



**WORK ORDER NO. D795**  
**UNDER GLO CONTRACT NO. 22-004-011**

Pursuant to **GLO CONTRACT NO. 22-004-011** (“Contract”) between the **GENERAL LAND OFFICE** (“the GLO”) and **FRESE AND NICHOLS, INC.** (“Provider”), each a “Party” and collectively “the Parties,” Provider is authorized to perform the services described herein, subject to the terms of this **Work Order No. D795** (“Work Order”).

**I. PROJECT DESCRIPTION**

- a) Provider shall perform, or cause to be performed, longshore transport modeling for Regions 2 and 3 (“the Project”), as described in Provider’s Proposal attached hereto as **Attachment A**.
- b) Provider must perform all work in accordance with the Contract and all its Attachments; the Solicitation; the Solicitation Response; and this Work Order and all its Attachments.

**II. INSURANCE**

- a) Prior to commencing work or incurring any charges under this Work Order, Provider must submit directly to the GLO Contract Management Division, certificates of insurance in the amounts required for the Project and in strict conformance with the requirements of **Attachment B** of this Work Order, Required Insurance and Form.
- b) Provider must submit certificates of insurance to the GLO Contract Management Division at the email address: [insurance@glo.texas.gov](mailto:insurance@glo.texas.gov). Submission by any other means may delay the Project.
- c) The GLO shall notify Provider of deficient certificates and specify a period of time for Provider to correct deficiencies. If Provider does not obtain acceptable insurance within the time specified, the GLO may, in its sole discretion, declare this Work Order void.

**III. TASKS, DELIVERABLES, AND DELIVERABLE DUE DATES**

Provider must perform all tasks and submit all deliverables in strict conformance with **Attachment A**. Provider must submit all deliverables in accordance with the due dates/schedules established in **Attachment A**, or as directed by the GLO if no due date or schedule is established in **Attachment A** for a given deliverable.

**IV. COMPENSATION AND REIMBURSEMENT**

- a) The total compensation due to Provider for services performed and costs incurred pursuant to this Work Order is not to exceed **\$2,393,425.00**.
- b) The GLO will not reimburse Provider for travel expenses of any kind without prior written GLO approval. The GLO will only reimburse travel expenses directly attributable to Provider’s performance of this Work Order at the rates established or adopted by the Comptroller of the State of Texas, as outlined in the Travel Regulations.

- c) Subject to the maximum Work Order amount authorized and upon specific, prior, written approval by the GLO, lodging, travel, and other incidental direct expenses may be reimbursed under this Work Order for professional or technical personnel who are working away from the cities in which they are permanently assigned and conducting business specifically authorized in the scope of services in the applicable Work Order.
- d) The limits for reimbursements are the rates established or adopted by the Comptroller, as outlined in the Travel Regulations. **Provider understands and acknowledges that any travel-expense reimbursement by the GLO is not a per diem. The GLO will only reimburse actual, allowable expenses in accordance with the Travel Regulations. Provider must submit itemized receipts to support any request for travel-expense reimbursement.**

#### V. SUBMISSION OF INVOICES

- a) Provider must submit invoices to the GLO in accordance with this Work Order and Provider's Proposal in **Attachment A**. Failure to submit invoices as instructed below may significantly delay payment under the Work Order.
- b) **Invoices must:**
  - (i) be submitted to [vendorinvoices@glo.texas.gov](mailto:vendorinvoices@glo.texas.gov);
  - (ii) be supported by documentation that, in the judgment of the GLO, allows for full substantiation of the costs incurred; and
  - (iii) prominently display **"GLO Work Order No. D795 under GLO Contract No. 22-004-011."**

#### VI. PERFORMANCE PERIOD, TERMINATION, AMENDMENTS

- a) This Work Order is effective on the date last signed and shall terminate upon the earlier of the completion of the Project, in the GLO's sole determination, or August 31, 2025 ("Performance Period").
- b) Notwithstanding the effective date of this Work Order, Provider must not incur charges or begin work before the date indicated on the GLO's written Notice to Proceed (NTP). The GLO may deliver the NTP to Provider by email or fax. Any services Provider performs or costs Provider incurs before the date established in the NTP or after the Contract's or Work Order's termination or expiration are performed at Provider's sole risk and the GLO may choose not to compensate Provider for such services.
- c) The GLO reserves the right to, at any time during the Performance Period, terminate, halt, or defer all or any portion of the work included in the Scope of Services of this Work Order. If such an event occurs: (1) Provider must follow all directions included in the GLO's notice; and (2) the Parties agree that the Work Order may require revision by written Amendment.
- d) Material changes to this Work Order may be made only by written agreement of the Parties. **Notwithstanding the preceding**, the GLO Project Manager may approve extensions to Deliverable Due Dates within the confines of the Performance Period. Such approvals must be in writing, may be delivered by regular mail, electronic mail, or facsimile transmission, and shall become part of the GLO's Project file.

