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SECTION 02000

MOBILIZATION AND DEMOBILIZATION
02/99

PART 1 GENERAL

1.1 SUBMITTALS

None

1.2 MOBILIZATION AND DEMOBILIZATION

Mobilization and Demobilization shall include transporting the dredge and all items of attendant plant to the site of the work, setting up the dredge and other equipment, and laying of pipelines and otherwise placing the entire plant in condition for effective dredging. Upon completion of the work, the dredge and all attendant plant shall be removed from the site.

PART 2 PRODUCTS (Not Applicable)

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SECTION 02020

DREDGING
02/99

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

CORPS OF ENGINEERS (COE)

EM 1110-1-1003 (August 1996) Navstar Global Positioning System Survey Ref Title

EM 1110-2-1003 (October 1994) Hydrographic Surveying

1.2 SUBMITTALS

Government approval is required for all submittals with a "G" designation. All submittals not requiring Government approval will be for information only (FIO). The following shall be submitted in accordance with SECTION 01330 SUBMITTAL PROCEDURES:

SD-04 Samples

Sediment Samples

SD-06 Test Reports

Dredge Dump Disposal Records

Daily Report of Operations

SD-07 Certificates

Dredge and Disposal Plan;G

Hydrographic Surveyor;G

1.3 REQUIRED WORK

In the area to be dredged, all materials shall be removed and disposed of as indicated. Should material which cannot be removed without unreasonable methods be encountered, the Contractor shall remove all overlying material which in the judgment of the Contracting Officer, can be removed. Nothing in this paragraph shall be construed as prohibiting the removal of excepted material by special means at prices agreed upon and approved in accordance with the CONTRACT CLAUSE: DIFFERING SITE CONDITIONS. The dredging area shall be dredged to the indicated depths below mean lower low water (MLLW).

Debris shall become the property of the Contractor and shall be removed from the site.

1.4 AVOIDANCE OF EXISTING CONSTRUCTION

1.4.1 Existing Breakwaters, Piers, Groin, and Revetment

The Contractor shall conduct dredging operations in such a manner as to prevent undermining of the breakwaters, piers, groin, and revetment. Excessive or unnecessary dredging may result in an unstable condition at the toe of the structures. The Contractor will be required to strictly adhere to the indicated dredging template when working near any structures, and shall be responsible for repairing any damage which may result from failure to comply with the requirements of these specifications.

Three (3) submarine pipelines are known to exist in the northern disposal location. Their approximate locations are as indicated on the drawings.

1.5 CHARACTER OF MATERIALS

The materials to be removed from the Modified Entrance Channel, Advance Maintenance Area, Transition Area, Sand Trap, Main Channel, Navy Channel, and Morro Channel is the shoaling that has occurred since the areas were last dredged. Data obtained from previous exploration (1988, 1989, 1993, and 2001) indicate that materials should consist of gray, poorly graded fine to medium-grained sand (SP) with less than 10 percent fines (percent passing the 200 sieve) and very fine to fine grained sand (SM) with more than 10 percent fines (percent passing the number 200 sieve). Layers of sandy gravel or gravelly sand will be encountered. Furthermore, cobbles particularly at the sand trap area, displaced breakwater armor and core stones, abandoned buoy anchors, tree stumps, tires, and other debris may be encountered. See Sheets 11 through 17 for the logs and locations of vibracore and dive core holes drilled and sampled for previous and present dredging. Tables 1 and 2 for investigations conducted in 2001 are included at the end of this section as Appendix-A.

1.6 RECENT MAINTENANCE DREDGING

The table describes the dredging episodes since 1998 Maintenance Dredging of Morro Bay Harbor.

<u>Dates</u>	<u>Area Dredged</u>	<u>Type of Dredge</u>	<u>Disposal Location</u>
Jan.-Apr. 1998 (Latest Maint. Dredging Contract Completed)	Modified Ent.Ch., Transition Area, Main Channel, Navy Channel, and Morro Channel	Hopper (NEWPORT and WESPORT)	Near-shore
Aug. 1998 (COE Dredging)	Modified Ent. Ch., Transition Area, and Main Channel	Hopper (COE YAQUINA)	Near-shore
Jun.-Jul 1999 (COE Dredging)	Modified Ent. Ch., Transition Area, and Main Channel	Hopper (COE YAQUINA)	Near-shore
Jul.-Aug. 2000	Modified Ent. Ch.,	Hopper	Near-shore

(COE Dredging) Transition Area, (COE YAQUINA)
and Main Channel

The Corps dredge YAQUINA is performing maintenance dredging for 27 days beginning 23 June 2001, dredging in the Modified Entrance Channel, Transition Area, and Main Channel. It is anticipated that approximately 105,000 cubic meters of dredged material will be removed from the designated areas.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 DREDGE AND DISPOSAL PLAN

The Contractor shall submit a Dredge and Disposal Plan indicating the methods and equipment he proposes to use to dredge, position and dispose. The plan shall be submitted to the Contracting Officer for approval at least 20 days prior to start of dredging operations and shall also include, as a minimum, the following information:

- a. Order of dredging operations, layout of dredging and disposal areas, and proposed time line.
- b. Layout of all buoys, anchors, pipelines, and ancillary equipment.
- c. Methods and equipment for positioning at the dredge and disposal site(s).
- d. Layout of dredge, including: dimensions; location of engines, fuel storage, electrical/transformer rooms; description of engine types and horsepower ratings, types and size of generating equipment, fuel storage capacity, and vertical and horizontal access. A copy of this information shall be provided to the local fire fighting agency.

