



**STANDARD OPERATING PROCEDURE
FOR
EXCAVATION BENCHING AND/OR BACKFILL COMPACTION
FOR LEVEE AND FLOODWALL MODIFICATIONS**



5 January 2011
15 April 2015

1. Placing backfill within the levee embankment will require the following:

- a) The surface of the levee shall be stripped of organics and topsoil to a depth of approximately 6 inches prior to benching the levee sideslope.
- b) The existing levee embankment shall be over-excavated in all directions by benching 1 ft vertical and 3 ft horizontal into stiff undisturbed soil. A level bottom surface day-lighting toward the levee toe shall be provided from which the upward benching on the sides shall initiate. Benching may have to be performed by hand methods or using small-scale excavation equipment.
- c) The levee soil on which the backfill is to be placed should not be excavated until immediately before backfilling, and shall not be allowed to become overly wet or dry while exposed. The surface area of the benches shall be scarified as necessary to ensure a good bond between the existing soil and the backfill material.
- d) Backfill material must be low permeability soils - impermeable soils (e.g. SC, CL or CL-ML with an estimated hydraulic conductivity less than 1×10^{-5} cm/sec) in accordance with ASTM 2488 - USCS classification system.
- e) Backfill material shall be placed in loose lifts with thicknesses not to exceed 6-inches and compacted in the holes to a minimum of 95 percent Standard Proctor density determined at optimum moisture content according to ASTM D-698. Moisture control limits are to be within -1% to +3% of optimum.
- f) Compaction test results of work accomplished in item "e" above shall be submitted to USACE for review and approval throughout the construction process.
- g) Earthwork Specification requirements shall be submitted for Permit review and approval.
- h) The finished riverside or landside slope of the levee shall be graded to match the existing levee slopes upstream and downstream. A site-specific grading plan must be approved for projects where the final grade differs from the original grade.
- i) The disturbed areas shall be seeded and covered with a bio-degradable geotextile when final grading is complete.

2. Placing backfill materials outside the projected levee slopes but within a minimum of 15 feet of the toe of the Levee or face of the Floodwall requires the following:

- a) Backfill material must be low permeability soils - impermeable soils (e.g. SC, CL or CL-ML with an estimated hydraulic conductivity less than 1×10^{-5} cm/sec) in accordance with ASTM 2488 - USCS classification system. Alternatively, controlled low strength material (e.g. flowable fill) meeting the above conductivity requirements and the governing state's DOT standard specification may also be used as backfill material.

- b) Backfill shall be placed in loose lifts with thicknesses not to exceed 8-inches and compacted in the holes to a minimum of 95 percent Standard Proctor density determined at optimum moisture content according to ASTM D-698, unless otherwise directed. Moisture control limits are to be within -1% to +3% of optimum.
- c) The disturbed areas shall be seeded and covered with a bio-degradable geotextile when final grading is complete.