APPENDIX B

Northeast Dredging Equipment Company, LLC:
Silt Curtain Maintenance Plan

Northeast Dredging Equipment Company, LLC

Silt Curtain Maintenance Plan

Prepared for:

Newark Bay / Arthur Kill Channel Contract 11
Navigation Improvement 50-foot Project
New York and New Jersey

Contract No.: W912DS-10-C-0023

SILT CURTAIN MAINTENANCE PLAN

Contract No.: W912DS-10-C-0023
Project Name: Newark Bay / Arthur Kill Channel Contract 11 Navigation Improvement 50 Foot Project, New York and New Jersey

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Appendices

1.0 PLAN PURPOSE

It is the intent of this Silt Curtain Maintenance Plan (SCMP) to establish and explain how this construction will incorporate the plans and specifications provided by the U.S. Army Corps of Engineers (ACOE) with regard to installation and maintenance of the deployed silt curtain for contract W912DS-10-C-0023. The plan's primary purposes are to provide for the level of construction quality required by strict accordance with the plans and specifications.

2.0 SILT CURTAIN, ANCHOR and LIGHTED BUOY PRODUCT SPECIFICATIONS

Refer to Appendix A for product cut sheets.

3.0 SILT CURTAIN DEPLOYMENT TYPE III

3.1 The silt curtain will be deployed in the depicted configuration, and at the approximate coordinates shown on the Contract Drawing sheet C-103. The curtain will be deployed in accordance with the manufactures recommendations for the type curtain specified in Table 2 of the ERDC TN-DOER-E21 for use during the South Elizabeth Channel Silt Curtain (Pilot) Study Project. All hardware used for connecting together or attaching to the silt curtain sections will meet or exceed the manufacturer's recommendations for those devices. After the completion of the silt curtain deployment, Differential GPS coordinates of the in place silt curtain will be recorded and submitted to the ACOE. Refer to Appendix B.

3.2 The silt curtain will be anchored in accordance with the manufactures recommendations for the type curtain deployed during the South Elizabeth Channel Silt Curtain (Pilot) Study Project. The anchors to be deployed will also meet, as a minimum, the recommendations of Table 3, Section 5 Mooring, sub-section c) of the document ERDC TN-DOER-E21. Refer to Appendix B.

3.3 Lighted buoys will be installed every one hundred feet along the entire length of the deployed silt curtain. The lighted buoys are used to illuminate the silt curtain during hours of darkness. The lighted buoy's will be controlled by a photo cell that will automatically turn the buoy lights on during the hours of darkness to maintain safety for all marine traffic operating in or transiting the area where the deployed silt curtain is located. Refer to Appendix B.

4.0 SILT CURTAIN INSPECTION

Twice daily, once at the beginning of the work shift and once after half the work shift is over or no more than 8 hours from the first inspection, the silt curtain will be inspected to ensure that the deployed sections are operating properly and free of damage and defects to its operation. The curtain shall be inspected by using the manufactures installed curtain furling system. Each curtain section will be raised to the surface using the furling system and visually inspected for damage and serviceability. After the inspection of each section

is completed the curtain will be unfurled and placed back in operation. The results of the inspection will be noted on the daily silt curtain inspection log and the inspection will continue until all sections have been visually inspected. Refer to Appendix C.

5.0 SILT CURTAIN MAINTENANCE

If during the daily inspection of a deployed silt curtain section, a problem is encountered with any section. The nature of the problem encountered will be noted in the daily silt curtain inspection log and the following steps will be taken.

5.1 If debris is found fouled in the turbidity curtain the debris will be removed and disposed of in a trash receptacle suitable for the type of debris being removed.

5.2 If a hole or tear is found in the fabric of the curtain, a repair may be done by one of the following methods.

a) Cut a patch from a section of fabric on hand to make repairs at least 3" x 3" larger than the area needing repair and attach over the damaged area with a pop rivet gun.

b) Cut a patch from a section of fabric on hand to make repairs at least 3" x 3" larger than the area needing repair and attach over the damaged area with PVC glue.

c) If the area needing repair is to large or unmanageable for repairing on site that section will be removed and replaced with another section of silt curtain stored for use on this project.

d) All anchor buoy lines, anchor lines and lighted buoys will be repaired or replaced as need to maintain all portions of the silt curtain system at full operational capability during the pilot study phase of the project.

6.0 SILT CURTAIN REMOVAL

The silt curtain will be removed in stages and the parts brought to a staging area where it will be cleaned, inspected and repaired as needed before being re-furled for storage off site.

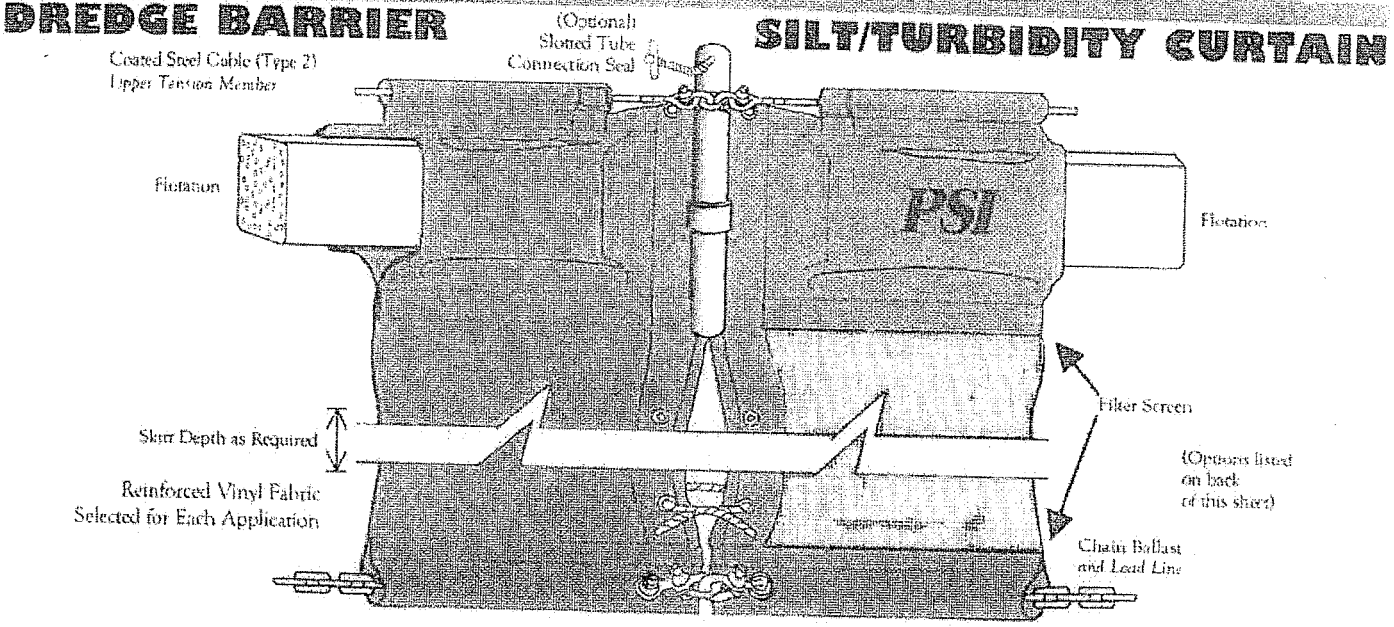
Appendix A
Silt Curtain, Anchor and Lighted Buoy Product Specifications

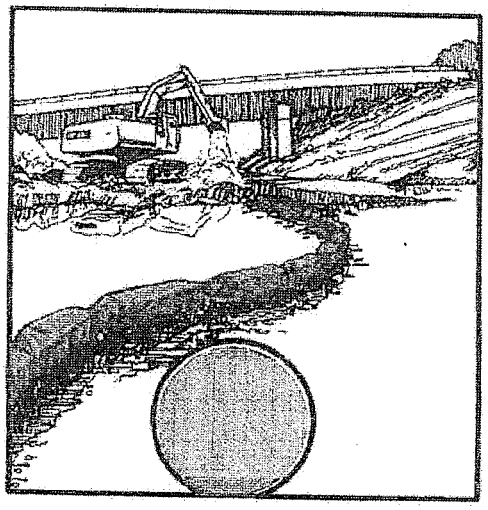
Silt Curtain Maintenance Plan

SILTMASTER™

DREDGE BARRIER

SILT/TURBIDITY CURTAIN





APPLICATIONS:

(Meets Many State D.O.T. Type 1/Type 2 Requirements)

- Waterfront Construction Sites
- Dredging Projects
- Settling Basins and Separation Ponds
- Any Waterfront Facility

When specifying a barrier to prevent silt migration: Due to the many variables to be considered at a construction site, we recommend that you consult with our field tested experts to obtain the best possible results.

FEATURES:

- The barriers can be designed with pervious (Geotextile) or impervious (Solid) vinyl alloy or urethane coated fabrics.
- The skirt depth can be prescribed to control only surface flow or full depth.
- Economical.
- Prevents sediment from migrating out of the immediate construction area.
- Offered in a large variety of standard and custom designs.

Quality Products at Competitive Prices

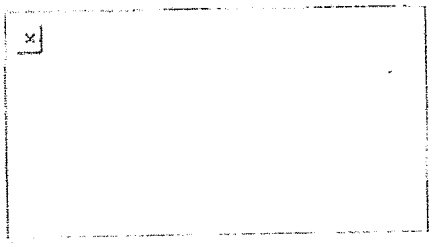
PSI PARKER SYSTEMS, INC.

THE OIL SPILL EQUIPMENT SUPPLY HOUSE...SINCE 1970

24-Hour Emergency Service

Oil Spill Containment Boom Sorbents Spill Response Equipment

TO ORDER: CALL TOLL FREE 1-(800) 666-0006 FAX: 1-(757) 487-5872



POLYMAR T-22 oz.
Tarpaulin Material

Typical Technical Properties	Style 8831
Base Fabric	
Type	Polyester 2x2 Basket
Weight	7.7 oz. sq. yd
Denier	1000
Count	29 x 29
Total Weight ASTM D-751	22.4 oz. sq. yd
Grab Break ASTM D-751	550 500 lbs
Strip Break ASTM D-751, Proc. B	425 390 lbs. in
Tongue Tear ASTM D-751, (8" x 10") Specimen	110 110 lbs
Adhesion ASTM D-751, RF Weld	11 lbs. in.
Cold Crack, 1"8" mandrel ASTM D 2136	Pass -40F
Std Roll Data	
Size Yards	100
Width Ins.	61"

We believe this information is the best currently available on the subject. It is offered as a possible suggestion and guideline in experimentation you may undertake along these lines. It is subject to revision as additional knowledge and experiences are gained. We make no guarantee of results and assume no obligation or liability whatsoever in connection with this information

23.04.02

OTHER OPTIONS AVAILABLE:

Fabrics:
- Impervious
  - Reinforced PVC Coated
    - 14 Oz./Sq. Yd.
    - 18 Oz.
    - 22 Oz.
  - Reinforced Alloy Coated
    - 24 Oz./Sq. Yd.
    - 30 Oz.
  - Reinforced Urethane Coated
    - 23 Oz./Sq. Yd.
- Pervious
  - Geotextile (Woven Polyolifin Mesh)
    - Skirt Insert
    - Entire Barrier

Section Connections:
- Grommets & Laced
- Slotted Tube (PVC Pipe)
- Extruded Aluminum Quick-Latch

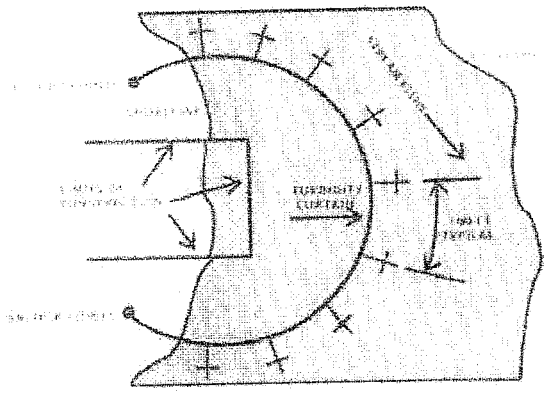
Upper Tension Member:
- Polyolifin Rope
- 1/4" Coated Galvanized Cable
- 5/16" Coated Galvanized Cable

Lower Tension Members (Ballast):
- 1/4" Galvanized Proof Coil Chain
- 5/16" Galvanized Proof Coil Chain
- 3/8" Galvanized Proof Coil Chain
- Dual 1/4" Galvanized Proof Coil Chains

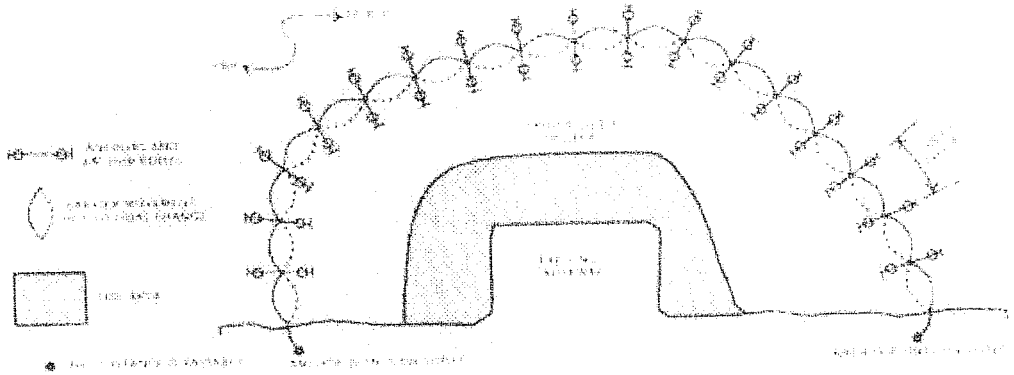
Flotation:
- Styrofoam: Available in 4" X 4" through 12" X 12"
- Rolled Polyolifin Foam with diameters 6" and up (resistant to oil)

When specifying a barrier to prevent silt migration: Due to the many variables to be considered at a construction site, we recommend that you consult with our field tested experts to obtain the best possible results.

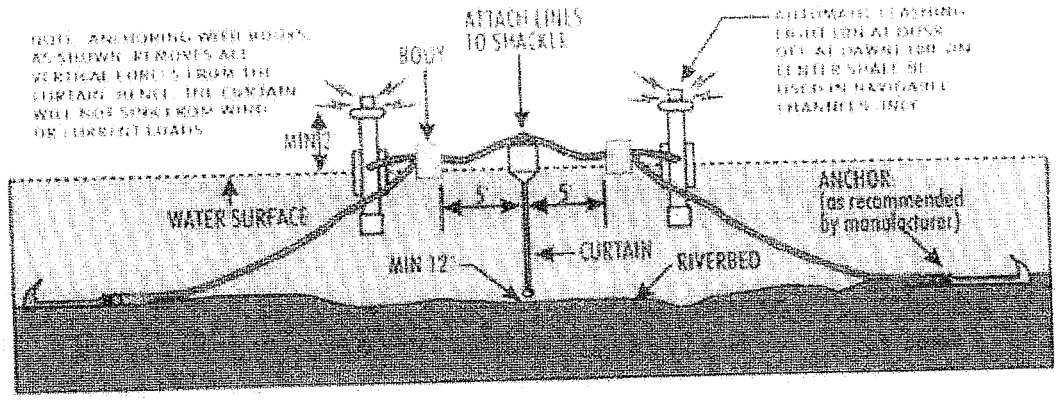
TYPICAL LAYOUTS, STREAMS, PONDS & LAKES (PROTECTED AND NON-TIDAL)



TIDAL WATERS AND OR HEAVY WIND AND WAVE ACTION

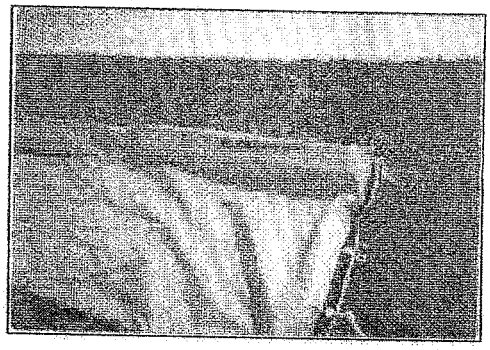


ORIENTATION WHEN INSTALLED (TIDAL SITUATION - TYPE III)

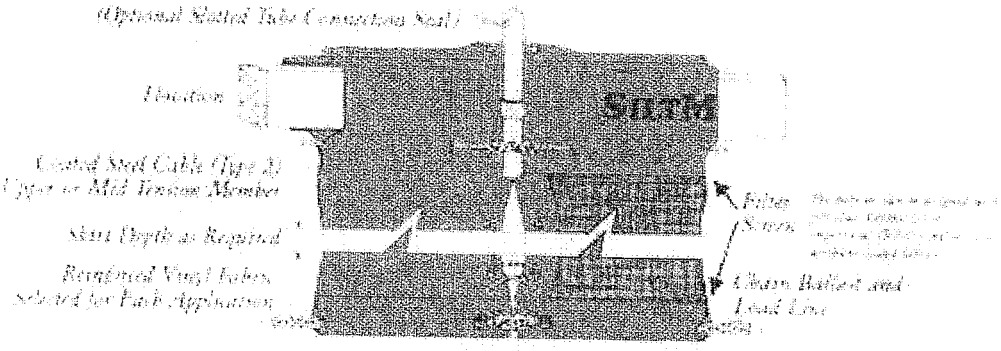


The SiltMaster® Dredge Turbidity Curtain / Silt Fence

As required by federal and state requirements silt and debris must be contained. PSI has proven that our turbidity curtains are the premium turbidity products for today's demanding construction and industrial environment. We offer a wide variety of pervious and impervious curtains from Type I through Type III. Our all-Geotextile pervious turbidity curtain has become the most economical, lightweight turbidity curtain in the industry.



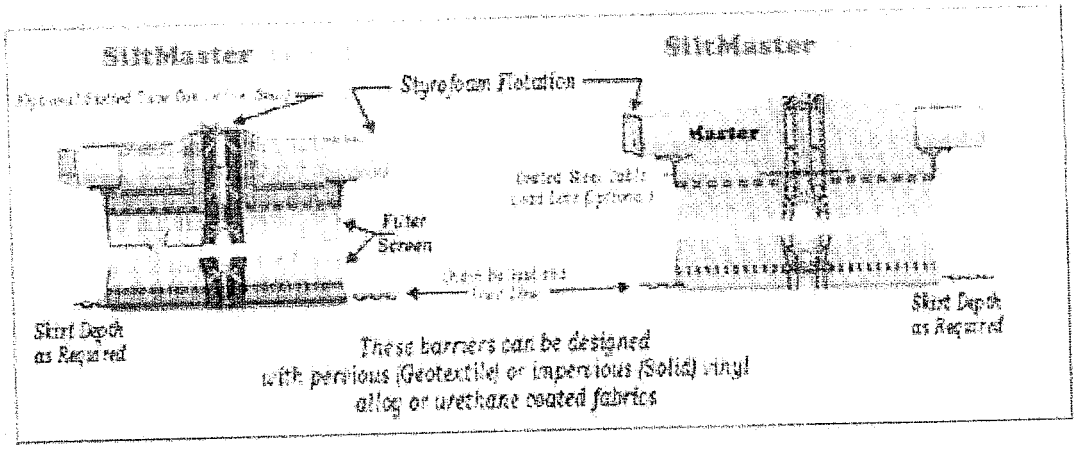
Siltmaster® On Ground



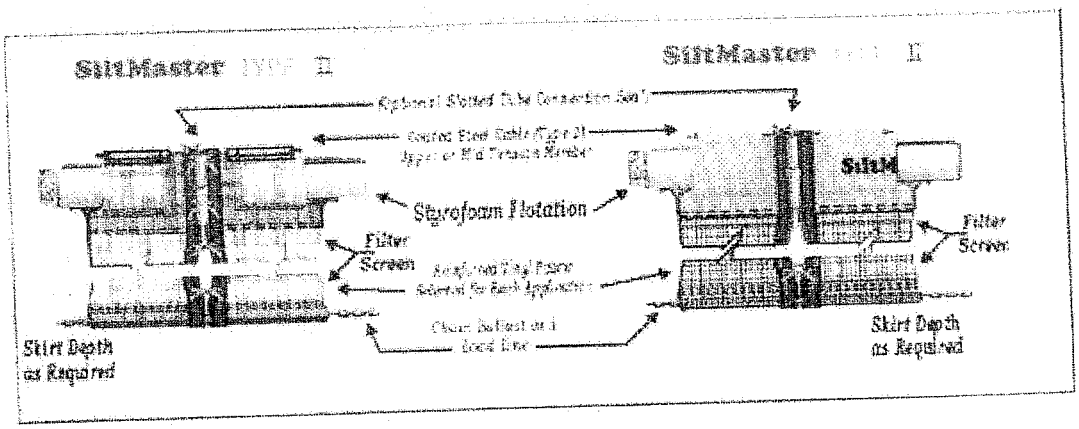
Type II Dredge Barrier

Silt Fence Design Criteria:

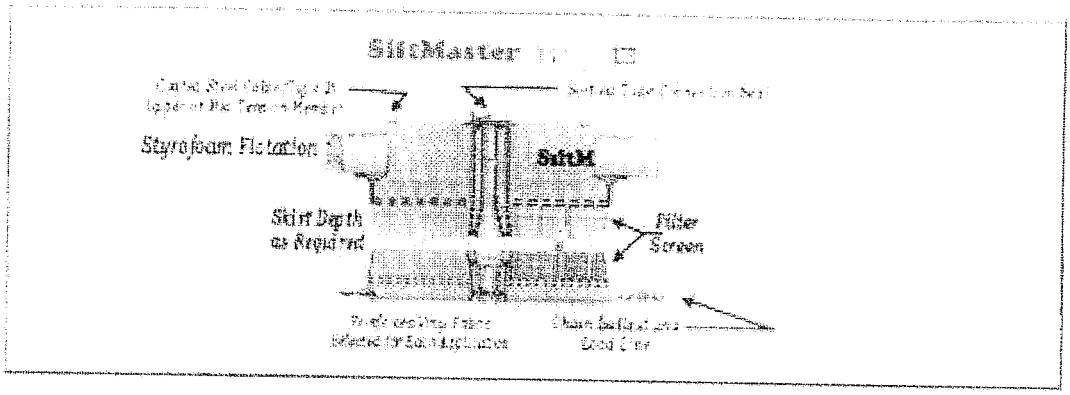
TYPE I --- Should be used in protected areas where there is no current and the area is sheltered from wind and waves.

