STANDARD OPERATING PROCEDURE
FOR
TREE REMOVAL, ROOT BALLS AND SEEDING GUIDANCE

10 Dec 2013
04 November 2014

Trees within levee embankments and within a minimum of 15 feet of the landside and riverside toes, or within a minimum of 15 feet of the face of a floodwall or 8 feet from the farthest floodwall structure (whichever is greater) shall be removed in accordance with this guidance. Trees with trunks less than four inches in diameter are cut flush to the ground surface. Trees four inches or greater in diameter are cut down and the root balls removed entirely. The size of root balls varies with the size and variety of tree. Root balls are removed so that all roots one-half inch and larger in diameter are taken out. The resulting excavation is then backfilled as described below.

1. **Placing backfill *within the levee embankment* in the holes caused by the removal of a tree root ball will require the following:**

    a) The existing levee embankment where the root ball has been removed shall be over excavated in all directions by benching 1ft vertical and 1.5 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 other three sides shall initiate. Benching will likely have to be performed by hand methods or small-scale excavation equipment.
    b) Backfill material must be low permeability soils - impermeable soils (e.g. SC, CL or CL-ML with an estimated hydraulic conductivity less than 1 $x10^{-5}$ cm/sec) in accordance with ASTM 2488 - USCS classification system.
    c) Backfill material shall be placed in loose lifts with thicknesses not to exceed 6-inches and compacted in the holes to a minimum 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.
    d) 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 during the repair operation. The surface area of the benches shall be scarified as necessary to ensure a good bond between the existing soil and the backfill material.
    e) The finished riverside or landside slope of the levee shall be graded to match the existing levee slopes upstream and downstream of the hole where the tree/root ball was removed.

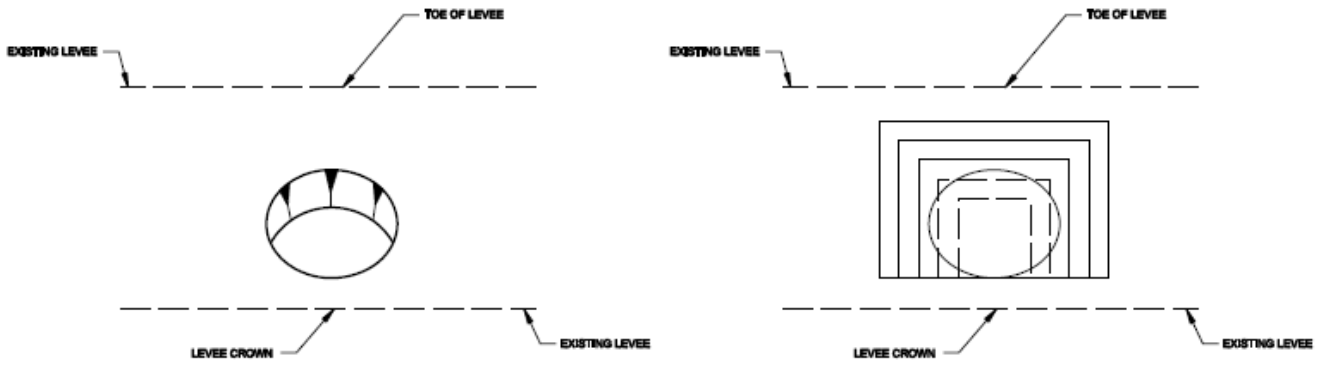
f) Once the hole has been completely filled, the disturbed areas shall be seeded and covered with a bio-degradable geotextile. Consult the project's Operation and Maintenance Manual for the sod seed mix.

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* in holes caused by the removal of a tree root ball will require the following:**

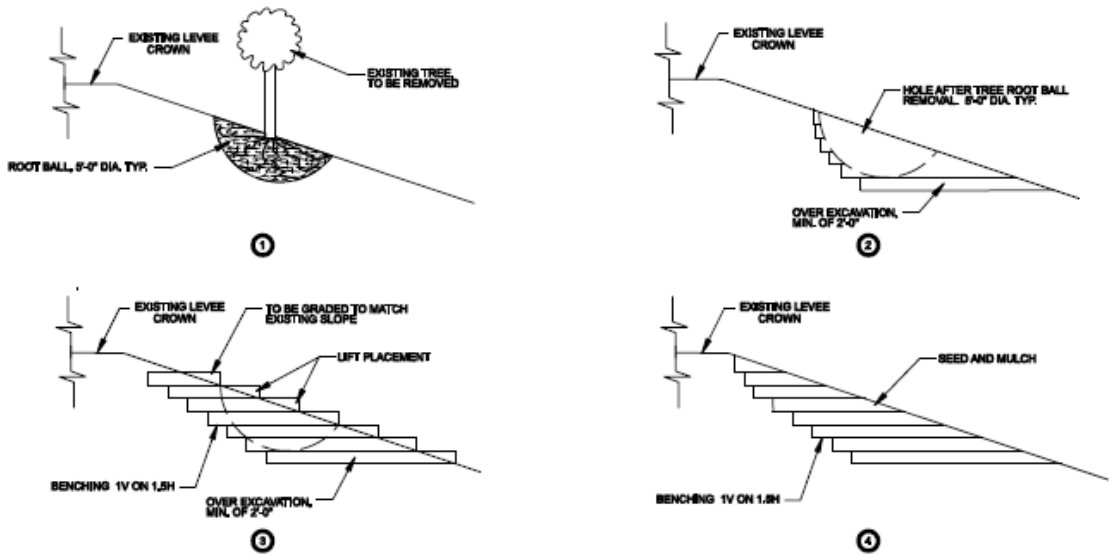
   a) Backfill material must be low permeability soils - impermeable soils (e.g. SC, CL or CL-ML with an estimated hydraulic conductivity less than 1 $x10^{-5}$ cm/sec) in accordance with ASTM 2488 - USCS classification system.
   b) Backfill shall be placed in loose lifts with thicknesses not to exceed 8-inches and compacted in the holes to a minimum 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) Once the hole has been completely filled, the disturbed areas shall be seeded and covered with a bio-degradable geotextile.

3. Reference details below on Tree Removal.

*** SAFETY PAYS ***



PLAN VIEW OF TREE REMOVAL (A G-103)
SCALE: NONE



TYPICAL TREE REMOVAL FROM EXISTING LEVEE - SEQUENCE OF WORK (B G-103)
SCALE: NONE

TREE REMOVAL SECTIONS

LFPP RIVERSIDE SCOUR REPAIR

G-101

*** SUPPORT VALUE ENGINEERING – IT PAYS ***

ENCLOSURE 1

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