



CASE STUDY: LIQUEFACTION SOIL STABILIZATION PROJECT – TRAINS 1, 2 & 3

Increased energy production in the United States, reflective of the immense domestic supply and increased production of natural gas, has driven economic activity on the Gulf Coast, including the export of natural gas. This LNG Facility is constructing an expansion of its terminal to enable liquefaction and export of U.S. natural gas in the form of LNG.

ENTACT performed mass stabilization of over 2,275,530 cubic yards of soft dredged sediment and fill soils in preparation for an LNG terminal expansion. In-situ stabilization was accomplished with (16) excavators working atop timber mats and pneumatic delivery of Portland cement via custom-fabricated conveyance boxes; and performed to 8.0 feet bgs under future foundation structure areas and 5.0 feet bgs from finish grade in other remaining areas. All cement-improved soils and sediment achieved a minimum unconfined compressive strength (UCS) of 25 psi.

Prior to stabilization efforts, ENTACT performed site wide clearing and grubbing; construction of board access roads to facilitate cement conveyance to proposed stabilization areas; performance of three field stabilization pilot tests to confirm reagent dosages met a minimum UCS of 25 psi in 28 days; excavation and hauling 925,117 cubic yards of soils and/or pre-stabilized material from 26 distinct cut areas using (10) 40-ton articulated trucks; backfill placement and compaction of over 1,004,708 cubic yards of soil and/or pre-stabilized material within 31 distinct fill areas; stockpiling 28,639 cubic yards of excess pre-stabilized material; installation of reinforced concrete drainage culverts, 36-inch HDPE outflow structure with catch basins and rock filter dam, liquefaction flap-gated outflow structure with headwall and wing walls, and the Facility drainage outflow structure including headwall and wing walls; demolition of 1,117 cubic yards of concrete foundations associated with an old plant/washout pit, existing outfall structure, and concrete supports; removal of 7,000 lineal feet of chain link fence, a 9-foot wide, 61-foot long and 4-foot wide, 26-foot long walkway grating with handrails, and miscellaneous timber and steel beams; and downsizing of 28 piles (HP 10x27) to 2.0 feet below existing grade.

Delivering Value

Achieving stabilization performance criteria and meeting the mandates and financial objectives required by the Client for this massive capital construction effort were critical to the project's success. Highlights of ENTACT's approach included:

- Maximizing strength while minimizing volume expansion of treated soils
- Enhancing the ability to rapidly move traffic over treated areas reducing overall total schedule
- Utilizing pneumatic reagent instead of wet grout minimizing the amount of water to reagent ratios
- Maintaining Quality Control staff and laboratory on-site to expedite field testing and enhance productivity
- Developing alternate grading plans in select areas to reduce stabilization volumes





ENTACT delivered the project ahead of schedule and under the original budget while achieving zero OSHA recordable safety incidents with a peak crew size of 40-50 employees.



Three LNG Trains (Trains 1 through 3), a Common Gas Pre-Treatment Unit, and a Loading Dock are currently being constructed and connected to the existing facility to complete this turnkey natural gas liquefaction facility now that ground improvement activities are complete. This LNG Facility expects to achieve commercial operation of the first liquefaction train in 2018.