**VII. MISCELLANEOUS**

- a) This Work Order amends and forms a part of the Contract, all provisions of which not amended herein remain in force and effect.
- b) Except as otherwise expressly provided in this Work Order, terms defined in the Contract have the same meanings in this Work Order.
- c) If the Contract, this Work Order, or any Attachments conflict, such conflicts shall be resolved in the order of priority established in the Contract. If the Work Order and Attachments to the Work Order conflict, such conflicts shall be resolved in the following order of priority: first, the Work Order; then Attachment B to the Work Order; then Attachment A to the Work Order.
- d) Subject to the terms and conditions of the Contract, Provider may subcontract with others for performance of some or all of the services described herein. Whether or not it is included in Attachment A, no subcontract, Subcontractor's proposal, nor any terms or conditions attached to such subcontract or proposal shall apply to the GLO. The GLO does not agree to and is not bound by any subcontract, Subcontractor's proposal, nor any terms or conditions attached to such subcontract or proposal.

**SIGNATURE PAGE FOLLOWS**

**SIGNATURE PAGE FOR WORK ORDER NO. D795  
UNDER GLO CONTRACT NO. 22-004-011**

**GENERAL LAND OFFICE**

**FREESE AND NICHOLS, INC.**

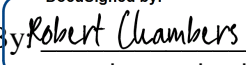
DocuSigned by:

  
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Mark A. Havens, Chief Clerk /  
Deputy Land Commissioner


Date of execution: 1/17/2023


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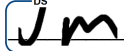
Robert Chambers  
Name: Robert Chambers  
Title: Vice President

Date of execution: 1/16/2023

OGC 


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**ATTACHMENTS TO THIS WORK ORDER:**

- ATTACHMENT A – PROVIDER’S PROPOSAL**
- ATTACHMENT B – REQUIRED INSURANCE AND FORM**

**ATTACHMENTS FOLLOW**



Innovative approaches  
 Practical results  
 Outstanding service

10431 Morado Circle, Suite 300 • Austin, Texas 78759 • 512-617-3100 • FAX 817-735-7491

www.freese.com

October 25, 2022

Ms. Rita Setser  
 CEPRa Project Manager  
 General Land Office  
 1700 N. Congress Ave  
 Austin, Texas 78701

RE: CEPRa 1747 Engineering Services Proposal for Sediment Budget Analysis and Modeling of the Texas Coast (Regions 2 and 3)

Dear Ms. Setser:

Freese and Nichols, Inc. (FNI) is pleased to submit our proposed scope and fee to provide the Texas General Land Office (GLO) with engineering services to analyze and model the sediment budget along the Texas coast.

The Gulf of Mexico coastal area proposed for the work includes Region 2, covering Matagorda, Jackson, Victoria and Calhoun Counties, and Region 3, covering Refugio, Aransas, San Patricio, Nueces and Kleberg counties.

The proposed work consists of data analysis and the development of a regional coastal sand transport model and sediment (sand) budget for Regions 2 and 3. In general the scope of services entails:

- Regions 2 and 3 Data identification and collation
- Regions 2 and 3 Data analysis
- Regions 2 and 3 Sand transport modeling and sediment budget analysis
- Meetings and report writing to support these analyses.

Our proposed fee to accomplish the scope of work is presented in the table below.

Task	Not to Exceed Amount (Labor)	Not to Exceed Amount (Travel/ODCs)
Task A: Region 2 & 3 Data Identification and Collation	\$ 253,376	
Task B: Region 2 & 3 Data Analysis	\$ 216,843	
Task C: Region 2 Sediment Budget Analysis and Modeling	\$ 746,967	
Task D: Region 3 Sediment Budget Analysis and Modeling	\$ 738,924	
Task E: Project Management & Meetings	\$ 409,443	\$ 27,872
Total Labor Budget:	\$ 2,365,553	
Travel/Other Direct Costs (Expenses)		\$ 27,872
<b>TOTAL FEE</b>	<b>\$ 2,393,425</b>	

CEPRA 1747 Sediment Budget Analysis and Modeling (Regions 2 & 3)  
Page 2 of 2

October 25, 2022

A detailed narrative of FNI's proposed engineering services work statement, and FNI billing rate sheet are provided as Attachments 1 and 2, respectively.

We thank you for this opportunity to submit our proposal for the CEPRA 1747 project. Please feel free to contact me directly, or Mr. Carl Sepulveda, PE at 281.884.9571 or carl.sepulveda@freese.com , if you have any questions regarding the proposal.

Sincerely,



Robert Chambers, PG  
Vice President/Principal  
817.735.7462  
rwc@freese.com

ATTACHMENTS:

- 1) Scope of Work, Sediment Budget Analysis and Modeling of the Texas Coast (Regions 2 And 3), CEPRA 1747
- 2) Architecture/Engineering Services Contract Work Order Driven GLO Contract No. NO. 22-004-011 Freese & Nichols, Inc. (Tax ID No. 17515319352) Rate Schedule

**SCOPE OF WORK**  
**SEDIMENT BUDGET ANALYSIS AND MODELING OF THE TEXAS COAST**  
**(REGIONS 2 and 3)**  
**CEPRA 1747**

## **INTRODUCTION**

The Texas General Land Office (GLO) intends to analyze existing Texas Gulf of Mexico hydrodynamic information and develop a sand transport model for the entire Texas coast to identify the sand transport pathways and rates, and to define the littoral cells and associated sediment budget for sand along the Texas Gulf facing beaches.