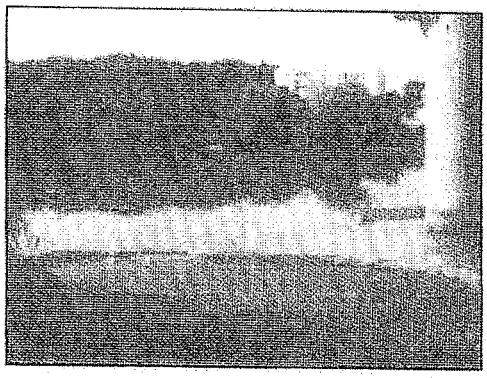


TYPE II - Should be used in areas where there may be slow to moderate running current (up to 2 knots or 3.5 feet per second) and/or wind and wave action which can effect the curtain.



TYPE III - Should be used in areas where considerable current (up to 3 knots or 5 feet per second) may be present, where tidal action may be present, and/or where the curtain is potentially subject to wind and wave action.





Siltmaster® In Use

Turbidity Curtain Options:

- Fabric -
  Impervious - 18 and 22 oz PVC, 24 oz. Alloy, and 23 oz. Urethane
  Pervious - Geotextile fabric
- Flotation - Styrofoam 4"x4" thru 12"x12"
- Section Lengths - standard 50' & 100' (custom sizes available)
- Curtain Depth - any size required
- End Connectors - lace or slotted tube
- Chain - sizes available include 1/4", 5/16", and 3/8"
- Cable - sizes available include 1/4", 5/16"
- Fabric Colors - yellow, orange, black (custom colors also available)

Some examples of our most Popular Types of Turbidity Curtain

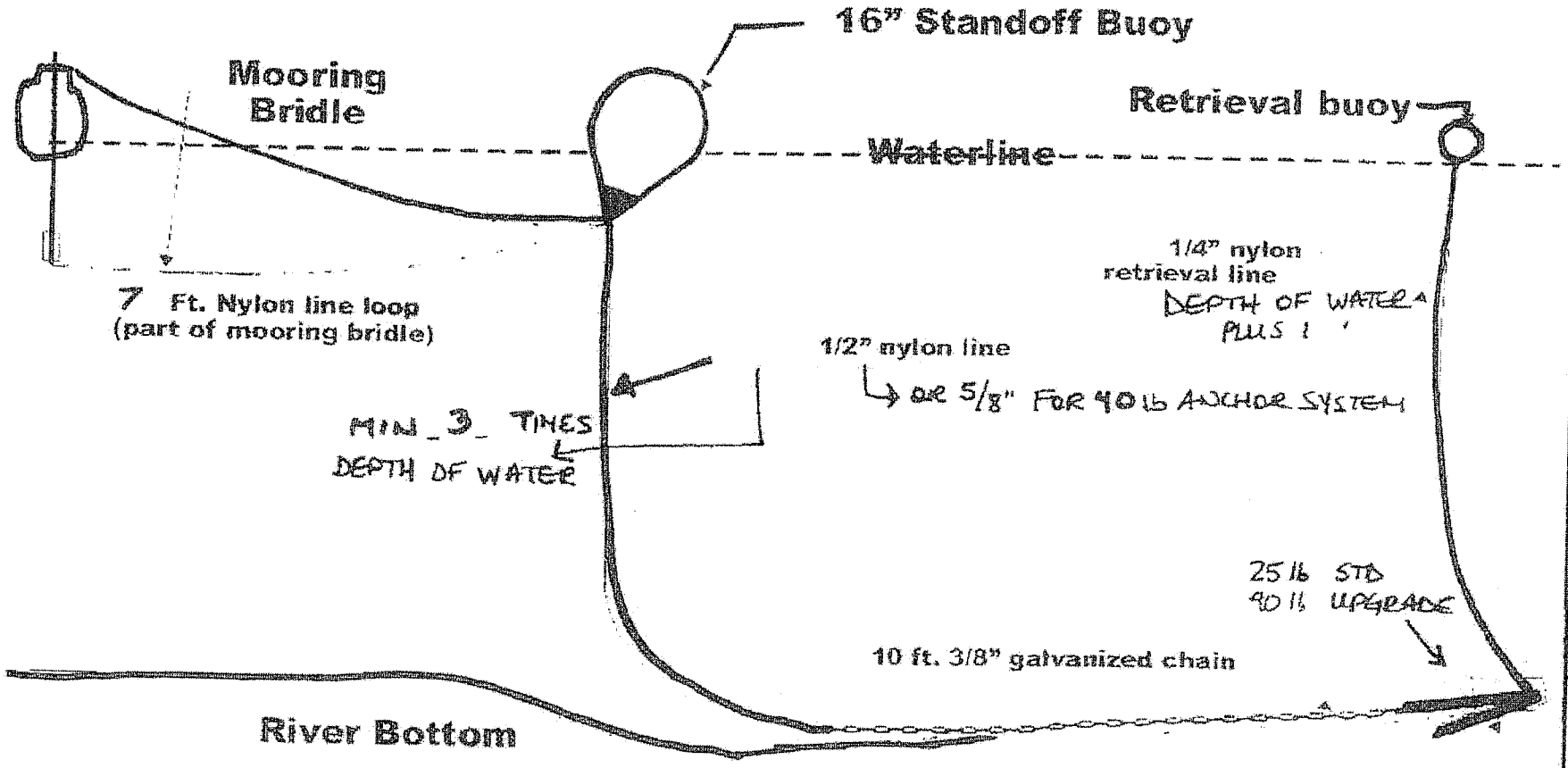
Type 1 (All Geotextile)
- Permeable
Part# DB-G10/L4/4

4" Styrene Float, 4' skirt, 5/16" chain ballast with lace connectors, 100' sections

Type I (All 18 oz. PVC) - Impermeable DB-P10/L18P8/6	6" Styrene Float, 8' skirt, 18 oz PVC coated polyester 5/16" chain ballast with lace connectors, 100' sections
Type II (All Geotextile) - Permeable DB-G1C/L6/6	6" Styrene Float, 6' skirt, 5/16" chain ballast , 5/16" cable with lace connectors, 100' sections

Top of page

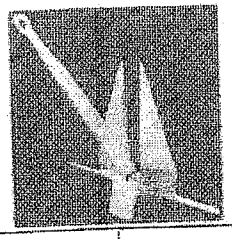
Boom Anchoring System



Not to Scale,
or illustration only

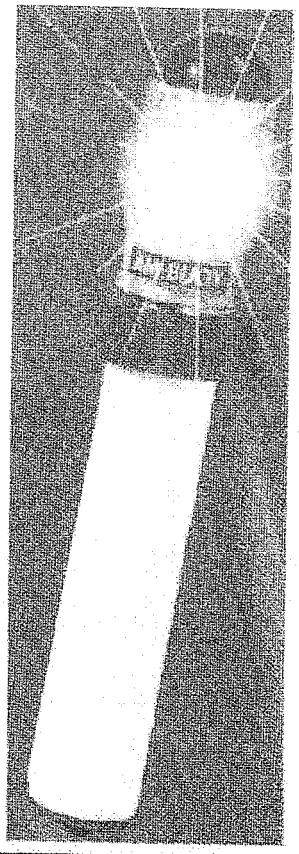
PSI PARKER SYSTEMS, INC.
THE OIL SPILL EQUIPMENT SUPPLY HOUSE SINCE 1990

Danforth Standard Marine Anchor



Part #	Material	Holding Power*	Weight (lbs)	Chain Dia.	A Height	B Shank Length	C Fluke Length

Jim Buoy No. 9000-X, No. 9000-XSB Light



JIM BUOY NO. 9000-X, NO. 9000-XSB LIGHT

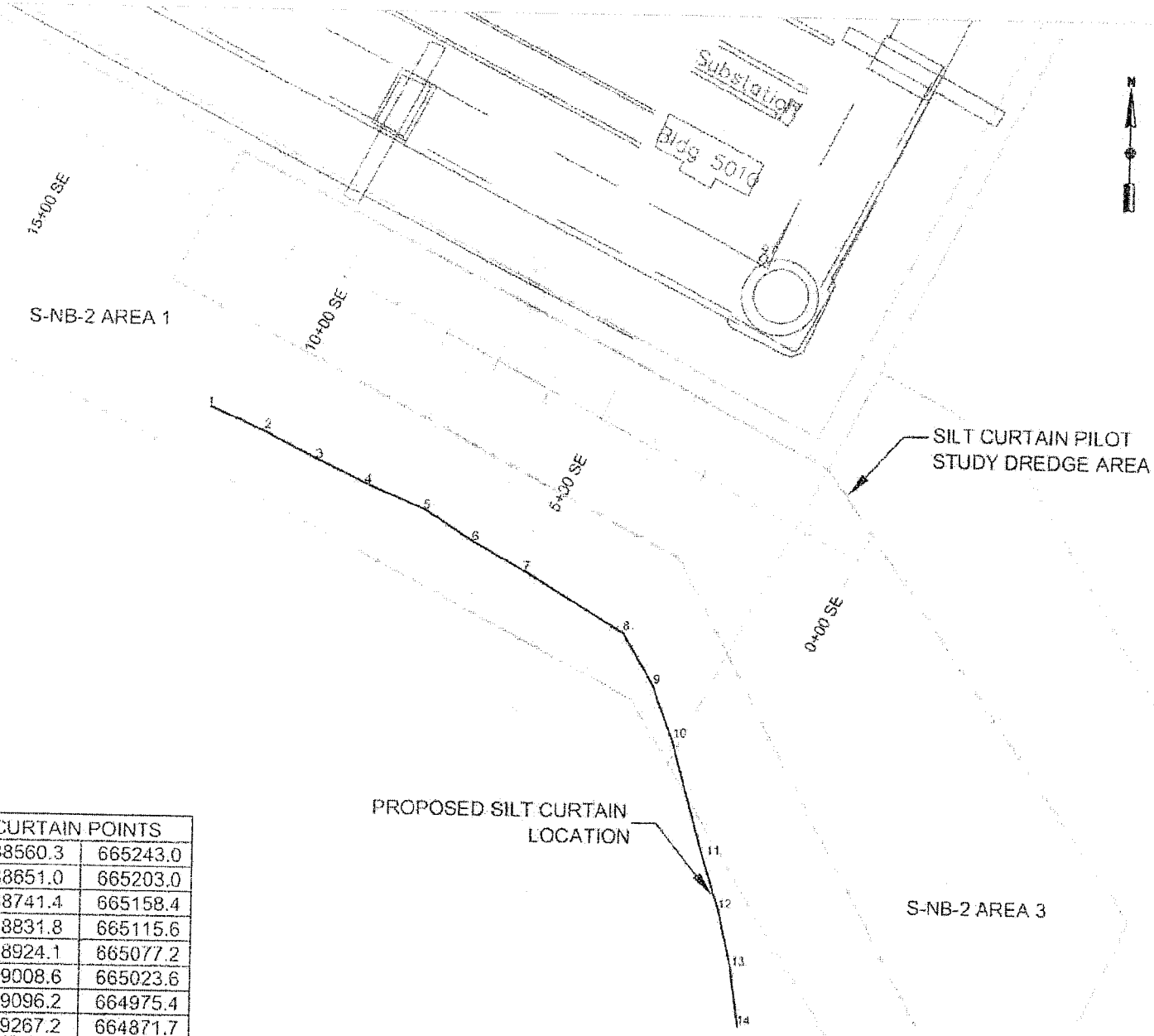
The No. 9000-X series light has three times the visibility distance as the No. 9000 light. The No. 9000-X light flashes 30 times per minute and lasts up to one year without a battery change. The 9000-XSB maintains a steady burn for up to 1 ½ months of continuous battery use. Both models electronically shut-off during day light hours and automatically turns on at darkness. They are powered by 3 Alkaline "D" cell batteries (not included) and have the same heavy-duty construction as the No. 9000 light utilizing an almost indestructible polycarbonate lens and are completely watertight and submersible.

U.S. Coast Guard Compliant – Complies with USCG Rule 88.15 for dredge pipeline applications, USCG Rule 24 for towing or pushing and USCG Rule 22.

Available in Red, Amber, White and Green.

Appendix B
Silt Curtain Installation:
Plan and Cut View Drawings

Silt Curtain Maintenance Plan



GENERAL NOTES:

LOCATION OF SILT CURTAIN WAS DESIGNED TO FALL BETWEEN CONTOURS FOR THE DEPTHS -11' AND -12'

SILT CURTAIN POINTS		
1	588560.3	665243.0
2	588651.0	665203.0
3	588741.4	665158.4
4	588831.8	665115.6
5	588924.1	665077.2
6	589008.6	665023.6
7	589096.2	664975.4
8	589267.2	664871.7
9	589318.6	664785.9
10	589354.6	664692.6
11	589409.4	664500.2
12	589439.2	664404.6
13	589462.4	664307.5
14	589476.5	664208.5

No. Revision/Issue Date

NORTHEAST DREDGING EQUIPMENT COMPANY, LLC

Drawing Title

PROPOSED SILT CURTAIN LOCATION

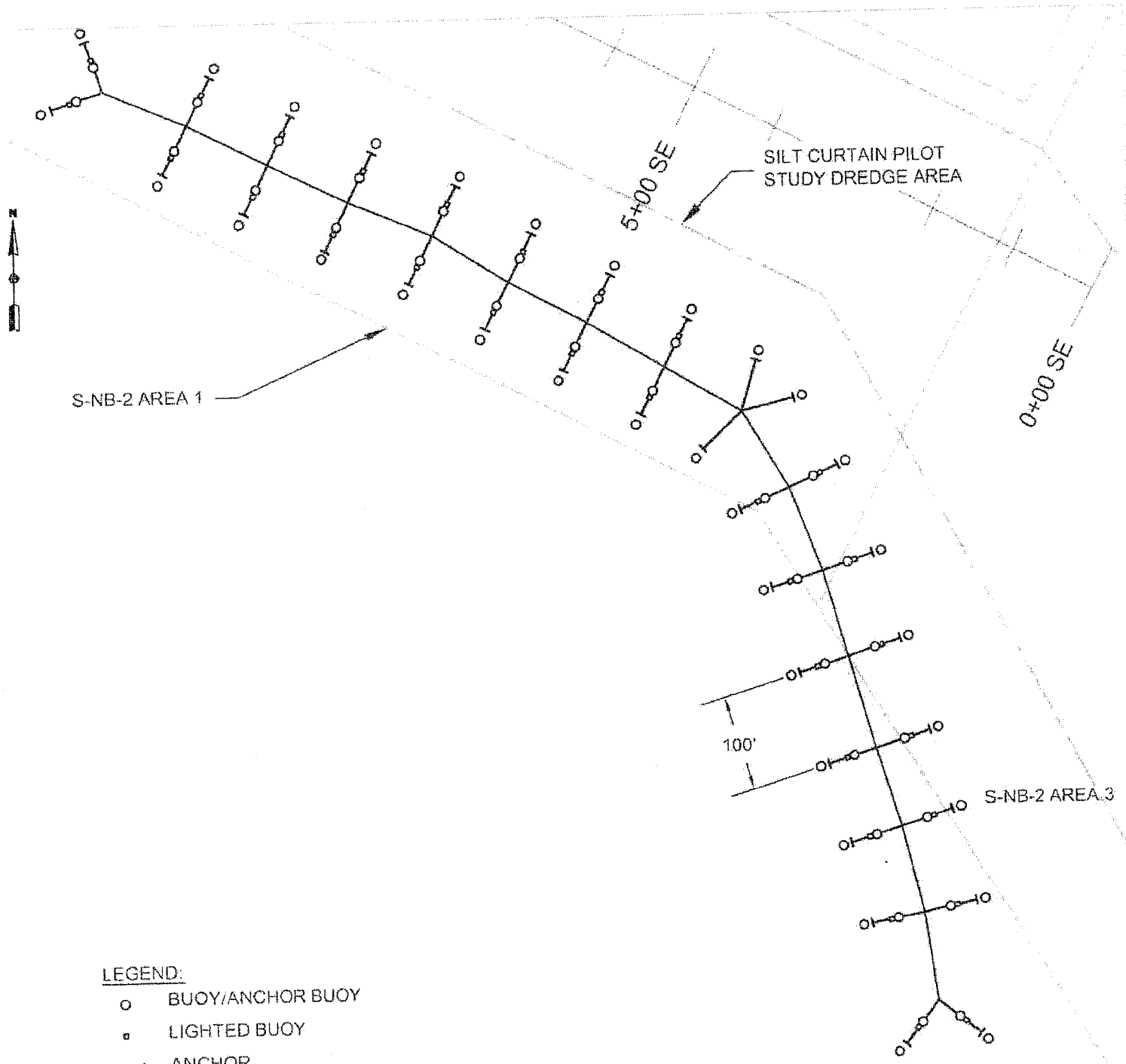
Date: 01/10/11 Scale: 1"=250'

Drawn By: MVF Check By: PP

Project: S-NB-2/S-AK-1

Sheet Number: 1 of 1

Dwg. No.: G-002



LEGEND:

- BUOY/ANCHOR BUOY
- LIGHTED BUOY
- ANCHOR

GENERAL NOTES:

NORTHEAST DREDGING EQUIPMENT COMPANY, LLC

Drawing Title:

PROPOSED SILT CURTAIN

ANCHORING PLAN VIEW

Date: 01/10/11

Scale: 1"=150'

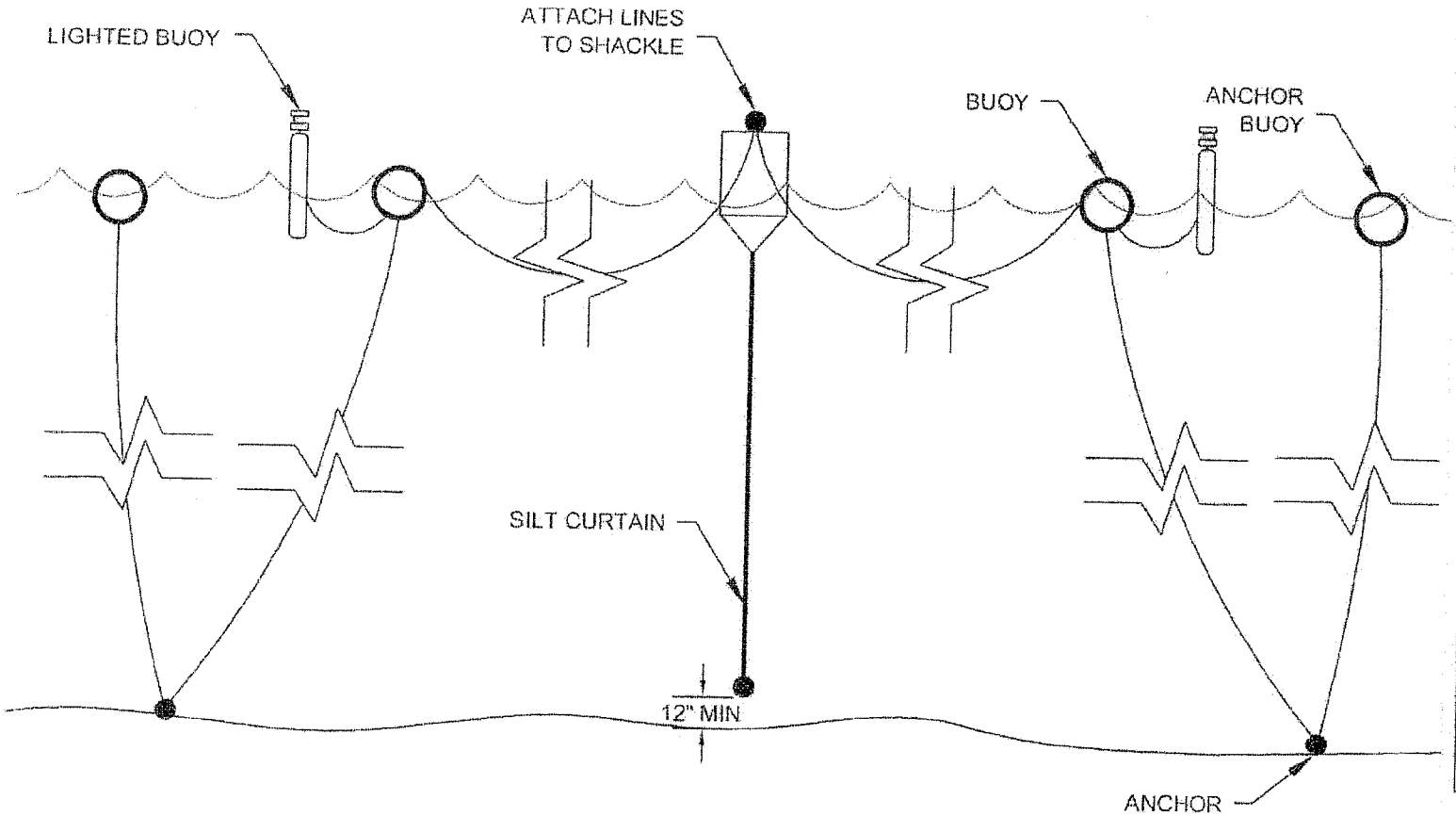
Drawn By: MVF

Chk'd By: PP

Project: S-NB-2/S-AK-1

Sheet Number: 2 of 3

Dwg. No.: G-002



GENERAL NOTES:

No. Revision/Update Date

NORTHEAST DREDGING
EQUIPMENT COMPANY, LLC

Drawing Title:

PROPOSED SILT CURTAIN

ANCHORING PROFILE VIEW

Date: 01/10/11 Scale: NTS

Drawn By: MVF Check By: PP

Project: S-NB-2/S-AK-1

Sheet Number: 2 of 3

Dwg No.: G-002

Appendix C
Daily Silt Curtain Inspection Log

Silt Curtain Maintenance Plan

Daily Silt Curtain Inspection Log

Date _____ Person Conducting the Inspection _____

Time of Inspection _____

Starting from the northwest end of the deployed silt curtain

Silt Curtain Section	Visually Inspected		Damage Noted		Repairs Made		Replaced Section		Discribe Damage found and Repairs Made
	Yes	No	Yes	No	Yes	No	Yes	No	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									

Lighted Buoy Inspection

Were all lighted buoys accounted for Yes _____ No _____

Were Damaged or missing buoys repaired or replaced Yes _____ No _____

Anchor Buoy Inspection

Were all anchor buoys accounted for Yes _____ No _____

Were Damaged or missing buoys repaired or replaced Yes _____ No _____

Appendix D
Project Permits

Silt Curtain Maintenance Plan

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF DREDGING AND SEDIMENT TECHNOLOGY
P.O. BOX 028
TRENTON, NEW JERSEY 08625-0028
(609) 292-1250
FAX: (609) 777-1914

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Mr. Leonard Houston, Chief
Environmental Analysis Branch
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Building
Federal Building
New York, New York 10278-0090

May 10, 2010

RE: Federal Consistency Determination / Water Quality Certification
File: 0000-01-1008.1 CDT100001
Project: Harbor Deepening Project
SNB-2/AK-1 Contract

Dear Mr. Houston:

This letter is forwarded in response to your February 8, 2010 request for a Federal Consistency (FC), as required by Section 307 of the federal Coastal Zone Management Act (16 USC 1451 et seq.) and Water Quality Certification (WQC) as required by Section 401 of the federal Clean Water Act (33 USC 1251 et seq. The request included the Bid Plans and Specifications for the Newark Bay and Arthur Kill Channels, Contract 11, S-NB-2/S-AK-1 (IFB NO. W912DS-10-B-00XX-DRAFT-90%-For WQC) dated February 2010. The New York District, Army Corps of Engineers (NY District) granted the Department two extensions of the decision date for the above referenced FC/WQC. The new decision deadline is May 10, 2010.

