STANDARD OPERATING PROCEDURE

WALKING/BIKE TRAILS ON LEVEES

2 October 2020

1) General

a) USACE Section 408 Request: Written approval from the Local Sponsor and the USACE Levee Safety Officer is required before any work is performed on or within 50-feet of a levee system using Form CELRL-803.

b) A/E Construction Drawing and Specifications: All proposed levee trails shall be designed by competent licensed engineers. The submittal of a complete set of project plans and specifications is required before the USACE Levee Safety Officer can approve the Section 408 Request.

c) Notification of Utility Companies: All local utility companies with utilities in the vicinity of the proposed construction shall be contacted to allow for utility relocations if necessary.

d) Work Easements and Rights-of-Entries: Permission from property owners must be acquired.

2) Trail Design

a) Trail Width: Trails on levee crowns shall not be within one foot of the landside or riverside edge of the crown to ensure the Local Sponsor can mow the levee without disturbing the edges of the trail with the blades.

b) Trail Elevation: Trails must constructed at or above the authorized levee design elevation.

c) Bollards/Lighting Bases: Bollard and lighting bases shall be encapsulated in concrete. These shall not exceed a two-foot embedment depth and shall be constructed of a suitable, safe, permanent material.

d) Vehicular Access: Removable bollards or gates are required at all access points to allow only authorized vehicular traffic.

3) Earthwork

a) Excavation:

i) 1.0 Annual Exceedance Probability (AEP) or 100-yr levees: The levee crown shall not be excavated beyond minimal stripping of sod. The stripped crown shall be proof rolled before any aggregate stone is placed for the subbase. Proof rolling may not be performed with a tri-axle. If excessive pumping or rutting occurs the material shall be removed and replaced with suitable material from an approved borrow location.

ii) 0.2 AEP or 500-yr levees: All suitable material that is excavated free of sod, excess stone, or other organic material shall be stored for reuse to facilitate final grading and for use as fill on overbuilt ramp sections. The excavated crown shall be proof rolled before any aggregate stone is placed for the subbase. Proof rolling may not be performed with a tri-axle. If excessive pumping or rutting occurs the material shall be removed and replaced with suitable material from an approved borrow location.

b) Fill Material:

i) 1.0 AEP or 100-yr levees: All material to be utilized for fill on levee slopes or low spots in the crown shall be acceptable cohesive material (USCS CL, CL-ML, or SC) and all necessary laboratory and field tests shall be performed to ensure proper compaction is met. Existing slopes shall be compacted to 95% Standard Proctor per ASTM D698. Loose lifts shall be limited to 6" for all work on the levee. All low areas of the levee crown shall be raised to the As-Built Design Elevation.

ii) 0.2 AEP or 500-year levees: All material to be utilized for fill on levee slopes shall be of acceptable cohesive material (USCS CL, CL-ML, or SC) and all necessary laboratory and field tests shall be performed to ensure proper compaction is met. Constructed ramps/slopes shall be compacted to 95% Standard Proctor per ASTM D698. Loose lifts shall be limited for 6" for all work on the levee. The final elevation of the top of the trail shall be at the As-Built Elevation.

c) Benching of Ramps: Ramps that extend from the levee toe to the levee crown (or any portion thereof) shall be benched into the existing levee to create a continuous well-integrated soil mass in accordance with the Louisville District, ***Standard Operating Procedure for Excavation Benching and/or Backfill Compaction for Levee and Floodwall Modifications*** **(USACE, 2015).** All benching shall coincide with the existing slope and consist of approved material compacted to 95% Standard Proctor per ASTM D698. The most common benching dimensions are given for a 10' horizontal length and a 3.33' rise. The benching slope shall coincide with the existing embankment slope and shall not be steeper than 3(H):1(V). Loose-lift thickness shall be limited to 6" for all work on the levee crown.

d) Soil Stabilization: Spray on adhesives and calcium chloride shall not be used as a soil stabilization method on the levee embankment. If the levee is too wet as determined by the Contracting Officer Representative (COR) or if visible rutting or pumping is occurring, the work on site shall be stopped until conditions improve as determined by the COR.

e) Positive Drainage: All paths and trails shall have a minimum 2% transverse slope to drain water down slope. Water shall not be allowed to pond at or near the levee or ramp toe and shall have adequate drainage measures undertaken to reasonably prevent ponding water. Ramps and other soil structures that are added to the existing levee must drain away from the levee. Interior drainage between the levee and the ramp is not permitted.

f) Pump Station Air Vents and Siphons: These structures are typically located between two and four feet below the levee crown with their risers protruding out of the ground. These structures shall not be removed from the levee trail to facilitate construction. Photos of the structures shall be taken before work begins so that the condition of the structures can be assessed after work is completed. No excavations shall be permitted deeper than one foot below the levee crown in these locations.

g) Pipes: Pipes or culverts shall not be removed without USACE permission. If pipes are profile pipes, their condition will need to be determined by video inspection prior to the start of work and post construction to determine if any impacts to the condition of the pipes have occurred due to the construction of the trail.