The intent of the analysis and modeling is to inform the development of sediment budgets for each of the four coastal regions as identified in the 2019 Texas Coastal Resiliency Master Plan (Master Plan). The results from this analysis can be made available as a resource to the GLO and coastal communities alike, which shall assist in the preliminary planning stages of future coastal restoration projects being considered under the GLO's Coastal Erosion Planning and Response Act (CEPRA) program and other grant-related programs.

Sediment budgets for Regions 1 and 4 were completed under GLO work order B892. This scope of work relates to the data analysis and development of a regional sand transport model and sediment budget for sand for Region 2, covering Matagorda, Jackson, Victoria and Calhoun Counties, and for Region 3, covering Refugio, Aransas, San Patricio, Nueces and Kleberg counties, in the waters of the Gulf of Mexico.

In general, the Scope of Services of this WORK ORDER entails:

- Regions 2 and 3 Data identification and collation
- Regions 2 and 3 Data analysis
- Regions 2 and 3 Sand transport modeling and sediment budget analysis

## **STUDY SCHEDULE**

An indicative estimate of days necessary to accomplish the work described herein has been developed. Business days after Notice to Proceed (NTP) in each task description are listed below for each task.

The Sections below describe the work that shall be performed by the PROVIDER under this WORK ORDER:

### **TASK A: REGIONS 2 AND 3 DATA IDENTIFICATION AND COLLATION**

#### **1. Data identification**

The purpose of the data identification task is to identify and obtain published material and data to inform the development of the Regions 2 and 3 sediment budgets, and for set up and verification of the sand transport modeling. These data sets shall contribute to inform the development of hydrodynamic and sand transport models of the Texas Coast.

FNI will conduct a review of published studies relating to coastal processes, sand transport and sediment budget along the Texas coast. Through this review a list of target datasets in each coastal region shall be developed. The target list shall define the type of dataset, duration of dataset and the data owner.

Data and published analysis of such data to be sourced by FNI will include:

- Beach profile data
- Offshore / nearshore bathymetric surveys
- LIDAR data to describe the onshore topography and beach crest levels
- Aerial photographs of historic shoreline positions
- Data on historic beach nourishment projects and their performance
- Data on historic USACE maintenance dredging and disposal activities where federal navigation channels intersect the barrier islands at coastal inlets
- Data on sand over-washing during severe events
- Offshore / nearshore wind, wave and current datasets
- Information on surficial sediment types in offshore area
- Offshore / nearshore measurements of sand transport rates
- Historic storm (hurricane) records

FNI will log all records of potential data sources identified for Regions 2 and 3.

***Task A.1 Deliverables.*** FNI will prepare and submit a data log report that includes a list of targeted data sets proposed to be acquired for Regions 2 and 3. The data log report will be submitted in digital PDF format **47 business days after notice to proceed (NTP).**

## **2. Data collation**

When the list of target data sets for Regions 2 and 3 have been finalized and prioritized, FNI will approach the organizations identified as the owners of the data to establish whether the data can be obtained for use in this study.

It is assumed that the GLO, through its partnership with the U.S. Army Corps of Engineers (USACE) on Coastal Storm Risk Management (CSRM) studies and projects, shall be able to facilitate discussions with the USACE regarding sharing data associated with previous and ongoing USACE CSRM-related modeling efforts along the Texas coast.

***Task A.2 Deliverables.*** FNI will develop and submit a detailed data inventory database for Regions 2 and 3. The data inventory log will be submitted in digital MS Excel Format **93 business days after NTP.**

## **TASK B: REGIONS 2 AND 3 DATA ANALYSIS**

The review of literature and data sets compiled in Task A shall be used by FNI to identify knowledge gaps and uncertainties from earlier work. Where possible these will be addressed by FNI using the compiled literature, data sets and results of the modeling undertaken as part of this study. Models to be applied for use in this study shall be well established models utilized within the international engineering community. All model codes shall be open source with the



expectation that outputs from the models could be made publicly available as part of future, project-specific studies. Such outputs may include the bathymetry over a sub-area of the model and model-derived results to provide boundary conditions for a sub-model area. The intent of publicly providing a common source of input data is to ensure consistency in underlying data and assumptions and cost efficiencies in terms of undertaking and approving future project or site-specific studies.

## 1. Analyze published reports to define a baseline sediment budget

A consolidation of previous sediment budgets compiled and shared by USACE SWG (P Hamilton 2021, personal communication) during the first stage of the project for Regions 1 and 4 include definitions of a series of sediment budget cells. For each cell the fluxes across boundaries between cells have been assessed along with a determination of whether the cell acts as a sink (accumulating) or source (eroding) for sand. For this Work Order the initial sediment budget cells for Regions 2 and 3 shall be defined based on USACE SWG's consolidated sediment budget (P Hamilton 2021, personal communication). As the analysis and modeling undertaken within this task progress, these cell boundaries may be refined and updated by FNI.

FNI will undertake a detailed review of the USACE SWG's consolidated sediment budget (P Hamilton 2021, personal communication). FNI will review the data sources underpinning this document and focus on the identified uncertainties and knowledge gaps. Where published data exists that addresses these uncertainties and gaps, the sediment budget shall be amended by FNI. Where published data sources do not exist, FNI will identify methods in which the modeling tools, as defined in subtasks C.3 to C.5, may be used to provide improved understanding of the sediment budget physical and environmental drivers.

