1st Meeting of Committees

File
Stable Berm
Mobile Harbor

DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P.O. BOX 631
VICKSBURG, MISSISSIPPI 39180-0631

REPLY TO
ATTENTION OF
CEWES-CD-S

13 October 1987

MEMORANDUM FOR RECORD

SUBJECT: Discussions on the Monitoring Efforts for the Mobile District's Feeder and Stable Berm Projects.

1. Background. The Mobile District (CESAM) has taken the initiative on construction of two submerged features using dredged material off the Gulf Coast of Alabama. Construction on the smaller feature, the Feeder Berm located approximately 3.5 nautical miles southwest of Mobile Point, was completed in February 1987. Construction of the larger Stable Berm, located approximately 5.5 nautical miles southwest of Mobile Point, is scheduled to begin in October/November 1987 using new material from the Mobile Harbor Deepening Project. Both features are shown in encl 1. The Waterways Experiment Station's Coastal Engineering Research Center (CERC) is providing assistance to CESAM in the design and implementation of monitoring efforts to describe the ultimate fate of the placed material. The purpose of both berms is to explore the beneficial uses of dredged material. The Feeder Berm was constructed on the 19-ft contour off of Sand Island using sand from routine maintenance dredging of the Mobile Channel Bar. Bathymetry surveys, side-scan sonar, a wave gage, seabed drifters, and sediment samples will be used to determine the fate of the placed material. The intent of the Feeder Berm is to place the sandy material within a zone of active wave influence where it may eventually become part of the beach evolution process and, therefore, increase the amount of littorally transported material (i.e. feed the beach). The Stable Berm will be constructed of new material in 35 to 45 ft of water. The structure will be approximately 9000 ft long, 1000 ft wide and have a nearly uniform depth of approximately 20 ft. The intent of the Stable Berm will be to create a stable submerged structure that may trip incident wave energy during storms and provide an aquatic habitat. Monitoring efforts utilized to determine the fate of the Stable Berm material will include several of the Feeder Berm techniques plus sediment profiling camera surveys, subbottom profiling, and a directional wave gage. Fishery concerns will be addressed by an Environmental Protection Agency (EPA) monitoring program. On 26 August 1987, personnel from CESAM, CERC, and the Water Resources Support Center (WRSC) met at CERC to discuss the current status and monitoring program of both projects. The remaining portion of this MFR details the results of that meeting.

ROUTING:
1. CEWES-CD-S 10/25
2. CEWESCD
3. CEWES-CV-A
4. CEWES-CV-Z 10/26
5.
6. CEWES-CD-S (McLellan)
7. CEWES-CD-S (Daughtry) (file)

2. The discussion outline for the 26 August meeting is shown in encl 2. CERC was represented by Messrs. Charles C. Calhoun, Jr., Edward B. Hands, T. Neil McLellan, and Ms. Joan Pope; representatives from CESAM were Messrs. Patrick Langan, Hugh McClellan, Paul Bradley, and Dewayne Imsand; and WRSC was represented by Mr. David Mathis. The meeting was chaired by Mr. Langan. The meeting was to update and inform personnel involved of the current status of the two berm projects. To improve project coordination and establish a formal line of communication, two committees, one management and one technical, were established. The Management Committee members are Messrs. Thomas W. Richardson (CERC), Calhoun, Langan (Chairman), McClellan, and Mathis. The Technical Committee will consist of two groups representing the project's Principal Investigators (Messrs. Hands and Bradley for the Feeder Berm, and Messrs. McLellan and Imsand for the Stable Berm) and other technical experts as necessary. Ms. Pope will serve as CERC's central coordinator for the Technical Committee and CERC's liaison from the Technical Committee to the Management Committee. It will be the Technical Committee's responsibility to maintain the daily progress of the study and to report progress, results, and problems to the Management Committee. The Management Committee will be responsible for the overall direction of the projects and advising the Technical Committee. Points of contact for the Management Committee will be Mr. Calhoun for CERC and Mr. Langan for CESAM. Technical points of contact will be the project's Principal Investigators.

