge is to be regularly checked and adjusted with the tide gauge at the Port.

5.0 Dredge Area

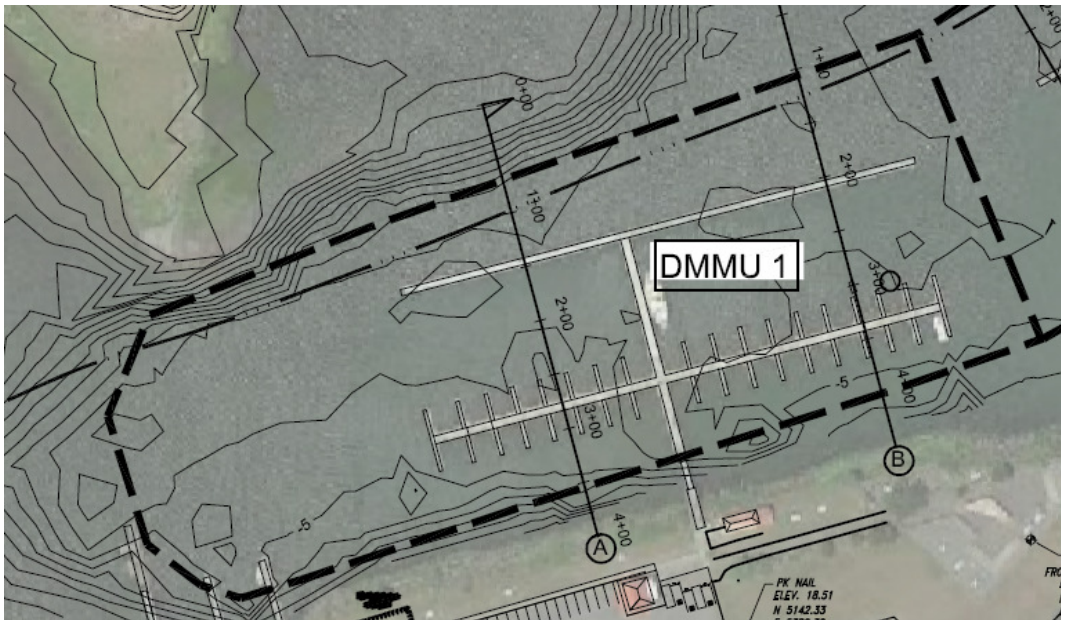
Description Table – The following table presents the specific sub-areas within the basins and dock more generally named **"West (Sport) Basin"** and the **"East (Commercial) Basin"**.

Table A

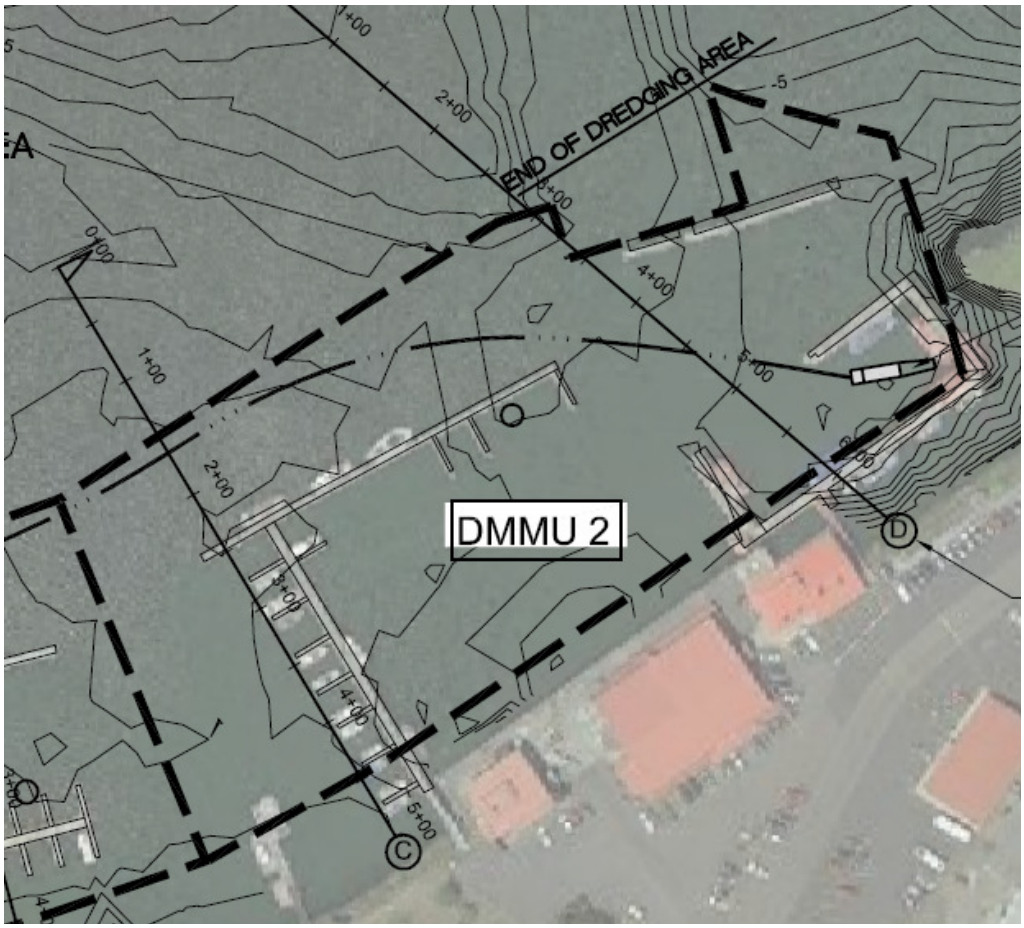
Area	Depth (ft. MLLW)	Maximum Volume Removed (yds.^{3})
West (Sport) Basin	Not to Exceed 10.5' MLLW	40000
East (Commercial) Basin	Not to Exceed 10.5' MLLW	40000