3.1.1 Priority of Construction

Unless directed otherwise, the Contractor shall conduct dredging and disposal activities in accordance with the following priorities: Transition Area, Main Channel, Navy Channel, Modified Entrance Channel, Sand Trap, and Morro Channel. Depending on the types of dredging equipment used, it is possible that more than one area could be dredged simultaneously; however, approval and permitting must be obtained from San Luis Obispo County Air Pollution Control District (APCD). Any changes in the order of operations shall be approved by the Contracting Officer. Further, environmental considerations in accordance with SECTION: 01354 ENVIRONMENTAL PROTECTION must be complied with regarding timing and material disposal.

3.2 DISPOSAL OF DREDGED MATERIAL

3.2.1 General

Dredged material shall be transported and deposited within the disposal limits of the area indicated on the drawings. Any dredged material that is deposited other than in the area indicated on the drawings, or as approved by the Contracting Officer, will not be included in the measurement for

payment, and the Contractor may be required to remove such misplaced material and deposit it where directed at his own expense. Debris and other unsuitable materials encountered shall become the property of the Contractor and shall be removed from the site. The Contractor can use both the beach disposal and the nearshore disposal sites, but shall submit his plan in accordance with paragraph: DREDGE AND DISPOSAL PLAN. See SECTION 01354: ENVIRONMENTAL PROTECTION for restrictions and commitments in environmental protection.

3.2.2 Surf Zone Discharge Method

If beach disposal is performed, the Contractor shall align the disposal pipeline and deposit dredged material in the surf zone. The disposal pipeline shall extend seaward of Mean Higher High Water (MHHW) and shall be located perpendicular to the ocean so that dredged material shall immediately run down the face of the beach. Construction equipment must stay within a 15-meter corridor, extending from + 2 meters MLLW to 15 meters landward as shown on the drawings. Disposal operations will begin at Sienna Street and work downcoast (southward). Surf-zone disposal will require the Contractor to remove sections of pipeline during disposal operations. If necessary, slotted or perforated pipes shall be used to extend the pipeline closer to the ocean in order to discourage erosion of sand mounds supporting the disposal pipes. Location of the slotted pipes within the pipeline will be directed by the Contracting Officer Representative. The Contractor shall notify the Contracting Officer Representative not less than 24 hours prior to movement of any discharge pipes. Slotted discharge pipes, multiple discharge points, or other approved means shall be employed to minimize loss of dredged material such that all dredged material will remain within the disposal site. Any material that is deposited elsewhere than in designated areas or approved by the Contracting Officer shall be removed and deposited where directed at the Contractor's expense. The disposed material shall not have an elevation higher than as indicated on the drawings.

Prior to disposal of dredged material, the Contractor shall provide, four (4) beach profiles. The location of the beach profiles as shown on the drawing shall be spaced approximately 400 meters and shall all start from the top of dunes and end at approximately - 2 meters MLLW with the northern beach profile at the location approximately in line with Terra Street. The data shall be provided and submitted to the Government on an electronic media (IBM compatible, ASCII format) in delimited files of easting, northing, and elevation (x,y,z), where the elevation is indicated as positive if recorded above MLLW or negative if recorded below MLLW. Refer also to SECTION: 02020DREDGING for data identification.

3.2.3 Nearshore Disposal

If the Contractor perform nearshore disposal, then the dredge material shall be placed in the designated nearshore disposal area. The approximate location of the nearshore disposal area is indicated on the plans. Prior to the disposal of any material in the nearshore disposal area, the corners will be defined by the Contracting Officer. The Contractor shall be responsible for marking the corners of the disposal area with approved buoys and making periodic inspections of the buoy locations. The dredge material shall be deposited in such a manner so as to create a berm approximately parallel to the shoreline. The mound shall be located between the -6 and -12 meter MLLW contours. The specific location of the berm will be designated by the Contracting Officer. The Contractor shall record and submit to the Contracting Officer coordinates of each dump

location, date and time of dump, and quantity of load in the Dredge Dump Disposal Records. Disposal in the nearshore disposal area shall advance only when operational technique, under keel clearance or equipment considerations will permit safe operations. For access restriction at Montana de Oro State Park, see SECTION 01354 ENVIRONMENTAL PROTECTION, para. 3.2.