3. The second item on the discussion outline was the philosophy and purpose of the mound projects. Mr. Calhoun reaffirmed CERC's commitment to do whatever needs to be done to document the effectiveness of the "feeder" and "stable" berm concepts. To fully do this, CERC needs to know what is ongoing for each project even though it may not appear to directly relate to the research and development aspects of the project. Mr. Calhoun also indicated he would like to see a project chart showing time lines, responsibilities, and tasks for the Stable Berm. Mr. Langan stated that CESAM was totally committed to the demonstration projects and realized their importance both at the District and the national levels. Mr. Langan also agreed on the practicality of a chart/worksheet showing project phases and report preparation scheduling. Confusion about the various nomenclature which has been used for the two mounds was also discussed. Upon conferring with Mr. Bill Murden, Chief Dredging Division, WRSC, Mr. Mathis reported that the two projects will be officially known as the "Feeder Berm" and "Stable Berm." The project chart for the Stable Berm was scheduled to be completed by Messrs. McLellan and Imsand the following week in Mobile.

4. An additional topic of the 26 August meeting not on the discussion outline was EPA's involvement in the Stable Berm project. EPA is involved with the Stable Berm site due to its designation as a 103 site. As a 103 site, EPA has management responsibility for any type of ocean disposal and is directed to review any Gulf Monitoring Program. Through coordination with CESAM, EPA has turned over much of the management responsibility to the Corps, but a

separate report is still required. Because of the requirement for an EPA report and the time lag between completion of the two projects, there will be a separate report for each project. A single synthesis report for the two projects may be useful. The main concern of EPA is that the material remains within the disposal limits described by CESAM and to document any direct fisheries benefits derived from the berm. To monitor any migration of the material outside of the disposal site, 25 sediment sample locations have been identified by EPA. Through coordination with CESAM, EPA will also take the lead to collect samples to address the fisheries aspects of the berm.

5. The third item on the discussion outline was the review/briefing request by Mr. Murden. The proposed letter to Mr. Murden was reviewed by the group, and several changes/comments were suggested. The letter will include a description of the current meeting and a proposed time frame for a briefing, most likely October. Mr. Murden will also be informed that oil companies were in the planning stages of placing a pipeline through the berm in 1990 or later. Oil companies have been cooperative in the past, allowing the Corps of Engineers to locate instrumentation on existing gas wells. The type of report to be prepared at the completion of both projects was also discussed. The options discussed were a synthesis/executive report describing each project or individual summary reports for each project. The decision on the type of report to be submitted to WRSC was deferred to the next management meeting.

6. The Feeder Berm was the next topic of discussion. Messrs. Hands and Bradley briefly gave a project introduction and reported progress to date. The berm was described as constructed from sandy maintenance material from the Mobile Channel Bar. It has roughly 6 ft of relief, a base width of 500 ft, and was constructed almost exactly as designed. Mr. Langan noted that the contractors did an excellent job placing the material as high as possible. The dredge occasionally ran aground while stacking the material on the berm. Messrs. Hands and Bradley described the monitoring program as continuing and on schedule. The berm had changed little with only slight erosion and flattening of the peaks. With little measurable change since placement in February, monthly surveys were postponed until after the summer calm. The monitoring effort was reinitiated in August with a seabed drifter release, wave/current measurements, sand samples, and bathymetric survey. Repetitive surveys are currently scheduled to continue at least through this calendar year. The in situ material and the placed material were not dissimilar enough to obtain a clear description using side-scan sonar, and its use was discontinued. The wave and current gage has not worked as well as expected, and one gage was lost when the mooring was dislodged, probably due to a collision or unintentional severing during mooring by a trawler. CERC is exploring several options for improving the gaging effort, and was not yet ready to propose a specific alternative. Some of the alternatives currently under investigation include:

a. Placement of two wave gages, using one as a backup.

b. Two or three gages in place for short periods of time throughout the year for comparison to the National Data Buoy Center (NBDC) data set.

c. Use of a telemetered system attached to one of the in-place oil/gas wells in the area.

d. Improve mounting of a new system to withstand storms and trawlers.

e. Use of NDBC buoy for one backup system.

f. Use of an alternative type of instrument.