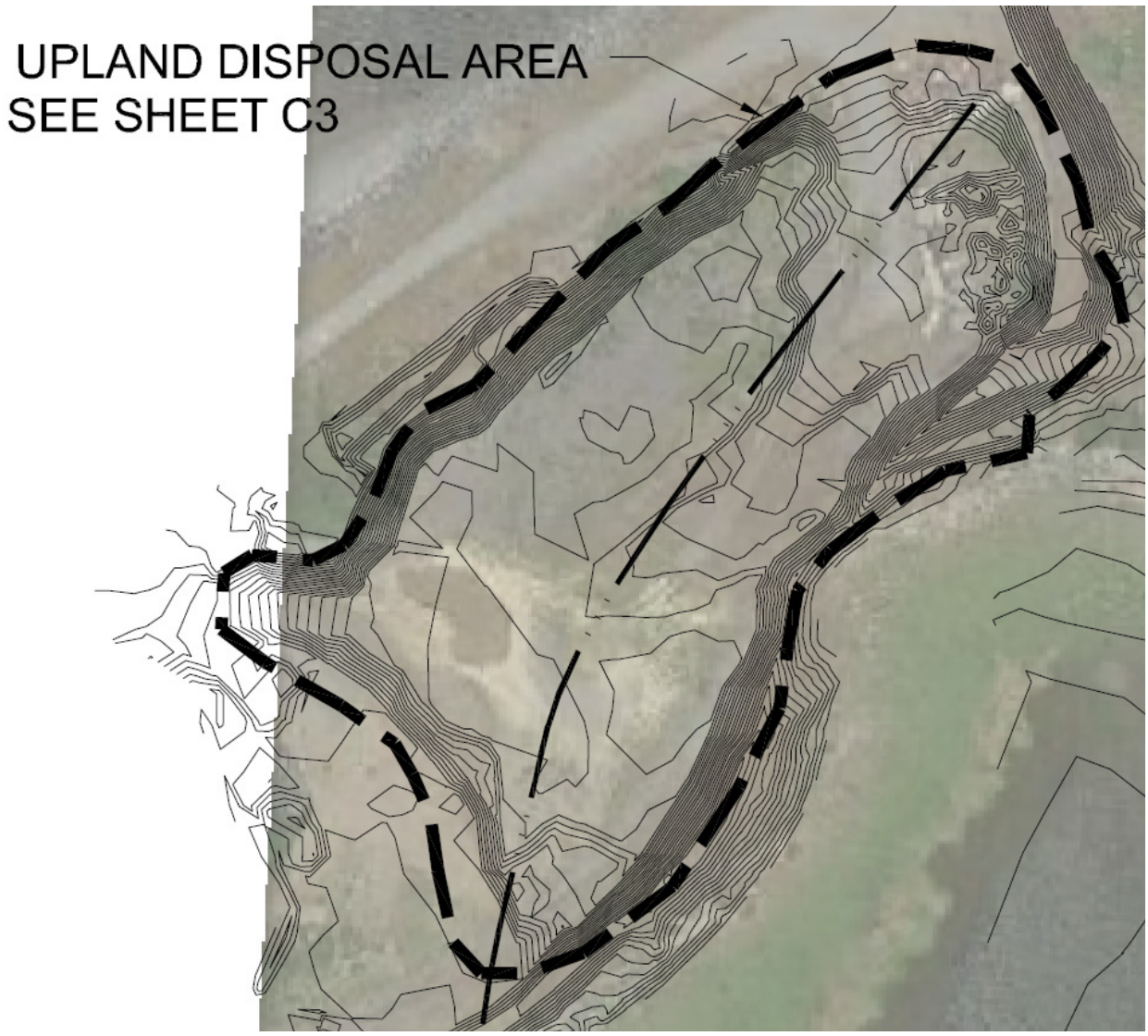
Port Basins with Pipe Route (to be Adjusted per Project Manager/Engineer. Please see attached drawings for better resolution)