Following the USACE approach (Morang, 2006), evidence associated with representative long-term conditions shall be differentiated by FNI from evidence associated with extreme hurricanes and severe tropical storms.

**Task B.1 Deliverables.** FNI will prepare and submit a Baseline Regions 2 and 3 sediment budget report based on published data. The report will be submitted in digital PDF format **93 business days after NTP**.

## 2. Data gap analysis

Through its internal Quality Assurance (QA) protocols, FNI will perform a data gap analysis and Quality Control (QC) reviews of the inventoried data for Regions 2 and 3 (Task A.2); identify data that can be used to establish and verify the models; and, establish assumptions that would need to be made as part of subsequent model development tasks (subtasks C.3 to C.5).

**Task B.2 Deliverables.** FNI will prepare and submit a data gap report for Regions 2 and 3 that defines the data to be used for model inputs, calibration, and verification; and, define assumptions to be carried forward into the subsequent modeling tasks (subtasks C.3 to C.5). The data gap report will be submitted in digital PDF format **121 business days after NTP**.

## TASK C: REGION 2 SEDIMENT BUDGET ANALYSIS AND MODELING

### 1. Nearshore wave modeling

FNI will setup a regional scale wave model using the TOMAWAC wave propagation model. Available wind/wave data shall be used to simulate representative long-term time series of nearshore wave conditions at up to 30 nearshore locations within Region 2.

**Task C.1 Deliverables.** FNI will prepare and submit a nearshore wave modeling report that details representative long-term time series of nearshore wave conditions at up to 30 locations within Region 2.

Nearshore wave hindcast data will be provided detailing a timeseries of  $H_s$ ,  $T_m$ ,  $Dir$  parameters at the 30 nearshore locations reported in nearshore wave modeling report.

The regional wave modeling report and nearshore wave hindcast data will be submitted in digital PDF and text file format respectively **127 business days after NTP**.

### 2. Calculation of littoral drift rates.

FNI will use the representative long-term time series of nearshore wave conditions developed in Task C.1 to develop preliminary estimates of longshore sand transport rates (littoral drift rates) at up to thirty (30) locations within Region 2.

**Task C.2 Deliverables.** FNI will prepare and submit a preliminary littoral drift estimate report detailing preliminary estimates of littoral drift rates within Region 2. The preliminary littoral drift estimate report will be submitted in digital PDF format **167 business days after NTP**.

### 3. Regional wave / flow model setup and calibration.

FNI will setup a single hydrodynamic modeling framework based on the TELEMAC hydrodynamic modeling suite for the Texas coastline. From this modeling framework a high-resolution area wave and flow model shall be established to cover the coastline of Region 2. The high-resolution area shall cover a part of the Region 2 coastline with sufficient resolution to accurately characterize tidal flows and longshore wave driven currents and their interaction in navigation channels and in the vicinity of natural and engineered shoreline features.

FNI will use appropriate data sets acquired in Task A.2 to calibrate the area wave and flow models for Region 2.

**Task C.3 Deliverables.** The Region 2 model calibration report shall be submitted in digital PDF format **185 business days after NTP**.

### 4. Regional sand transport modeling and verification.

Using the high-resolution area wave and flow model from Task C.3, FNI will conduct sand transport modeling with the TELEMAC modeling suite to refine the understanding and detail of the sand transport pathways and fluxes across Region 2.

Under this task, sand transport modeling shall be conducted for representative (higher frequency) environmental force conditions.

The results of the sand transport modeling shall be compared against published results relating to observed evidence of sand transport, erosion, and accumulation identified in Task B.2.

**Task C.4 Deliverables.** FNI will prepare and submit a regional sand transport modeling and verification report that presents results of the sand transport pathways and fluxes under higher frequency environmental force conditions. The regional sand transport modeling and verification report will be submitted in digital PDF format **253 business days after NTP**.

## 5. Sand transport modeling for extreme conditions.

FNI will perform modeling and a sensitivity analysis of sand transport under extreme environmental force conditions for Region 2 to gain insight into the magnitude of sand transport during such events. Two types of modeling shall be performed: 1) area modeling; and, 2) cross-shore profile modeling.

Using the TELEMAC area models, FNI will simulate a historic hurricane making landfall on the Texas coast. Following a review of historic data, FNI will make a recommendation on the historic hurricane to simulate for this task prior to commencing the modeling. Hydrodynamic and sand transport conditions during the simulated hurricane shall be contrasted with those predicted under representative (higher frequency) conditions (Task C.4)

FNI will employ the X-Beach two-dimensional model to predict cross-shore transport at up to ten (10) representative locations in Region 2. The X-Beach model shall be used to simulate conditions for both the historic hurricane event and higher frequency events that may contribute to erosion or over-washing of the beach-dune face.

**Task C.5 Deliverables.** FNI will prepare and submit a report that presents results of the sand transport pathways and fluxes under extreme environmental forcing conditions; and, will document the sensitivity analysis for sand transport under extreme events. The extreme conditions sediment transport report will be submitted in digital PDF format **275 business days after NTP**.

## 6. Region 2 Sediment Budget Analysis

FNI will prepare a Draft Report for the GLO's review that presents the processes, results and conclusions of the Texas Coast Region 2 sediment budget analysis and modeling activities.