Mr. Langan stated that he would like justification for whatever option was selected. A proposal outlining options and costs for the revised plan will be submitted to CESAM. It was also suggested that the monitoring program be continued since it is currently scheduled to end this calendar year and there has been limited movement of material to date due to unusual calm conditions on-site. The newly formed management group unanimously supported the extension, and Mr. Mathis was going to explore financial options at WRSC for an additional year of study.

7. The final topic in the discussion outline was the Stable Berm. Major needs for the monitoring program identified during the meeting include a detailed plan of study, including schedules and assigned responsibilities for the entire study program, and a detailed scope of work (SOW). The plan of study will be developed by Messrs. Imsand and McLellan when Mr. McLellan visits CESAM the week of 31 August. From this plan of study, a detailed SOW will be developed for the entire monitoring program. The goals of the monitoring program stated by the Management Committee will drive the plan of study and SOW. Data collections to date on the project have been suspended pending initiation of dredging activity. The monitoring effort was originally scheduled to coincide with construction which was initially to begin in July 1987. Construction is currently scheduled to begin in October or November with monitoring beginning 30 days prior to construction. The construction schedule has been extended from 20 to 36 months due to problems with the dredge CHICAGO. The baseline survey and sediment samples contract has been awarded, and the contractor is waiting for the letter to proceed. Some sediment profile camera data were collected in July at 20 sites located outside the disposal site. The survey report was due at the end of August 1987. There was considerable discussion on the availability of technology for measuring the in situ density of the mound after placement. In situ density will be essential if mass balance calculations of the mound are required. Density data would allow researchers to quantify the change in mound elevation over time, i.e. to separate erosion from consolidation effects. Economic density measurements, however, are probably not feasible due to the expected

thickness and inhomogeneity of the mound and the limited water depth for free fall density sampler. Further investigation will be carried out at CESAM and CERC to identify additional options for density measurements. Some options include (a) vibracores, (b) push cores, (c) cone penetromenters, and (d) nuclear density meters. These devices would be needed before the winter of 1988, therefore, there is little time to thoroughly evaluate which option is most applicable for this situation.

8. The major results/conclusions of the 26 August meeting are as follows:

a. Formation of a Management Committee.

b. Formation of a Technical Committee.

c. The necessity of extending the Feeder Berm study.

d. Investigation is needed to maintain a reliable process measuring station for Feeder Berm.

e. A detailed Plan of Study needs to be developed for the Stable Berm.

f. A detailed SOW needs to be developed for the monitoring needs for the Stable Berm.

