

AUG 6 1993

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BIOLOGICAL STUDIES
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12,600.00

August 2, 1993

Mr. Armin Cantini
American Indemnity Group
P.O. Box 1259
Galveston, TX 77553

RE: Galveston Beach Nourishment

Dear Mr. Cantini:

Enclosed is the executive summary for the Preliminary Design Report for the Beach Management Project.

If you would like a copy of the complete report, please let me know.

Very truly yours,

COASTAL PLANNING & ENGINEERING, INC.



Kim E. Beachler, P.E.
Vice President

KEB/ys

GLV01:EXE.SUM

EXECUTIVE SUMMARY

A preliminary design of a beach restoration project was performed to widen the beach within a groin field in the City of Galveston, Texas. The proposed project would place 715,000 cubic yards along 3.7 miles of beach from 10th Street to 61st Street. The beach in this area will initially be constructed an average of 220 feet wide, but will adjust within the first year to 150 feet wide at the center of the groin compartments as sand is moved offshore by wave action.

Design Analysis

Computer modeling of the fill placement shows that the fill should be relatively stable within the groin field, losing only 110,000 cubic yards of sand in 7 years. The model assumes average wave conditions. Losses would be greater if a major storm (such as a hurricane) hit during that time period.

The model revealed two high erosion areas that could lose all of the placed sand in 7 years. These are at the east end of the groin field between 10th Street and 12th Street and the beach at 51st Street near the west end. Additional fill was placed in these compartments to compensate for higher expected erosion. Enough fill could not be placed here to totally compensate for high erosion trends; these areas will be narrower than the average at the end of 7 years.

At the end of 7 years the beach should have an average width of 140 feet.

Project Cost

The total project cost is estimated as follows:

150 ft. design	\$4,069,745
135 ft. design	\$3,421,845

These costs include engineering and the additional recommended surveys and designs of the Boddecker Drive channel borrow area.

Project Schedule

Following is the recommended project schedule for completion of the project between 10th Street and 61st Street:

Final Design	August-September 1993
Bid Project	October 1993
Construct Project	January-April 1994

Design Limitations

This project will place only about 35 c.y./ft. of sand over the entire project area due to the limited quantity of sand in the Big Reef borrow area. This volume is about half of the quantity of sand which would be placed in a typical beach nourishment. Based on computer modeling, the fill appears to remain stable as a result of the groins. The limited quantity of fill does not provide any contingency for the variation in erosion rates or the potential effects of a hurricane. The actual performance of the fill and longevity could vary from the results shown.

The design computations are also limited by the lack of historic data for computation of shoreline change rates and calibration of the model. The more recent profiles were taken in the center of the groin compartments. This does not allow for consideration of the groin fillets in the volume calculations. We recommend that a detailed survey be carried out as part of the final design phase to more accurately define the existing conditions for design purposes.

Borrow Area

The proposed borrow area is located offshore of the Big Reef shoal in Galveston ship channel in 5 to 20 feet of water. The location was dictated by concern about eroding the dry portion of Big Reef due to the nearshore dredging.

An analysis was performed to evaluate the impacts of the proposed dredging on Big Reef (Appendix 1). The borrow area cuts were designed to limit impacts on the dry portion of Big Reef.

Texas A&M University, under contract to the City, evaluated the sand within the borrow area. The sand to be obtained from the borrow area was evaluated by analyzing vibracores within the borrow area. The sand obtained in the cores was analyzed for sand grain size, silt and mud content. The mean grain size was computed by CPE to be 0.13 mm. This is comparable to what is presently on the beach. There are thin layers of mud and silt in the borrow area which will cause higher than natural turbidity (cloudiness) in the water during the dredging process. It is anticipated these sediments will be quickly dissipated.

The borrow area analysis included evaluation of future potential borrow sources. The Corps of Engineers conducted an offshore investigation in 1978 to locate potential sources of beach quality sand. They identified two potential areas that they estimated contained 50 million c.y. of sand. Most of these sands are overlain by muds which could make obtaining the sands more difficult and costly. The areas were defined based on limited field data and further studies would be needed prior to designating one of these areas as suitable for beach nourishment.