West, or Sport Basin (Please see attached drawings for better resolution)



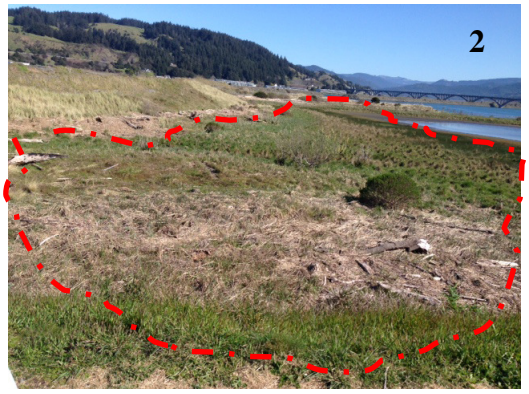
East, or Commercial Basin (Please see attached drawings for better resolution)





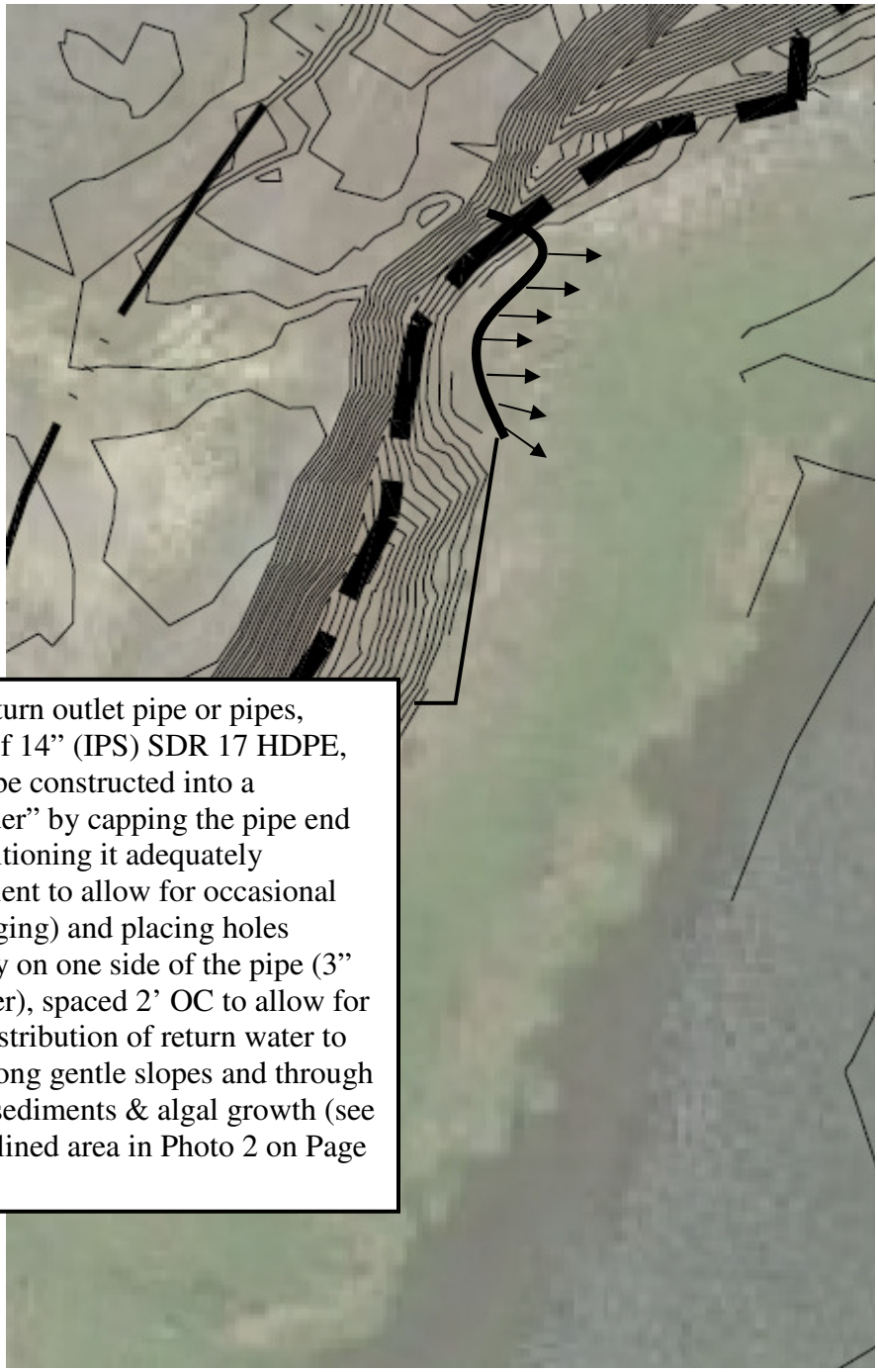
(Please see attached drawings for better resolution)

