

SCOPE OF WORK

(revised as of 7/18/97)

Use of Dredged Materials as Fill In Transportation Related Projects

Submitted by:

The Sediment and Dredged Materials Technology Institute

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Submitted to:

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Project Objectives

The objective of this project is to provide testing and consultation services to the NJDOT associated with the utilization of treated sediment in transportation related projects. Such services include: review of existing test results and performance monitoring, performance of the necessary engineering and environmental testing associated with evaluating the potential use of cement stabilized dredged materials as fill in transportation related projects and providing assistance to NJDOT in developing design and material properties standards. Two potential uses for the resulting material will be investigated: Structural fill (for bridge construction, roadway embankment, etc.) and non-structural fill (slope flattening and infield fill, noise wall berms, landscape applications, etc.).

Scope of Services

The overall scope of our services is to assist NJDOT in using treated dredged materials in roadway construction applications and developing guidelines necessary to enable field applications. This will be achieved through close cooperation between the different participating parties, task forces and their respective members. The main thrust of the proposed work will be the development of pertinent standards, procedures and protocols to enable the reuse of treated dredged material as fill in transportation related projects. This will entail a careful study of treated and untreated dredged materials' engineering properties, environmental behavior, and the economic considerations as outlined in the following sections.

Task I-1 Engineering Properties

Sub-Task I-1.1: Characterization of Untreated Dredge Material: The Port Authority, US Army Corps of Engineers and other entities have been studying and testing harbor dredged materials for some time. As a result a partial testing and engineering material characterization database already exists with Port Authority. The limitations are that only a few locations in the harbor have been sampled and tested and additional information that may be available through the Army Corps and other entities has not been brought together into a single database. Consequently, it is proposed that all existing literature on the engineering properties will be compiled into a single data base, preferably in a binary format (computer disk), to facilitate end use and dissemination. The properties that will be included in this database are as follows:

1. Particle Size Distribution
2. pH
3. Solid Content
4. Moisture Content (both based on weight and volumetric)
5. Hydrocarbon presence
6. Heavy Metals

7. Organic Content
8. Consolidation Characteristics
9. Hydraulic Conductivity/Permeability
10. Atterberg Limits

This work has been already initiated with the close cooperation of Dr. Peter Dunlop, the Port Authority's chief geotechnical consultant. Finally, it is also proposed to concurrently pursue the mineralogical characterization of dredged materials by means of X-Ray Diffraction analyses on representative samples.

Sub-Task I-1.2 : Develop Engineering Performance Criteria for Potential Uses:

Traditional methods of specifying materials as fill for construction may not be applicable to the proposed treated dredged material end uses. Consequently, in order to evaluate material performance in reuse applications, it will be necessary to develop a set of non-traditional testing processes. The task group has already established a preliminary list of testing procedures which may be needed to evaluate the material engineering properties:

1. Atterberg Limits
2. Particle Size Analysis
3. Organic Content
4. Compaction Characteristics
5. Unconfined Compression
6. Cone Penetration
7. Direct Shear
8. Consolidation

There are a number of steps that must be taken to refine the above list into a practical form which may then be applied to the present work. First, it will be necessary to establish threshold performance values for each test listed for the proposed uses both as structural as well as non structural fill. If no definitive information on threshold values is available it will be necessary to perform some additional testing and/or conservatively estimate these properties. At the present time, it may be prudent to also define the anticipated effect of varying field conditions, such as water content, on both the engineering properties and environmental behavior of the treated sediment as a function of the anticipated end use. Overall, upon completion of this task a comprehensive test protocol will be developed, which will be then used to evaluate the engineering performance of the treated dredged material.

Sub-Task I-1.3: Perform Engineering Properties Tests: Upon receiving some additional amounts of the treated dredge sediment, an evaluation of the treated product will be performed based on the engineering performance test protocol developed in sub-task I-1.2. On the basis of the executed testing protocol the overall engineering behavior of the sediment will be evaluated and the potential for reuse will be assessed as a function of the type of transportation-related application.

Task I-2 Environmental Behavior

Sub-Task I-2.1: Develop Test Protocols: Based on the final list of end uses, and in close collaboration with the NJ DEP, a list of testing protocols will be developed in order to evaluate the environmental impact of the reused dredged material. Initial contacts have already been made with NJ DEP officials and the development of the testing protocols has been effectively streamlined. Overall, it seems that DEP will require testing for any potential contaminants including dioxin and any other leachates. The final form of the test being a function of the type of dredged material end use.

Sub-Task I-2.2: Conduct Environmental Testing: Following the completion of sub-task I-1.6, the treated dredge sediment will be tested according to protocols developed in sub-task I-2 in order to determine its field environmental behavior.

Sub-Task I-2.3: Develop Fate and Transport Protocol: Environmental fate and transport protocols will be developed for each of the anticipated end uses. These protocols will include general guidelines for assessing the potential environmental impacts resulting from the use of dredged materials in transportation related projects.

Task I-3 MOU Assistance

SDMTI will provide assistance to NJDOT, during the duration of this project, in developing any necessary Memoranda of Understanding with NJDEP or other agencies for the beneficial use of contaminated sediment in transportation related projects

Task I-4 Economic Analysis

An economic evaluation of the dredge-derived construction material will be performed for each type of proposed end use. Comparative economic and cost-benefit analyses will be performed to evaluate the competitiveness of such materials in the market place. A market analysis will be performed for each transportation related end use in New Jersey.

COORDINATION AND COLLABORATION

All tasks of this project will be coordinated with NJDOT and in particular with the Specialty subgroups (Environmental, Engineering Properties, Economic Feasibility). We anticipate maintaining regular coordination with these groups and reach agreement before testing protocols are implemented. In addition, the SDMTI project manager will work closely with the NJDOT project manager to coordinate the project efforts with efforts of other agencies including but not limited to the Army Corps of Engineers, NJDEP, NJTA, New Jersey Transit, and USEPA. Such coordination will help avoid duplication will benefit the project and will facilitate dissemination of the project findings. NJDOT shall make the final decisions on this coordination, as well as, decisions in releasing any

statements regarding Capital Projects or delivery of the overall Capital Construction Program.

Budget

The services described above will be provided to NJDOT for a duration of 12 months. The approximate budget for this period is presented below:

PROJECT BUDGET FUNDING REQUEST For 1 Year (1997-1998)

Use of Funds	Costs
Salaries	
1. Program Management	5,000
2. Senior Engineering Staff	20,000
3. Laboratory Assistant	12,000
4. Administrative Assistant	2,000
Subtotal	39,000
Benefits (32% on 1, 2, and 4)	8,613
Graduate Laboratory Assist. Benefits	7,500
Total Salaries + Benefits	55,113
Materials and Supplies	6,000
Equipment	0
Analytical Laboratory (external)	0
Miscellaneous	
Travel	1,000
Office Materials and Supplies	800
Total Direct Costs (STEVENS)	62,913
Subcontracts	
NJIT	25,000
Indirect Costs	
General Overhead (Stevens)	29,369
Total	117,282