The request for a FC/WQC was published in the DEP Bulletin on March 10, 2010 with the close of the 15-day comment period ending on March 25, 2010. Comments were submitted on the DEP public notice from two interested parties. The same interested parties also submitted letters directly to the NY District on the contract. The Department was copied on response letters from the NY District to the interested parties dated April 15, 2010 (Clean Ocean Action response) and April 29, 2010 (NRDC, Baykeeper, Eastern Environment Law Center). The Department has responded separately to the comment letters concurrent with this approval.

The proposed project involves deepening Contract Area S-NB-2 located in Newark Bay and AK-1 located in the Arthur Kill from its present maintained depth to a construction depth of –50 feet + 2.0' additional safety clearance + 1.5' paid overdepth (total depth=-53.5 feet below MLW). The proposed project also involves the deepening of a berth widening area in proximity to the Port Authority of New York and New Jersey Port Newark/Port Elizabeth Terminal to a depth of -50 feet + 2' overdredge (total depth=-52 feet feet below MLW). The volume of material to be removed (including overdredge) within the contract

area and berth widening area is approximately 2,977,318 cy. Of that total; 2,147,663 cy consists of material suitable for use in remediating the Historic Area Remediation Site (HARS), 581,410 cy consists of material suitable for use at the artificial reefs, and 248,245 cy unsuitable for use as remediation material at the HARS.

The contract bid specification package and plans also propose the deployment of 1,500 feet of silt curtain in South Elizabeth Channel. The deployment of this structure is part of a pilot study being administered by the NY District as specified in a document entitled "South Elizabeth Channel Silt Curtain (Pilot) Study Final Work Plan" dated February 2010. The Department will continue to coordinate with the NY District on the proposed monitoring plan currently being developed for this pilot study.

Artificial Reef Material

The 581,410 cy of rock is proposed for placement at the Axel Carlson reef, as coordinated with the Department.

HARS Material

The 2,147,665 cy of Holocene age sandy silt, Pleistocene glacial till and red-brown clay has been determined to be suitable for use as remediation material at the HARS pursuant a joint memorandum between the NY District and USEPA Region 2 dated September 29, 2009 and October 22, 2009.

The bid specification package contains an Option 8 that seek approval for approximately 107,000 cy of fine to medium fine grain sand from the SNB-2 contract area be diverted from HARS placement. Instead this material would be used as cap material in the closure of the Newark Bay Confined Disposal Facility (NBCDF) by the PA NY/NJ. The exact area of the sand reach is located in South Elizabeth Channel of the SNB-2 contract. The current permit issued to the PA NY/NJ (DEP Permit #) requires written approval from the Department on the proposed NBCDF capping plan. This capping plan has yet to be submitted to the Department by the PA NY/NJ. A separate approval of the capping plan and source of sand material is required to be obtained by the PA NY/NJ from the NY District ACOE Regulatory Branch (ACOE authorization #). **As such, this federal consistency determination recognizes that Option 8 provides for diversion of approximately 107,000 cy of material from placement at the HARS to use as cap material at the NBCDF. However, as a condition of this federal consistency determination, the Department will require that the NY District submit a formal amendment to this approval to request authorization to award the Option 8. The submission of the federal consistency shall include documentation from the PA NY/NJ that it has received all necessary permits and approvals to utilize the 107,000 cy of sand material from the SNB-2 contract as cap material at the NBCDF.**

Non-Hars Material

Regarding the remaining 248,245 cy of non-HARS material, the NY District has requested that the federal consistency determination be generic in terms of the potential upland placement site(s) for this material. **A subsequent amendment to the determination would be submitted to the Department by the NY District once the apparent low bidder for the contract has identified a fully permitted or approved upland placement site(s). The amendment to the determination would need to be submitted by the Corps a minimum of two weeks prior to the award of the contract.**

The bid specification package contains Options that seek to allow the use of the NBCDF for up to 125,000 cy of non-HARS material from this contract. These options has been incorporated into the bid package at the request of the PA NY/NJ to facilitate the closure of the NBCDF as required by the NY District Regulatory Branch's letter dated April 27, 2009 which approved the PA NY/NJ's NBCDF Closure

Management Plan dated April 15, 2009. One or more of these options would be exercised by the NY District only if it is determined that additional dredged material is necessary to fill the NBCDF prior to cessation of filling activities that are required to be completed by May 1, 2011. The Department, in coordination with the PA NY/NJ, the NY District and the New Jersey Department of Transportation will continue to monitor the filling activities of the NBCDF to determine the appropriate timeframe for these options to be awarded and the necessary volume to close the NBCDF. **Therefore, the decision to divert any of the non-HARS material to the NBCDF from this contract will be made on an Option by Option basis with written notification by the Corps and written concurrence by the Department and the Port Authority. Disposal of non-HARS suitable material from this contract, as approved by the Department, shall comply with all conditions specified in the PA permit (DEP Permit No. 0714-07-0003.1 (DT070001) and the Operations and Management Plan dated February 2008, and any amendment thereto.**

The Rules on Coastal Zone Management (N.J.A.C. 7:7E) constitute New Jersey's enforceable policies under its federally approved Coastal Zone Management Program. The SNB-2/AK-1 Harbor Deepening Project and the PA NY/NJ Berth Widening Area has been reviewed under the following Rules on Coastal Zone Management: Navigation Channels (7:7E-3.7), Ports (7:7E-3.11), Submerged Infrastructure Routes (7:7E-3.12), Historic and Archaeological Resources (7:7E-3.36), Special Hazards Areas (7:7E-3.41), New Dredging (7:7E-4.2(g)), Dredged Material Disposal in Water (7:7E-4.2(h)), Dredged Material Disposal on Land (7:7E-7.12), Marine Fish and Fisheries (7:7E-8.2), and Water Quality (7:7-8.4). Based on the summary of details of the contract presented in the February 8, 2010 request for a contract specific FC/WQC, and the Department's umbrella approval of a Federal Consistency Determination/Water Quality Certificate for the entire Harbor Deepening Project dated April 12, 2004 (as amended on October 25, 2004), **I have <u>CONDITIONALLY</u> determined that the dredging of the is Contract is consistent with the Rules on Coastal Zone Management and New Jersey's federally approved Coastal Management Program, provided the NY District requests to amend this federal consistency, as identified in Paragraph 6 and 7 of this letter, and requests written approval to dispose of non-HARS material in the NBCDF as identified in Paragraph 8.** I have also reviewed this Contract for potential water quality impacts. Provided that the following conditions are met, I have determined that this project is not likely to cause a violation of New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B-1.1 et seq.). **Therefore, this determination includes the State's Water Quality Certification pursuant to Section 401 of the federal Water Pollution Control Act (33 USC 1251 et seq.) subject to the following conditions:**

1. For the S-NB-2 (Newark Bay Federal Navigation Channel and South Elizabeth Federal Navigation Channel:

   - Dredging is prohibited from February 15th through May 20th of any given year 500' from the top of slope of the federal navigation channels in proximity to the intertidal flats adjacent to Bayonne, NJ and adjacent to the intertidal flats in Elizabeth, NJ.

   For the S-AK-1 (Arthur Kill Federal Navigation Channel):

   - Dredging is prohibited from February 15th through May 20th of any given year to protect the early life stages of winter flounder.

   Prior to initiation of dredging under this contract, the NY District shall provide the Department with updated plans of the dredge areas that depicts the above referenced timing restrictions. The Department will continue to coordinate with the NY District on the environmental windows for this contract based on the fisheries information provided to the Department on April 15, 2010.

2. Between 01 April and the end of the first week of May, a qualified biologist, selected by the NY District and agreed upon by the Department, shall inspect Shooter's Island for the presence of any nesting activity by herons or egrets. This inspection shall be conducted once each year that dredging/blasting is expected to occur within 1,000 feet of Shooter's Island. Upon completion of the inspection, the NY District shall submit a written inspection report to the Department.

   - If no active nests are observed, avian protective measures will not be required.
   - If nesting is confirmed, the following protective measures shall be implemented:
     - No blasting and/or dredging activity shall occur with 1,000 feet of Shooter's Island from 1 April-31 July.
     - The NY District shall use marker buoys every 200 feet or less(except within the existing federal channel) to indicate the 1,000 foot restricted area.

3. A qualified biologist selected by the NY District and agreed upon by the Department, shall inspect Shooter's Island and areas surrounding South Elizabeth Channel for the presence of any osprey nests. This inspection shall be constructed once year year that dredging/blasting is expected to occur in proximity to these two areas. Upon completion of the inspection, the NY District shall submit a written inspection report to the Department.

   - If no active nests are observed, avian protective measures will not be required.
   - If nesting is confirmed, the following protective measures shall be implemented:
     - No blasting and/or dredging activity shall occur with 1,000 feet of an osprey nest from March 15th through August 15th or until the young fledge.
     - The NY District shall use marker buoys every 200 feet or less (except within the existing federal channel) to indicate the 1,000 foot restricted area.

4. Dredging of soft, fine-grained material shall be accomplished using an environmental bucket. Said environmental bucket shall comply with the bucket specifications outlined in the contract bid document, and any amendments thereto. The environmental bucket shall be maintained in working condition at all times during the dredging operation.

5. The contractor shall undertake all reasonable operational measures to minimize the loss of solid sediments from the ascending environmental bucket due to extrusion of solid sediments through vent openings or hinge area of the bucket. Such measures shall include limiting the amount of sediment contained in each bucket bite. The dredging contractor shall use appropriate software and sensors on the dredging equipment to ensure consistent compliance with this condition during the entire dredging operation, while an environmental bucket is required. The NY District Project Engineer shall monitor the operation of the software and sensors during the inspections required by this authorization. Any malfunction of the software and sensors on the dredge at any time shall be immediately reported to the NY District Project Engineer by the dredging contractor and shall be immediately repaired to working order.

6. The environmental bucket shall be equipped with sensors to ensure complete closure of the bucket before lifting the bucket. Said sensors shall be operational during the entire dredging operation, while an environmental bucket is required. Where an environmental bucket is required, it shall be lifted slowly through the water, at a rate of 2 feet per second or less.

7. Dredged material shall be placed deliberately in the barge in order to prevent spillage of material overboard.

8. A "No barge overflow" applies to the material from this contract that is unsuitable for placement at the HARS, at the artificial reef site or at any aquatic placement site (if a split-hull scow will be in use).

9. All barges or scows used to transport sediment shall be of solid hull construction or be sealed with concrete. This condition does not apply to dredged material to be beneficially used at the HARS, at the artificial reef site, or for disposal of dredged material in the NBCDF.

10. The gunwales of the dredge scows shall not be rinsed or hosed during dredging except to the extent necessary to ensure the safety of workers maneuvering on the dredge scow.

11. All decant water holding scows shall be water tight and of solid hull construction.

12. Decant water from this project may only be discharged within the Newark Bay in close proximity to the dredging contract area. The NY District has identified as Berth 50 in the Port Newark as the dewatering location for this contract. Discharge to another receiving waterbody requires prior approval from the Department, and may require a New Jersey Discharge Pollutant Elimination System/Discharge to Surface Water (NJDPES/DSW) permit. This condition does not apply to dredged material to be beneficially used at the HARS or for disposal of dredged material in the NBCDF.

13. All decant water shall be held without further physical disturbance in the decant holding scow a minimum of 24 hours after the last addition of water to the decant holding scow. Said water contained in the decant holding scow may only be discharge after this mandatory 24 hour retention time.

    Should the contractor wish to reduce the required holding time, the contractor shall demonstrate that the reduced holding time is sufficient to meet the previously established total suspended solids (TSS) background value of 30 mg/L. The total suspended solids shall be determined through gravimetric analysis. No discharge shall be permitted from the decant holding scow until the results of the gravimetric analysis have confirmed that the 30 mg/L background level has been achieved. No additional water shall be added to the decant holding scow between the time of sample acquisition and discharge. Upon successful demonstration that the reduced holding time is sufficient to meet the TSS background level of 30 mg/L, the monitoring of TSS may be suspended and the demonstrated settling time shall replace the 24 hour minimum. A successful demonstration of the reduced holding time efficiency shall be determined once three consecutive TSS analyses have confirmed that the 30 mg/L action level has been achieved by the reduced holding time. Should the contractor wish to demonstrate this reduced holding time, all records including time of last addition of decant water into the scow, time of TSS sampling and the results of TSS sampling shall be submitted to the NJDEP as soon as they become available, together with a request for a reduced holding time

14. During pumping of the decant water from the holding scow, great care shall be taken to avoid re-suspending or pumping sediment which has settled in the decant holding scow.

15. The dredging contractor shall complete and submit the attached Dewatering Form to the NY District Project Engineer on a weekly basis as part of the Quality Control Report provided to the NY District. Said Dewatering Form shall be certified by a NY District Project Engineer that they have witnessed the dewatering process during the preceding week. The NY District shall submit the completed Dewatering Form with appropriate certifications by fax to the Office of Dredging and Sediment Technology for the preceding week.

16. The NY district shall perform inspections of the dredging contract a minimum of twice per week using the attached WQC Field Inspector form. The NY District shall submit the completed inspection forms to the NJDEP on at least a weekly basis. *Note: The Department is currently revising the WQC Field Inspection form. The updated form will be provided to the NY District prior to initiation of dredging under this contract.*

17. REPORTING REQUIREMENTS: At the completion of this contract, the NY District shall submit the following information to the Department. This information shall be submitted within six months of contract completion.

- Start and finish date of contract
- Post-dredge hydrographic survey
- Completed "Notice of Completion of Work" attached.

Should you have any questions regarding this determination and certification, please do not hesitate to contact me at (609) 292-8838.

Sincerely,

Suzanne U. Dietrick, Chief
Office of Dredging and Sediment Technology

C: Scott Douglas, Office of Maritime Resources
Matt Masters, Port Authority of NY/NJ

Mr. Stephen Zahn
NY Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21st Street
Long Island City, NY 11101-5407

DEWATERING FORM

Week of _____ **(Sunday to Saturday) (SEE NOTE BELOW)**

USACE Contract: _____

Contract Reach: _____

Decant Scow Identification _____ Capacity _____ gallons/ _____ cubic yards

Volume Calculation: _____ Estimated _____ Measured (check one) (If measured, provide calculation procedure)

Dredge Scow Identification #	Date of discharge into decant scow	Time of initiation of discharge into decant scow	Time of cessation of discharge into decant scow	Rate of pump used to discharge into decant scow	Volume of Discharge into decant scow

Last addition of decant water into decant scow:
Date:_____
Time:_____

Discharge of decant water to surface waterbody
Date:_____
Time:_____
Volume:_____ gallons

NOTE: Should more than one decant barge be used during a given week, a new dewatering form should be utilized and submitted to the ACOE Field Office.

CERTIFICATIONS:

I,_____, *as Quality Control Officer for* _____ *(Company)* for the above ACOE Dredging Contract, do hereby certify that the information provided in this document is true and accurate, and that I have personally observed the dewatering procedure recorded herein during the timeframe specified above.
Signature:_____

I, _____, as ACOE Project Engineer for the above referenced contract have personally observed the dewatering procedure recorded herein during the timeframe specified above. Said procedure has complied with the conditions specified in the *Federal Consistency Determination/Water Quality Certificate issued by the NJDEP* for the project. Signature:_____

NOTICE OF COMPLETION OF DREDGING

Date: _____
New Jersey Department of Environmental Protection
Office of Dredging and Sediment Technology
P.O. Box 028
401 East State Street
Trenton, NJ 08625

Attn: NJDEP, ODST, Project Manager FAX: (609) 777-1914

Re: NJDEP Permit No.
Insert project title:_____
Location of Dredging:_____

Dear Sir/Madam:

I hereby serve notice that the DREDGING allowed by the above referenced permit has been completed as of _____, 20__.

The dredged material was removed via mechanical_____ or hydraulic____ dredging (check one).

The dredged material was/is being dewatered with discharge into _____.

The actual quantity of material dredged was _____cys. The dredged material was taken to:

1._____ cys was taken to the Historic Area Remediation Site.

2._____ cys used on site as per NJDEP Permit(s) #_____
_____(specify the type of permit(s)).

3._____ cys was taken to _____ for beneficial reuse.

4._____ cys was taken to_____ for disposal.

5._____ cys was taken to_____ for beach nourishment.

_____
Signature of the Permittee

_____
Permittee's Name (Printed)

_____
Name of Permitted Agency/Entity

_____
Street Address

_____
City State ZIP

_____
Telephone

_____
Signature of the Contractor (if any)

_____
Contractor's Name (Printed)

_____
Name of Company

_____
Street Address

_____
City State ZIP

_____
Telephone

State of New Jersey
Department of Environmental Protection

James E. McGreevey
Governor

Bradley M. Campbell
Commissioner

April 12, 2004

Mr. Frank Santomauro, P.E., Chief
Planning Division, Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, New York 10278-0090

RE: AMENDED Federal Consistency Determination/ISSUANCE of Water Quality Certification
File: 0000-92-0031.9
Project: NY-NJ Harbor Deepening Project

Dear Mr. Santomauro:

On June 17, 2002 the New Jersey Department of Environmental Protection (Department) issued the Federal Consistency (FC) determination as required by Section 307 of the federal Coastal Zone Management Act (16 USC 1451 et seq which constituted an umbrella approval for the Harbor Deepening Project (HDP). The Department did not issue the Water Quality Certification (WQC) for the project at that time. This was due to the absence of chemical and physical analysis of the sediments to be dredged from each contract to determine that the project would not contravene the New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B), nor was it possible to determine appropriate best management practices to reduce project impacts. In a letter, dated October 24, 2003, the NY District requested a WQC for the HDP. It is the Department's understanding that a WQC must be issued by the State of New Jersey prior to the execution of the Performance Cooperation Agreement for the HDP by the NY District and Port Authority of New York and New Jersey.

The Harbor Deepening Project involves deepening various channels in the New York/New Jersey Harbor to a maintained depth of between 50 and 53 feet below the plane of mean low water (MLW) as follows:

Channel	Excavated Depth	Maintained Depth
Ambrose Channel	53 feet	53 feet
Anchorage Channel	50 feet	50 feet
Kill van Kull	50 feet	50 feet
Newark Bay	50 feet	50 feet
Elizabeth Channel	50 feet	50 feet
South Elizabeth Channel	50 feet	50 feet
Arthur Kill (Howland Hook)	50 feet	50 feet
Port Jersey Channel	50 feet	50 feet

The Department acknowledges that these depths do not include the allowable safety clearance, which shall not exceed 2 feet below the excavated depths, and an overdredge depth of 1.5 feet below the excavated depths. The most recent volume calculations of material anticipated to be generated by construction of this project is approximately 42,501,000 cubic yards. Of this total it is expected that

5,600,000 cubic yards will be recently accumulated (Holocene) material, 31,288,000 cubic yards will be native non-rock "new work" (Pleistocene) material, and 5,613,000 cubic yards will be rock. The Department notes that final placement sites for any of this dredged material has not been proposed, and the analytical data required to support any placement of dredged material is not currently available. This information will be generated on a contract-by-contract basis prior to initiating dredging in any given contract area.

As discussed in the June 17, 2002 umbrella FC determination for the HDP, the NY District has agreed to submit the required additional information to demonstrate compliance with the Rules on Coastal Zone Management (N.J.A.C. 7:7E, or the Rules) to the Department during the Pre-construction, Engineering and Design (PED) Phase of the project. There is an understanding between the Department and the NY District that this required additional information would be reviewed by the Department and that Phased Consistency Determinations would be made on an incremental basis (i.e. each separate dredging contract of the HDP) as allowed under 15 CFR 930.36. The NY District has proposed that this same process be utilized in the issuance of the Water Quality Certification for the HDP project. The Department finds this approach acceptable.

Therefore, this amendment to the 6/17/02 Federal Consistency Determination and the issuance of a Water Quality Certification shall constitute an umbrella approval of the HDP with the understanding that Phased Consistency Determination (PCD) and Water Quality Certification will be issued by the Department on EACH INDIVIDUAL DREDGING CONTRACT of the HDP as allowable under 15 CFR 930.36. These Phased Consistency Determination/WQCs shall be limited in scope to the issues identified in the following conditions, except that the Department does not waive any rights to require Supplemental Coordination under 15 CFR 930.46 should new circumstances or information relevant to the project occur. The conditions of the umbrella FC/WQC are as follows:

1. As required by N.J.A.C. 7:7E-4.2(g), prior to initiating dredging in any contract area, the NY District shall sample and test the material to be dredged in accordance with the protocol appropriate to the placement site. A sampling and testing plan shall be coordinated with and approved by the appropriate regulatory agency. The following schedule shall be utilized by both agencies to ensure that sediment results are available for submission with the request for a PCD/WQC for each dredging contract.

   - A request for a sediment sampling plan for non-HARS material from each contract shall be forwarded to the Department and the New York Department of Environmental Conservation a **minimum of 60 days** prior to the date of sampling.

   - The NY District shall submit the HARs sampling plan (as applicable) to the Department a **minimum of 15-30 days** prior to the date of sampling. Said plan shall be utilized by the Department in evaluating HARS sediment sample results at the time of submission of the PCD/WQC for each individual dredging contract.

2. As required by N.J.A.C. 7:7E-3.5, N.J.A.C. 7:7E-4.2(g) and N.J.A.C. 7:7E-8.2, equipment and seasonal restrictions on dredging activities as necessary to minimize impacts on fisheries resources shall be determined on a contract-by-contract basis and will be incorporated in the

PCD/WQC issued for the dredging contract area. The essential fish habitat recommendations of the National Marine Fisheries Service issued in a letter from Peter D. Colosi to you dated July 27, 2001 shall serve as the baseline for the restrictions imposed in each contract.