Dredge Dump Disposal Records: For nearshore disposal, dredge dump disposal records shall be maintained. In addition to the daily reporting of disposal positional data, the Contractor shall provide the Contracting Officer at the completion of dredging operations with the dump records on an electronic media (IBM compatible, ASCII format) in delimited files of dump number, date, time, depth of water in which dump is made (meters), easting and northing of dump, quantity of dump (cubic meters), cumulative quantity, and area from which the load was dredged (Modified Entrance Channel STA 0+200).

<u>Dump#</u>	<u>Date</u>	<u>Time</u>	<u>Depth</u>	<u>Easting</u>	<u>Northing</u>	<u>Quantity</u>	<u>Cumulative Quantity</u>	<u>Area Dredged (Station)</u>
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A hard copy of this disposal data shall be provided to the Contracting Officer on a weekly basis.

3.3 ELECTRONIC POSITIONING SYSTEM FOR NEARSHORE DISPOSAL

The Contractor shall obtain, operate, and maintain a short range Electronic Positioning System (EPS) or Differential Global Positioning System (DGPS) for nearshore disposal operations. This EPS or DGPS shall be established, operated, and maintained by the Contractor when disposal is actively underway. The EPS or DGPS shall be capable of displaying and recording the disposal vessel's location in the State Plane Coordinates System based on the California Lambert Conformal Projection System for Zone 5 (SPCS 83 Meters) at 30 second time intervals while traveling to or from the disposal site and during disposal operations. The EPS or DGPS shall be activated at least 1,000 meters from the disposal site when transiting, and shall not be deactivated until at least 1,000 meters from the site on the return trip. Positional data shall be annotated for the time when actual dumping begins and ends and may be required to be taken at more frequent intervals than specified herein above. A record of each dump's positional data, automatically correlated with time, and annotated with date and eccentric distance measurement, if any, shall be submitted to the Contracting Officer as a part of the Daily Quality Control record. The Contractor shall provide access for the Contracting Officer to the EPS or DGPS equipment as part of the Government's quality assurance responsibility.

3.3.1 EPS/DGPS Configuration

The EPS or DGPS shall be similar, or equal, in design, performance, accuracy, operation characteristics, and frequency to equipment specified in the following technical materials:

COE EM 1110-1-1003 Navstar Global Positioning System Surveying
and COE EM 1110-2-1003 Hydrographic Surveying

Information on the above mentioned manuals may be obtained from: U.S. Army Corps of Engineers, Los Angeles District. It is emphasized that Differential GPS positioning techniques shall be used for GPS surveying and further emphasized that an EPS system with a low and medium frequency

(long-range navigation system) will not comply with the above specifications. The complete system shall be subject to the approval of the Contracting Officer.

3.3.2 Shore-Based Control

The Contractor shall establish horizontal control necessary to locate active and/or passive short range EPS or DGPS transmitter/receiver devices.

Survey control shall meet third order, class I, accuracy standards in accordance with COE EM 1110-2-1003 "Hydrographic Surveying". The Contractor shall obtain all necessary permits, rights-of-entry, or leases required to operate and maintain shore-based electronic equipment on public/private property. The actual number of shore-based control points shall be determined by the Contractor and shall be determined by the operating characteristics of the approved system (i.e., circular). As a minimum, the EPS shall provide at least three redundant lines-of-position from the shore-based network, and for DGPS, ranges from 4 (minimum) or more satellites will be needed for 3-dimensional positioning. The shore-based control points shall be located such that the generated lines-of-position shall intersect at the final vessel location at not less than 40 degrees.

3.3.3 Disposal Vessel Location

Except as specified herein after, electronic positioning data shall be received, displayed, and recorded on board the disposal vessel. Positional data may be received, displayed, and recorded on a towing or other adjacent vessel provided the eccentric distance between the vessels is less than 30 meters and that the eccentric distance and bearings remain essentially constant for each successive disposal operation. Eccentric distance measurements shall be computed by means of an electronic data transmitter/telemetry system. Gyro-radar distance/bearing measurements will not be permitted for eccentric distance measurements. Eccentric coordinates, if any, shall be clearly identified and computed on the hard copy positional record required under paragraph: Electronic Positioning System for Nearshore Disposal.

3.3.4 Calibration

EPS calibration techniques and calibration requirements (checklist) for DGPS shall conform to the standard hydrographic surveying practice in accordance with Chapters 5 and 6 of COE EM 1110-2-1003, "Hydrographic Surveying". The Contractor shall be responsible for maintaining effective, accurate, and reliable EPS calibration, including periodic survey checks throughout the duration of the contract. Calibration records shall be submitted as part of the daily Quality Control records. Degradation in offshore positional accuracy during the course of this contract may cause a suspension of disposal operations.