The Draft Report shall include descriptions of the modeling tools used in the studies; the underlying input data; assumptions; calibration and verification against available published data.

Additionally, the Draft Report shall present the updated results of the sediment budget analysis, and include descriptions of knowledge gaps and uncertainties.

The GLO shall provide comments on the Draft Report to FNI. FNI will provide responses to the GLO's comments and update the report into a Final Report

**Task C.6 Deliverables:** FNI will prepare and submit a Draft and Final Texas Coast (Region 2) Sediment Budget Analysis and Modeling Report. The Draft Report shall be submitted for GLO review in digital PDF format **373 business days after NTP**. FNI will revise the Draft Report into a Final Report and target resubmission within 2 weeks of receiving GLO comments on the Draft Report.

The following deliverables will also be provided to accompany the Region 2 sediment budget for the GLO to host on their chosen GIS platform upon acceptance of the Region 2 report:

- Sediment budget cells in GIS shapefile format
- Annual sediment fluxes for each sediment budget cell in GIS shapefile format (Net A, Net B, Gross A, Gross B & offshore)
- Littoral depth of closure points in GIS shapefile format (up to 30 locations)
- Nearshore wave data extraction points in GIS shapefile format (up to 30 locations)
- Annual sediment transport curves in GIS shapefile format
- Integrated annual net, gross & cumulative transport at 1ft contour intervals along each transect
- Monthly sediment transport curves in GIS shapefile format
- Integrated monthly net & cumulative transport at 1ft contour intervals along each transect
- Region 2 model bathymetry in GIS shapefile format
- Region 2 model bathymetry X, Y, Z data in text file format
- Region 2 sediment characteristic maps (anticipate 5 layers)

## **TASK D: REGION 3 SEDIMENT BUDGET ANALYSIS AND MODELING**

### **1. Nearshore wave modeling**

FNI will setup a regional scale wave model using the TOMAWAC wave propagation model. Available wind/wave data shall be used to simulate representative long-term time series of nearshore wave conditions at up to 30 nearshore locations within Region 3.

**Task D.1 Deliverables.** FNI will prepare and submit a nearshore wave modeling report that details representative long-term time series of nearshore wave conditions at up to 30 locations within Region 3.

Nearshore wave hindcast data will be provided detailing a timeseries of Hs, Tm, Dir parameters at the 30 nearshore locations reported in the nearshore wave modeling report.

The regional wave modeling report and nearshore wave hindcast data will be submitted in digital PDF and text file format respectively **179 business days after NTP**.

## 2. Calculation of littoral drift rates.

FNI will use the representative long-term time series of nearshore wave conditions developed in Task D.1 to develop preliminary estimates of longshore sand transport rates (littoral drift rates) at up to thirty (30) locations within Region 3.

**Task D.2 Deliverables.** FNI will prepare and submit a preliminary littoral drift estimate report detailing preliminary estimates of littoral drift rates within Region 3. The preliminary littoral drift estimate report will be submitted in digital PDF format **219 business days after NTP**.

## 3. Regional wave / flow model setup and calibration.

FNI will setup a single hydrodynamic modeling framework based on the TELEMAC hydrodynamic modeling suite for the Texas coastline. From this modeling framework, a high-resolution area wave and flow model shall be established to cover the coastline of Region 3. The high-resolution area shall cover a part of the Region 3 coastline with sufficient resolution to accurately characterize tidal flows and longshore wave driven currents and their interaction in navigation channels and in the vicinity of natural and engineered shoreline features.

FNI will use appropriate data sets acquired in Task A.2 to calibrate the area wave and flow models for Region 3.

**Task D.3 Deliverables.** The Region 3 model calibration report shall be submitted in digital PDF format **401 business days after NTP**.

## 4. Regional sand transport modeling and verification.

Using the high-resolution area wave and flow models from Task D.3, FNI will conduct sand transport modeling with the TELEMAC modeling suite to refine the understanding and detail of the sand transport pathways and fluxes across Region 3.

Under this task, sand transport modeling shall be conducted for representative (higher frequency) environmental force conditions.

The results of the sand transport modeling shall be compared against published results relating to observed evidence of sand transport, erosion, and accumulation identified in Task B.2.

**Task D.4 Deliverables.** FNI will prepare and submit a regional sand transport modeling and verification report that presents results of the sand transport pathways and fluxes under higher frequency environmental force conditions. The regional sand transport modeling and verification report will be submitted in digital PDF format **459 business days after NTP**.

## 5. Sand transport modeling for extreme conditions.

FNI will perform modeling and a sensitivity analysis of sand transport under extreme environmental force conditions for Region 3 to gain insight into the magnitude of sand

transport during such events. Two types of modeling shall be performed: 1) area modeling; and 2) cross-shore profile modeling.

Using the TELEMAC area models, FNI will simulate a historic hurricane making land fall on the Texas coast. Following a review of historic data FNI will make a recommendation on the historic hurricane to simulate for this task prior to commencing the modeling. Hydrodynamic and sand transport conditions during the simulated hurricane shall be contrasted with those predicted under representative (higher frequency) conditions (Task D.4)

FNI will employ the X-Beach two-dimensional model to predict cross-shore transport at up to ten (10) representative locations in Region 3. The X-Beach model shall be used to simulate conditions for both the historic hurricane event and higher frequency events that may contribute to erosion or over-washing of the beach-dune face.