There is a high probability that the Big Reef borrow area will refill after construction. The Corps' previous studies of the ship channel indicate that the area is a nodal point for currents and sediment typically drops out of suspension in the area of Big Reef. Sand also moves over the jetty during certain wave conditions.

Federal Funding

There are two ways to qualify for Federal funds for beach nourishment projects; through a Federal beach erosion control project or through a Section 111 study.

A previous study by the Corps of Engineers in 1985 concluded that a beach erosion control project in front of the seawall in the groin field was economically justified as a recreational project but could not be funded because of Federal policy against recreation projects. The same study identified West Beach (west of the seawall) as a justified project with significant storm protection benefits. The Corps should be requested to continue their feasibility study to:

- A) Qualify West Beach as a Federal project
- b) Re-analyze the protective nature of sand in front of the seawall

A conference is being held by the Corps of Engineers on Thursday, July 29, 1993, to discuss federal funding opportunities.

A Section 111 study would provide Federal funds if it can be shown that the Federal navigation project has caused the erosion of the beach. The Corps should be requested to do a reconnaissance evaluation for a Section 111 study (at no local cost) to determine if there is a basis for further evaluation.

Drainage and Revegetation

The City has requested an evaluation of drainage solutions and a revegetation project. Due to the limited construction budget we recommend the City wait to perform these additional projects. The physical effects of the drainage will be limited and not contribute significantly to the net erosion losses. The major effect will be aesthetic. Therefore, we believe solutions to drainage can wait until the exact impacts are known. Similarly, revegetation can also wait until we know the exact impact of the blowing sand.

Future Planning

The City has proposed continuing the beach nourishment program to the west in 2 phases. The second phase would be in front of the seawall west of 61st Street. The third phase would be renourishment of West Beach area. The West Beach area has a high potential for Federal funding participation. The continuation of the project will further stabilize the beach along the entire shoreline.

A monitoring program is recommended to evaluate the performance of the project. A knowledge of performance of the beach fill is important in the design of the renourishment efforts of the beach between 10th Street and 61st Street as well as the design of the subsequent phases.

Planning efforts should also include further evaluation of offshore borrow sources. This sand will be needed to construct Phase II and Phase III projects.

Recommendations

1. Authorize the final design phase as outlined in this report. This will put the City in a position to be able to bid the project in October and construct in January.
2. Authorize the additional surveys and Boddecker Drive borrow area designs which are needed to complete the final design.
3. Request that the Corps of Engineers continue the beach erosion control feasibility study and Section 111 study.
4. Establish a monitoring program for the beach and Big Reef borrow area.
5. Move quickly to obtain easements for construction.
6. The initial construction of the nourishment project should not include immediate resolution of the drainage erosion. The situation should be monitored and, if it becomes significant, the City should develop a design which reduces flow rates across the beach.
7. Initiate planning for Phase II and Phase III construction projects with sand search investigations.

ATTACHMENT I

SCOPE OF WORK

Beach Renourishment Project City of Galveston

I. PERMITS FOR DREDGE & FILL; PRELIMINARY DESIGN; COORDINATION

- Define Borrow Area

Based on the volume requirements determined in the fill placement analysis, a borrow area perimeter will be delineated and a depth of cut determined. A detailed analysis will be undertaken of the vibracore samples taken within the defined borrow area to determine the coarseness of the sand and the amount of silt in the mix.

Bathymetric surveys of the borrow site will be reviewed to determine existing stable side slopes that could be expected once the cut of the areas offshore of Big Reef are made. Setbacks from the Big Reef shoreline will be established based on expected stable side slopes to be attained after the sides of the dredge cut slough off to equilibrium.

Based on the above information, a final dredge borrow area will be determined and a depth of cut established.