4) Subgrade

a) Compacted Aggregate Base: Compacted aggregate subbase shall be placed in accordance with State DOT Specifications.

b) Stripping: The levee crown shall be stripped of all vegetation. Vegetation stripping shall be limited to 1 foot on either side of the proposed trail width.

c) Grading/Compaction: Compacted aggregate shall be placed above ground. Each lift of aggregate shall be compacted with a suitable roller or vibrating compactor until the base is compacted to 95% Standard Proctor per ASTM D698.

d) Base Course Depth: The base course shall not exceed 12 inches in depth. The aggregate shall be compacted with sloped edges on a maximum 1:1 slope. The base of the sloped edges shall be a minimum of 12” from the crown’s edge.

e) Base Side Slopes: Side slopes shall be compacted and placed in lifts simultaneously with all other aggregates.

f) Geotextiles: The use of Contech, Tensar BX1100 Geogrid Fabric or equivalent is recommended to reduce the amount of stone required.

5) Pavement

a) Pavement: All pavement designs shall be approved by the USACE.

b) Thickness: Minimum pavement thickness will depend on material and must be approved by the USACE.

c) Cover: Cover shall completely cover compacted aggregate subbase including the sloped edge portion.

d) Approved Castings: Pavement shall not be placed such that it covers or conceals any structures necessary for successful operation or maintenance of the levee including but not limited to survey monuments, valves, relief wells, manholes, closure structures, toe drains, etc. If covering such components is necessary, approved castings shall be utilized to provide access. A typical installation is provided in Figure 1. Installations on the levee crest can utilize slab construction, while installations in areas that may become saturated must include a footer extending below the frost line. Note that a bond-breaker separation must be installed between the monument and the concrete slab to prevent the monument from moving with the slab/footer.

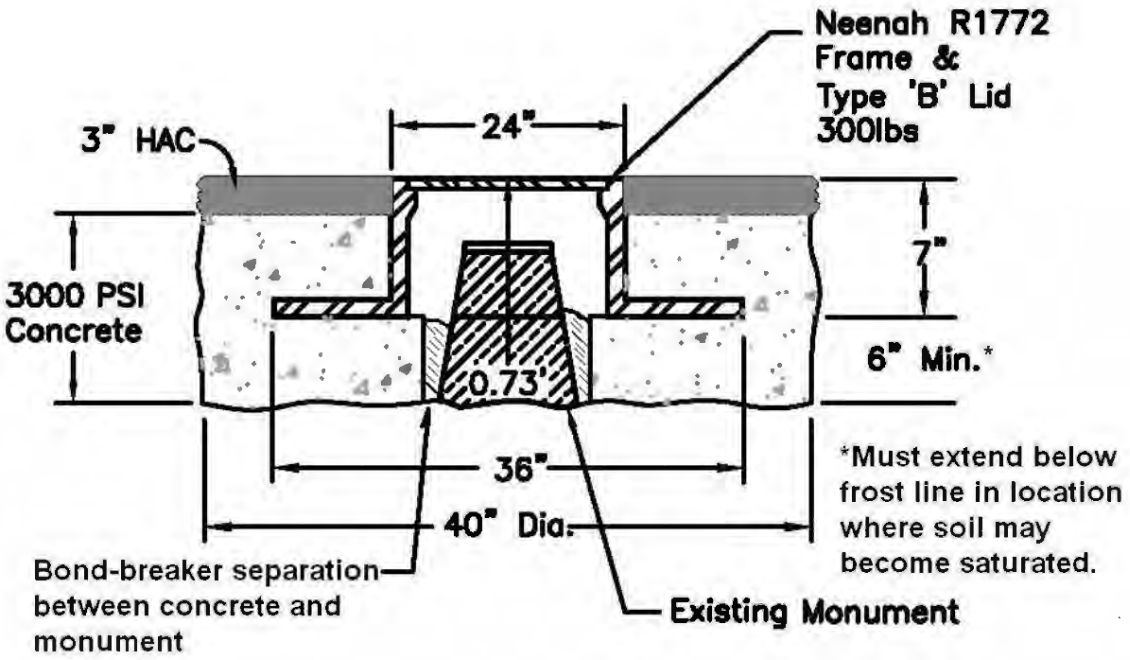

Figure 1: Typical Manhole Protection for an Existing Monument

6) Landscaping and Seeding: Landscaping and Seeding shall be accomplished in accordance with the Operations and Maintenance Manual for the subject levee system.

7) ADA Requirements:

a) Trail ADA Requirements: All ADA requirements shall be in compliance with recommendations from ***Part II Architectural and Transportation Barriers Compliance Board 36 CFR Part 1195 Architectural Barriers Act (ABA) Accessibility Guidelines for Outdoor***

Developed Areas; Proposed Rule **(Architectural and Transportation Barriers Compliance Board, 2007)** and shall comply with all future revisions.

b) Other Facilities ADA Requirements: ADA requirements for all other parking and facilities needs shall be met as needed for the trail project. Signage indicating handicapped access and other vital information shall be included per State Manual on Uniform Traffic Control Devices recommendation if the trail crosses a city street.

8) Replacement of Survey Monuments:

a) Survey Monuments: For survey monuments that have been damaged and/or need to be replaced, replacement monuments shall be ordered from Surve-Kap. The disk that shall be used is Model "M/M-B3 1/2 SPD". When ordering, the Corps of Engineers Survey Mark logo shall be specified. The link to Surv-Kap's webpage for these disks is: http://www.surv-kap.com/index.php/3-1-2-dome-brass-m-m-cast-split-stem.html.

b) Monument Reestablishment: When monuments are reset, control needs to be reestablished. For each monument, a control point description form (See Attachment 1) shall be filled out and sent to Louisville District. Attachment 2 shows an example form properly filled out.