**Task D.5 Deliverables.** FNI will prepare and submit a report that presents results of the sand transport pathways and fluxes under extreme environmental forcing conditions; and, will document the sensitivity analysis for sand transport under extreme events. The extreme conditions sediment transport report will be submitted in digital PDF format **493 business days after NTP**.

## 6. Region 3 Sediment Budget Analysis

FNI will prepare a Draft Report for the GLO's review that presents the processes, results and conclusions of the Texas Coast Region 3 sediment budget analysis and modeling activities.

The Draft Report shall include descriptions of the modeling tools used in the studies; the underlying input data; assumptions; calibration and verification against available published data.

Additionally, the Draft Report shall present the updated results of the sediment budget analysis, and shall include descriptions of knowledge gaps and uncertainties.

The GLO shall provide comments on the Draft Report to FNI. FNI will provide responses to the GLO's comments and update the report into a Final Report

**Task D.6 Deliverables:** FNI will prepare and submit a Draft and Final Texas Coast (Region 3) Sediment Budget Analysis and Modeling Report. The Draft Report shall be submitted for GLO review in digital PDF format **585 business days after NTP**. FNI will revise the Draft Report into a Final Report and target resubmission within 2 weeks of receiving GLO comments on the Draft Report.

The following deliverables will also be provided to accompany the Region 3 sediment budget for the GLO to host on their chosen GIS platform upon acceptance of the Region 3 report:

- Sediment budget cells in GIS shapefile format

- Annual sediment fluxes for each sediment budget cell in GIS shapefile format (Net A, Net B, Gross A, Gross B & offshore)
- Littoral depth of closure points in GIS shapefile format (up to 30 locations)
- Nearshore wave data extraction points in GIS shapefile format (up to 30 locations)
- Annual sediment transport curves in GIS shapefile format
- Integrated annual net, gross & cumulative transport at 1ft contour intervals along each transect
- Monthly sediment transport curves in GIS shapefile format
- Integrated monthly net & cumulative transport at 1ft contour intervals along each transect
- Region 3 model bathymetry in GIS shapefile format
- Region 3 model bathymetry X, Y, Z data in text file format
- Region 3 sediment characteristic maps (anticipate 5 layers)

## TASK E: MEETINGS

**1. Regions 2 and 3 Kick-Off Meeting.** FNI will provide up to **three (3) personnel** from the PROVIDER and **three (3) personnel** from HRW to attend a Kick-Off meeting at the GLO office in Austin, Texas. FNI proposes up to **two (2) roundtrip airfares** for **two (2) HRW United Kingdom (UK) personnel** to attend the Kick-Off meeting. FNI assumes the Kick-Off meeting shall not exceed a total of **eight (8) hours**. The Kick-Off meeting will be coordinated, scheduled, and facilitated by FNI. FNI will prepare an agenda ahead of the Kick-Off Meeting, and minutes following the Kick-Off Meeting.

**2. Monthly Progress Meetings.** FNI and HRW will provide up to **nine (9) personnel** to participate remotely for up to **twenty-two (22) Monthly Progress meetings of one (1) hour** each, to be held remotely via Microsoft Teams (or similar). The Monthly Progress Meetings will be coordinated, scheduled, and facilitated by FNI. FNI will prepare an agenda and a monthly progress summary memorandum ahead of each Monthly Progress Meeting, and minutes following each Monthly Progress Meeting.

**3. Data Collation Meetings.** FNI will provide up to **three (3) personnel** to participate in up to **ten (10) in-person Data Collation Meetings** with Federal and State agencies and Academic Institutions for the purpose of obtaining data sets for Regions 2 and 3. FNI will submit to the GLO for approval a list of agencies and institutions and the rationale for requesting a data collation meeting with the listed entities. The Data Collation Meetings will be coordinated, scheduled, and facilitated by FNI. FNI will prepare an agenda ahead of each Data Collation Meeting, and minutes following each Data Collation Meeting. Where relevant, FNI will take care to ensure each Data Collation Meeting is scheduled and structured to allow for GLO personnel to participate either in-person or remotely.

**4. Region 2 Results Meeting.** FNI will provide up to **three (3) personnel from the PROVIDER** and up to **six (6) personnel from HRW** to attend the Region 2 Results Meeting to present the Region 2 study results. An in-person meeting is proposed at either FNI or the GLO office in Austin, Texas and will include the option for remote participation via Microsoft Teams (or similar). No allowance has been made for airfares for HRW UK personnel as part of this meeting. FNI assume the Region 2 Results Meeting shall not exceed a total of **four (4)**

**hours.** The Region 2 Results Meeting shall be coordinated, scheduled, and facilitated by FNI. FNI will prepare an agenda ahead of the Region 2 Results Meeting, and minutes following the Region 2 Results Meeting.