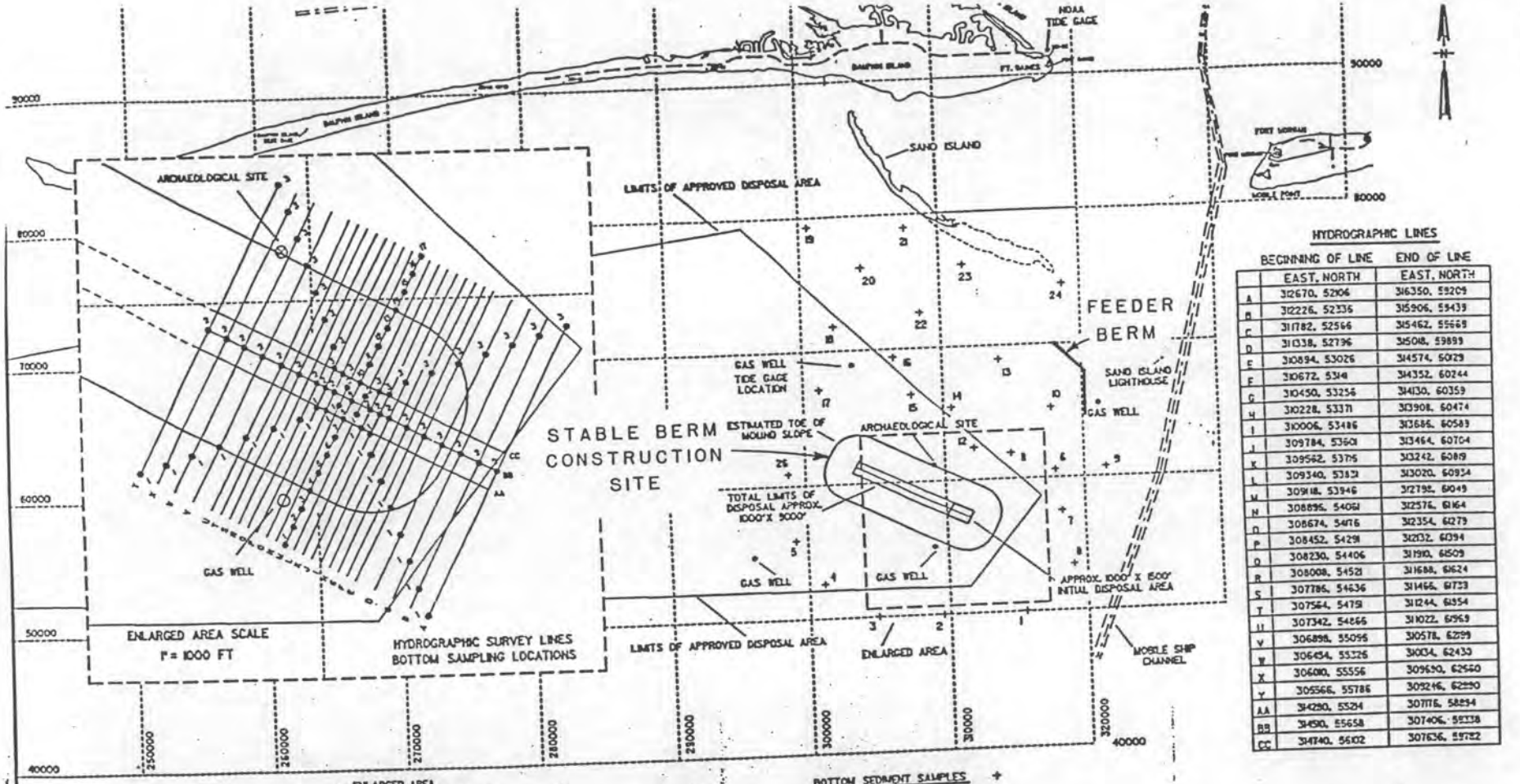
g. Investigation is underway to determine methods for density measurements for the Stable Berm.

2 Encls

T Neil McLellan

T. NEIL MCLELLAN
Coastal Structures and Evaluation Branch
Engineering Development Division
Coastal Engineering Research Center

CF (wo/encls):
CESAM-OP (Mr. Patrick Langan)
CESAM (Mr. Hugh McClellan)
CESAM-RD-EC (Mr. Dewayne Imsand)
CESAM-OP-ON (Mr. Paul Bradley)
CEWRC (Mr. David Mathis)
CEWRC-D (Mr. William R. Murden)
CEWES-CD-S (Ms. Joan Pope)
CEWES-CD (Mr. Thomas W. Richardson)
CEWES-CV-A (Mr. Charles C. Calhoun, Jr.)
CEWES-CD-S (Mr. Edward B. Hands)