3. **The NY District shall submit a PCD/WQC to the Department for each individual dredging contract area of the HDP at least 90 days prior to bid advertisement of said dredging contract area.** The request for a PCD/WQC by the NY District shall contain the information specified in the attached checklist. **NO INDIVIDUAL DREDGING CONTRACT AREA SHALL PROCEED TO BID ADVERTISEMENT UNTIL THE DEPARTMENT ISSUES THE PCD/WQC FOR THE INDIVIDUAL DREDGING CONTRACT AREA.**

4. Pursuant to the project specific Dredged Material Management Plan (DMMP) for the HDP included in the final LRR/EA dated January 2004, dredged material placement alternatives that include the beneficial use of material shall be given preference. Aquatic disposal of dredged material is only acceptable if alternative placement options less damaging to the environment are unavailable (N.J.A.C. 7:7E-4.2(h)).

5. The NY District shall obtain a separate Federal Consistency Determination and Water Quality Certification from the Department for the pier removals (Commerce Street Pier and Allied Signal Pier) to be completed under the HDP. Said request for a PC/WQC for this activity shall be submitted **a minimum of three months prior to bid advertisement** for this activity and shall include appropriate demolition plans and specifications. Any proposed pipeline or cable that is to be removed during the HDP shall obtain all necessary permits and approvals from the Department.

6. The following conditions will be imposed in the PCD/WQC issued for the individual dredging contract area to ensure that dredging of the sediments does not contravene New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B), and that best management practices are adhered to during the contract. Additional conditions may be imposed by the Department upon review of sediment sample results submitted by the NY District for each individual contract.

- A "No barge overflow" condition applies to the dredging and transport of any contaminated, non-HARS, non –rock dredged material.
- All dredging of non-HARS suitable material shall be accomplished using a closed clam shell "environmental" bucket dredge.
- Dredged material shall be placed deliberately in the barge in order to prevent spillage of material overboard.
- The dredge shall be operated so as to maximize the bite of the clamshell. This will reduce the amount of free water in the dredged material and the number of bites required to complete the job.
- The clamshell bucket shall be lifted slowly through the water column, generally 2 feet per second or less.

- All barges or scows used to transport sediment shall be of solid hull construction or be sealed with concrete, except for material permitted for aquatic placement.

- The gunwales of the dredge scows shall not be rinsed or hosed during dredging.

7. The following conditions related to the dewatering procedures for non-HARS material shall be imposed in the PCD/WQC issued for each individual contract area:

- Decant water of non-HARs material shall only be discharged at a location that is in the same waterbody and in reasonable proximity to the limits of the dredging contract. The NY District shall provide the identified dewatering location for each contract at the time of submission of the PCD/WQC for the individual dredging contract.

- All decant water shall be held in the decant holding scow a minimum of 24 hours after the last addition of water to the decant holding scow. Said water contained in the decant holding scow may only be discharge after this mandatory 24 hour retention time.

- Should the contractor wish to reduce the required holding time, the contractor shall demonstrate that the reduced holding time is sufficient to meet a total suspended solids (TSS) background value of 30 mg/L. This TSS action level is consistent with the ambient TSS results presented in the NY District study entitled "2001 Total Suspended Solids and Turbidity Monitoring for Newark Bay, Kill Van Kull and Port Jersey" (September 2002). The total suspended solids shall be determined through gravimetric analysis. No discharge shall be permitted from the decant holding scow until the results of the gravimetric analysis have confirmed that the 30 mg/L background level has been achieved. No additional water shall be added to the decant holding scow between the time of sample acquisition and discharge. Upon successful demonstration that the reduced holding time is sufficient to meet the TSS background level of 30 mg/L, the monitoring of TSS may be suspended and the demonstrated settling time shall replace the 24 hour minimum. A successful demonstration of the reduced holding time efficiency shall be determined once three consecutive TSS analyses have confirmed that the 30 mg/L action level has been achieved by the reduced holding time.

  Should the contractor wish to demonstrate this reduced holding time, all records including time of last addition of decant water into the scow, time of TSS sampling and the results of TSS sampling shall be submitted to the NJDEP as soon as they become available, together with a request for a reduced holding time.

- During pumping of the decant water from the holding scow, great care shall be taken to avoid resuspending or pumping sediment which has settled in the decant holding scow.

- The dredging contractor shall complete and submit the attached Dewatering Form to the ACOE Field Office on a weekly basis as part of the Quality Control Report provided to the Field Office. Said Dewatering form shall be certified by the ACOE Field Office that they have witnessed the dewatering process during the preceding week. The ACOE Field Office shall submit the completed Dewatering form with appropriate certifications to the appropriate state agency the Monday after the end of the preceding week.

8. As required by N.J.A.C. 7:7E-8.10, the Corps shall implement the procedure for incremental air quality conformity outlined in the Statement of Conformity dated March 31, 2004. This includes the completion of additional studies during the PED Phase to ensure the implementation of technically feasible and cost-effective measures to reduce emissions and otherwise comply with appropriate air quality standards and the State Implementation Plan. A Conformity Consistency Review (CCR), will be performed at least a minimum of 180 days prior to the start of construction for each contract. The Final CCR report, which contains the detailed compliance plan including contingency plans, shall be submitted for each project element prior to the initiation of construction of those elements. In the event of project delays, a contingency plan(s) approved by the Regional Air Team shall be implemented and working in order for construction to continue as scheduled. Given that the project is in a severe non-attainment area for ozone and nitrogen oxides, the Department wishes to reemphasize the preference for real emissions reductions to offset construction-related emissions from this project.

9. The Department is currently reviewing the latest version of the Habitat Mitigation Report (January 2004), and the most recent assessment of littoral habitat impact acreage. A conditional approval of the conceptual mitigation plan will be forthcoming from the Department to allow the NY District to proceed to Pre-construction, Engineering and Design (PED) Phase of the mitigation project. The NY District shall not commence construction of the mitigation project until the Department approves in writing the Plans and Specifications for the mitigation project. The District shall comply with the following conditions related to mitigation for the loss of littoral habitat during construction of the HDP:

   - The NY District shall submit a schedule for implementation of the mitigation project for the HDP **within 60 days of the date of this letter**. The results of HTRW sampling shall also be submitted within this timeframe.

   - At the time of submission of the PCD/WQC for each individual contract, the NY District shall recalculate the habitat type impact using the most recent bathymetric surveys of the contract area and re-confirm the acreage of loss of habitat for the entire HDP project.

   - The NY District shall utilize the attached "Checklist for Completeness" when developing the Plans and Specifications for the mitigation project. Said Plans and Specifications shall be submitted to the Department for review and written approval prior to initiation of construction.

   - The NY District shall comply with the conditions specified in the attached "Coastal Wetland Mitigation Conditions" as it relates to monitoring and reporting requirements for the mitigation project.

10. At the completion of each individual dredging contract, the NY District shall submit the following information to the Department. This information shall be submitted within six months of contract completion.

   - Start and finish date of contract
   - Post-dredge hydrographic survey

- Completed "Notice of Completion of Work" attached.

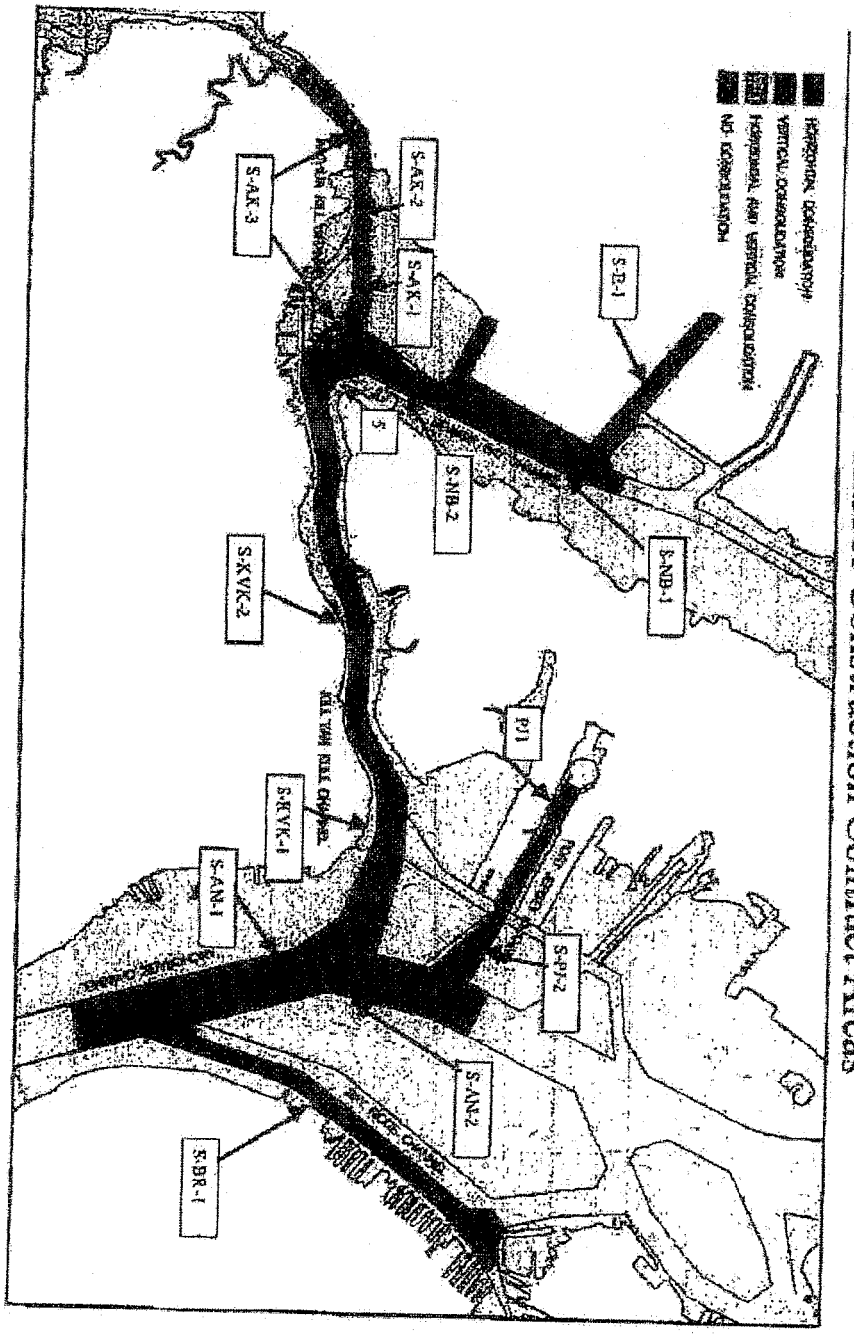
The Department requests that the NY District provided written notification to the Department within 10 days of receipt of the umbrella FC/WQC for the Harbor Deepening Project that it has reviewed and understands the conditions specified herein as it relates to consistency with the New Jersey Coastal Management Program.

Should you have any questions in this regard, please do not hesitate to contact me at (609) 292-8838.

Sincerely,

Suzanne U. Dietrick, Chief
Office of Dredging and Sediment Technology

C: Richard Gimello, Executive Director, New Jersey Maritime Resources
Steve Dorrler, Port Authority of New York and New Jersey
Kaydee McGuckin, NYDEC



NY & NJ Harbor Construction Contract Areas

PCD/WQC CHECKLIST FOR HDP DREDGING CONTRACT REACH AREA

Name of Contract Reach:_____

For each Contract Reach proposed for dredging pursuant to Federal Consistency Determination/WQC issued April 11, 2004 (DEP File(s): 0000-92-0031.9 (FC)/0000-03-0035.1 (WQC), the NY District shall submit a *Request for Phased Consistency Determination and Water Quality Certification (PCD/WQC)* at least ninety (90) days prior to bid advertisement for named Contract Reach. Said request is to be accompanied by the following information:

1. Request for PCD/WQC

History

2. Date of last dredge event for specified contract reach
3. Volume removed during last dredge event(s) for specified contract reach
4. Disposal location for all material removed during last dredge event(s) for specified contract reach.

Proposed Dredging

5. The most recent (60% or 90%) Design Plans and Specification package
6. Estimated start date of specified contract reach
7. Project depth + over dredge + safety clearance:
8. Scaled, legible hydrographic surveys that clearly and accurately depict:
   - i. Existing and new channel boundaries
   - ii. Location of top of slope
   - iii. Location of shoreline (such as mean high or mean low water line)
   - iv. General landside features in the project area such as street names, facility names, towns, rivers, etc.
   - v. Highlight areas of recent shoaling, if any (areas where recent material has accumulated since last dredge event?)

9. Results of HARS testing, including:
   NOTE: Sampling plan must be approved by the Department at least 120 days prior to proposed dredging date
   - i. Core log (NOTE: core log must indicate depth of Pleistocene layer and depth of overlying accumulated sediments, if any)
   - ii. Grain size analysis
   - iii. Bulk chemistry
   - iv. Bioassay results

10. HARS memo, if any/all material is going to HARS

11. Results of testing for non-HARS material, including:

NOTE: Sampling plan must be approved by the Department at least 120 days prior to proposed dredging date

i. Core log (NOTE: core log must indicate depth of Pleistocene layer and depth of overlying accumulated sediments, if any)

ii. Grain size analysis

iii. Applicable sediment sample results for appropriate upland placement site.

iv. List all piers, bulkheads, pipelines, cables, or other structures that will be impacted by the commencement of dredging for specified contract reach

12. Submit dewatering plan (location and method)

13. Estimated total volume to be removed in contract:

i. Estimated volume going to HARS

ii Estimated volume going to artificial reefs

iii. Estimated volume going upland (specify disposal location)

Estimated volume going elsewhere (specify disposal location)

Habitat Impact

14. Updated area of impact survey that clearly indicates:

i. Toe of slope

ii. Top of slope

iii. Types of habitat impacted by the proposed dredging

15. Summary of any changes in total impact area for the proposed dredging include square footage of each habitat type impact

i. denote any changes (square footage) in impacts for each habitat type

DEWATERING FORM

Week of _____ **(Sunday to Saturday) (SEE NOTE BELOW)**

USACE Contract: _____

Contract Reach: _____

Decant Scow Identification _____ Capacity_____ gallons/_____ cubic yards

Volume Calculation:_____Estimated _____Measured (check one) (If measured, provide calculation procedure)

Dredge Scow Identification #	Date of discharge into decant scow	Time of initiation of discharge into decant scow	Time of cessation of discharge into decant scow	Rate of pump used to discharge into decant scow	Volume of Discharge into decant scow

Last addition of decant water into decant scow:

Date:_____

Time:_____

Discharge of decant water to surface waterbody

Date:_____

Time:_____

Volume: _____ gallons

NOTE: Should more than one decant barge be used during a given week, a new dewatering form should be utilized and submitted to the ACOE Field Office.

CERTIFICATIONS:

I,_____, as Quality Control Officer for _____(Company) for the above ACOE Dredging Contract, do hereby certify that the information provided in this document is true and accurate, and that I have personally observed the dewatering procedure recorded herein during the timeframe specified above. Signature:_____

I, _____, as ACOE Project Engineer for the above referenced contract have personally observed the dewatering procedure recorded herein during the timeframe specified above. Said procedure has complied with the conditions specified in the Federal Consistency Determination/Water Quality Certificate issued by the NJDEP for the project.

Signature:_____

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

CREATION, RESTORATION OR ENHANCEMENT FOR A TIDAL WETLAND MITIGATION PROPOSAL

CHECKLIST FOR COMPLETENESS

(4/03)

These are the application requirements for an administratively complete proposal package for an onsite or offsite tidal wetland mitigation proposal. Please read each section and check the box next to each area after you have fully completed the information for each requirement that applies to you.

Please provide five copies of the following information and plans.

☐ 1. An introduction describing the wetland mitigation proposal. The introduction must include the following:

a. The type of permit that requires you to perform wetland mitigation (include a copy of the permit);

b. How many acres of wetland mitigation are you required under N.J.A.C. 7:7E-3.27 or permit to create, enhance and/or restore;

c. The goals of the mitigation project in terms of wetlands types, values, and functions, and a discussion of how the mitigation proposal will satisfy those goals. (e.g., The goal of the wetlands mitigation project is to establish a low marsh wetland complex dominated by *Spartina alterniflora* that is flowed twice daily by the tide, etc.);

d. The reason why the mitigation site is an appropriate site for meeting the goals in (1c.) above, and the aspects of the site that will ensure the success of the mitigation project; and

e. A copy of USGS quad map(s) showing the location of the permitted activity and showing the mitigation site with the state plane coordinates of the mitigation site. The accuracy of these coordinates should be within 50 feet of the actual center point of the site. For linear mitigation projects, the applicant shall provide State plane coordinates for the end-points. For linear mitigation projects 2000 feet in length and longer, the applicant supply additional coordinates at each 1000 foot interval.

☐ 2. A description (e.g., size, type, vegetation, hydrology, wildlife use, etc.) of the wetlands that are being destroyed or disturbed by the permitted activity.

- ☐ 3. Photos of the proposed mitigation site, showing topographic, vegetative, tidal streams and wetland features.

- ☐ 4. The names and addresses of all current and proposed owner(s) of the proposed mitigation site.

- ☐ 5. The lot, block, municipality and county of the proposed mitigation site. This information must be clearly visible on the front page of the proposal and must also be placed on the mitigation plans as required under item 14. In addition, provide the New Jersey Wetland/Tidelands Map number(s) for the development site and the mitigation site if it is in a different location.

- ☐ 6. A description (e.g., size, type, vegetation, hydrology, wildlife and adjacent land use etc.) of the proposed mitigation site.

- ☐ 7. A projected water budget for the proposed mitigation site. The water budget should detail the sources of water for the mitigation project as well as the water losses. The budget should include the following regional information:

    - the seasonal high water table;
    - the tidal range (low, high and spring high tide) over the course of a month;
    - elevation of existing reference wetland system in the vicinity of the project site; and,
    - the salinity range of adjacent waters;

  The projected water budget should document that an ample supply of water is available to create, enhance, or restore wetland conditions, as applicable. The water budget must contain sufficient data to show that the mitigation project will have sustained wetland hydrology indefinitely in the future.

- ☐ 8. Existing soil profiles including the location of soil borings on the proposed mitigation site.

- ☐ 9. A detailed discussion of the substrate you propose to create for the mitigation site (e.g. How will the substrate of the site be prepared? Is the soil texture appropriate for the community proposed? Is the pH appropriate?).

- ☐ 10. A landscape plan showing the proposed vegetative community on the proposed mitigation site that includes the following:

    - the species;
    - quantity of each species;
    - the spacing of all plantings;
    - the stock type (plugs, potted, seed); and

- the source of the plant material.

The wetland buffer required as part of the mitigation site under N.J.A.C. 7:7E-3.28 must also be planted. The landscape plan must identify the proper time to plant and must indicate any appropriate substitutions.

- ☐ 11. A preventive maintenance plan detailing how invasive or noxious vegetation will be controlled, and how predation of the mitigation plantings will be prevented. The plan shall explain the measures that will be taken if a problem with invasive or noxious plants or predation presents itself during the construction or monitoring period. The applicant is encouraged to install a goose fence to control problems resulting from the presence of geese in the State..

- ☐ 12. A metes and bounds description of the proposed mitigation site. The metes and bounds description shall include the wetland buffer required under N.J.A.C. 7:7E-3.28.

- ☐ 13. An estimate of the actual cost of carrying out the construction of the mitigation project. The cost estimate should include but is not limited to the value of the land, engineering costs, environmental consultant fees, attorney fees, site preparation costs, construction costs, planting costs, supervising construction fees, and monitoring costs. The cost estimate of the project will be used when determining the amount of the financial assurance required.

- ☐ 14. A site plan for the mitigation project which includes:

  i. Project location within the region;

  ii. The lot and block number of the mitigation project location;

  iii. Existing and proposed elevations and grades of the mitigation site and, when necessary off-site elevations and grades. All existing and proposed elevations and grades must be shown in at least one foot intervals. The slope shall be no greater than 10:1 along a created transition area as well as along any berms that are intended to function as water control structures or berms created along a stream;

  iv. The wetland buffer required under N.J.A.C. 7:7E-3.28 shown clearly;

  v. A detail that shows, or a statement indicating, the soil amendments and the seed stabilization mix if any to be used on the mitigation site; and

  viii. Pre and post construction plan views and cross sectional views of the mitigation site.

- ☐ 15. A construction schedule including projected dates of excavation, planting, fertilizing, etc.

- ☐ 16. A draft conservation restriction that meets the requirements of N.J.A.C. 7:7E-3B.2. Contact Virginia Kop'Kash at (609) 777-0454 or email her at gkopkash@dep.state.nj.us for a model that has been approved by the Department.

- ☐ 17. Certify the proposed mitigation will not adversely affect properties, which are listed or are eligible for listing on the National Register of Historic Places. If the mitigator before or during the course of mitigation work encounters a probable historic property that has not been listed or determined eligible for listing on the National Register, but which may be eligible for listing on the National Register, the NY District shall immediately notify the Department and proceed as directed by the Department.

Proposal packages shall be submitted to:

New Jersey Department of Environmental Protection
Office of Dredging and Sediment Technology
P.O. Box 028
Trenton, New Jersey 08625-028
Attn: Suzanne Dietrick

mitcoastalchecklist4-03
last revised 4/03

COASTAL WETLAND MITIGATION CONDITIONS

1. The NY District shall complete and sign a Department approved conservation restriction for the mitigation site. The restriction shall be included on the deed, and recorded in the office of the County Clerk (the Registrar of Deeds and Mortgages in some counties), in the county wherein the lands of the mitigation project are located, within 10 days of approval of the wetland mitigation proposal.

2. The NY District shall notify the Department, in writing, at least thirty (30) days in advance of the start of construction of the wetland mitigation project for an on-site pre-construction meeting between the NY District, the contractor, the consultant and the Program.

3. The mitigation designer must be present during critical stages of construction of the mitigation project this includes but is not limited to herbicide applications, sub-grade inspection, final grade inspection, and planting inspection to ensure the intent of the mitigation design and their predicted wetland hydrology is realized in the landscape. Mitigation designs are not static documents and changes may be necessary to ensure success of the project. It shall be the prerogative of the mitigation consultant to make changes to the design should field conditions warrant such action.

4. Immediately following final grading of the site, a disc must be run over the site to eliminate compaction. The mitigation designer must be present to oversee this phase of the project and confirm with the Department this activity has occurred prior to planting of the site.

