Appendix A
Scope of Work for Phases 1 and 2 of the Project

Scope of Work

1.1.1. Suitability Study – Work Package 2, Phase 1

Phase 1 Work includes the evaluation and cataloguing of the data, the development of a Data Repository assembled in a Contractor hosted SharePoint web site, and the generation of a Data Gap Analysis with conclusions and recommendations. The Phase I Task Order Notice to Proceed was issued to the Contractor on 28 September 2011.

1.1.1.1 Amendment to Work Package 2, Phase 1 Work

1.1.1.1.1. Due Diligence 1 – Change 0003

The requirement is to conduct a geotechnical evaluation of the existing soil backfill properties in the open cell sheetpile structures constructed for the Port of Anchorage expansion to assist in the suitability study of the expansion design. It has been determined that the strength and stiffness characteristics of the cell backfill are critical to the stability of the cell structures during seismic events and therefore determination of these backfill properties is required.

The work is to be conducted by CHM2Hill and their sub-consultants (drilling and laboratory analysis providers) under a contract modification to WP2, Phase 1. The work will consist of services necessary to provide a report that presents the data collected and summarizes the assessment of the strength and stiffness characteristics of the cell backfill for use in the cell stability numerical models.

1.1.1.1.2. Due Diligence 2 – Change 0005

The requirement is to perform an additional geotechnical evaluation to further determine the engineering properties of the Bootleggers Cove Clay Formation (BCF) supporting the backfill within the open cell sheet pile structures constructed for the Port of Anchorage. It has been determined that the characteristics of the BCF need to be further evaluated in regards to both the static and dynamic conditions for global stability of the cell structures.

The work will consist of services necessary to provide a report that presents the data collected and summarizes the assessment of the BCF for use in the cell stability numerical models. This includes 5-exploratory mud-rotary borings drilled at the site to depths between 120 and 160 feet. An optional boring will be proposed in the event additional information is warranted. All boring locations will be surveyed after completion. A field sampling and laboratory testing program will be performed. The sampling program will consist of a combination of Standard Penetration Test (SPT) samples, grab samples, Modified (3-inch diameter) Penetration Tests, and both 3 and 5 inch Shelby tubes. The laboratory testing program will be directed specifically toward the geotechnical engineering evaluations required to develop soil strength parameters for the global

stability analysis. The testing procedures and quantity are to be approved by our USACE engineering staff.

The work also extends the performance of the Contractor electronic file maintenance, site architecture support, and plant as required to maintain the Share Point System through the end of the revised Performance Period of the Phase 2 Suitability Study. Additionally, the scope requires the Contractor to provide up to 10 external hard drives of the entire Electronic Data File Management System.

1.1.2. Suitability Study – Work Package 2, Phase 2

The Phase 2 Suitability Analysis includes the analysis of the open cell sheet pile foundation system at the Port of Anchorage, including the associated hydrologic, geotechnical, structural, and seismic condition to determine current design suitability for use at the current site.

The work is intended to be a comprehensive analysis consisting of the elements as outlined herein:

1.1.2.1 Definition of Design

A review of the multi-level seismic, performance and design criteria utilized for the current, as-specified design for the Port of Anchorage Intermodal Expansion Project at the Port of Anchorage. In addition, compare the existing design criteria to other applicable port facility design criteria and make recommendation to the appropriate design criteria that will be applied to this work. Definition of design criteria includes, but is not limited to, loading cases, design seismic events, performance levels, and design life.

1.1.2.2 Seismic Hazard Assessment

Perform an in-depth analysis of issues and conditions relating to seismic conditions associated with the project location toward the purposes of providing input to an independent design of the open-cell system used at the Port of Anchorage Intermodal Expansion Project and for the evaluations of as-built conditions of those Works already constructed. Perform a Seismic Hazard Assessment consisting of a Firm Ground Input Motions Verification and a Site-Specific, Seismic Ground Response Evaluation.

1.1.2.3 Hydrological Analysis

Hydrological Analysis – Perform an independent assessment of the hydrological conditions at the Port of Anchorage Intermodal Expansion Project, focusing on scour, sedimentation, and forces relating to ice flows. The Hydrological Analysis shall consist of a Sedimentation Analysis, a Scour Analysis, and Ice Flows Analysis.

1.1.2.4 Geotechnical Analysis

Perform an in-depth analysis to evaluate the subsurface conditions at the Port of Anchorage Intermodal Expansion Project. The Geotechnical Analysis shall consist of a Subsurface Conditions Analysis including the generation of modeling of the Design Subsurface Conditions present at the site and a Geotechnical Engineering Analysis evaluating: 1) Liquefaction Susceptibility, 2) Settlement Potential, 3) Global Stability, 4) Earth Pressures, 5) Anchor Pile

Axial and Lateral Resistances, and 6) Backfill Requirements and properties based on known borrow sources, 7) Local Cell Stability, 8) Effects of over dredge and/or scour, 9) Groundwater conditions, 10) Seismic deformations. In addition, the analysis will include a Sheet Pile Interlock Pullout Evaluation and an evaluation of Groundwater and Tidal Effects on the Existing Bulkheads.