3.3.5 Backup Equipment

The Contractor shall provide and maintain the following backup equipment:

For EPS System:

- One shore control transmitter/receiving device.
- One line printer and/or plotter.
- One offshore guidance controller.
- One power supply.
- Spare parts kit for the receiver.

For GPS System:

One Complete Differential GPS (DGPS) equipment and accessories.

In the event of a failure of the EPS or DGPS, the Contractor shall immediately notify the Contracting Officer.

3.4 ADDITIONAL MONITORING

3.4.1 Hopper and Hydraulic Dredges

The Contractor shall provide:

a. Continuous records of measurement of bulk density and mass flow rate with time, and location - cutterhead/draghead coordinates (horizontal and vertical). Data shall be recorded electronically and shall be made available in time increments as designated by the Contracting Officer and in either printed record or electronic format as designated by the Contracting Officer.

b. Records of continuous loading of hoppers, barges, or scows based on hull displacement (load charts).

These records shall be submitted to the Contracting Officer daily with the Quality Control Reports.

3.4.2 Barges and Scows

The Contractor shall provide a record of the measurements of the draft of the hull and freeboard of bins of each barge or scow when empty and prior to disposal operations. Measurement for displacement shall be taken at each corner, on the outside of the barge or scow, immediately before the start of a disposal operation. These records shall be submitted to the Contracting Officer daily with the Quality Control Reports.

3.5 DREDGE QUANTITIES

Quantity of material available within the dredge prism as of the condition survey of April 2001 is listed below. The estimated quantity specified in the Bid Schedule is based upon these numbers with an estimated amount of material added to account for shoaling and deducted to account for Government Dredging.

<u>Area</u>	<u>Station</u>	<u>Standard Dredging</u> (Cu.Meters)	<u>Overdepth</u> (Cu. Meters)
Modified Entrance	0+124-0+592	288,000	None
Channel			
Transition Area,	0+592-0+745	28,000	None
Main, and	0+745-1+292	93,000	16,000
Navy Channels	1+292-2+256	144,000	31,000
Morro Channel	2+256-2+500	26,000	16,000
	2+800-3+500		
	3+700-4+279		
Sand Trap Area	0+534-0+838	131,000	None

Overdepth dredging will be allowed to the limits specified in paragraphs:

Overdepth and Excessive Dredging.

3.6 OVERDEPTH AND SIDE SLOPES

3.6.1 Overdepth

To cover inaccuracies of the dredging process, a 0.5 meter allowable overdepth applies to this contract. Material dredged from below the allowable overdepth will not be estimated and will not be included in the measurement of work.

3.6.2 Side Slopes

Material actually removed within limits approved by the Contracting Officer, shall provide for final side slopes not flatter than those indicated on the drawings and will be estimated and paid for. The Contractor may dredge material in original position or may dredge below the pay slope plane at the bottom of the slope to allow for sloughing of upslope material capable of falling into the cut (box dredge). However, material removed below any pay slope plane will not be estimated for payment. In computing the limiting amount of side slope dredging, the overdepth indicated on the drawings, measured vertically, will be used. The quantity of material to be paid for shall not be in excess of that originally lying above this limiting slope. Side slopes are given for pay purposes only and are not necessarily the angle of repose of the soil. Sloughing side slopes shall not be the basis for claims against the Government. End slopes, where indicated on the drawings, shall be treated in the same manner as side slopes.

Box cutting of side slopes will not be allowed near the breakwaters, groin, and revetment.

3.6.3 Excessive Dredging

Material taken from beyond the allowable overdepth limits may be deducted from the total amount dredged as excessive overdepth dredging, or excessive side-slopes dredging. Materials dredged from below the depth limit which result in extra costs shall be the responsibility of the Contractor. Nothing here shall be construed to prevent the inclusion in the measurement of material dredged for the removal of shoals performed in accordance with the applicable provisions of the paragraphs: FINAL EXAMINATION AND ACCEPTANCE or SHOALING.

3.6.4 Advance Maintenance Depth

For the Advance Maintenance Area of the Modified Entrance Channel, including the Transition Area, and Sand Trap area, any material removed from below the advance maintenance depth (indicated on the drawings) will not be included in the measurement of work accomplished. Due to inaccuracies of the dredging process, the Contractor will only be required to remove material to within 0.5 meter above the advance maintenance dredge depth. However, any material removed to the advance maintenance dredge depth will be included in the measurement of work accomplished.