5. Immediately following the final grading of the mitigation site and prior to planting, the NY District shall notify the Department for a post-grading construction meeting between the NY District, contractor, consultant and the Department. The NY District must give the Program at least thirty (30) days notice prior to the date of this meeting.

6. Within 30 days following the final grading and planting of the mitigation project, the NY District shall submit a final report to the Department. The final report shall contain, at a minimum, the following information:

   a. A completed WETLAND MITIGATION PROJECT COMPLETION OF CONSTRUCTION FORM (attached) which certifies that the mitigation project has been constructed as designed and that the proposed area of wetland creation, restoration or enhancement has been accomplished;

   b. As built plans which depict final grade elevations at one foot contours and include a table of the species and quantities of vegetation that were planted including any grasses that may have been used for soil stabilization purposes;

   c. Show on the as-built plans that the boundaries of the wetland mitigation area has been visibly marked with 3 inch white PVC pipe extending 4 feet above the ground surface. The stakes must remain on the site for the entire monitoring period;

d. Photos of the constructed wetland mitigation project with a photo location map as well as the GPS waypoints in NJ state plane coordinates NAD 1983;

e. To document that the required amount of soil has been placed/replaced over the entire area of the mitigation site, provide a minimum of 6 soil profile descriptions to a depth of 20 inches. The location of each soil profile description should be depicted on the as built plan as well as provide the GPS waypoints in NJ state plane coordinates NAD 1983;

f. The NY District shall post the mitigation area with several permanent signs, which identify the site as a wetland mitigation project and that mowing, cutting, dumping and draining of the property is prohibited; and

g. The sign must also state the name of the site, a contact name and phone number.

7. If the Department determines that the mitigation project is not constructed in conformance with the approved plan, the NY District will be notified in writing and will have 60 days to submit a proposal to indicate how the project will be corrected.

8. The NY District shall monitor the mitigation project for 3 full growing seasons after the mitigation project has been constructed. The NY District shall submit monitoring reports to the Department no later than December 31st of each monitoring year (All monitoring report must include the standard items identified in the attachment and the information requested below).

9. All monitoring reports will include all the following information:

a. All monitoring reports except the final one must include documentation that it is anticipated, based on field data, that the goals of the wetland mitigation project including the transition area, as stated in the approved wetland mitigation proposal and the permit will be satisfied. If the NY District is finding problems with the mitigation project and does not anticipate the site will be a full success then recommendations on how to rectify the problems must be included in the report with a time frame in which they will be completed;

b. All monitoring reports except the final one must include field data to document that the site is progressing towards 85 percent survival and 85 percent area coverage of mitigation plantings or target hydrophytes (Target hydrophytes are non-invasive native species to the area and similar to ones identified on the mitigation planting plan). If the proposed plant community is a scrub/shrub or forested wetland or wetland buffer the NY District must also demonstrate each year with data that the woody species are thriving, increasing in stem density and height each year. If the field data shows that the mitigation project is failing to meet the vegetation survival, coverage and health goals, the monitoring report should contain a discussion of steps that will be taken to rectify the problem, including a schedule of implementation;

c. All monitoring reports except the final one must include documentation of any invasive or noxious species (see below for list of species) colonizing the site and how they are being eliminated. The NY District is required to eliminate either through hand-pulling, application of a pesticide or other Department approved method any

occurrence of an invasive/noxious species on the mitigation site during the monitoring period;

d. All monitoring reports except the final one must include documentation that demonstrates the proposed hydrologic regime as specified in the mitigation proposal appears to be met. If the NY District is finding problems with the mitigation project and does not anticipate the proposed hydrologic regime will be or has not been met then recommendations on how to rectify the problem must be included in the report along with a time frame within which it will be completed;

e. The final monitoring report must include documentation to demonstrate that the goals of the wetland mitigation project including the required wetland buffer, as stated in the approved wetland mitigation proposal and the permit, has been satisfied. Documentation for this report will also include a field wetland delineation of the wetland mitigation project based on techniques as specified in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989);

f. The final monitoring report must include documentation the site has an 85 percent survival and 85 percent area coverage of the mitigation plantings or target hydrophytes. The NY District must also document that all plant species are healthy and thriving and if the proposed plant community contains trees demonstrate that the trees are at least five feet in height;

g. The final monitoring report must include documentation demonstrating the site is less than 10 percent occupied by invasive or noxious species such as but not limited to *Phalaris arundinacea* (Reed canary grass), *Phragmities australis* (Common reed grass), *Pueraria lobata* (Kudzu), *Typha latifloia* (Broad-leaved cattail), *Typha angustifolia* (Narrowed leaved cattail), *Lythrum salicaria* (Purple loosestrife), *Ailanthus altissima* (Tree-of-heaven), *Berberis thunbergi* (Japanese barberry), *Berberis vulgaris* (Common barberry), *Elaeagnus angustifloia* (Russian olive), *Elaeagnus umbellata* (Autumn olive), *Ligustrum obtusifolium* (Japanese privet), *Ligustrum vulgare* (Common privet) and *Rosa multiforia* (Multiflora rose);

h. The final monitoring report must include documentation that demonstrates that the proposed hydrologic regime as specified in the mitigation proposal, which proves the mitigation site is a wetland has been satisfied. The documentation shall include when appropriate monitoring well data, tide gauge data, photographs and field observation notes collected throughout the monitoring period; and

10. Once the required monitoring period has expired and the NY District has submitted the final monitoring report, the Department will make the finding that the mitigation project is either a success or a failure. This mitigation project will be considered successful if the NY District demonstrates all of the following:

a. That the goals of the wetland mitigation project including acreage and the required wetland buffer, as stated in the approved wetland mitigation proposal and the permit, has been satisfied. The NY District must submit a field wetland delineation of the wetland mitigation project based on the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989) which shows the exact acreage of wetlands in the mitigation area;

b. The site has an 85 percent survival and 85 percent area coverage of the mitigation plantings or target hydrophytes which are species native to the area and similar to ones identified on the mitigation planting plan. All plant species in the mitigation area are healthy and thriving. All trees are at least five feet in height;

c. The site is less than 10 percent occupied by invasive or noxious species such as but not limited to *Phalaris arundinacea* (Reed canary grass), *Phragmities australis* (Common reed grass), *Pueraria montana* (Kudzu), *Typha latifloia* (Broad-leaved cattail), *Typha angustifolia* (Narrowed leaved cattail), *Lythrum salicaria* (Purple loosestrife), *Ailanthus altissima* (Tree-of-heaven), *Berberis thunbergi* (Japanese barberry), *Berberis vulgaris* (Common barberry), *Elaeagnus angustifloia* (Russian olive), *Elaeagnus umbellata* (Autumn olive), *Ligustrum obtusifolium* (Japanese privet), *Ligustrum vulgare* (Common privet) and *Rosa multiforia* (Multiflora rose); and,

d. The proposed hydrologic regime as specified in the mitigation proposal, which proves the mitigation site is a wetland has been satisfied.

11. If the mitigation project is considered a failure, the NY District is required to submit a revised mitigation plan to rectify the wetland mitigation site. The plan shall be submitted within 60 days of receipt of the letter from the Program indicating the wetland mitigation project was a failure. The financial surety, if required, will not be released by the Program until such time that the NY District satisfies the success criteria as stipulated in condition number 15.

12. The NY District shall assume all liability for accomplishing corrective work should the Department determine that the compensatory mitigation has not been 100% satisfactory. Remedial work may include re-grading and/or replanting the mitigation site. This responsibility is incumbent upon the NY District until such time that the Department makes the finding that the mitigation project is successful.

WETLAND MITIGATION PROJECT
COMPLETION OF CONSTRUCTION FORM

THE COMPLETION OF THIS FORM IS A REQUIREMENT OF THE NJDEP AUTHORIZATION OF A WETLAND MITIGATION PROJECT. THIRTY DAYS FOLLOWING THE COMPLETION OF CONSTRUCTION OF THE WETLAND MITIGATION PROJECT, COMPLETE THIS FORM AND INCLUDE IT WITH YOUR AS-BUILT MITIGATION REPORT. SEND ALL DOCUMENTS TO THE ADDRESS REFERENCED BELOW.

THE COMPLETION OF THIS FORM HEREBY CERTIFIES THAT I, _____,

_____

(PRINT NAME) (SIGNATURE) (DATE)

OF THE CONSULTING FIRM: _____ SUPERVISED THE CONSTRUCTION OF THE REFERENCED WETLAND/STATE OPEN WATER MITIGATION PROJECT. I WAS PRESENT DURING CRITICAL STAGES OF CONSTRUCTION TO CONFIRM THAT ALL CONDITIONS OF THE MITIGATION APPROVAL WERE ADHERED TO, THAT THE ANTICIPATED HYDROLOGY WAS ACHIEVED AND HEREBY CERTIFY THAT THE PROJECT WAS CONSTRUCTED IN CONFORMANCE WITH ALL NJDEP APPROVED PLANS AND SPECIFICATIONS CITED BELOW, INCLUDING FIELD ADJUSTMENTS AGREED UPON DURING ONSITE MEETINGS WITH NJDEP MITIGATION STAFF ON THE FOLLOWING DATES: _____.

PERMIT NUMBER (S) _____

ISSUANCE DATE _____

NAME OF PERMITTEE _____

PROJECT NAME _____

AS-BUILT SURVEY IS IDENTIFIED AS _____

_____

ADDRESS OF FIRM _____

_____

TELEPHONE # _____

E-MAIL ADDRESS _____

FAX # _____

SEND TO: STATE OF NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF DREDGING AND SEDIMENT TECHNOLOGY, P.O. BOX 028, TRENTON, NJ 08625, ATTN: ODST

NOTICE OF COMPLETION OF DREDGING

Date: _____

New Jersey Department of Environmental Protection
Office of Dredging and Sediment Technology
P.O. Box 028
401 East State Street
Trenton, NJ 08625

Attn: NJDEP, ODST, Project Manager FAX: (609) 777-1914

Re: NJDEP Permit No.
Insert project title:_____
Location of Dredging:_____

Dear Sir/Madam:

I hereby serve notice that the DREDGING allowed by the above referenced permit has been completed as of _____, 200__.

The dredged material was removed via mechanical____ or hydraulic____ dredging (check one).

The dredged material was/is being dewatered with discharge into _____.

The actual quantity of material dredged was _____cys. The dredged material was taken to:

8. _____ cys was taken to the Historic Area Remediation Site.
9. _____ cys used on site as per NJDEP Permit(s) #_____ _____(specify the type of permit(s)).
10. _____ cys was taken to _____ for beneficial reuse.
11. _____ cys was taken to_____ for disposal.
12. _____ cys was taken to_____ for beach nourishment.

_____
Signature of the Permittee

_____
Permittee's Name (Printed)

_____
Name of Permitted Agency/Entity

_____
Street Address

_____
City State ZIP

_____
Telephone

_____
Signature of the Contractor (if any)

_____
Contractor's Name (Printed)

_____
Name of Company

_____
Street Address

_____
City State ZIP

_____
Telephone

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 17 2010

Thomas J. Shea III, Acting Chief
Harbor Programs Branch
New York District, Corps of Engineers
Jacob K. Javits Federal Building
26 Federal Plaza
New York, New York 10278-0090

Re: FP64-SBB2-2010

Dear Mr. Shea,

This is in response to Puboic Notice FP64-SNB2-2010 dated February 3, 2010 regarding the upcoming dredging to be conducted as part of the New York and New Jersey Harbor Deepening Project. This contract will deepen select areas of the existing Newark Bay main stem and Arthur Kill federal navigation channels and also widen the existing South Elizabeth federal navigation channel. Dredged material will be disposed of at the Historic Area Remediation Site (HARS).

Endangered Species Act Comments
On October 13, 2000, a Biological Opinion (Opinion) was issued by NOAA's National Marine Fisheries Service (NMFS) to the New York District of the Army Corps of Engineers (ACOE) concerning impacts to listed sea turtles from the New York and New Jersey Harbor Deepening Projects. In this Opinion, NMFS concluded that the proposed action was likely to adversely affect but not likely to jeopardize the continued existence of listed sea turtles. The Opinion included an Incidental Take Statement (ITS) exempting the incidental take of two loggerhead, 1 green, 1 Kemp's ridely and 1 leatherback sea turtle for the initial dredging of Ambrose Channel. No incidental take was anticipated for the other areas to be dredged, including the areas to be dredged as part of the contract that is the subject of the current Public Notice. As the work to be conducted as part of this contract was considered in the 2000 Opinion, no additional consultation pursuant to Section 7 of the ESA is required.

Use of the HARS Disposal Site
Listed whales and sea turtles are likely to occur at the HARS disposal site and may occur along the transport route to the HARS site. The ACOE and the US Environmental Protection Agency (EPA) have previously conducted Section 7 consultation with NMFS on dredged material disposal operations at the HARS site. This consultation concluded with a July 30, 1997 letter from NMFS to the EPA as the lead action agency indicating that NMFS concurred with the EPA's determination that disposal operations at the HARS site, including transport of material from dredge sites to the HARS site, were not likely to adversely affect any listed species under our jurisdiction. As Section 7 consultation has previously been conducted on the disposal operation and no new information is available which changes the previous conclusion, no further consultation regarding the disposal of material at the HARS is necessary.

Candidate Species Technical Assistance

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are distributed along the entire East Coast of the United States and have been designated a Candidate Species by NMFS. In 2006, NMFS initiated a status review for Atlantic sturgeon to determine if listing as threatened or endangered under the ESA is warranted. The Status Review Report was published on February 23, 2007. NMFS is currently considering the information presented in the Status Review Report to determine if any listing action pursuant to the ESA is warranted at this time. If it is determined that listing is warranted, a final rule listing the species could be published within a year from the date of publication of the proposed rule. Currently, NMFS expects to publish a finding as to whether any listing action is appropriate by the Fall of 2010.

As a candidate species, Atlantic sturgeon receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on Atlantic sturgeon from any proposed project. At this time, NMFS requests that any interactions with Atlantic sturgeon be promptly reported to NMFS. A reporting sheet has been enclosed for your use. In the event of an observation or interaction with Atlantic sturgeon, photographs should be taken and this form should be filled out as completely as possible and returned to NMFS via fax ((978)281-9394). If an Atlantic sturgeon is killed during dredging operations, please instruct the dredge contractor to refrigerate or freeze the fish and contact Lynn Lankshear of my staff as soon as possible to discuss potential sampling and disposal procedures ((978)282-8473 or Lynn.Lankshear@noaa.gov). Should you have any questions regarding Atlantic sturgeon, please contact Ms. Lankshear at the above number or e-mail address.

Please note that once a species is proposed for listing the conference provisions of the ESA apply (see 50 CFR 402.10). As the listing status for Atlantic sturgeon may change, NMFS recommends that the ACOE obtain updated status information from NMFS prior to the commencement of the project. Additionally, should Atlantic sturgeon be listed, it may be necessary to reinitiate the 2000 Opinion to consider effects of the deepening project on Atlantic sturgeon.

We look forward to continuing to work cooperatively with you and your staff on dredging projects in the New York District. Should you have any questions regarding these comments, please contact Julie Crocker at (978)282-8480 or by e-mail (Julie.Crocker@noaa.gov).

Sincerely,

Mary A. Colligan
Assistant Regional Administrator
For Protected Resources

Enclosure

EC: Crocker, Lankshear – F/NER3

File Code: Sec 7 ACOE NY District – NY/NJ Harbor Deepening (2000 Opinion)

enclosure

STURGEON SALVAGE FORM

For use in documenting dead sturgeon in the wild under ESA permit no. 1614 (version 07-20-2009)

INVESTIGATORS'S CONTACT INFORMATION
Name: First _____ Last _____
Agency Affiliation _____ Email _____
Address _____
Area code/Phone number _____

UNIQUE IDENTIFIER (Assigned by NMFS)

DATE REPORTED:
Month ☐☐ Day ☐☐ Year 20☐☐
DATE EXAMINED:
Month ☐☐ Day ☐☐ Year 20☐☐

SPECIES: (check one)
- ☐ shortnose sturgeon
- ☐ Atlantic sturgeon
- ☐ Unidentified *Acipenser* species

Check "Unidentified" if uncertain.
See reverse side of this form for aid in identification.

LOCATION FOUND: ☐ Offshore (Atlantic or Gulf beach) ☐ Inshore (bay, river, sound, inlet, etc)
River/Body of Water _____ City _____ State ____
Descriptive location (be specific) _____
Latitude _____ N (Dec. Degrees) Longitude _____ W (Dec. Degrees)

CARCASS CONDITION at time examined: (check one)
- ☐ 1 = Fresh dead
- ☐ 2 = Moderately decomposed
- ☐ 3 = Severely decomposed
- ☐ 4 = Dried carcass
- ☐ 5 = Skeletal, scutes & cartilage

SEX:
- ☐ Undetermined
- ☐ Female ☐ Male

How was sex determined?
- ☐ Necropsy
- ☐ Eggs/milt present when pressed
- ☐ Borescope

MEASUREMENTS: circle unit

Fork length	_____	cm / in
Total length	_____	cm / in
Length ☐ actual ☐ estimate		
Mouth width (inside lips, see reverse side)	_____	cm / in
Interorbital width (see reverse side)	_____	cm / in
Weight ☐ actual ☐ estimate	_____	kg / lb

TAGS PRESENT? Examined for external tags including fin clips? ☐ Yes ☐ No Scanned for PIT tags? ☐ Yes ☐ No

Tag #	Tag Type	Location of tag on carcass

CARCASS DISPOSITION: (check one or more)
- ☐ 1 = Left where found
- ☐ 2 = Buried
- ☐ 3 = Collected for necropsy/salvage
- ☐ 4 = Frozen for later examination
- ☐ 5 = Other (describe) _____

Carcass Necropsied?
☐ Yes ☐ No
Date Necropsied: _____
Necropsy Lead: _____

PHOTODOCUMENTATION:
Photos/vide taken? ☐ Yes ☐ No
Disposition of Photos/Video: _____

SAMPLES COLLECTED? ☐ Yes ☐ No

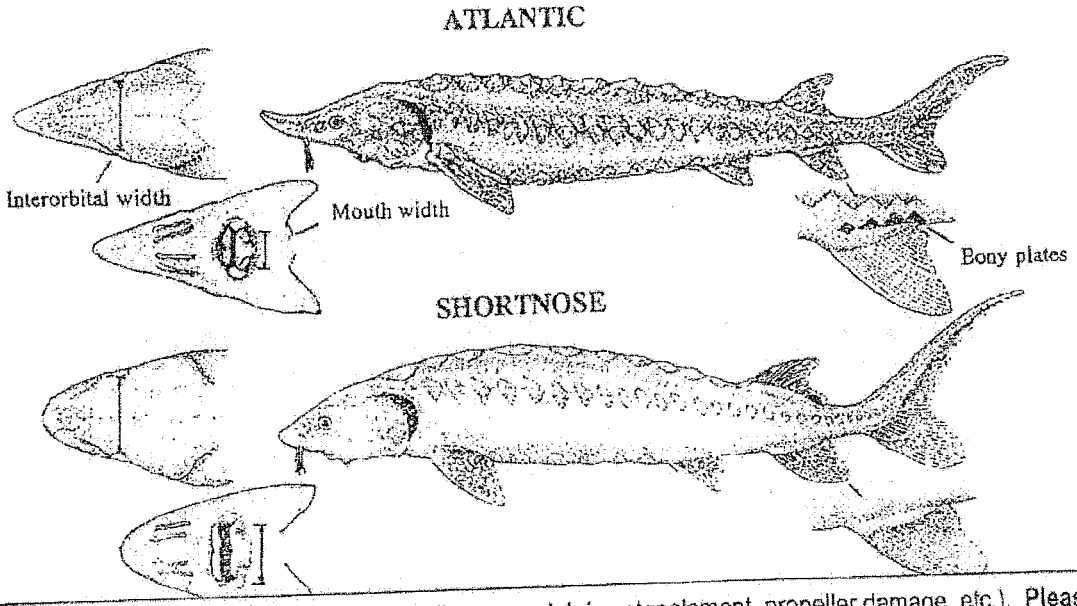
Sample	How preserved	Disposition (person, affiliation, use)

Comments:

Distinguishing Characteristics of Atlantic and Shortnose Sturgeon (version 07-20-2009)

Characteristic	Atlantic Sturgeon, *Acipenser oxyrinchus*	Shortnose Sturgeon, *Acipenser brevirostrum*
Maximum length	> 9 feet/ 274 cm	4 feet/ 122 cm
Mouth	Football shaped and small. Width inside lips < 55% of bony interorbital width	Wide and oval in shape. Width inside lips > 62% of bony interorbital width
*Pre-anal plates	Paired plates posterior to the rectum & anterior to the anal fin.	1-3 pre-anal plates almost always occurring as median structures (occurring singly)
Plates along the anal fin	Rhombic, bony plates found along the lateral base of the anal fin (see diagram below)	No plates along the base of anal fin
Habitat/Range	Anadromous; spawn in freshwater but primarily lead a marine existence	Freshwater amphidromous; found primarily in fresh water but does make some coastal migrations

* From Vecsei and Peterson, 2004



Describe any wounds / abnormalities (note tar or oil, gear or debris entanglement, propeller damage, etc.). **Please note if no wounds / abnormalities are found.**

Data Access Policy: Upon written request, information submitted to National Marine Fisheries Service (NOAA Fisheries) on this form will be released to the requestor provided that the requestor credit the collector of the information and NOAA Fisheries. NOAA Fisheries will notify the collector that these data have been requested and the intent of their use.

Submit completed forms (within 30 days of date of investigation) to: Jessica Pruden, Shortnose Sturgeon Recovery Coordinator, NOAA Fisheries Northeast Region, 55 Great Republic Drive, Gloucester, MA 01930 Phone: 978-282-8482; Fax: 978-281-9394; E-Mail: Jessica.Pruden@noaa.gov

Appendix E
Dredging Operations and Environmental Research (DORE) Program Technical Note: ERDC TN-DORE-E21

Silt Curtain Maintenance Plan

Table 2
Recommended Silt Curtain Specifications[1,2]

Parameter	Recommended Value
Skirt Depth	Up to 100 ft maximum allowing 1-2 ft clearance between skirt and bottom
Fabric	
Tensile strength grab	500 lb/in.
Tear strength strip 18 oz 22 oz	 320 lb – quiescent conditions 400 lb – medium to high current
Abrasion resistance	200 lb/in. tensile strength after abrasion
Material	Polyester
Coating	PVC
Weight	18-22 oz (depending on type of curtain design)
Seams	Heat sealed
Buoyancy	
Ratio	>5
Type	Solid, closed cell, and enclosed in a fabric pocket
Connector	Load transfer type – aluminum extrusion
Ballast	
Type	Noncorrosive galvanized chain
Weight	See Figures 16 and 17
Tension Member	
No current	Fabric only
Current (0.1-1.0 knots	Top or center tension, center tension provides slightly greater effective skirt depth

[1] In 2002, a 100-ft section of silt curtain with top tension member to the above specifications and a skirt depth of 5 ft could be purchased at an approximate cost of $1,100.00.