- Analyze Surveys, Control, Cross-Sections

The Engineer will collect existing surveys performed by the Corps of Engineers. He will analyze its sufficiency for design purposes, including project baseline control, cross-sections of the beach, location of pipelines, roadways, groins, piers and other obstructions, utilities, and the location of land boundaries and corners sufficient to establish required easements and rights-of-way. The Engineer will discuss his findings with the Public Works Department and identify if additional surveys may be required.

- Establish Pipeline Route and Easement Requirements

A comprehensive beach inspection will be performed along the proposed pipeline route from the Big Reef area through the entire construction site. A meeting will be held with Richard Witmeyer of the Corps of Engineers to review Corps of Engineers surveys of their proposed pipeline route. An AutoCAD drawing of the project site superimposing a proposed pipeline route will be prepared. Descriptions will be prepared for easements that are required where the pipeline crosses roads and accessways or otherwise runs over private property.

- Identify and Coordinate Drainage Solutions

The Engineer will coordinate with the City Public Works Department to identify drainage outfalls across the beach. The Engineer will observe and photograph outfalls during the beach inspection. The Engineer will evaluate how the project would impact the existing drainage and how the drainage could affect the project. The Engineer will advise the City of modifications that may be required to the existing systems. The Engineer will provide coastal engineering and beach design information to the Public Works Department to assist them on the design of drainage modifications, if required.

- Design Fill Placement on the Beach

A beach inspection will be performed by the project engineer in conjunction with the pipeline route inspection. Corps of Engineers beach profiles will be reviewed and additional profile requirements determined (see survey option section).

Sand from the borrow area and the beach will be analyzed to establish the amount of fill necessary to widen the beach 300 feet.

The equilibrium profile that the beach is expected to take after one year of wave interaction will be established. A design template will be also be identified for use in the construction plans during the construction process.

Volumes will be computed for up to four distinct fill placements along the beach from 10th Street to 61st Street. This will include two separate widths and phasing of two separate fill placements within the groin compartments along the four mile area.

A construction phasing plan will be discussed with the City. This will allow for multiple constructions using the same design and permit. A preliminary design will be developed for the fill placement which will be the basis of the permit drawings.

- Computer Model of Fill Behavior

A wave refraction analysis will be performed using either RCP WAVE (Corps model) or RIFDIF (by Kirby/Dalrymple) and waves from the CERC Wave Information Study to establish the expected wave climate for the Galveston area.

A shoreline model will be run using the CERC GENESIS model. Coordination will be maintained with CERC on appropriate input parameters, calibration and interpretation of the results.

The model will be calibrated to existing conditions between available survey time periods. The permeability and bypassing of the individual groins will be estimated based on field inspections and discussions with CERC. The permeability may be adjusted during the calibration process to better simulate historical shoreline behavior.

After calibration, the model will be run with beach nourishment designs from 10th street to 61st Street. First, a design beach with uniform fill will be analyzed. A second run will be made adjusting the fill to address high erosion areas predicted by the first run. A second adjustment will be made to finalize the design of the project so that a uniform amount of design fill remains after a 7-year period.

A second series of runs of the model will focus on the performance of a shorter project if it is necessary to phase the project. The purpose of this analysis is to identify the appropriate amount of fill placement for a shorter project to enable the project to perform well before the second phase is built.

• Environmental Assessment

Bird nesting and feeding habitats will be identified near the borrow area and fill areas. These include the areas used by the piping plover. Other habitats that could be affected by the dredge and fill activity will be identified. The study will start with the collection of existing data and studies and reports on the project area, including the 1985 environmental assessment prepared by the Corps of Engineers. The Engineer will meet with agency representatives and members of the environmental community to identify and discuss their concerns about the potential environmental impacts of the dredge and fill program. Our marine biologists will visit the site, making a field assessment based on their own observations and meetings with agency and environmental community groups.

The engineering design for the dredge and fill process will be modified as required to provide for environmental safeguards to protect existing habitats. Guidelines will also be established for the dredge and fill activities to avoid, to the extent possible, disturbance of sensitive habitats and nesting activities. Time windows that are preferable will be identified that could have the least impact for dredge and fill activities.