Recent (August, 2015) Photos of Various Disposal Site Locations



Looking northwestward from a point near the Port's Launch Ramp, the proposed dredge disposal site is seen in Photo 1. Photo 2 looks northward from a point along the disposal site road access, about 300 yards west of the Launch Ramp.

Photos 3 – 6 provide views of the proposed upland disposal site. During the site reconnaissance when these photos were taken underlying soils were observed to be primarily of fine and very fine sands and silts, populated with grasses and sedges. Algal growth was noted on the eastern toe of the slopes approaching the Port's West Basin. Combined hydrophytic vegetation/hydric soil/wetland hydrologic conditions looked for during a classical wetlands determination were not observed by EMC.



This return outlet pipe or pipes, likely of 14" (IPS) SDR 17 HDPE, would be constructed into a "spreader" by capping the pipe end (or positioning it adequately upgradient to allow for occasional unplugging) and placing holes laterally on one side of the pipe (3" diameter), spaced 2' OC to allow for even distribution of return water to flow along gentle slopes and through stilled sediments & algal growth (see red-outlined area in Photo 2 on Page 8).

(Please see attached drawings for better resolution)

6.0 Working Hours

Working hours for the duration of the project are anticipated to be 12 or more hours each day (Monday through Sunday).

7.0 Positioning & Progress Surveys

The Port will utilize a survey rod and/or sonar depth finder system to measure and confirm that basin floor design depths have been obtained, but not exceeded. Used in conjunction with the US Coast Guard posted vertical reference marker, frequent measurements and recordings will be used to assist. The marker is a tide gauge, or a "tide board" with markings in tenths of feet, posted near in the Port basin. Depth readings will be recorded on existing contoured maps of the basin floors. The maps will be updated as a result of depth measurements taken after the dredging is completed.

8.0 Dredge Navigation

Navigation of the dredge is not anticipated to be difficult as it is conducted within the confines of the Port basins. Horizontal and vertical location of the equipment is observed throughout the project through use of the system described in Section 4.0 to monitor the basin floor elevation. HYPACK navigational software will utilize present coordinates after having been adjusted to State Planar coordinates.