[2] Source: Elastic/American Marine, 401 Shearer Blvd., Cocoa, FL 32922 USA, Tel: 321-636-5783, Fax: 321-636-5787 E-mail: jpearce@elastec.com, www.elastec.com.

Table 3
Checklist for Selection and Application of Silt Curtains

1) **Pre-dredging Site Survey –**
   a) Have background conditions at the site been established? Y__N__N/A__
   b) Has the site been adequately characterized with respect to Y__N__N/A__
      i) Current velocity, water depth (relative to tidal range)? Y__N__N/A__
      ii) Bottom sediment types? Y__N __N/A__
      iii) Background levels of turbidity? Y__N __N/A__

(Sheet 1 of 4)

Table 3 (Continued)

2) Deployment –

a)	Have maximum surface currents over a tidal cycle (12 or 24 hr) been established first to determine types of deployment configurations that may be needed? Y__N	__N/A✓
b)	Have direction of current and water turbulence been defined?	Y__N__N/A✓
c)	Have the minimum water depths been established at the lowest low tide?	Y__N__N/A✓
d)	Has a minimum 0.5-m skirt depth been established between the lower edge of the skirt and the existing bottom of the disposal area at the lowest low tide during the operations?	Y__N✓N/A__
e)	Have the effects of fluid mud accumulation on water depth as well as the proposed schedule for moving the silt curtain to prevent burial been considered when selecting the curtain skirt depth? Y__N	✓N/A__
f)	Is the character of the bottom sediment/vegetation known? Y__N	__N/A✓
g)	Have traffic- and boat-generated waves been determined?	Y__N✓N/A__
h)	Are locations of launching ramps, crane services, etc. known?	Y__N__N/A✓
i)	Have deployment geometry and configurations been determined for the site? Y✓N	__N/A__
j)	Have curtain deployment lengths been established?	Y✓N__N/A__
k)	Have different anchor types been considered?	Y✓N__N/A__
l)	Have different curtain configurations been considered (e.g., U, V, circular, elliptical)? Y__N	__N/A✓

3) Silt Curtain Specifications –

a)	Does the lower edge of the silt curtain extend a minimum of 0.5 m from the bottom at lower tide? Y__N	✓N/A_
b)	Is skirt depth less than the recommended 3 m?	Y✓N__N/A__
c)	Has fabric material been selected (PVC or equivalent) with a minimum tensile strength of 525 N/m?	Y✓N__N/A__
d)	Has the fabric weight (minimum of 610 g/m^2 for low current conditions, and 746-g/m^2 for high current conditions) been designated?	Y✓N__N/A__
e)	Has a tear strength (min of 445 for 610-g fabric or 890 N for 746-g fabric been designated? Y✓N	__N/A__
f)	Has a tensile strength after abrasion (greater than 350 N/m) been designated? Y__N	__N/A✓
g)	Has a material been selected that is easily cleaned and resistant to marine growth, ultraviolet light, and mildew?	Y✓N__N/A__
h)	Are all fabric seams heat-sealed or equivalent? Y✓N	__N/A__
i)	Has flotation been designated as sections of solid, closed-cell, plastic foam flotation material sealed into a fabric pocket that provide a buoyancy ratio (buoyant force/curtain weight) greater than 5? Y__N	✓N/A__
j)	Is each flotation segment a minimum of 3 m in length so the curtain may be easily folded for storage or transport?	Y✓N__N/A__
k)	Do connectors in low currents (<0.1 knot) maintain adequate physical contact along the entire skirt joint?	Y✓N__N/A__

(Sheet 2 of 4)

Table 3 (Continued)

3) **Silt Curtain Specifications – (continued)**

l) Have aluminum extrusion (or equivalent) load-transfer connectors been designated for current velocities exceeding 0.1 knot? Y✓N__N/A__

m) Have non-corrosive ballast chains with a weight ranging from approximately 1.5 kg/m for a 1.5-m skirt depth up to 3.0 kg/m for a 3-m skirt depth been selected? Y✓N__N/A__

n) Are tension members used as follows:

i) Negligible current, no tension member? Y__N__N/A✓

ii) Current velocities between 0.1 and 1.0 knot? Y✓N__N/A__

iii) Galvanized or stainless steel wire rope as top or center tension member? Y✓N __N/A__

o) Have handholds been designated along the top of the curtain between the flotation segments for ease in handling? Y__N✓N/A__

p) Have repair kits been designated to patch minor tears in the fabric? Y✓N__N/A__

4) **Transportation –**

a) Have furls (lightweight straps or rope) been specified every 1 to 1.5 m from storage to unloading site? Y✓N __N/A__

b) Has curtain been specified to be compactly folded accordion style, packaged into large bundles, and carefully lifted into transportation vehicle? Y✓N __N/A__

c) Will curtains be unloaded like a string of sausages and connected in appropriate sections (up to 30 m) as they are played out of the vehicle? Y__N✓N/A__

d) Will curtains be towed by boat (traveling at 2 to 3 knots) to the deployment site? Y✓N __N/A__

e) Will the curtain be kept furled except near the end of the connectors until it has been deployed at the site? Y✓N__N/A__

5) **Mooring –**

a) Has the recommended mooring system consisting of an anchor, chain, an anchor rode (line or cable), and mooring and crown buoys been designated? Y✓N __N/A__

b) Has the anchor pattern been designated based on the curtain deployment geometry site conditions (e.g., from section joints every 30 m in a radial pattern and on both sides if the curtain is exposed to reversing tidal currents)? Y✓N__N/A__

c) Have sizes (e.g., ½ -inch etc.) of anchor lines and anchor weights (e.g., 4.5 kg for sandy bottoms and up to 34 kg for firm mud) been selected based on bottom conditions.? Y✓N__N/A__

(Sheet 3 of 4)

Table 3 (Concluded)

6) **Deployment Model –**

a) Has the length of time for deployment before reconfiguration or movement been determined based on accumulation of fluid mud inside the curtain relative to the deployment geometry, the discharge (filling) rate, and the initial bottom gap (i.e., the distance between the lower skirt edge and the bottom sediment at the beginning of the operation)? Y__N✓N/A__

b) Is the total length of the curtain available for the project adequate for the size of the enclosure? Y__N__N/A✓

7) **Maintenance –**

Has adequate attention been given to

a) Moving the curtain away from the turbidity sources just before the fluid mud layer reaches the lower edge of the skirt? Y__N__N/A✓

b) Replacing worn or broken anchor lines? Y✓N__N/A__

c) Maintaining the integrity of the curtain by repairing leaking connectors and / or tears in the curtain fabric? Y✓N __N/A__

d) Repairing tears in the flotation pocket with hand-type pop rivet gun and rivets? Y✓N __N/A__

e) Repairing moderate tears in skirts on land with vinyl/nylon repair kit and VINYLFIX or PVC glue? Y✓N__N/A__

f) Keeping one or two spare sections of curtain for immediate replacement of unrepairable sections onsite? Y✓N__N/A__

8) **Recovery –**

a) Will silt curtains be refurled after operations are completed? Y✓N__N/A__

b) Will anchor/mooring systems be recovered? Y✓N __N/A__

c) Will the curtains be returned to the launching site for repacking and subsequent storage? Y✓N __N/A__

9) **Monitoring –**

a) Have plans been made for monitoring during dredging operations? Y__N__N/A__

b) Will measurements of turbidity (NTU) and samples for TSS (mg/L) be taken on both sides of the silt curtain near the dredging operations and near any sensitive habitat? Y__N__N/A__

c) Will tide, wind, wave, and current measurements be made? Y__N__N/A__

d) Are there plans to monitor post-dredging operations with respect to limited measurements of current, tidal range, winds, turbidity (NTU) and samples for TSS (mg/L) for comparison with background conditions? Y__N__N/A__

(Sheet 4 of 4)

- In applications where the curtain will be extended to the bottom of the waterway in tidal or moving water conditions, a heavy woven permeable filter fabric or tide flaps should be designed into the curtain to relieve pressure on the curtain wall.
- In general, silt curtains should be used on slow to moderate currents, stable water levels, and relatively shallow water depths.

Contractor

DONJON MARINE CO., INC.

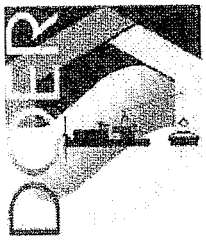
✓ Approved

Approved with corrections as noted on submittal data and/or attached sheets (s).

Signature:

Title: CQC Representative

Date: 1/14/2011



ERDC TN-DOER-E21
September 2005

Silt Curtains as a Dredging Project Management Practice

INTRODUCTION: Environmental windows are im posed on m any U.S. Army Corps of Engineers (USACE) dredging projec ts in bo th coastal and inland water ways. Over 83 prote cted or sensitive species that have been identified fall into at least 20 general categories of concern for potentially negative impacts from dredging and disposal operations. One of the m ost frequently cited reasons for establishing an environmental window is impacts from turbidity and suspended sediments (Reine, Dickerson, and Cl arke 1998). Over the past 15 to 20 years there have also been increased concerns regarding the potential impacts that dredging of contaminated sediments may have on nearby environmental resources.

In response to the need to prot ect sensitive environm ental resour ces, silt or turbidity curtains have been designated a "best m anagement prac tice (BMP)" by the Corps of Engineers, other Federal Agencies, and state regulatory autho rities. Silt curtains are dev ices that contro l suspended solids and turbidity in the water colum n generated by dredging and disposal of dredged material. Consequently, silt curtains are considered an integral and necessary part of the regulatory strategy for m any dr edging projects. Unfortunatel y, factors contributing to the effectiveness of silt cu rtains und er different circum stances are poorly understood by dredging project regulators and the public alike. Dredging contractors attest to the f act th at, in th eir experience, silt curtains do not work under many of the site conditions encountered in navigation and environm ental dredging projects. The pub lished literature contains few comprehensive studies that dem onstrate how eff ective silt curtains have been in m eeting the inten ded project objectives (Johanson 1976, 1977; JBF Scientific Co rporation 1978; Lawler, Matusky and Skelly Engineers 1983).

One goal of the Dredging Operations and Envi ronmental Research (DOER) Program is to provide current, accurate techni cal guidance on environm ental controls for dredging operations. Remaining challenges include rigorous exam ination of silt or turbidity curtains as a tem porary control m easure to better define perform ance criteria and identif ication of technica l guide lines for their selection and use in navigation and environmental dredging projects.

PURPOSE: This tech nical note re views the basic type s of silt curtain s used in navigation and environmental dredging projects. The em phasis is on the state of the pr actice and circumstances under which silt curtains function be st. A checklist is provided to aid in consideration of silt curtain applications, including selection, design, specifications, deployment, and maintenance of silt curtains at dredging pr ojects. This note also serves to update and supplem ent earlier guidance (e.g., Johanson 1977 and JBF Scientif ic Corporation (19 78)) published on the application and performance of silt curtains.

DEFINITIONS: Silt curtains, turbidity screens, silt/turbidity barriers, gunderbooms, etc., are not to be confused with silt fences used in terrestrial control of soil erosion. Silt curtains are designed specifically to control suspended solids and turbidity generated in the water column as a result of navigation and environmental dredging operations. Silt and turbidity control devices have many names that have been used interchangeably by the Corps of Engineers, the U.S. Environmental Protection Agency (USEPA), various State regulatory agencies, dredging contractors, consultants, and manufacturers and suppliers. The following terminology represents common usage:

- *Silt* is defined as fine-grained suspended material that can be readily resuspended or stripped from sediment that is either being hydraulically or mechanically dredged from or placed in the water. Resuspended matter is generally measured gravimetrically and expressed as Total Suspended Solids (TSS) in milligrams per liter.
- *Turbidity* is a measure of the *optical properties* (amount of scattering and absorption of light rays) of the water in which dredging and dredged material disposal occur. Turbidity is frequently expressed in Nephelometric Turbidity Units (NTU).
- A *Silt/Turbidity Curtain* has traditionally been defined as an *impermeable* device for control of suspended solids and turbidity in the water column generated by dredging and dredged material disposal operations. Recently, the term "silt curtain" has been used to describe floating vertical barriers fabricated from either solid or permeable materials.
- A *Silt/Turbidity Screen* is a *flow-through filtering* device for control of suspended material and turbidity in the water column generated by dredging and dredged material disposal operations. All screens are composites of solid material (usually to facilitate flotation and mooring purposes) and permeable geosynthetic fabrics to filter water and reduce water pressure on the device.
- A *Gunderboom* is a device similar to a silt or turbidity screen that has been modified to control oil spills by adding adsorbent geotextile material.

For the purposes of this technical note, the term "*silt curtain*" will be used generically to describe devices deployed in water to control suspended solids or turbidity resulting from dredging operations.

TYPICAL QUESTIONS ON SELECTION AND USE OF SILT CURTAINS

What Are the Components of Silt Curtains? Silt curtains are vertical, flexible structures that extend downward from the water surface to a specified water depth. Typically fabricated of flexible, polyester-reinforced thermoplastic (vinyl) fabric, the curtain is maintained in a vertical position by flotation material at the top and a ballast chain along the bottom (Figure 1).

A tension cable is often built into the curtain immediately above or just below the flotation segments (top tension) to absorb stresses imposed by currents and hydrodynamic turbulence. The curtains are usually manufactured in standard sections (e.g., up to 50 ft) that can be joined together at a particular site to provide a curtain of specified length. Curtains are generally deployed to extend to 1-2 ft above the bottom to allow mudflow to pass beneath them. Anchored

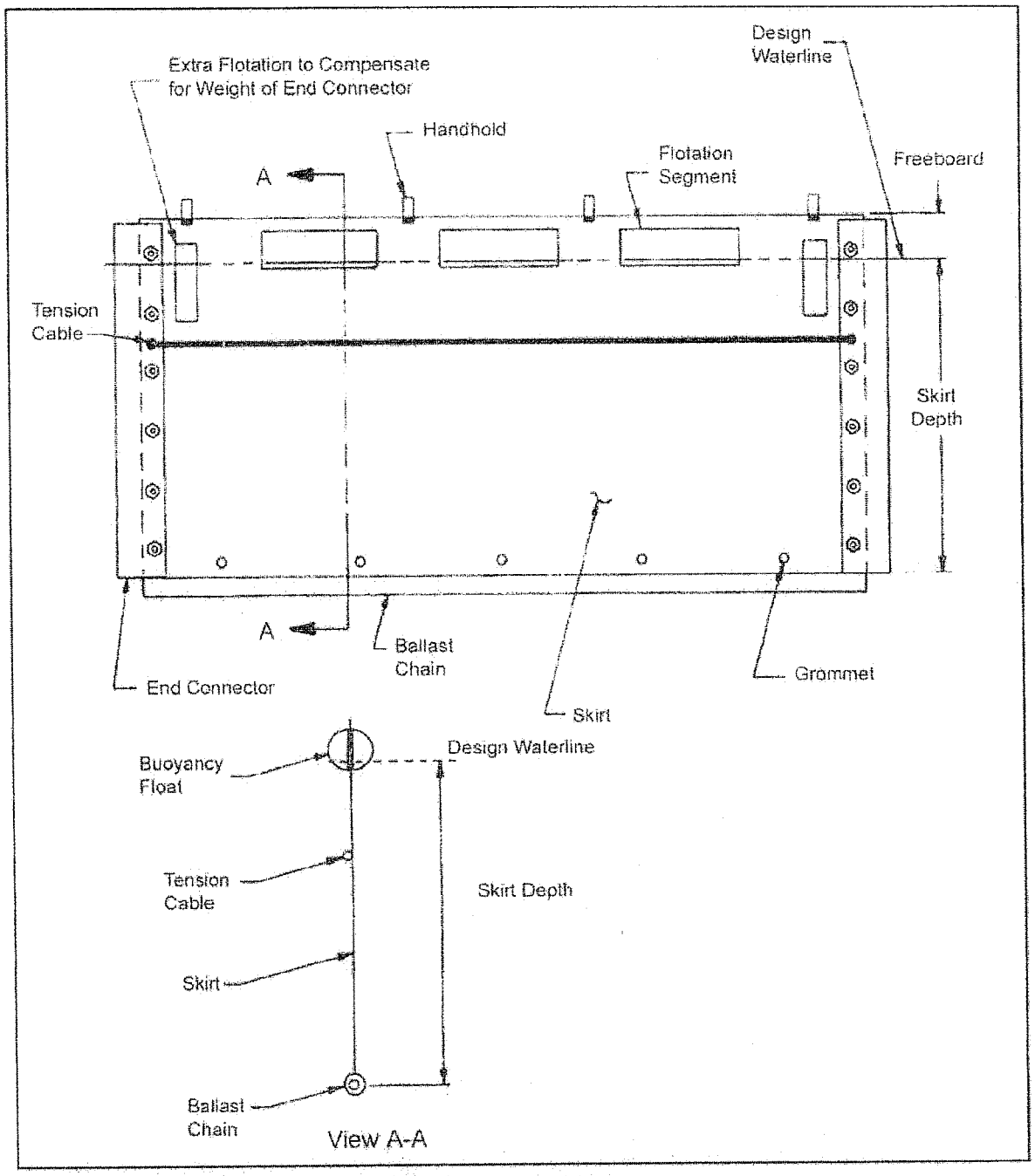


Figure 1. Construction of a typical silt curtain section (JBF Scientific Corporation (1978))

lines hold the curtain in a deployed configuration that can be U- or V-shaped, or circular or elliptical, depending upon the application.

What Are the Functions of Silt Curtains? Silt curtains are designed to contain or deflect suspended sediments or turbidity in the water column. Sediment containment within a limited

area is intended to provide residence time to allow soil particles to settle out of suspension and reduce flow to other areas where negative impacts could occur. Suspended solids can also conceivably be diverted from areas where environmental damages could occur from the settlement of these suspended particles. Silt curtains may also be used to protect specific areas (e.g., sensitive habitats, water intakes, or recreational areas) from suspended sediment and particle-associated contamination.

What Processes Affect Silt Curtains? In many cases where silt curtains are used, the concentration of fine-grained suspended solids inside the curtain enclosure may be relatively high (i.e., in excess of 1 g/L). The suspended material may be composed of relatively large, rapidly settling particles or flocs. In the case of a typical pipeline disposal operation surrounded by a silt curtain (Figure 2), where suspended solid concentrations are high and material usually flocculated, the vast majority (95 percent) of the fine-grained material descends rapidly to the bottom where it forms a fluid mud layer that slopes away from the source at an approximate gradient of 1:200. The other 5 percent of the material remains suspended in the water column above the fluid mud layer and is responsible for the turbid appearance of the water inside the curtain. While the curtain provides an enclosure where some of the fine-grained material may flocculate and/or settle, most of this fine-grained suspended material in the water column escapes with the flow of water and fluid mud under the curtain. The silt curtain does not indefinitely contain turbid water but instead controls the dispersion of turbid water by diverting the flow under the curtain, thereby minimizing the turbidity in the water column outside the silt curtain.

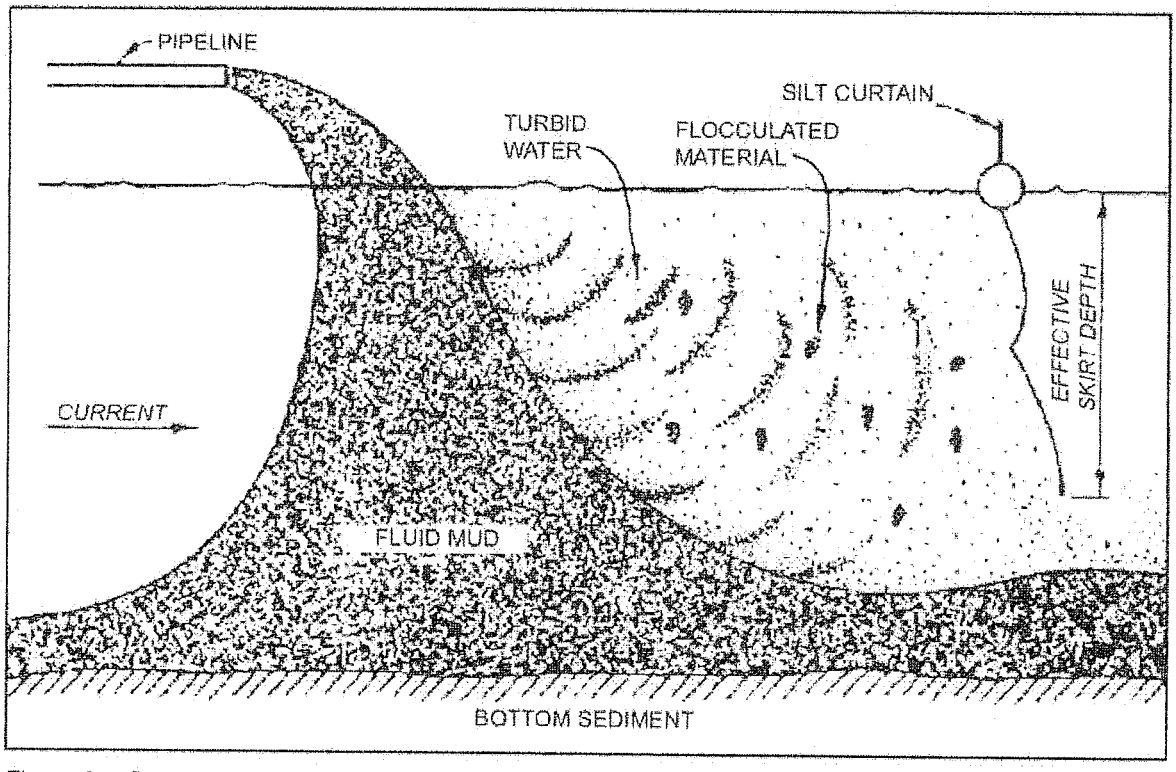


Figure 2. Processes affecting silt curtain performance (JBF Scientific Corporation (1976))

Whereas properly deployed and maintained silt curtains can effectively control the distribution of turbid water, they are not designed to contain or control fluid mud. In fact, when the accumulation of fluid mud reaches the depth of the ballast chain along the lower edge of the skirt, the curtain must be moved away from the discharge; otherwise sediment accumulation on the lower edge of the skirt can pull the curtain underwater and eventually bury it. Consequently, the rate of fluid mud accumulation relative to changes in water depth due to tides must be considered during a silt curtain operation.