• Coordination and Public Involvement

The Engineer will meet with County and City Parks personnel to determine long range plans and existing activities on the beaches and beach park areas. Future plans for the use of Big Reef as a bird watching park site will be discussed and integrated with a long range plan for erosion control. The construction activities' impact on public use of the beach and park facilities and the safeguards of the

public during the construction activities will be discussed. Detailed coordination will be maintained between the Engineer and the Engineering and Public Works Departments throughout the project design. Two (2) formal meetings for onboard review of project details are suggested along with continual phone contact with these departments. All inspections by the Engineer should be undertaken with personnel from the Engineering Department.

The Engineer will participate in the public information meetings and prepare informational packages to assist in the dissemination of data.

Meetings with the Corps of Engineers will be attended to identify design considerations and environmental concerns. Meetings with members of the regulatory branch of the Corps of Engineers will be held to discuss regulatory concerns. The Engineer will meet with the Chief of Planning and a representative of the operations and maintenance branch to discuss coastal engineering aspects and the expected performance of the project. Overall coordination will be maintained with the Deputy District Engineer for the Galveston District.

The Engineer will coordinate with Texas A&M University during the coastal engineering analysis of the project site. The Engineer will make use of existing studies and information on the project site to avoid duplication of previous studies.

• Permit Applications

The Engineer will start the permit process by attending one of the joint agency pre-application meetings which are held at the Corps of Engineers every two weeks. Based on that meeting and the preliminary available information described above, they will prepare permit applications and submit those to the agencies. Permit applications will be modified to include ongoing design findings.

II. COORDINATE DREDGING BIDS; FINAL DESIGN; EASEMENTS

Based on the design information developed in the preliminary engineering phase, the Engineer will prepare a set of plans and specifications for the project which will detail what the contractor will be required to do to build the beach renourishment project. The specifications will include environmental safeguards, easements and pipeline route requirements, the order of the work and the work hours, the liability and insurance requirements for the contractor (as provided by the risk management advisors to the City), and the slopes and grades that will be required to be met in the final fill cross-sections.

The Engineer will follow up weekly on the review of the permit application and provide additional information as necessary to complete the permit process.

The specifications and bid package will be flexible to address the funding availability at the City and the phasing of future construction activities.

Easements necessary to complete the project will be described by the Engineer. The Engineer will assist the City in securing easements by providing the necessary information which can be forwarded to the private owners who would sign the easements.

The Engineer would assist the City by preparing bid packages of plans and specifications and distributing those to contractors who could undertake the job. The Engineer will attend a pre-bid meeting with the contractors to describe the project in detail and the requirements for the construction. An engineering cost estimate and a phasing plan as required for the construction of the entire project will be prepared.

During the bidding process the Engineer will answer questions that the contractors may have and issue contract addendums as necessary. The Engineer will then attend the bid opening, tallying the bids and checking for required submittal information.

Finally, the Engineer will analyze the bids and make a recommendation to the City on a contractor to select for the job.

III. CONSTRUCTION PHASE ENGINEERING

The Engineer will attend and direct a pre-work meeting by the Contractor. The details of the construction, the time of operation, the environmental safeguards and public interaction and safety will be reviewed with the Contractor.

The Engineer will provide resident inspection for a period of 2 weeks (10 City working days) during which time he will provide training to the City inspectors. The Engineer will visit the site once every two weeks to observe the progress of the work. The City will provide daily inspections which will be coordinated (by phone and facsimile) with the Engineer.

The Engineer will coordinate with the Public Works Department of the City of Galveston and keep them advised on the progress of the project.

Monthly we will review contractor pay requests and compute pay volumes which will be the basis of payment, based on surveys that are provided by the Contractor.

Final Inspection

The Engineer will perform a final inspection of the project and certify completion. Once it has been verified that the site has been brought to grade and slopes as required and all equipment is removed from the site, the Engineer will make a recommendation for final payment to the Contractor.

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F. PAYMENT RECOMMENDATION