HYDROGRAPHIC LINES

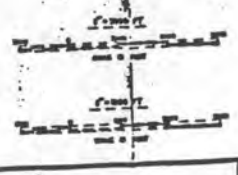
	BEGINNING OF LINE	END OF LINE
	EAST, NORTH	EAST, NORTH
A	312670, 52106	316350, 59209
B	312226, 52336	315906, 59439
C	311782, 52566	315462, 59669
D	311338, 52796	315018, 59899
E	310894, 53026	314574, 60129
F	310672, 53141	314352, 60244
G	310450, 53256	314130, 60359
H	310228, 53371	313908, 60474
I	310006, 53486	313686, 60589
J	309784, 53601	313464, 60704
K	309562, 53716	313242, 60819
L	309340, 53831	313020, 60934
M	309118, 53946	312798, 61049
N	308896, 54061	312576, 61164
O	308674, 54176	312354, 61279
P	308452, 54291	312132, 61394
Q	308230, 54406	311910, 61509
R	308008, 54521	311688, 61624
S	307786, 54636	311466, 61739
T	307564, 54751	311244, 61854
U	307342, 54866	311022, 61969
V	306898, 55096	310578, 62199
W	306454, 55326	310134, 62430
X	306010, 55556	309690, 62660
Y	305566, 55786	309246, 62890
AA	314250, 55524	307776, 58854
BB	314510, 55658	307406, 59338
CC	314740, 55602	307636, 59782

ENLARGED AREA BOTTOM SEDIMENT SAMPLES

	EAST, NORTH		EAST, NORTH		EAST, NORTH		EAST, NORTH		EAST, NORTH		EAST, NORTH
A1	312670, 52106	E2	312734, 56578	K3	311632, 57712	M8	311488, 58386	P2	310292, 57843	V3	309888, 60868
A2	314510, 55658	E3	313654, 58354	L1	311065, 57161	M2	311648, 58830	P3	310539, 58320	W1	306984, 56214
A3	316350, 59209	G1	311600, 55476	L2	311295, 57605	M3	311878, 59274	O1	309960, 57070	W2	308294, 56878
B1	312456, 52780	G2	312290, 56808	M1	309118, 53946	M4	312908, 59718	O2	310070, 57958	W3	309674, 61542
B2	314066, 55888	G3	312980, 58440	M2	309348, 54390	M5	312338, 60162	O3	310530, 58846	X1	306240, 56000
B3	315676, 58395	I1	311386, 56150	M3	309578, 54834	M6	312568, 60605	S1	308936, 56856	X2	307850, 59108
C1	312242, 53454	I2	311846, 57038	M4	309808, 55278	M7	312798, 61049	S2	309626, 58188	X3	309460, 62216
C2	313672, 56118	I3	312306, 57926	M5	310038, 55722	N1	310621, 57391	S3	310346, 59520	Y1	305566, 55786
C3	315002, 58781	J1	311077, 56676	M6	310268, 56166	N2	310859, 57835	U1	308262, 56642	Y2	307406, 59338
D1	312028, 54128	J2	311624, 57153	M7	310498, 56610	O1	310284, 57284	U2	309882, 58418	Y3	309246, 62890
D2	313378, 56348	J3	311871, 57630	M8	310728, 57054	O2	310514, 57728	U3	310102, 60934		
D3	314328, 58568	K1	311172, 56824	M9	310958, 57498	O3	310744, 58172	V1	307588, 56428		
E1	311184, 54802	K2	311402, 57268	M10	311188, 57942	P1	310045, 57366	V2	308738, 58648		

BOTTOM SEDIMENT SAMPLES

	EAST, NORTH		EAST, NORTH
1	35327, 50047	14	310575, 65530
2	309545, 50008	15	307843, 66560
3	304912, 50047	16	306576, 69411
4	30492, 52542	17	304190, 67154
5	27992, 55868	18	302778, 71787
6	317829, 60536	19	300636, 73271
7	318217, 57492	20	304398, 76103
8	318970, 53453	21	307645, 78254
9	321653, 60779	22	308635, 72658
10	317623, 65293	23	311605, 76064
11	317623, 65293	24	318653, 74440
12	320040, 62442	25	322028, 70639
13	33980, 68976	26	298695, 60937



U.S. ARMY ENGINEER DISTRICT, MOBILE
CORPS OF ENGINEERS

MOBILE HARBOR DEEPENING
GULF DISPOSAL AREA
BASE LINE SURVEY

PROJECT CONT.