How Are Silt Curtains Deployed? After the deployment site has been surveyed, the geometry of the deployed curtain should be determined based on the objectives of silt curtain application, the hydrodynamic regime at the project site, and factors such as boat traffic. Typical deployment configurations for silt curtains are shown in Figure 3. In some cases, the curtain may be deployed in an open-water environment in the form of a "maze," a semicircle or U, or a circle or ellipse.

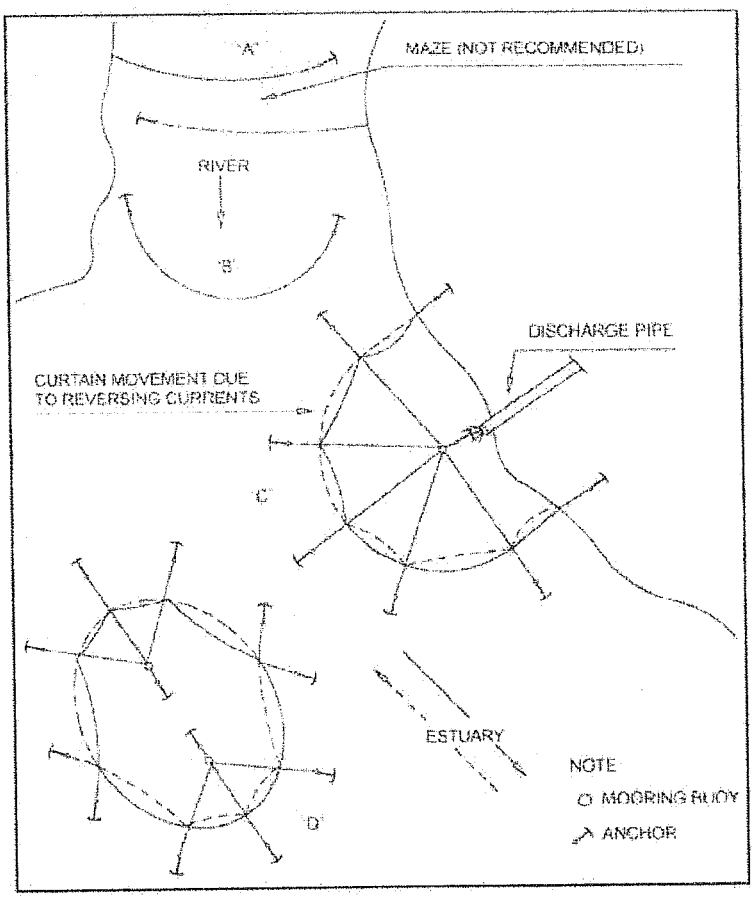


Figure 3. Typical silt curtain deployment configurations (JBF Scientific Corporation (1978))

The maze configuration ("A," Figure 3) has been used on rivers where boat traffic is present, but appears to be relatively ineffective due to direct flow through the aperture between the curtain sections. On a river where the current does not reverse, a U configuration ("B," Figure 3) is acceptable, but the distance between the anchored ends of the curtain (i.e., across the gap) should be large enough to prevent leakage of turbid water around the ends of the U. In situations where the turbid water is being generated by effluent from a containment area or a pipeline disposal operation close to the shoreline, the curtain can be anchored in a semicircular or U configuration ("C," Figure 3) with the ends of the curtain anchored onshore approximately equidistant from the discharge point. In a tidal situation with reversing currents a circular or elliptical configuration ("D," Figure 3) is necessary. This latter case requires a more extensive mooring system. A typical curtain might be 500 to 1500 ft for the U or semicircular configurations and 1000 to 3000 ft for the circular/elliptical case. Figure 4 shows a single floating silt curtain being deployed from a pier.

What Types of Silt Curtains Are Commercially Available for Silt Curtains? Many types of commercially available silt curtains are manufactured to perform specific functions. Names given by the manufacturers to describe the silt curtains include "floating," "floating diversion baffle," "fixed hanging," "permeable," "standing," "frame," "sinkable hanging," and "combination." Other names refer to the type of water or current where the curtain will be used (e.g., slack, slow, medium, fast, rough, tidal, etc.).

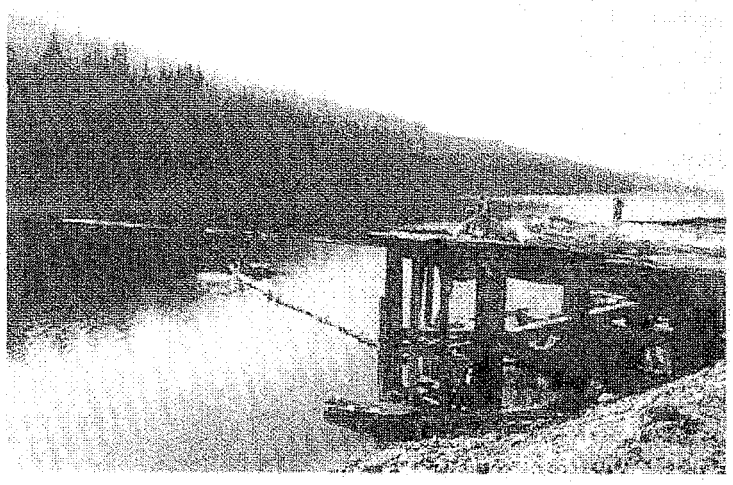


Figure 4. Single flotation silt curtain being deployed from shoreline (Courtesy of Marke Wilkie, Elastec/ American Marine, Inc., 401 Shearer Blvd., Cocoa, FL 32922)

Typical silt curtain types are shown in Figures 5 and 6. Most silt curtains incorporate the following common specification components:

- Flotation or buoyancy (e.g., solid or compressed air).
- Skirt depth (height between the top boom and the curtain bottom).
- Fabric (e.g., tensile strength, tear strength, abrasion resistance, material, coating, weight, seams/seals, drains, and color—bright yellow or international orange are recommended).
- Connectors (e.g., lace, bolt through, ASTM universal, PVC slotted tube, hook and O-ring).
- Ballast (e.g., type and weight).
- Tension member or load line (i.e., upper, mid, or bottom).

What Is Known about the Effectiveness of Silt Curtains? Silt curtains have been evaluated since the early 1970's. One of the most definitive early studies on the functional capabilities and performance of silt curtains in the United States was completed by JBF Scientific Corporation (1978) during the Corps of Engineers' Dredged Material Research Program. The study consisted of evaluating past and present uses, effectiveness of various applications, deployment guidelines and specifications, deployment methods, and environmental conditions that might limit the use of silt curtains. Much of the technical guidance presented in the study report is still valid and represents a fundamental source of information currently used by silt curtain design practitioners. Summarizing the JBF Scientific Corporation study, silt curtain effectiveness depends on many factors such as:

- Nature of the operation (i.e., navigation or environmental dredging).
- Quantity and type of material in suspension within or upstream of the curtain (including debris, oils, and chemicals).
- Characteristics, construction, and condition of the curtain as well as the area and configuration of the barrier enclosure (e.g., partial or full depth containment, either solid or permeable).

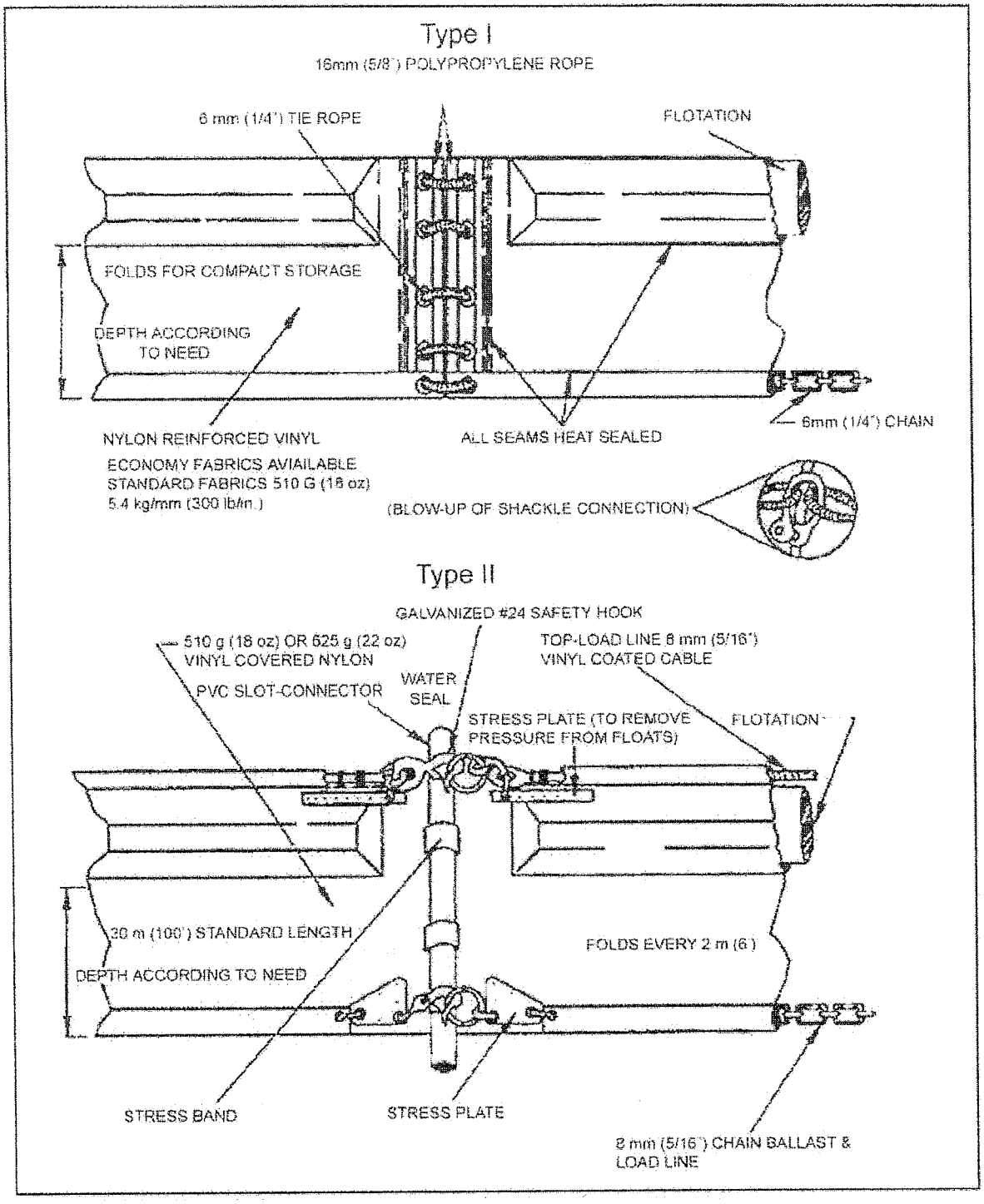


Figure 5. Types I and II silt curtains (USACE EP 1110-1-16, Appendix C, BMP-27, page C-167)

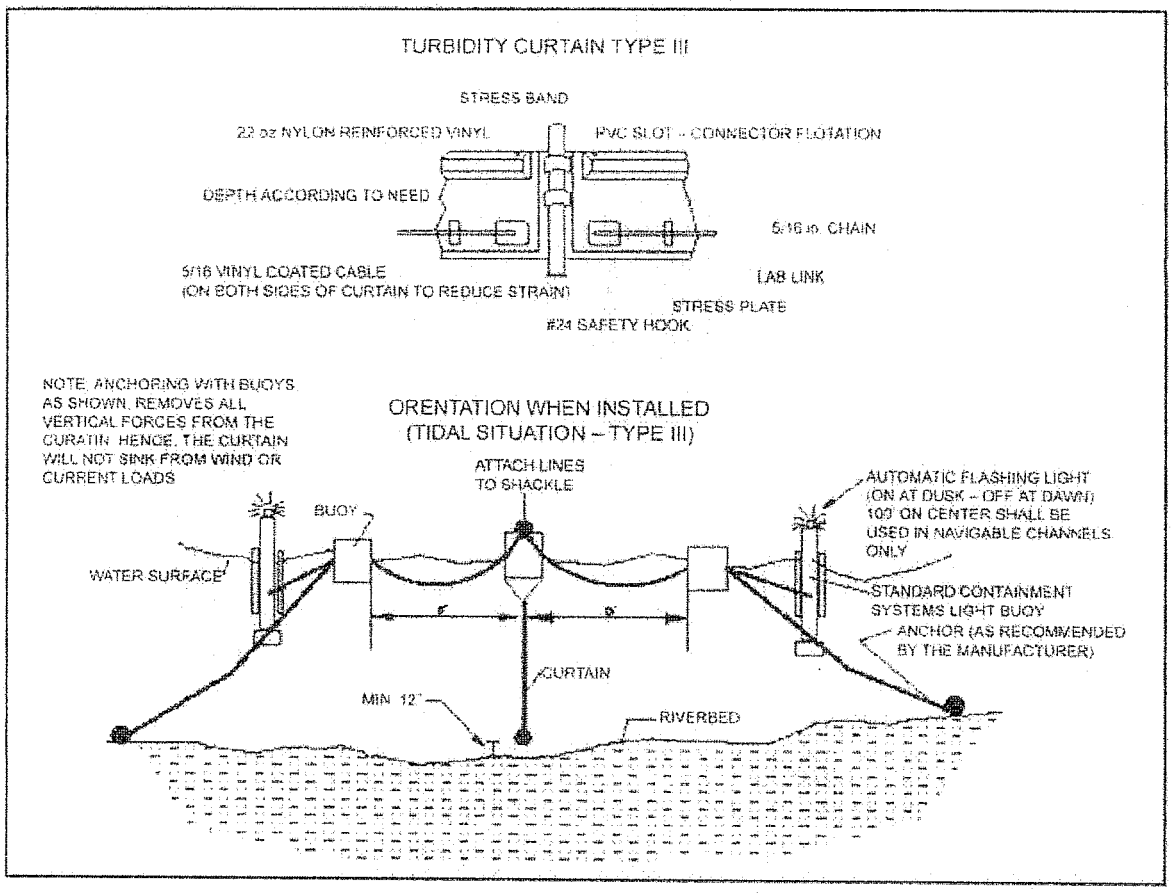


Figure 6. Type III silt curtain (USACE EP 1110-1-16, Appendix C, BMP-27, page C-167)

- Method of deployment.
- Hydrodynamic conditions (e.g., strong currents [>1 knot or 1.5 fps], high winds [especially with long f etch areas], flu etuating w ater levels [i.e., tides], excessive wave height including ship wakes, and drifting debris and ice).

Figure 7 shows a silt curta in installation in San F rancisco Bay during a moderate squall.

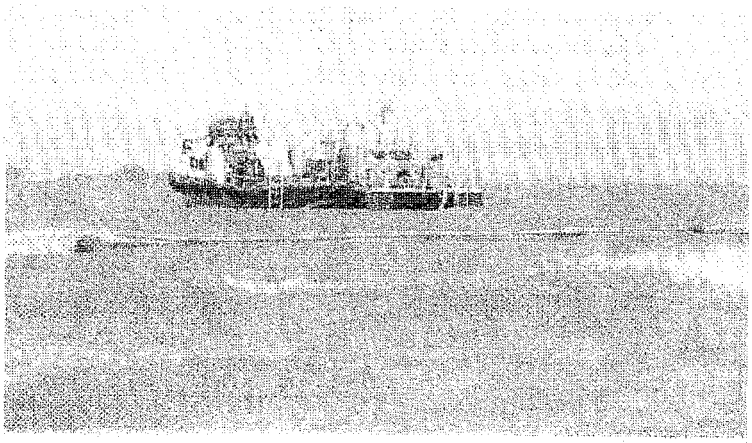


Figure 7. Floating curtain deployed in San Francisco Bay (courtesy of Julie Kistle, KFM-Joint Venture, San Francisco-Oakland Bay Bridge East Span Skyway Project Turbidity Monitoring Project)

JBF Scientific Corporation (1978) defined effectiveness as "the degree of turbidity reduction outside the curtain relative to the turbidity levels inside the curtain enclosure." They also concluded that:

> In some cases, turbidity levels in the water column outside the curtain can be 80-90 percent lower than levels inside or up-current of the curtain enclosure. High current and energy environments cause silt curtains to flare, thus reducing the curtain's effective depth. At a current of 1 knot, the effective skirt depth of a 1.5-m curtain is approximately 0.9 m. Increased turbulence around the curtain also tends to cause resuspension of the fluid mud layer and may cause increased turbidity levels in the upper water column beyond the curtain. Tidal currents that dominate the hydrodynamic regime may cause the fluid mud to be resuspended, especially if the curtain is not properly deployed. Frequently, changes in the direction of the current will dominate the direction and movement (flapping) of an improperly anchored curtain. Where anchoring is inadequate and particularly at sites where tidal currents dominate the hydrodynamic regime and probably cause resuspension of the fluid mud as the curtain sweeps back and forth over the fluid mud with changes in the direction of the tidal currents, the turbidity levels outside the curtain can be higher (as much as 10 times) than the levels inside the curtain.

Finally, JBF Scientific Corporation (1978) stated, "With respect to overall effectiveness and deployment considerations a current velocity of approximately 1 knot appears to be a practical limiting condition for silt curtain use."

In preparation for the construction of the Westway interstate highway in New York, a test program was established to determine the effectiveness and deployment configurations needed for the dredging activities associated with the highway construction project. Lawler, Matusky, and Skelly Engineers (1983) reported the results of the water quality tests performed on the prototype silt curtains used in the test program. They concluded, "Visual observations and field measurements showed the silt curtain to be an effective barrier to currents, dye, suspended solids, and turbidity. The curtain did not function as a permeable fabric as predicted; water appeared to flow around it rather than through it." The silt curtain contained most contaminants with the exception of ammonia. Mixing outside the curtain in the water column brought the levels down to background levels. Lawler, Matusky, and Skelly Engineers also concluded, "The low currents measured behind the curtain indicated that the curtain blocks flow patterns and creates a quiescent zone. The lack of flow through the curtain is probably attributable to the water taking the path of least resistance (i.e., under the piers or around the ends). Clogging of the curtain with suspended solids (either background or caused by dredging) would only aggravate this situation." At the time, the concept of enclosing a dredge was new and untested. Notably, a concern arose that enclosing the dredge with a silt curtain would create a settling basin for solids that could promote the concentration and release of oxygen-consuming suspended contaminants in violation of water quality standards. The exchange of water inside the curtain became a design topic and relief panels (flaps) were considered to allow a 25-percent exchange of basin volume over a 12-hr period.

In 1994, the USEPA published a remediation guidance document as part of the Assessment and Remediation of Contaminated Sediments (ARCS) Program (USEPA 1994). They concluded, "As a generalization, silt curtains and screens are most effective in relatively shallow quiescent water. As the water depth increases and turbulence caused by currents and waves increases, it

becomes increasingly difficult to effectively isolate the dredging operation from the ambient water. The St. Lawrence Centre (1993) advises against the use of silt curtains in water deeper than 6.5 m or in currents greater than 50 cm/sec (USEPA 1994)."

The USEPA also suggested that to be effective, curtains deployed around the remediation dredging operation must remain in place until the operation is completed at that site. For large projects, frequent relocation of the curtains may be necessary as the dredge moves to new areas. The USEPA also highlighted the fact that curtains should not impede navigation traffic, an important consideration during their deployment.

What Information Is Available on Selection, Design, Specification, and Deployment of Silt Curtains? Several types of guidelines are used to select, design, and deploy silt curtains for dredging projects. Guidelines available for silt curtains are contained in several technical and regulatory resource documents. Table 1 is a listing of technical guidelines and best management practices. Typically, topics covered include planning considerations (site-specific project conditions), design criteria, construction specifications (curtains and other materials), installation or deployment, removal, and maintenance. A notable exception is monitoring of curtain performance.

Selecting which guide or best management practice to follow depends on particular project requirements, site locations, and the type of silt curtain specification needed (i.e., performance of product). Table 2 is an example of the minimum recommended specification for a silt curtain (originally developed by JBF Scientific Corporation (1978)) that has been updated by a silt curtain manufacturer to reflect 2002 conditions.

What Should Be Done to Properly Select and Use a Silt Curtain? Table 3 is a checklist for selecting and applying silt curtains. The purpose of the checklist is to prompt the designer or reviewer to consider various critical aspects of selection, designation, and installation of silt curtains for typical dredging projects. However, the checklist should be considered as an aid and not be used as a specification requirement. The selection and use of silt curtains is extremely site-specific and requires both knowledge and practical experience for successful applications.

What Are Some "Lessons learned" Regarding Selection, Design, and Deployments of Silt Curtains? Silt curtains should be selected, designed, and installed to meet permit and water quality certification requirements where applicable.

- Very few silt curtain applications are alike. Each is unique and requires site-specific application and adaptation.
- Silt curtains should be designed to pass water either under or through their walls. Curtains are designed to confine suspended sediment and to allow it to settle or be filtered, not to impede the movement of water.

Table 1
Sources of Technical Guidelines on Silt Curtains

Source	Reference
Technical Reports	
US Army Corps of Engineers Exchange Bulletin Article	JBF Scientific Corporation. 1977. "Application and Performance of Silt Curtains," DMRP Work Unit 6C06. Dredged Material Research Exchange Bulletin Article - Vol. D-77-10, pp. 2-8.
Technical Report D-78-39	JBF Scientific Corporation. 1978. "An Analysis of the Functional Capabilities and Performance of Silt Curtains." Prepared for U.S. Army Engineer Waterways Experiment Station, Technical Report D-78-39. NTIS No. AD-A060 382
Manuals	
EM 1110-2-5025	USACE, "Dredging and Dredged Material Disposal," March 1983. p. 3-34
EM 1110-2-1614, 30 Jun 95	USACE, "Design of Coastal Revetments, Seawalls and Bulkheads," Chapter 6, Environmental Impacts, 6-3. Water Quality Impacts
EPA 905-B94-003	USEPA, "Great Lakes Contaminated Sediments: ARCS Remediation Guidance Document- Chapter 4 [EPA-905-B94-003]
Army TM 5-818-8/Air Force AFJMAN 32-1030-July 20, 1995	CEMP, "Engineering Use of Geotextiles," 20 Jul 95
Best Management Practices	
Section 404 (b)(1) Guidelines	Part 230.73: Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Subpart H. Actions to Minimize Adverse Effects –Actions affecting the method of dispersion.
BMP – Turbidity Curtains	King County Courthouse, 516 Third Avenue, Seattle, WA 98104
EMP No. 0-16	AAPA, "Environmental Management Practices Activity: Dredging and Dredge Material Disposal (EMP No. 0-16)
Manufacturer's Guide	
Turbidity Curtain Selection Guide	Elasted/American Marine, Inc., 401 Shearer Blvd., Cocoa, Florida 32922
Turbidity Barrier Guide	ABBCO/American Boom & Barrier Corp., 7077 N. Atlantic Avenue Cape Canaveral, Florida 32920
Turbidity Screens	Section IV-6 - Final Construction and Contract Specifications, New Cut Dune/Marsh Restoration Project, Federal Project No TE-37, Terrebonne Parish, Louisiana, June 2001

Table 2
Recommended Silt Curtain Specifications[1,2]

Parameter	Recommended Value
Skirt Depth	Up to 100 ft maximum allowing 1-2 ft clearance between skirt and bottom
Fabric	
Tensile strength grab	500 lb/in.
Tear strength strip 18 oz 22 oz	 320 lb – quiescent conditions 400 lb – medium to high current
Abrasion resistance	200 lb/in. tensile strength after abrasion
Material	Polyester
Coating	PVC
Weight	18-22 oz (depending on type of curtain design)
Seams	Heat sealed
Buoyancy	
Ratio	>5
Type	Solid, closed cell, and enclosed in a fabric pocket
Connector	Load transfer type – aluminum extrusion
Ballast	
Type	Noncorrosive galvanized chain
Weight	See Figures 16 and 17
Tension Member	
No current	Fabric only
Current (0.1-1.0 knots	Top or center tension, center tension provides slightly greater effective skirt depth

[1] In 2002, a 100-ft section of silt curtain with top tension member to the above specifications and a skirt depth of 5 ft could be purchased at an approximate cost of $1,100.00.