9.0 Vessel Traffic and Security

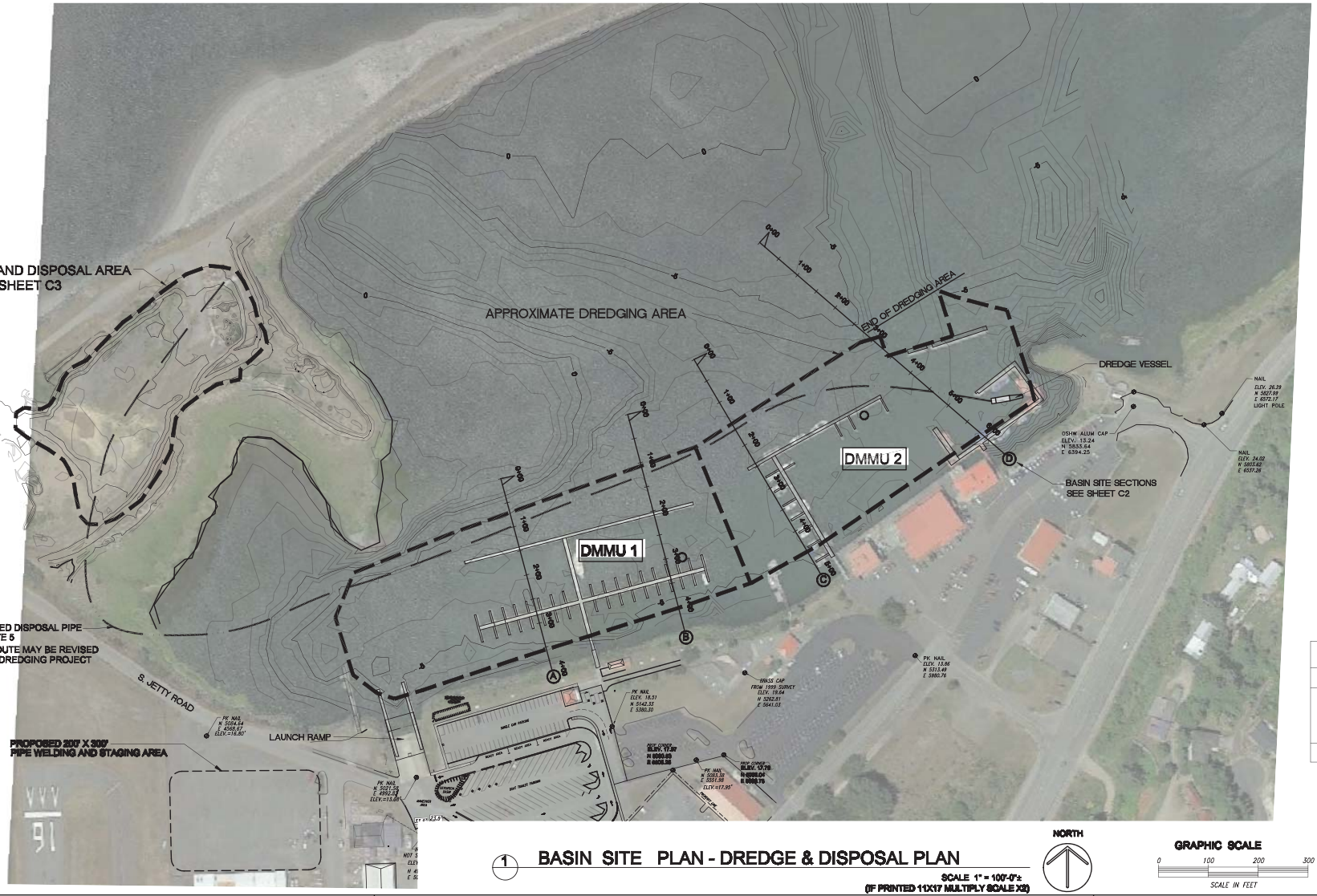
The Port is a working facility and anticipates being able to coordinate with Port management on how to both avoid interference with vessel traffic and complete the project within the permitted time constraints. The Port will notify the Coast Guard of activities as required to comply with Coast Guard and Port regulations guiding operations in and near the Rogue River.

10.0 Protection of Port Facilities

The Port will conduct a photographic survey of the Port facilities prior to start of work. The facilities will be returned to the identical condition at project completion as they are found to be at project outset.

Sincerely,

Jack Akin, MS, PE
EMC, Engineers/Scientists, LLC
(on behalf of Port of Gold Beach, Oregon)