3.7 SAMPLING OF MATERIAL

The Contractor shall obtain representative Sediment Samples at the discharge point as material is being discharged onto the beach, or in the case of a hopper dredge or scow, as material is placed into the hopper or

scow. The exact location and depth of each sample shall be as directed by the Contracting Officer. The number of required samples shall be as follows:

<u>Area</u>	<u>Station</u>	<u>Number of Samples Required</u>
Modified Entrance	0+124-0+592	12
Channel		
Transition Area,	0+592-0+745	2
Main and	0+745-1+292	7
Navy Channels	1+292-2+256	7
Morro Channel	2+256-2+500	4
	2+800-3+500	
	3+700-4+279	
Sand Trap Area	0+534-0+838	10

The samples shall be taken at evenly spaced intervals of time and volume as each of the areas is dredged. Each sample (water extracted) shall be not less than one (1) liter and shall be obtained in clear plastic bottles. The sample bottles shall be labeled in indelible ink with the sample number, date sampled, and name of person obtaining sample. Sample bottle lids shall be securely fastened to prevent spillage or leakage during shipment. Sample bottles shall be placed in a suitable shipping container with adequate cushioning to prevent breakage during shipment. The samples shall be delivered to the address specified herein below at weekly intervals, or at such other times as may be determined by the Contracting Officer.

A Dredge Sample Data Form with the description of the dredge cut location by coordinates and stationing, dredge cut elevation, placement location and description of where sample was taken, date, time, sample number, and the name of the person who collected the sample shall accompany each sample. The sample form shall be placed in a waterproof sealed plastic bag for protection during shipment. A copy of a sample form is provided at the end of this section.

A copy of the sample form shall be submitted to the Contracting Officer's Representative along with the transmittal form.

The Contractor shall notify the Contracting Officer's Representative 48 hours in advance of sample collection. Samples shall be delivered to:

U.S. Army Corps of Engineers
 ATTN: Baseyard Soils Laboratory
 645 North Durfee Avenue
 South El Monte, CA 91733-4399
 ATTN: Art Moncayo Tel: (626) 401-4095

3.8 CONTRACTOR'S SURVEYS

3.8.1 Survey Data

Reference is made to SECTION 00800: SPECIAL CONTRACT REQUIREMENTS, QUANTITY SURVEYS, FAR 52.236-16 which requires payment based on Government surveys. Progress payments or evidence (condition surveys) supporting extreme

weather (storm) related shoaling, will be based upon Contractor's hydrographic surveys. The Contractor's survey shall provide full coverage of an entire area, such as Modified Entrance Channel, Transition Area, Main, Navy, and Morro Channels, or Sand Trap Area, for which progress payment or evidence of storm-related shoaling is being submitted.

It is further emphasized that only condition surveys supporting extreme weather (storm) - related shoaling will be considered for payment in addition to the government surveys, provided that the Contractor's surveys clearly show the condition before and after each shoaling event and the condition after removal of material from the shoaled area. Survey data which does not meet all applicable requirements and quality assurance verifications will not constitute a valid request for payment of shoaling.

Contractor's hydrographic surveys shall be performed electronically (automated) and the data shall be provided and submitted to the Government on an electronic media (IBM compatible, ASCII format) in delimited files of easting, northing, and depth (x,y,z), where the depth is indicated as negative if recorded below MLLW. The first lines of the data file will list the information as follows:

- * Project Name: Morro Bay Harbor, Maintenance Dredging FY2002
- * Surveyor's Name and Company Name
- * Area Surveyed
- * Type of Survey and Date of Survey (i.e. Pre-dredge, MM/DD/YR)
- * Vertical Datum
- * Horizontal Datum

These first 6 lines will be preceded by an asterisk (*), which indicates a comment line.

A plot of soundings will accompany the x,y,z data and all data shall be collected and plotted in metric units (meters).

3.8.2 Sounding Data Standards

The Contractor's hydrographic surveys for progress payment or evidence supporting extreme(storm) weather-related shoaling shall meet or exceed the survey standards listed in EM 1110-2-1003 (Hydrographic Surveying) for Class I surveys. Surveys shall be in the State Plane Coordinate System of 1983 - meters (SPCS 83), Zone 5, State of California, and be performed by an independent hydrographic survey contractor with at least three (3) years of experience in hydrographic surveying of navigable channels and have either a current Land Surveyor's or a Professional Engineer's license, authorized to certify surveys in the State of California. The Hydrographic Surveyor firm selected by the Contractor must be approved by the Contracting Officer prior to performing surveys for this contract.

3.8.3 Positioning System

It is required that hydrographic surveys shall be conducted using an Automated Range-Azimuth Positioning System or Differential Global Positioning System (DGPS) with positional accuracy of +/- 3 meters (1 DRMS) or exceed the survey standards listed in EM 1110-1-1003 and EM 1110-2-1003 that is linked to an automated (digital) depth recording device capable of continuous logging of x,y,z positional data with depth measurement resolution to the nearest five-hundredths (5/100) of a meter. Digital depths shall be supplemented by analog depth records if survey is performed by single beam echosounder. Sounding lines shall be verified by crosslines

at least 10 percent of the principal lines and along the centerline of channel. Distance between successive soundings (sounding interval) shall be no more than 2 meters. Soundings shall be reduced to sounding datum (Mean Lower Low Water) by using actual tides and other appropriate corrections resulting in an accuracy of +/- 0.2 meter from actual depth.