[2] Source: Elastic/American Marine, 401 Shearer Blvd., Cocoa, FL 32922 USA, Tel: 321-636-5783, Fax: 321-636-5787, E-mail: jpearce@vlastec.com, www.elastec.com.

Table 3
Checklist for Selection and Application of Silt Curtains

1) **Pre-dredging Site Survey –**
   a) Have background conditions at the site been established? Y__N__N/A__
   b) Has the site been adequately characterized with respect to Y__N__N/A__
      i) Current velocity, water depth (relative to tidal range)? Y__N__N/A__
      ii) Bottom sediment types? Y__N __N/A__
      iii) Background levels of turbidity? Y__N __N/A__

(Sheet 1 of 4)

Table 3 (Continued)

2) **Deployment –**

a) Have maximum surface currents over a tidal cycle (12 or 24 hr) been established first to determine types of deployment configurations that may be needed? Y__N __N/A__

b) Have direction of current and water turbulence been defined? Y__N__N/A__

c) Have the minimum water depths been established at the lowest low tide? Y__N__N/A__

d) Has a minimum 0.6-m skirt depth been established between the lower edge of the skirt and the existing bottom of the disposal area at the lowest low tide during the operations? Y__N__N/A__

e) Have the effects of fluid mud accumulation on water depth as well as the proposed schedule for moving the silt curtain to prevent burial been considered when selecting the curtain skirt depth? Y__N __N/A__

f) Is the character of the bottom sediment/vegetation known? Y__N __N/A__

g) Have traffic- and boat-generated waves been determined? Y__N__N/A__

h) Are locations of launching ramps, crane services, etc. known? Y__N__N/A__

i) Have deployment geometry and configurations been determined for the site? Y__N __N/A__

j) Have curtain deployment lengths been established? Y__N__N/A__

k) Have different anchor types been considered? Y__N__N/A__

l) Have different curtain configurations been considered (e.g., U, V, circular, elliptical)? Y__N __N/A__

3) **Silt Curtain Specifications –**

a) Does the lower edge of the silt curtain extend a minimum of 0.5 m from the bottom at lower tide? Y__N __N/A_

b) Is skirt depth less than the recommended 3 m? Y__N__N/A__

c) Has fabric material been selected (PVC or equivalent) with a minimum tensile strength of 525 N/m? Y__N__N/A__

d) Has the fabric weight (minimum of 610 g/m^2 for low current conditions, and 746-g/m^2 for high current conditions) been designated? Y__N__N/A__

e) Has a tear strength (min of 445 for 610-g fabric or 890 N for 746-g fabric been designated? Y__N __N/A__

f) Has a tensile strength after abrasion (greater than 350 N/m) been designated? Y__N __N/A__

g) Has a material been selected that is easily cleaned and resistant to marine growth, ultraviolet light, and mildew? Y__N__N/A__

h) Are all fabric seams heat-sealed or equivalent? Y__N __N/A__

i) Has flotation been designated as sections of solid, closed-cell, plastic foam flotation material sealed into a fabric pocket that provide a buoyancy ratio (buoyant force/curtain weight) greater than 5? Y__N __N/A__

j) Is each flotation segment a minimum of 3 m in length so the curtain may be easily folded for storage or transport? Y__N__N/A__

k) Do connectors in low currents (<0.1 knot) maintain adequate physical contact along the entire skirt joint? Y__N__N/A__

(Sheet 2 of 4)

Table 3 (Continued)

3) **Silt Curtain Specifications – (continued)**

l) Have aluminum extrusion (or equivalent) load-transfer connectors been designated for current velocities exceeding 0.1 knot? Y__N__N/A__

m) Have non-corrosive ballast chains with a weight ranging from approximately 1.5 kg/m for a 1.5-m skirt depth up to 3.0 kg/m for a 3-m skirt depth been selected? Y__N__N/A__

n) Are tension members used as follows:

i) Negligible current: no tension member? Y__N__N/A__

ii) Current velocities between 0.1 and 1.0 knot? Y__N__N/A__

iii) Galvanized or stainless steel wire rope as top or center tension member? Y__N __N/A__

o) Have handholds been designated along the top of the curtain between the flotation segments for ease in handling? Y__N__N/A__

p) Have repair kits been designated to patch minor tears in the fabric? Y__N__N/A__

4) **Transportation –**

a) Have furls (lightweight straps or rope) been specified every 1 to 1.5 m from storage to unloading site? Y__N __N/A__

b) Has curtain been specified to be compactly folded accordion style, packaged into large bundles, and carefully lifted into transportation vehicle? Y__N __N/A__

c) Will curtains be unloaded like a string of sausages and connected in appropriate sections (up to 30 m) as they are played out of the vehicle? Y__N__N/A__

d) Will curtains be towed by boat (traveling at 2 to 3 knots) to the deployment site? Y__N __N/A__

e) Will the curtain be kept furled except near the end of the connectors until it has been deployed at the site? Y__N__N/A__

5) **Mooring –**

a) Has the recommended mooring system consisting of an anchor, chain, an anchor rode (line or cable), and mooring and crown buoys been designated? Y__N __N/A__

b) Has the anchor pattern been designated based on the curtain deployment geometry site conditions (e.g., from section joints every 30 m in a radial pattern and on both sides if the curtain is exposed to reversing tidal currents)? Y__N__N/A__

c) Have sizes (e.g., ½-inch etc.) of anchor lines and anchor weights (e.g., 4.5 kg for sandy bottoms and up to 34 kg for firm mud) been selected based on bottom conditions ? Y__N__N/A__

(Sheet 3 of 4)

Table 3 (Concluded)

6) **Deployment Model –**

a) Has the length of time for deployment before reconfiguration or movement been determined based on accumulation of fluid mud inside the curtain relative to the deployment geometry, the discharge (filling) rate, and the initial bottom gap (i.e., the distance between the lower skirt edge and the bottom sediment at the beginning of the operation)? Y__N__N/A__

b) Is the total length of the curtain available for the project adequate for the size of the enclosure? Y__N__N/A__

7) **Maintenance –**

Has adequate attention been given to

a) Moving the curtain away from the turbidity sources just before the fluid mud layer reaches the lower edge of the skirt? Y__N__N/A__

b) Replacing worn or broken anchor lines? Y__N__N/A__

c) Maintaining the integrity of the curtain by repairing leaking connectors and / or tears in the curtain fabric? Y__N __N/A__

d) Repairing tears in the flotation pocket with hand-type pop rivet gun and rivets? Y__N __N/A__

e) Repairing moderate tears in skirts on land with vinyl/nylon repair kit and VINYLFIX or PVC glue? Y__N__N/A__

f) Keeping one or two spare sections of curtain for immediate replacement of unrepairable sections onsite? Y__N__N/A__

8) **Recovery –**

a) Will silt curtains be refurled after operations are completed? Y__N__N/A__

b) Will anchor/mooring systems be recovered? Y__N __N/A__

c) Will the curtains be returned to the launching site for repacking and subsequent storage? Y__N __N/A__

9) **Monitoring –**

a) Have plans been made for monitoring during dredging operations? Y__N__N/A__

b) Will measurements of turbidity (NTU) and samples for TSS (mg/L) be taken on both sides of the silt curtain near the dredging operations and near any sensitive habitat? Y__N__N/A__

c) Will tide, wind, wave, and current measurements be made? Y__N__N/A__

d) Are there plans to monitor post-dredging operations with respect to limited measurements of current, tidal range, winds, turbidity (NTU), and samples for TSS (mg/L) for comparison with background conditions? Y__N__N/A__

(Sheet 4 of 4)

- In applications where the curtain will be extended to the bottom of the waterway in tidal or moving water conditions, a heavy woven permeable filter fabric or tide flaps should be designed into the curtain to relieve pressure on the curtain wall.
- In general, silt curtains should be used on slow to moderate currents, stable water levels, and relatively shallow water depths.

- Currents greater than 1 to 1-1/2 knots are problematic, leading to difficult and often expensive curtain designs. Silt curtains should not be used in current velocities greater than 3-5 knots unless there are unusual circumstances and special designs are considered. Curtain deployments for deep, fast-flowing water and windy conditions require customized designs. However, for all practical purposes, the 1 to 1-1/2 knot value appears to be an industry standard.
- In slow currents, resuspension and turbidity are localized, so a fundamental question is whether or not a silt curtain is even necessary.
- In high currents where sediment plumes disperse rapidly, silt curtains are very difficult to maintain properly and can easily become dysfunctional.
- In all but the slowest current flows, curtains will "billow out" in the downstream direction, allowing water to pass beneath the curtain, thereby reducing the effective skirt depth.
- Extra length (up to 10-20 percent) and depth (slack) of curtains should be included in designs to allow for tidal fluctuations and exchanges of water within the curtain.
- Special designs may be required for applications of curtains at depths greater than 10-15 ft or with currents exceeding 1-1/2 knots, particularly in tidal waters. At greater depths, loads or pressures on curtains and mooring systems become excessive and could result in failure of standard construction materials.
- High winds can lift large curtains out of the water like a sail.
- Curtains can sink due to excessive biological fouling on the fabric.
- An attempt should be made to minimize the number of joints in the curtain; a minimum continuous span of 15 m (50 ft) between joints is a "good rule of thumb."
- Curtains should be a bright color (yellow or "international" orange are recommended) to enhance visibility for boaters.
- In tidal situations, where currents move in both directions, it is important to attach anchors on both sides of the curtain to hold the curtain in place and to not allow it to overrun the anchors and pull them out when the tide reverses.
- Anchor lines should be attached to the flotation device, not to the bottom of the curtain.
- Care should be taken during removal of silt curtains to avoid or minimize resuspension of settled solids.
- Removal of settled solids trapped by the silt curtain is optional and should only be considered if the resulting bottom contour elevation is significantly altered.
- When dredging contaminated sediment, installing silt curtains within continuous or intermittent sheetpile walls to provide anchoring points has proven to be more effective than using silt curtains alone.
- Silt curtains can be effective in containing floating debris, but not always in containing contamination. Soluble contaminants, particularly heavy metals, can flow through, around, or under the curtain.
- Aquatic habitat can be successfully protected with deflection curtains provided they are properly designed and deployed, taking into consideration site-specific conditions.
- Designs should conform to relevant contract specifications and manufacturer recommendations and guidelines for installation and safety measures.

- Silt curtains should not be considered a "one solution fits all" type of best management practice. They are highly specialized, temporary-use devices that should be selected only after careful evaluation of the intended function and designed based upon a detailed knowledge of the site where they will be used.

SUMMARY: The term "*silt curtain*" is used to describe devices deployed in water to control suspended solids or turbidity resulting from dredging operations. Almost every silt curtain application has unique features that require site-specific adaptations. Several sources of published technical guidelines and best management practices are identified and referenced in this note. Typical topics covered in these guides include planning considerations (site-specific project conditions), design criteria, construction specifications (curtains and other materials), installation or deployment, removal, and maintenance. A notable exception is monitoring of silt curtain performance.

For cost considerations, logistical constraints, and performance expectations, prevailing current velocities of 1 to 1-1/2 knots effectively limit deployments, with exceptions on a case-by-case basis. Unfortunately, few comprehensive studies are published on the actual performance of silt curtains under varying project conditions. Additional monitoring studies will be required to properly document the functional characteristics and incremental costs of silt curtains under demanding project conditions of moderate to high currents, winds, and waves.

Silt curtains should not be considered a "one solution fits all" type of best management practice. They are highly specialized, temporary-use devices that should be selected only after careful evaluation of the intended function and designed based on a detailed knowledge of the site where they will be used.

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> Francingues, N. R., and Palermo, M. R. (2005). "Silt curtains as a dredging project management practice." *DOER Technical Notes Collection* (ERDC TN-DOER-E21). U.S. Army Engineer Research and Development Center, Vicksburg, MS. http://el.erdc.usace.army.mil/dots/doer/doer.html.

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Table 2
Recommended Silt Curtain Specifications[1,2]

Parameter	Recommended Value
Skirt Depth	Up to 100 ft maximum allowing 1-2 ft clearance between skirt and bottom
Fabric	
Tensile strength grab	500 lb/in.
Tear strength strip 18 oz 22 oz	 320 lb – quiescent conditions 400 lb – medium to high current
Abrasion resistance	200 lb/in. tensile strength after abrasion
Material	Polyester
Coating	PVC
Weight	18-22 oz (depending on type of curtain design)
Seams	Heat sealed
Buoyancy	
Ratio	>5
Type	Solid, closed cell, and enclosed in a fabric pocket
Connector	Load transfer type – aluminum extrusion
Ballast	
Type	Noncorrosive galvanized chain
Weight	See Figures 16 and 17
Tension Member	
No current	Fabric only
Current (0.1-1.0 knots	Top or center tension, center tension provides slightly greater effective skirt depth

[1] In 2002, a 100-ft section of silt curtain with top tension member to the above specifications and a skirt depth of 5 ft could be purchased at an approximate cost of $1,100.00.

[2] Source: Elastic/American Marine, 401 Shearer Blvd., Cocoa, FL 32922 USA, Tel: 321-636-5783, Fax: 321-636-5787 E-mail: jpearce@elastec.com, www.elastec.com.

Table 3
Checklist for Selection and Application of Silt Curtains

1) **Pre-dredging Site Survey –**
   a) Have background conditions at the site been established? Y__N__N/A__
   b) Has the site been adequately characterized with respect to Y__N__N/A__
      i) Current velocity, water depth (relative to tidal range)? Y__N__N/A__
      ii) Bottom sediment types? Y__N __N/A__
      iii) Background levels of turbidity? Y__N __N/A__

(Sheet 1 of 4)

Table 3 (Continued)

2) Deployment –

a)	Have maximum surface currents over a tidal cycle (12 or 24 hr) been established first to determine types of deployment configurations that may be needed? Y__N	__N/A✓
b)	Have direction of current and water turbulence been defined?	Y__N__N/A✓
c)	Have the minimum water depths been established at the lowest low tide?	Y__N__N/A✓
d)	Has a minimum 0.5-m skirt depth been established between the lower edge of the skirt and the existing bottom of the disposal area at the lowest low tide during the operations?	Y__N✓N/A__
e)	Have the effects of fluid mud accumulation on water depth as well as the proposed schedule for moving the silt curtain to prevent burial been considered when selecting the curtain skirt depth? Y__N	✓N/A__
f)	Is the character of the bottom sediment/vegetation known? Y__N	__N/A✓
g)	Have traffic- and boat-generated waves been determined?	Y__N✓N/A__
h)	Are locations of launching ramps, crane services, etc. known?	Y__N__N/A✓
i)	Have deployment geometry and configurations been determined for the site? Y✓N	__N/A__
j)	Have curtain deployment lengths been established?	Y✓N__N/A__
k)	Have different anchor types been considered?	Y✓N__N/A__
l)	Have different curtain configurations been considered (e.g., U, V, circular, elliptical)? Y__N	__N/A✓

3) Silt Curtain Specifications –

a)	Does the lower edge of the silt curtain extend a minimum of 0.5 m from the bottom at lower tide? Y__N	✓N/A_
b)	Is skirt depth less than the recommended 3 m?	Y✓N__N/A__
c)	Has fabric material been selected (PVC or equivalent) with a minimum tensile strength of 525 N/m?	Y✓N__N/A__
d)	Has the fabric weight (minimum of 610 g/m^2 for low current conditions, and 746-g/m^2 for high current conditions) been designated?	Y✓N__N/A__
e)	Has a tear strength (min of 445 for 610-g fabric or 890 N for 746-g fabric been designated? Y✓N	__N/A__
f)	Has a tensile strength after abrasion (greater than 350 N/m) been designated? Y__N	__N/A✓
g)	Has a material been selected that is easily cleaned and resistant to marine growth, ultraviolet light, and mildew?	Y✓N__N/A__
h)	Are all fabric seams heat-sealed or equivalent? Y✓N	__N/A__
i)	Has flotation been designated as sections of solid, closed-cell, plastic foam flotation material sealed into a fabric pocket that provide a buoyancy ratio (buoyant force/curtain weight) greater than 5? Y__N	✓N/A__
j)	Is each flotation segment a minimum of 3 m in length so the curtain may be easily folded for storage or transport?	Y✓N__N/A__
k)	Do connectors in low currents (<0.1 knot) maintain adequate physical contact along the entire skirt joint?	Y✓N__N/A__

(Sheet 2 of 4)

Table 3 (Continued)

3) **Silt Curtain Specifications – (continued)**

l) Have aluminum extrusion (or equivalent) load-transfer connectors been designated for current velocities exceeding 0.1 knot? Y✓N__N/A__

m) Have non-corrosive ballast chains with a weight ranging from approximately 1.5 kg/m for a 1.5-m skirt depth up to 3.0 kg/m for a 3-m skirt depth been selected? Y✓N__N/A__

n) Are tension members used as follows:

i) Negligible current, no tension member? Y__N__N/A✓

ii) Current velocities between 0.1 and 1.0 knot? Y✓N__N/A__

iii) Galvanized or stainless steel wire rope as top or center tension member? Y✓N __N/A__

o) Have handholds been designated along the top of the curtain between the flotation segments for ease in handling? Y__N✓N/A__

p) Have repair kits been designated to patch minor tears in the fabric? Y✓N__N/A__

4) **Transportation –**

a) Have furls (lightweight straps or rope) been specified every 1 to 1.5 m from storage to unloading site? Y✓N __N/A__

b) Has curtain been specified to be compactly folded accordion style, packaged into large bundles, and carefully lifted into transportation vehicle? Y✓N __N/A__

c) Will curtains be unloaded like a string of sausages and connected in appropriate sections (up to 30 m) as they are played out of the vehicle? Y__N✓N/A__

d) Will curtains be towed by boat (traveling at 2 to 3 knots) to the deployment site? Y✓N __N/A__

e) Will the curtain be kept furled except near the end of the connectors until it has been deployed at the site? Y✓N__N/A__

5) **Mooring –**

a) Has the recommended mooring system consisting of an anchor, chain, an anchor rode (line or cable), and mooring and crown buoys been designated? Y✓N __N/A__

b) Has the anchor pattern been designated based on the curtain deployment geometry site conditions (e.g., from section joints every 30 m in a radial pattern and on both sides if the curtain is exposed to reversing tidal currents)? Y✓N__N/A__

c) Have sizes (e.g., ½ -inch etc.) of anchor lines and anchor weights (e.g., 4.5 kg for sandy bottoms and up to 34 kg for firm mud) been selected based on bottom conditions.? Y✓N__N/A__

(Sheet 3 of 4)

Table 3 (Concluded)

6) **Deployment Model –**

a) Has the length of time for deployment before reconfiguration or movement been determined based on accumulation of fluid mud inside the curtain relative to the deployment geometry, the discharge (filling) rate, and the initial bottom gap (i.e., the distance between the lower skirt edge and the bottom sediment at the beginning of the operation)? Y__N✓N/A__

b) Is the total length of the curtain available for the project adequate for the size of the enclosure? Y__N__N/A✓

7) **Maintenance –**

Has adequate attention been given to

a) Moving the curtain away from the turbidity sources just before the fluid mud layer reaches the lower edge of the skirt? Y__N__N/A✓

b) Replacing worn or broken anchor lines? Y✓N__N/A__

c) Maintaining the integrity of the curtain by repairing leaking connectors and / or tears in the curtain fabric? Y✓N __N/A__

d) Repairing tears in the flotation pocket with hand-type pop rivet gun and rivets? Y✓N __N/A__

e) Repairing moderate tears in skirts on land with vinyl/nylon repair kit and VINYLFIX or PVC glue? Y✓N__N/A__

f) Keeping one or two spare sections of curtain for immediate replacement of unrepairable sections onsite? Y✓N__N/A__

8) **Recovery –**

a) Will silt curtains be refurled after operations are completed? Y✓N__N/A__

b) Will anchor/mooring systems be recovered? Y✓N __N/A__

c) Will the curtains be returned to the launching site for repacking and subsequent storage? Y✓N __N/A__

9) **Monitoring –**

a) Have plans been made for monitoring during dredging operations? Y__N__N/A__

b) Will measurements of turbidity (NTU) and samples for TSS (mg/L) be taken on both sides of the silt curtain near the dredging operations and near any sensitive habitat? Y__N__N/A__

c) Will tide, wind, wave, and current measurements be made? Y__N__N/A__

d) Are there plans to monitor post-dredging operations with respect to limited measurements of current, tidal range, winds, turbidity (NTU) and samples for TSS (mg/L) for comparison with background conditions? Y__N__N/A__

(Sheet 4 of 4)

- In applications where the curtain will be extended to the bottom of the waterway in tidal or moving water conditions, a heavy woven permeable filter fabric or tide flaps should be designed into the curtain to relieve pressure on the curtain wall.
- In general, silt curtains should be used on slow to moderate currents, stable water levels, and relatively shallow water depths.

Contractor

DONJON MARINE CO., INC.

✓ Approved

Approved with corrections as noted on submittal data and/or attached sheets (s).

Signature:

Title: CQC Representative

Date: 1/14/2011