WESCD-S

25 AUGUST 87

COMMITTEE MEETING ON MOBILE MOUNDS
26 AUGUST 1987

DISCUSSION OUTLINE

I. INTRODUCTIONS AND ESTABLISHMENT OF COMMITTEE (LANGAN)

II. PHILOSOPHY AND PURPOSE OF MOUND PROJECTS (MATHIS/CALHOUN)

III. REVIEW OF MURDEN LETTER AND RESPONSE
- BRIEFING

IV. SAND ISLAND BERM (HANDS AND BRADLEY)
- Status of project
- Status of monitoring program
- Extension of monitoring program
- Modification of monitoring program scale
- Funding

V. OUTER MOUND (MCLELLAN AND SAM)
- Plan and status of project (dredging [redacted] contract)
- Plan and status of monitoring program
- Goals of monitoring program
- Roles of CERC and SAM
- Coordination and identify POC
- Detailed discussion of monitoring tasks
  (who, what, timeline, schedule, analysis, etc.)
- Develop written detailed monitoring plan
- Reports (procedures, involvement, schedules)

PROPOSAL TO MONITOR A NEARSHORE DREDGED MATERIAL
PLACEMENT DEMONSTRATION, MOBILE, ALABAMA

1. Each year transportation of sandy dredged materials from coastal channels to offshore disposal sites costs millions of dollars. Altering this practice by placing some or all of this sand in the nearshore zone would substantially reduce the cost of channel maintenance and also preserve valuable sand resources. The U.S. Army Engineer District, Mobile (SAM) is considering a demonstration of nearshore placement which will put 300 to 400 thousand cubic yards of sand size maintenance material a short distance west of the entrance channel to Mobile Bay in 20-25 ft of water or less.

2. Plans to monitor the placement have been discussed among District personnel and the U.S. Army Engineer Waterways Experiment Station (WES) personnel from the Coastal Engineering Research Center (CERC) and the Environmental Laboratory. The objective is to determine the characteristics and behavior of the placement to provide a firmer basis for projecting more widespread use of the technique. The following plan is based on assumptions about the placement that were effective during a 12 March 1986 meeting at SAM. The assumptions include relatively shallow water placement and a high possibility of the material moving toward Dauphin Island at a significant rate. Any changes to the nature of the demonstration may affect the work items, schedule, and costs of this monitoring plan.

3. The jointly developed monitoring plan includes:

PRE-PLACEMENT STUDIES TO CHARACTERIZE:

a. Existing nearshore versus maintenance material.

b. Maintenance versus material from channel deepening.

*c. Historic bathymetric changes and morphology in the vicinity of the placement site.

COLLECTION OF BASELINE DATA (ASAP)

a. Bathymetric and side-scan sonar surveys.

b. Sediment sampling.

c. Aerial photography.

d. Biological and water quality measurements.

*e. Sea bed drifter study.

*f. Current meter measurements for approximately 45 days.

Encl 2

IMMEDIATELY POST PLACEMENT DATA COLLECTION

Same as baseline except

*g. Redeploy current meters.

*h. Install directional wave gage.

FOLLOW-UP DATA COLLECTION (1)

Tasks a, b, and *e will be repeated monthly.

*Current meters and wave gage will be maintained for continuous operation.

POST SPRING DATA COLLECTION (1)

Same or similar to baseline data collection

POST HURRICANE DATA COLLECTION (1)

Tasks a, b, and c if a hurricane impacts the area.

Starred (*) items will be CERC's responsibility. The unstarred tasks will be primarily SAM's responsibility.

(1) Continuation of these phases depends on interim results.

Each task is discussed in more detail below.

4. Baseline studies and data collection provide the background against which the placement behavior will be assessed. The baseline data will also help determine the best placement site and configuration. Tracking of the placement material will be easier if it is placed over a dissimilar material. The presence of rubble from the Hurricane Frederick cleanup and other conditions that might affect the value of this test should be determined as soon as possible. The baseline data will be useful in designing the minimum monitoring plan consistent with demonstration objectives.