1.1.2.5 Structural Analysis

Perform an analysis of the open cell sheet pile structure, evaluating and predicting the life-cycle performance of the as-built conditions and perform an independent design analysis of an open cell sheet pile structure utilizing the state of the practice standards for the classical (no contribution from interlock passive wedges) design of such structural systems, factoring the site conditions and utilizing the appropriate factors of safety. Identify construction defects/variations that the Contractor deems deleterious to the long-term viability of the completed Works. Estimate the design life including notional maintenance requirements of the major structural elements the coating systems, and the cathodic protection system in terms of scope and cost across the design life. Evaluate general major and minor maintenance procedures including those which are anticipated due to corrosion, impact damage, or design seismic event. Perform an independent open-cell sheet pile design analysis (Modified Diaphragm as identified in the U.S. Steel "Steel Sheet Piling Design Manual", July 1975, page 69) to establish cell material properties and geometry necessary to meet minimum construction, long-term operations, and static and dynamic performance requirements, utilizing the geometry and location of the existing bulkhead in the independent design (e.g., cell radii, required dredge depth); including the reaction and dynamic forces under long-term service conditions, including corrosion, and will consider issues from the geotechnical and hydrological analysis, such as settlement potential and scour.

1.1.2.6 Numerical Modeling

Evaluate the performance of the open-cell sheet pile system used at the Port of Anchorage Intermodal Expansion Project site for the as designed and the as-built condition, utilizing a combination of 2 and 3-dimensional soil-structure interaction models for evaluation under both static and seismic loadings, with evaluations conducted for the short-term construction case, long-term operational loading, and for seismic level 1 and seismic level 2 events. The As-Designed Open Cell Modeling will assess deflections, stresses, and strains in the structural members for each loading case and compare these results to the member allowable and best estimate nominal values to evaluate the adequacy of the design. Instrumentation data, if available, should be used to calibrate the models. The As-Built Open Cell Modeling will incorporate deviations from as-built information into the modeling to evaluate the as-built condition, drawing these deviations from multiple sources, including a review of the sedimentation data from the hydrological study, the soil stratigraphy and properties developed under the geotechnical task, and the as-built assessment of the structure, assessing deflections, stresses, and strains in the structural members for each loading case and compare these results to the member allowable and best estimate nominal values to evaluate the adequacy of the constructed Works. The Independent-Design Modified Diaphragm will also be modeled to evaluate the performance of the design.

1.1.2.7 Constructability Assessment

Perform a constructability assessment of the Works completed to date at the Port of Anchorage

Intermodal Expansion Project, including an evaluation of the construction contractor selection process, an evaluation of the construction methods and records, and an evaluation of the construction equipment and inspection as it relates to the open-cell sheet pile system. Document risks associated with construction of the as-designed structure given the configuration and environmental conditions. In addition, evaluate the constructability of this design with respect to the phased approached currently shown in the phasing plan. Analyze the potential for contractor experience-related construction issues relating to the installation of open cell sheet pile systems affecting the project performance outcome and provide recommendations for the technical criteria appropriate for construction contractor selection for future work toward the goal of limiting the potential for said contractor experience-related construction issues. Evaluate the construction methods employed on previous phases of the open-cell bulkhead, including as a minimum the review of the following: 1) Pile driving records, 2) Pre and post-dredge surveys, 3) Photo logs, 4) Daily reports, 5) Soil testing reports, 6) Sheet pile survey, 7) Post vibra-compaction Standard Penetration Test data, 8) Piezometer readings, and 9) Dive Inspection reports. Conduct a constructability review to evaluate the construction equipment employed by the contractor and the construction inspection processes, including review of such items as: 1) equipment selected for driving sheets, 2) sheet pile driving template, 3) survey control methods, 4) construction QC procedures, and 5) backfill techniques and procedures.

1.1.3. Amendments to Work Package 2, Phase 2 Work

1.1.3.1. Provide for input from Due Diligence Part 2 and Change Review/Reporting Requirements - 0006 & 0007

Extend Summary Report date to September/October to provide for input from Due Diligence Part 2 (WP2, Phase 1). Alter Public Meeting schedules to reflect review periods and or edits and add the reviews/edits, Add printing of Final Summary Report - 20-copies each for each public meeting after edits, Extend Contract Performance Period as required to support revised schedule – JZ02 Mod 3. Work includes USACE review of product (new requirement, original WP2 Phase 2 Final-submittal did not include a review process.