NOTES

1. EXISTING SURVEY DATA SHOWN HAS BEEN SUPPLIED BY OREGON STATE MARINE BOARD- BASIN SURVEY, AND BY THE PORT OF GOLD BEACH, COMBINED WITH USACE POST DREDGING ELEVATIONS.
2. INTERPOLATED ELEVATION DATA WAS USED AT SEVERAL LOCATIONS ON THIS DRAWING IN ORDER TO EXTEND BEYOND THE PROPOSED DREDGING BOUNDARY.
3. ALL AREAS OF THE SPORT BASIN(WEST) ARE TO BE DREDGED TO -10.5 FEET MLLW(INCLUDES 2 FT. OVER DREDGE), OR TO OTHER DEPTHS AS DICTATED BY CONDITIONS, WHICH EVER IS SHALLOWER.
4. ALL AREAS OF THE COMMERCIAL BASIN(EAST) ARE TO BE DREDGED TO -10.5 FEET MLLW(INCLUDES 2 FT. OVERDREDGE), OR TO OTHER DEPTHS AS DICTATED BY CONDITIONS, WHICH EVER IS SHALLOWER.
5. DISPOSAL PIPE IS SPECIFIED TO BE 10 OR 12 INCH, HDPE SDR 11, 17 OR 21 , WITH THE TOTAL OF PIPE SECTIONS TO BE ABOUT 3,000 FEET, AND SUBSEQUENT ENGINE HORSEPOWER AND PUMP (CENTRIFUGAL SLURRY) CHARACTERISTICS ARE BASED UPON PRODUCTION RATE CAPACITY OF THE AVAILABLE DREDGE.
6. THE SYSTEM IS DESIGNED ASSUMING A 440 HP HYDRAULIC SUCTION DREDGE, SUPPLIED WITH A ROTATING CUTTERHEAD/LADDER SYSTEM CAPABLE OF PUMPING ABOUT 10-12 FPS, 3000 gpm OF 15%-30% SLURRY AS SPECIFIED BY THE PROJECT MANAGER, PROVIDING AN APPROXIMATED 160 TO 250 cu. yds.3/hr PRODUCTION RATE. UTILIZING THESE RATE ASSUMPTIONS, THIS PROJECT IS EXPECTED TO BE COMPLETED IN ABOUT 80 DAYS, INCLUDING MOBILIZATION/DEMOBILIZATION. HORSEPOWER IS SPECIFIED AS THE MOVEMENT OF MASS AGAINST HEAD PER UNIT OF TIME.
7. PIPE SECTIONS WITHIN THE MARINA WILL BE SUNKEN BY SEDIMENT ONLY, AND THEREFORE WILL HAVE POTENTIAL TO FLOAT WHEN FILLED ONLY WITH SEAWATER. THIS CAN OCCUR DURING PURGING, AND SAFETY PRECAUTIONS TO AVOID COLLISIONS WITH BOATERS MUST BE TAKEN DURING PURGING(PIPE CLEANOUT).
8. ANCHORING OF THE PIPE WILL BE COMPLETED AS SPECIFIED BY THE PROJECT ENGINEER/MANAGER TO PREVENT UNCONTROLLED HORIZONTAL DRIFTING OF PIPE SECTIONS IN THE PACIFIC OCEAN.
9. ALL ANCHORS WITHIN NAVIGABLE WATERS WILL BE MARKED BY BUOYS AND LIGHTED AS SPECIFIED BY THE PROJECT ENGINEER / MANAGER.
10. THE END OF THE PIPE WILL BE MANAGED SO AS TO PROVIDE EVEN LOADING OF DESIGNATED UPLAND DISPOSAL AREA.

APPROXIMATE DREDGING VOLUMES WITHIN DREDGE LIMITS SHOWN		
AREA	DEPTH	VOLUME
DMMU 1	-10.5' MLLW	39,500 CU. YDS.
DMMU 2	-10.5' MLLW	39,400 CU. YDS.
	TOTAL	78,900 CU. YDS.

PORT OF GOLD BEACH

EXISTING SURVEY DATA SHOWN SUPPLIED BY OREGON STATE MARINE BOARD(OSMB) BASIN SURVEY .
BOAT BASIN SURVEY 11/18/13 & 02/26/14
CONTOUR ELEVATIONS GIVEN IN MLLW DATUM

1 BASIN SITE PLAN - DREDGE & DISPOSAL PLAN

SCALE 1" = 100'-0"±
(IF PRINTED 11X17 MULTIPLY SCALE X2)

NORTH

GRAPHIC SCALE
0 100 200 300
SCALE IN FEET

PRELIMINARY
NOT FOR CONSTRUCTION

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WELCOME PORT OF GOLD BEACH

PORT OF GOLD BEACH
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BASIN SITE PLAN
DREDGE & DISPOSAL PLAN

DRAWN:	JW
CHECKED:	JA
DATE:	11-20-15

C1
OF 4