5. The baseline current meter array will consist of 6 ENDECO 174 meters at three stations along the 25-ft contour: one at each end of the potential placement zone and one roughly midway in between. Each station will have a near-bottom and an upper current meter recording mean velocities at two minute intervals. The current meters will be removed at the end of their 6-week recording period. The data will be analyzed and formatted for potential SAMEN-YD uses. Tabular and graphical forms will also be provided to aid in selection of the exact placement area, to indicate the degree of spatial uniformity of the currents, and to establish the relative effects of tides and winds on the local bottom currents.

6. The directional wave gage should be installed just before placement. The winter wave action which the bar will be exposed to is radically different from the summer regime. This approach should reduce wave measurement cost significantly.

7. Two current meters and a directional wave gage will be installed offshore of the selected placement site prior to initiation of dredging. The use of two meters per station not only provides a shear measurement, but increases the chance of having at least one current meter working at all times. The extra cost is very small with both meters at the same location. A SEA DATA 635-12 directional wave gage at the same site will record a 17 minute record at 1 Hz every 3 hours. These formats will permit simultaneous servicing of the wave gage and current meters every 6 weeks. Therefore, it may be possible to schedule every other gage maintenance in conjunction with a profile survey.

8. Wave spectra will be plotted for the storms that occur during intervals of significant bathymetric change.

9. Short sediment cores will be taken in the placement deposit each time instruments are serviced (i.e. about every 6 weeks). The stratification of sediments will be examined and documented by photography, textural analysis, and x-ray radiography as necessary to evaluate reworking of the upper layers, infauna activity, and reversals in erosion and accumulation between bathymetric surveys. Supplemental elevation changes will be measured at underwater reference rods.

10. Sea bed drifters will be deployed at specified coordinates during regularly scheduled surveys and/or gage servicing dives. The drifters that wash directly ashore during the summer and fall releases will be recovered and documented with precise control by CERC. Information on drifters that wash ashore later at more distant beaches will depend on voluntary return of postage paid recovery cards. SAM will transpose location information on recovery cards in a mutually agreed upon format that will be tabulated, analyzed, and plotted at CERC.

11. SAM will investigate the availability of wind data near the site from the National Weather Service and the Dauphin Island Marine Laboratory.

12. The follow-up and later field efforts may be terminated whenever data on placement stability are sufficent or when sediment dispersion makes it impossible to identify the placement deposit.

13. Data reports will be forwarded 6 weeks after the completion of each major stage of data collection. A WES report will be prepared and published to disseminate the lessons learned after completion of the monitoring effort. The report will summarize the documented physical and environmental conditions, the behavior of the placement material, and any effect on adjacent shores. A draft will be forwarded 7 months after completion of the data collection.

14. This demonstration represents an opportunity to advance the Corps understanding of beach nourishment via nearshore placement. Consequently, CERC will use research funds to offset part of the expenses of this test. CERC also is developing open-water disposal monitoring guidelines under the Dredging Operations Technical Support (DOTS) program. Since this demonstration will expand the conditions under which monitoring techniques have been evaluated, the DOTS effort will also provide support.

15. Time and cost estimates based on a starting date of 27 May 1986 are as follows:

TASK	COMPLETION DATE	FUNDS REQUIRED FROM SAM ($K)	FUNDS REQUIRED FROM CERC ($K)	TOTAL ($K)
BASELINE thru IMMEDIATE POST DISPOSAL	30 OCT	50	6	56
FOLLOW-UP	30 APRIL	75	12	87
POST SPRING	4 NOV	20	3	23
FINAL REPORT		9	4	13