3.8.4 Survey Firm Acceptance

For the Contracting Officer to approve the selected survey firm, the Contractor must provide documentation indicating that modern electronic horizontal positioning and sounding system equipment will be used for the surveys to be performed as well as documentation verifying the experience of the operators using the equipment. Typical information that will be required, as a minimum, includes the name, model, and year of manufacture of the electronic equipment, the electronic frequencies of the horizontal positioning equipment and sounding equipment, and the manufacturer's stated positioning and sounding accuracies, and capability of the equipment proposed for usage. In addition, the Contractor must provide information that a safe and suitable vessel meeting U.S. Coast Guard requirements is available and will be used for operation in the waters where the surveys are to be performed. The Contractor shall submit credentials/qualifications as evidence that qualified, experienced staff are available and will be used for the operation of the vessel as well as for the electronic positioning and sounding equipment.

3.8.5 Data Processing

The Contractor shall use a Data Processing System to map the sounding data and calculate quantities. Reduced sounding data shall then be imported into the Data Processing System where cross-sections are compared to dredge templates and volume quantities are calculated. The software shall be capable of digital terrain modeling and shall produce, as a minimum, sounding sheets, cross section profiles, 3-dimensional area profiles, and quantity volume calculations using the Triangulated Irregular Network (TIN) method.

3.9 PRE-DREDGE AND FINAL SURVEYS

The Contractor shall notify the Contracting Officer not less than 15 calendar days prior to the scheduled commencement of dredging. The Government will perform a pre-dredge survey based upon the Contractor's scheduled commencement date. For the post-dredge survey, the Contractor shall notify the Contracting Officer not less than ten (10) working days prior to completion of the entire work. The Government will perform the final survey as soon as possible after completion of the entire work, generally within 10 calendar days. All areas found to be in compliance with the contract requirements will be accepted and measured for payment in accordance with SECTION 01270: MEASUREMENT AND PAYMENT.

If the Government is unable to perform the final survey(s) due to the failure of the Contractor to complete the work in accordance with his prior notification, the Contracting Officer will charge the cost of the survey plant and standby labor, at \$3,000.00 per day, to the Contractor. Preliminary data from the final Government survey will be available within ten (10) calendar days. If the preliminary survey data indicates that the dredged area is not at the required depth, the Contractor will be directed to resume dredging and to complete the work to project depth. Adjustment in cost for additional Government post-dredge surveys shall be as specified in paragraph: FINAL EXAMINATION AND ACCEPTANCE.

3.10 METHODS OF SOUNDINGS

The material removed will be measured by cubic meter in place, by means of soundings taken before and after dredging. Soundings will be taken by either lead line, trigonometric leveling (total station)/differential leveling, 200 kHz single-beam acoustic methods, acoustic multi-beam swath methods, or in combination, as determined by the Government; results of soundings by any of these methods, singularly or in combination, will be the basis for payment. The Contractor has the option of being present when such soundings are made.

3.11 SHOALING

If, before the contract is completed, additional shoaling occurs in any section (area) including shoaling in the finished channel, because of the natural lowering of the side slopes or from sediments transported inside the project area, re-dredging at contract price, within the limit of available funds, may be done if agreeable to both the Contractor and the Contracting Officer.

3.12 REPORTING REQUIREMENT

The Contractor will be required to prepare and maintain a Daily Report of Operations and furnish copies thereof to the Contracting Officer's representative. The daily reports shall document dredging operations for all shifts in a 24-hour period. Further instruction on the preparation of the report will be furnished at a pre-construction conference. Copies of sample submittals are provided at the end of the Contractor's Quality Control section.

3.13 FINAL EXAMINATION AND ACCEPTANCE

As soon as practicable after the completion of the entire work, a final examination of the work will be conducted by the Contracting Officer. Should any shoals, lumps, or other lack of contract depth be disclosed by this examination, the Contractor will be required to remove same dredging at the contract rate for dredging. However, if the bottom is soft and the shoal areas are small and form no material obstruction to navigation, the removal of such shoal may be waived by the discretion of the Contracting Officer. The Contractor or his authorized representative will be notified when soundings are to be made, and will be permitted to accompany the survey party. When the area is found to be in a satisfactory condition, it will be accepted finally. Should more than two sounding operations by the Government over an area be necessary by reason of work for the removal of shoals disclosed at a prior sounding, the cost of such third and any subsequent sounding operations will be charged against the Contractor at the rate of \$3,000.00 per day for each day in which the Government plant is engaged in sounding and/or is en route to or from the site or held at or near the said site for such operations.

Final acceptance of the whole or a part of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud, or obvious error, and the acceptance of a completed section shall not change the time of payment of the retained percentages of the whole or any part of the work.

