

International Boundary and Water Commission

United States and Mexico

United States Section

4191 N. Mesa, El Paso, TX 79902



Requirements for Projects On or Affecting a USIBWC Flood Control Structure

USIBWC Directive SD.II.01031-M-1 Appendix C

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The purpose of this document is to present additional criteria and guidelines for the application, review, approval, and inspection of construction activities not performed by or for the United States Section, International Boundary and Water Commission (USIBWC) which affects USIBWC flood control structures. See "[Appendix A-Design and Construction Requirements for All Projects](#)" for general requirements covering all projects including those affecting flood control structures.

1. General Conditions for all Projects.

- A. Within this document, levee is used to cover all flood control structures. Levee may mean earthen levee, concrete floodwall, floodgates, stoplogs, sluice/slide gates, or any combination of such which acts as a flood control structure as well as all appurtenances.

- B. All materials used shall have National Science Foundation (NSF) 61 rating. Metals, concrete, rocks, and soil are not required to meet this requirement.
- C. All reports, drawings, specifications, and test results shall be signed and sealed by a professional engineer licensed to practice in the state where the work will be performed.
- D. Licenses will not be issued for use of levees and O&M roads as trails or parks except for minimal lengths at bridge crossings. Trails and parks are allowed on river floodplains as long as the improvements do not cause the water design flood water surface elevation to increase above threshold limits. Additionally, for the Rio Grande and Colorado River, the maximum deflection of design flood flows by the project is 5% or less to either the U.S. or to Mexico. For additional details, refer to "[Appendix E-Design Report Requirements](#)" and "[Appendix F-Hydraulic Modeling Methodology](#)."

2. Work on Levees.

- A. Work impacting USIBWC levees and appurtenant structures cannot negatively affect their flood control abilities. Proponents are not required to analyze our levees beyond their project and its impacts, but work must ensure that USIBWC's levee meets and/or exceeds all of the requirements of the Federal Emergency Management Agency's (FEMA) 44 CFR §65.10(b) for levee accreditation and of the US Army Corps of Engineers' Engineering Manual (EM) 1110-2-1913 entitled "*Design and Construction of Levees*."
- B. The entire levee portion impacted by Proponent's project shall be analyzed for concurrence with 44 CFR §65.10(b). All instances where Proponent's project causes or modifies a "break" in the levee caused by a bridge, roadway, or similar structure, Proponent shall certify in their design report that this break has been analyzed and will meet all 44 CFR §65.10(b) requirements.
 - (1) If the "break" will not meet 44 CR §65.10(b) requirements, then modifications shall be designed to ensure compliance. These modifications shall be coordinated with the owner of said "break."
- C. All concrete structures in USIBWC levees or acting as a flood control structure shall be designed per American Concrete Institute (ACI) 350, Code Requirement for Environmental Engineering Concrete Structures.
- D. Structures shall not be placed within 15 feet (or USIBWC's-controlled property boundary whichever is smaller) from the levee toe.
- E. A minimum of 15 feet (or USIBWC's-controlled property boundary whichever is smaller) from the levee toe shall slope away from the levee to prevent ponding of water against the levee. Please note that it is not USIBWC's intention to create a "toe road" on the riverside of the levee.
- F. The Proponent project must meet and/or exceed all of the requirements of the US Army Corps of Engineers' Engineer Pamphlet (EP) 1110-2-18, "*Guidelines for Landscaping Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*."
- G. Wherever work disturbs the levees, the levees side slopes shall be capped with 6 inches of topsoil. The topsoil shall be of sufficient quality to promote growth of native grasses.

- H. All areas disturbed by construction shall be revegetated. The areas shall be watered to ensure germination and to maintain vegetative growth until the plants have reached their full height or 6 inches, whichever is smaller. See "[Appendix G-Reseeding USIBWC Property](#)" for details on required seed mixes and planting guidelines.

3. Minimum Height of Levee.

- A. USIBWC will provide the design flood elevation for the levee impacted by the Proponent's project. See "[Appendix F-Hydraulic Modeling Methodology](#)" for required design flows.
- B. The top of the levee's impervious section shall be the higher of the existing ground surface or the calculated water surface elevation from the design flood (WSE) plus a minimum of 3 feet freeboard. The freeboard is measured after settlement is taken into account. Refer to 44 CFR §65.10(b) for additional information on freeboard requirements.
- C. Hard structures such as floodwalls that cannot be raised if the WSE changes, must be set at least 4 feet above the calculated WSE.
- D. The gravel O&M road material shall not be considered as part of the impervious section, but shall be considered as part of the levee height when calculating overhead clearances.