FISHERY MONITORING PROGRAM

SAND ISLAND, ALABAMA SUBMERGED MOUND

The nearshore northern Gulf of Mexico, off Alabama and Mississippi, is considered the most 'desert-like' area of the Gulf (Shipp, personal communication) and it is believed that the provision of relief through construction of the submerged mound will substantially add to the sport fishery resources of the area. On the other hand, it is possible that the presence of the berm would disrupt spawning of certain species. In order to monitor the effectiveness of the submerged mound in enhancing the fishery habitat, or disruption of fishery use of this region of the nearshore Gulf of Mexico, a fishery monitoring program will be established and continued for a three year period. This program will be concerned with migratory species such as pompano (Trachinotus carolinus), mackerel (Scomberomorus cavalla and S. maculatus), blue fish (Pomatomus saltatrix), speckled trout (Cynoscion nebulosus), and redfish (Sciaenops ocellata). In addition, key forage species such as Spanish sardine (Sardinella anchovia), Atlantic bumper (Chloroscombrus chrysurus), and round scad (Decapterus punctatus) will be monitored. No effort will be made to monitor resident species (i.e. no mark - recapture studies) as this structure is not expected to provide the necessary habitat for residents.

Biweekly underwater censuses will be performed by divers between March and October of each of the three years to determine the presence and abundance of key sport species. Two - three diver surveys will be performed each winter for each of the three years to determine the presence and abundance of key forage species. Trawling efforts will be restricted to late April, late June, and mid-September of each year to determine the presence and abundance of juveniles of these species. These data will be analyzed to determine the effectiveness of the berm in attracting these species as well as any detramental impacts of the berm. Supplemental information concerning the shape and persistence of the berm throughout the three year period would also be gained through the diver surveys.

PRELIMINARY COST ESTIMATE

Item 1.	Biweekly diver surveys	
	16 surveys X 3 years X $500.00 ea	$ 24,000.00
Item 2.	Winter diver surveys	
	3 surveys X 3 years X $500.00 ea	$ 4,500.00
Item 3.	Trawling effort	
	3 trawl periods X 3 years X $500.00 ea	$ 4,500.00
Item 4.	Data Analysis	
	1 Man-month	$ 4,000.00
Item 5.	Boat Time	
	66 days X $450.00 per 8 hr day (42-foot vessel)	$ 29,700.00
	Overhead (120% salaries)	$ 44,400.00
	Subtotal	$111,100.00
	Profit (12%)	$ 13,332.00
	TOTAL	$124,432.00

Prepared By: Susan Ivester Rees, PD-EC
7 May 1986

SUBMERGED BERM
COST/EFFORT ESTIMATE

MAINTENANCE:

FISHERY MONITORING PROGRAM: (~3 YEARS) $124,500

Includes diver surveys, trawling effort, data analysis, & boat time

HYDROGRAPHIC SURVEYS: (~1 YEAR) $ 65,100

Includes baseline & 9 subsequent surveys, to include establishing horizontal & vertical controls, data processing, etc.

CERC's EFFORT: (~ 1 YEAR) $ 179,000

Includes baseline thru immediate post-placement, follow-up, post-spring/hurricane, final report (Of which, CERC would provide $25K)

ENGINEERING/(MODELING) EFFORT: (~ 1 YEAR) $ 50,000

Includes analysis of meteorological data, berm design, collection & analysis of sediment data, analysis of monitoring data (currents, waves, etc.)

CULTURAL RESOURCES EFFORT:

Includes side scan survey of area prior to construction $ 3,000

OVERALL MANAGEMENT/ S&A OF EFFORT: (~1.5 YEARS) $ 24,000

EA and 404(b)(1): $ 12,000

$457,600

ESTIMATE

NEW WORK:

ENGINEERING/MODELING EFFORT

Hydrographic/Bathymetric Survey	$ 15,000
Design of Berms	7,500
— Hydrodynamic Data Collection & Analysis	24,000
Sediment Data Collection & Analysis	4,500
* Develop Model Grid	6,000
* Calibrate & Verify Model	18,000
Post-Construction Hydro Surveys & Data Analysis	80,000
Report of Findings & Conclusions	6,000
Contingency	37,000
	$198,000

(* These items would be optional if the field data (i.e. currents, etc.) indicate insufficient energy to transport sediments with "long period" currents (i.e. tidal and current patterns established by wind shear). In this case, the modeling effort would not provide additional information, and short period wave analysis would be the primary evaluation tool.)