**5. Region 3 Results Meeting.** FNI will provide up to **three (3) personnel from the PROVIDER** and up to **six (6) personnel from HRW** to attend the Region 3 Results Meeting to present the Region 3 study results. An in-person meeting is proposed at either FNI or the GLO office in Austin, Texas and will include the option for remote participation via Microsoft Teams (or similar). FNI proposes for up to **two (2) roundtrip airfares for two (2) HRW UK personnel** to attend the Region 3 Results Meeting. FNI assume the Region 3 Results Meeting shall not exceed a total of **four (4) hours**. The Region 3 Results Meeting shall be coordinated, scheduled, and facilitated by FNI. FNI will prepare an agenda ahead of the Region 3 Results Meeting, and minutes following the Region 3 Results Meeting.

***Task E Deliverables.*** FNI will prepare and distribute agendas and minutes for each Kick-Off, Monthly Progress, Data Collation and Final Progress meetings; and shall prepare monthly and interim progress summary memorandums through **102 weeks**.

## REFERENCE

Morang, A. 2006 (Morang, 2006). North Texas Sediment Budget, Sabine Pass to San Luis Pass, U.S. Army Corps of Engineers, Engineer Research and Development Center (ERDC), Coastal Hydraulics Laboratory (CHL), ERDC/CHL Technical Report (TR) TR-06-17, Vicksburg, Mississippi. September 2006.



## PROJECT BUDGET

Task	Not to Exceed Amount  (Labor)	Not to Exceed Amount  (Travel/ODCs)
Task A: Region 2 & 3 Data Identification and collation	\$ 253,376	
Task B: Region 2 & 3 Data Analysis	\$ 216,843	
Task C: Region 2 Sediment Budget Analysis and Modeling	\$ 746,967	
Task D: Region 3 Sediment Budget Analysis and Modeling	\$ 738,924	
Task E: Project Management & Meetings	\$ 409,443	\$ 27,872
Total Labor Budget	\$ 2,365,553	
Other Direct Costs (Expenses)		\$ 27,872
<b>Total</b>	<b>\$ 2,393,425</b>	

<b>ARCHITECTURE/ENGINEERING SERVICES CONTRACT</b>				
<b>WORK ORDER DRIVEN</b>				
<b>GLO Contract No. NO. 22-004-011</b>				
<b>FREESE &amp; NICHOLS, INC.</b>				
<b>(Tax ID No. 17515319352)</b>				
<b>Rate Schedule</b>				
<b>Job Classification</b>	<b>Nov 22, 2021 to Nov 21, 2022 (2021/2022)</b>	<b>Nov 22, 2022 to Nov 21, 2023 (2022/2023)</b>	<b>Nov 22, 2023 to Nov 21, 2024 (2023/2024)</b>	<b>Nov 22, 2024 to Nov 21, 2025 (2024/2025)</b>
Principal	\$293.34	\$305.08	\$317.28	\$329.97
Sr. Engineer IV	\$293.93	\$305.68	\$317.91	\$330.63
Sr. Engineer III	\$252.25	\$262.34	\$272.83	\$283.74
Sr. Engineer II	\$204.12	\$212.29	\$220.78	\$229.61
Engineer	\$164.35	\$170.93	\$177.77	\$184.88
Engineer in Training	\$118.19	\$122.92	\$127.84	\$132.95
Environmental Scientist VII	\$242.08	\$251.76	\$261.83	\$272.30
Environmental Scientist VI	\$200.94	\$208.97	\$217.33	\$226.03
Environmental Scientist V	\$174.96	\$181.96	\$189.24	\$196.81
Environmental Scientist IV	\$144.24	\$150.01	\$156.01	\$162.25
Environmental Scientist III	\$113.23	\$117.76	\$122.47	\$127.36
Environmental Scientist II	\$98.24	\$102.17	\$106.26	\$110.51
Environmental Scientist I	\$82.25	\$85.53	\$88.96	\$92.51
Construction Manager 4	\$208.24	\$216.57	\$225.24	\$234.25
Construction Manager 3	\$166.61	\$173.28	\$180.21	\$187.42
Construction Manager 2	\$129.33	\$134.50	\$139.88	\$145.48
Construction Manager 1	\$118.44	\$123.18	\$128.11	\$133.23
GIS Analyst V	\$149.14	\$155.11	\$161.31	\$167.76
GIS Analyst IV	\$123.65	\$128.59	\$133.74	\$139.09
GIS Analyst III	\$109.40	\$113.78	\$118.33	\$123.06
GIS Analyst II	\$94.24	\$98.01	\$101.93	\$106.00
GIS Analyst I	\$79.12	\$82.28	\$85.57	\$88.99
CAD Technician/Designer 4	\$192.64	\$200.35	\$208.36	\$216.69
CAD Technician/Designer 3	\$158.30	\$164.64	\$171.22	\$178.07
CAD Technician/Designer 2	\$128.40	\$133.53	\$138.87	\$144.43
CAD Technician/Designer 1	\$98.36	\$102.29	\$106.38	\$110.64
Intern	\$73.11	\$76.04	\$79.08	\$82.24
Administrative Assistant	\$98.23	\$102.16	\$106.25	\$110.50
Contract Administrator	\$152.84	\$158.96	\$165.32	\$171.93
Non-Labor costs for equipment and purchased services will be assessed a 10% handling fee.				
Non-Labor for travel and expense will be billed at State rates without handling fee.				
Subcontractor rates will be billed at a 10% mark-up				