Dredge Sample Data Form

MORRO BAY HARBOR MAINTENANCE DREDGING

Contract No.: _____ Sample No.: _____
 Contractor Name: _____ Date: _____
 Name of Dredge: _____ Time: _____
 Type of Dredge: ___clamshell ___hopper ___hydraulic cutterhead ___other
 If other, please specify: _____

Cut Location

area: _____ northing: _____
 station: _____ easting: _____
 range: _____
 elevation: _____

Placement Location

area: _____ northing: _____
 station: _____ easting: _____
 range: _____
 elevation: _____

Sample Obtained By: _____

Sample Obtained From: _____

Remarks: _____

Note: A copy of this completed form shall accompany the sample when shipped to a laboratory for testing.

-- End of Section --

APPENDIX - A

Table 1. Sample Gradations.

Location	Phi Size (US Standard Sieve Sizes, mm)													USCS Class.	Description
	-3 (8.00)	-2 (4.00)	-1 (2.00)	0 (1.00)	+1 (0.500)	+2 (0.250)	+3 (0.125)	+4 (0.063)	+5 (0.032)	+6 (0.016)	+7 (0.008)	+8 (0.004)	+9 (0.002)		
MORRO CHANNEL															
C1	100	99	97	94	92	70	7	2	2	2	1	1	1	SP	POORLY GRADED SAND: gray, fine to coarse, with occasional shell fragments to 20 mm, top 0.1 m is dark gray clay, feels medium to highly plastic.
C2					100	99	8	1	1	1	1	1	1	SP	POORLY GRADED SAND: very fine to fine grained; medium gray; loose; occasional very fine shell fragments
C3		100	99	99	98	96	26	10	9	8	7	6	5	SM	SILTY SAND: dark gray to black; sulfide odor, plant material and other organics (in middle 0.75 m); top 0.6 m sandier (very fine to fine grained; bottom 0.3 m sandier)
C4						100	13	1	1	1	1	1	1	SP	POORLY GRADED SAND: very fine to fine grained, medium to dark gray, occasional scattered shell fragments
C5						100	13	1	1	1	1	1	1	SP	POORLY GRADED SAND: dark gray, very fine to fine grained sand, micaceous, occasional small shell fragments, trace of silt.

Table 1. Sample Gradations. (cont.)

Location	Phi Size (US Standard Sieve Sizes, mm)													USCS Class.	Description
	-3 (8.00)	-2 (4.00)	-1 (2.00)	0 (1.00)	+1 (0.500)	+2 (0.250)	+3 (0.125)	+4 (0.063)	+5 (0.032)	+6 (0.016)	+7 (0.008)	+8 (0.004)	+9 (0.002)		
NAVY CHANNEL															
N1					100	97	6	1	1	1	1	1	1	SP	POORLY GRADED SAND: mostly fine grained, loose, brown to medium gray, uniform in grain size.
N2					100	94	4	0	0	0	0	0	0	SP	POORLY GRADED SAND: mostly fine grained, clean, brown to medium gray, loose, occasional medium sized grains, occasional shell fragments to 13 mm
N3					100	96	7	1	1	1	1	1	1	SP	POORLY GRADED SAND: mostly fine grained, medium gray with brown cast, occasional shell fragments to 6 mm, slight rotting odor, but not sulfurous
N4					100	95	7	1	1	1	1	0	0	SP	POORLY GRADED SAND: medium gray to brown, loose, interval of dark gray from 1.4 to 2.1 m, very fine to coarse but mostly fine grained, shell fragments to 25 mm long.
N5		100	99	97	92	71	4	1	1	1	1	1	1	SP	POORLY GRADED SAND: medium gray, very fine to coarse, shell fragments to 20 mm, mostly fine grained, only top 1.2 m tested, last 0.3 m has more hash than rest, loose
N6-1/2		100	99	99	98	96	31	10	8	6	5	4	3	SM	SILTY SAND: dark gray, sulfurous, very fine to coarse grained, shell fragments to 25 mm
N7		100	99	99	99	97	31	11	9	8	6	5	4	SM	SILTY SAND: dark gray, very fine to coarse with 25 mm shell fragments, low density, sulfurous

Location	Phi Size (US Standard Sieve Sizes, mm)													USCS Class.	Description
	-3 (8.00)	-2 (4.00)	-1 (2.00)	0 (1.00)	+1 (0.500)	+2 (0.250)	+3 (0.125)	+4 (0.063)	+5 (0.032)	+6 (0.016)	+7 (0.008)	+8 (0.004)	+9 (0.002)		
MAIN CHANNEL															
M1	100	99	96	94	92	84	5	1	1	1	1	1	1	SP	POORLY GRADED SAND: mostly fine grained to medium, brown, with occasional dark gray intervals, bad odor (similar to M-2, like sewage), loose; 2.3 - 2.4 m, coarse interval with shell fragments to 6 mm, scattered shell fragments throughout and coarse grained from 1.2 - 2.0 m
M2		100	99	98	98	91	6	1	1	1	1	1	1	SP	POORLY GRADED SAND: brown to dark gray, very fine to fine grained, organic odor, occasional shell fragments to 13 mm, 50 mm long pebble, loose, 0.6 m interval of dark gray sand from 0.6 - 1.2 m, coarse sand lens from 1.4 - 1.5 m
SAND TRAP															
S1				100	99	97	15	1	1	1	1	1	1	SP	POORLY GRADED SAND: brown to dark gray, very fine to fine grained, mostly fine grained, loose, clean, occasional scattered shells and fragments to 3 mm
S2				100	99	96	16	1	1	1	1	1	1	SP	POORLY GRADED SAND: brown to gray, very fine to fine grained, mostly fine grained, loose, occasional shells and fragments to 30 mm, micaceous, slightly sulfurous

Table 1. Sample Gradations. (cont.)

Location	Phi Size (US Standard Sieve Sizes, mm)													USCS Class.	Description
	-3 (8.00)	-2 (4.00)	-1 (2.00)	0 (1.00)	+1 (0.500)	+2 (0.250)	+3 (0.125)	+4 (0.063)	+5 (0.032)	+6 (0.016)	+7 (0.008)	+8 (0.004)	+9 (0.002)		
SAND TRAP (cont.)															
S3		100	98	97	96	94	11	0	0	0	0	0	0	SP	POORLY GRADED SAND: brown to gray, very fine to coarse, mostly fine, coarse grained 3.3 - 4.3 m (with interval of fine material from 3.6 - 4.0 m, occasional gravel size grains and shell fragments to 20 mm, coarsest material from 3.3 - 3.4 m, shell fragments to 25 mm at bottom (4.3 m), slight sulfur odor, loose.
S4				100	99	96	10	1	1	0	0	0	0	SP	POORLY GRADED SAND: very fine to medium grained, mostly fine grained, brown to gray, loose, no significant shell fragments, rounded pebble, 25 mm, at 3.1 m
S5	100	99	94	89	86	81	10	1	1	1	1	1	1	SP	POORLY GRADED SAND: very fine to coarse grained, with gravel at bottom, occasional 75 mm rounded cobbles, loose, mostly fine grained sand, medium to dark gray to brown, occasional widely scattered shell fragments to 3 mm (white), coarse material starts at 3.4 m, getting coarser with depth (occasional rounded gravel at about 3.1 m, 20 mm), slight sulfur odor.

Table 2. Sample Data.

Location	Date Sampled	Elev., (m, MLLW)		Depth, (m)		Location Coordinates (m, CA Zone 5, NAD 83)	
		Top	Bottom	Top	Bottom	Northing	Easting
MORRO CHANNEL							
C1	05 Jun 01	-2.9	-4.7	0.0	1.8	710,793	1,740,507
C2	05 Jun 01	-3.4	-4.3	0.0	0.8	710,090	1,740,781
C3	05 Jun 01	-2.6	-4.4	0.0	1.8	709,844	1,740,850
C4	05 Jun 01	-3.2	-4.6	0.0	1.4	709,291	1,741,169
C5	05 Jun 01	-2.7	-4.3	0.0	1.5	709,162	1,741,258
NAVY CHANNEL							
N1	06 Jun 01	-3.5	-5.2	0.0	1.7	710,990	1,739,846
N2	06 Jun 01	-3.5	-5.5	0.0	2.0	711,139	1,740,004
N3	06 Jun 01	-3.1	-5.5	0.0	2.4	711,154	1,740,192
N4	06 Jun 01	-3.1	-5.5	0.0	2.4	711,066	1,740,338
N5	06 Jun 01	-4.3	-6.6	0.0	2.3	710,886	1,740,505
N6	05 Jun 01	-3.6	-5.6	0.0	2.0	711,286	1,740,036
N7	05 Jun 01	-4.0	-5.5	0.0	1.5	711,271	1,740,147
MAIN CHANNEL							
M1	06 Jun 01	-3.1	-5.5	0.0	2.4	710,688	1,739,598
M2	06 Jun 01	-2.8	-5.5	0.0	2.7	710,849	1,739,710
SAND TRAP							
S1	07 Jun 01	-5.8	-8.1	0.0	2.3	710,317	1,739,436
S2	07 Jun 01	-4.6	-8.1	0.0	3.5	710,324	1,739,571
S3	07 Jun 01	-4.5	-8.1	0.0	3.6	710,412	1,739,454
S4	07 Jun 01	-4.4	-8.1	0.0	3.7	710,369	1,739,550
S5	07 Jun 01	-3.9	-8.1	0.0	4.2	710,515	1,739,554