## REQUIRED INSURANCE

GENERALLY. Provider shall, at its sole expense, acquire, maintain, and keep in force for the duration of this Contract, insurance in the amounts attached herein and under the requirements specified herein. Furthermore, unless specified or otherwise agreed to by the GLO, the required insurance shall be in effect prior to the commencement of work by Provider and shall continue in full force until the earlier as appropriate of (i) the expiration of this Contract; or (ii) such time as the GLO notifies Provider that such insurance is no longer required. Any insurance or self-insurance available to the GLO shall be in excess of, and non-contributing with, any insurance required from Provider. Provider's insurance policies shall apply on a primary basis. If, at any time during the Contract, an insurer or surety fails to provide insurance to Provider or otherwise fails to comply with the requirements of this Contract, Provider shall immediately notify the GLO and replace such insurance or bond with an insurer meeting such requirements. General aggregate limits of Provider's Commercial General Liability policy shall apply per project. Provider's auto insurance policy shall apply to "any auto."

Approval. Prior approval of the insurance policies by the GLO shall be a condition precedent to any payment of consideration under this Contract and insurance must be submitted for review and approval by the GLO prior to the commencement of work. Any failure of the GLO to timely approve or failure to disapprove the insurance furnished by Provider shall not relieve Provider of Provider's full responsibility to provide the insurance required by this Contract.

Continuing Coverage. The GLO's approval of any changes to insurance coverage during the course of performance shall constitute an ongoing condition subsequent to this Contract.

Renewal. Provider shall provide the GLO with renewal or replacement certificates no less than thirty (30) days before the expiration or replacement of the required insurance.

Additional Insured Endorsement. The GLO, its officers, employees, and authorized agents shall be named as additional insureds for all liability arising under this Contract except on Workers' Compensation and Professional Liability policies. **An original additional insured endorsement signed by an authorized insurance company representative must be submitted to the GLO to evidence the endorsement of the GLO as an additional insured on all policies, and the certificate(s) must reference the related GLO Contract Number.**

Subrogation. Each liability insurance policy, except Professional Liability, shall provide for a waiver of subrogation as to the State of Texas, the GLO, and their officers, employees, and authorized agents, and shall be issued by insurance companies authorized to do business in the State of Texas, and currently rated by A.M. Best as "A-" or better.

Policy Cancellation Endorsement. Except for ten (10) days' notice for non-payment of premium, each insurance policy shall be endorsed to specify that without 30 days' prior

written notice to the GLO, the policy shall not be canceled, non-renewed, or coverage and/or limits reduced or materially altered, and shall provide that notices required by this paragraph shall be sent by certified mail to the address specified in this Contract. A copy of this signed endorsement must be attached to this Contract.

Alternative Insurability. Notwithstanding the requirements of this Attachment, the GLO reserves the right to consider reasonable alternative methods of insuring the contract in lieu of the insurance policies and/or bonds required. It will be Provider's responsibility to recommend to the GLO alternative methods of insuring the Contract. Any alternatives proposed by Provider should be accompanied by a detailed explanation regarding Provider's inability to obtain insurance coverage as described in this Contract. The GLO shall be the sole and final judge as to the adequacy of any substitute form of insurance coverage.

**INSURANCE REQUIRED:**

**\$1 MILLION COMMERCIAL GENERAL LIABILITY (EACH OCCURRENCE)**  
**\$2 MILLION COMMERCIAL GENERAL LIABILITY (AGGREGATE LIMIT)**  
**\$1 MILLION CSL AUTOMOBILE INSURANCE**  
**\$1 MILLION ERRORS AND OMISSIONS, PER CLAIM**  
**STATUTORY WORKERS' COMPENSATION & EMPLOYERS LIABILITY**  
- \$1 MILLION EACH ACCIDENT  
- \$1 MILLION DISEASE EACH EMPLOYEE  
- \$1 MILLION DISEASE POLICY LIMIT

**NOTE:** Insurance certificates must be in the form approved by the Texas Attorney General, a sample of which follows this page.

Insurance Certificates must:

- (a) be submitted to [insurance@GLO.TEXAS.GOV](mailto:insurance@GLO.TEXAS.GOV)
- (b) **prominently display "GLO Contract No. 22-004-011 and Work Order No. D795."** and
- (c) Name the General Land Office as an additional insured.

Failure to submit required insurance forms as instructed may significantly delay the start of work under the Contract.

**REQUIRED FORM OF CERTIFICATE FOLLOWS THIS PAGE**



Contract No. \*\*\*\*\*

DATE (MM/DD/YYYY)

# CERTIFICATE OF LIABILITY INSURANCE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	Required form of Insurance	CONTACT NAME:	
		PHONE (A/C, No, Ext):	FAX (A/C, No):
		E-MAIL ADDRESS:	
		INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED		INSURER A :	
		INSURER B :	
		INSURER C :	
		INSURER D :	
		INSURER E :	
		INSURER F :	

**COVERAGES**                      **CERTIFICATE NUMBER:**                      **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	<b>GENERAL LIABILITY</b> <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	<b>UMBRELLA LIAB</b> <input type="checkbox"/> OCCUR <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED    RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICE/MEMBER EXCLUDED? <input type="checkbox"/> Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below						WC STATU-TORY LIMITS    OTH-ER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER	<b>CANCELLATION</b>
	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.  AUTHORIZED REPRESENTATIVE