4. Levee Closure Structures.

- A. All levee openings shall be designed to meet 44 CFR §65.10(b). Culverts, pipes, utility crossing, road crossing, and bridges are considered levee openings. Design checks/reviews shall be included in the Design Report.
- B. All structures that pass through or under the levee shall be evaluated to determine if structure and closure device meets 44 CFR §65.10(b). If any closure device requires maintenance or rehabilitation, it shall be included in the construction documents.
- C. All closure devices must be able to be safely operated when water is at the design flood elevation. If modification is required, it shall be included in the construction requirements.
- D. Closure devices must be provided on pipelines on the landside of each levee.
- E. If any pipes or boxes that cross the levee require new closure devices, only slide/slucice type gates shall be used. Flap gates are not acceptable.

5. Levee Side Slopes.

- A. The angle of the levee side slopes shall be determined by the design, but site constraints in some sections of the project must be taken into account. For maintenance, USIBWC prefers slopes 3H:1V or flatter. Slopes steeper than 3H:1V shall be minimized.
- B. USIBWC equipment cannot mow a slope steeper than 2.5H:1V. Proponent shall take this into account when designing the levee slopes. If slopes are steeper than 2.5H:1V, measures shall be taken whereby the slope does not require mowing.

6. Levee Alignment.

- A. The levee may not be moved closer to the river without approval of USIBWC.
- B. Relocating the levee will require Proponent to provide a Drainage Report indicating the design flood water surface elevation increase and percent deflection values are within threshold limits. Refer to "*Appendix E-Design Report Requirements*" and "*Appendix F-Hydraulic Modeling Methodology*" for additional information.
- C. If USIBWC agrees with the proposal to relocate the levee, concurrence with Mexico must be reached if the work is along an international reach of the levee. This concurrence may require weeks or months of communications. Proponent may continue working on the design during this period, but in no instance, shall construction proceed until concurrence is reached with Mexico.

7. Utilities.

- A. Utilities include privately, publicly, or cooperatively owned lines, wires, pipelines, facilities, and systems for producing, transmitting, or distributing communications, power, heat, gas, oil, water, waste, stormwater, or irrigation water.
- B. In no instance shall a utility hinder or impair USIBWC's ability to perform maintenance or flood operations.
- C. Transverse utilities may be routed on top of the levee. A utility on top of the levee shall be designed to withstand AASHTO HS25 loading and shall be protected from damage from grading and other levee maintenance. The utility or its associated cover must be shaped to allow passage of a loaded lowboy semi trailer. The Proponent must acknowledge that they will be required to raise their utility if the USIBWC raises the levee.
- D. Pipeline utilities crossing the levee shall include closure devices on the landside of each levee.
- E. Utility excavations shall meet the design and construction requirements for levees including the minimum testing requirements.
- F. Utilities shall not remain within the levee prism after construction. Proponent shall design for relocation of utilities including coordination with utility owners. The levee prism includes all components above the floodplain elevation as well as the floodplain/landside toe (can be assumed to be 15 feet from levee toe) and subsurface that carries flood seepage under the levee.
 - (1) USIBWC may make rare exceptions when placement of the utility does not affect USIBWC's ability to operate, maintain, and raise the levee. In these instances, the utilities shall be located in the landside half of the levee, preferable above the design flood elevation, or completely under the levee.
 - (2) Utility must meet requirements of USACE's EM 1110-2-191 Chapter 8.
 - (3) In no instances shall the utility be "plowed" into levee.
 - (4) Installation by tunneling or jacking is only allowed when utility is placed so deep under the levee that subsurface flow conditions are not changed by installation.

- (5) The Design Report, including a seepage analysis, shall certify that the utilities within the levee do not expose the levee to any risks associated with 44 CFR §65.10(b)(3) and (4).
- G. Utilities running parallel to the levee shall be set at least 15 feet off of the existing levee toe. This includes underground utilities.
- H. Relocated utilities shall be completely removed from USIBWC-controlled property instead of being abandoned in place.
 - (1) USIBWC only leaves abandoned utilities within levees if they provide no risk to the levee and are extremely difficult to remove. If utility is abandoned in place, Design Report shall certify that the utility does not expose the levee to any risks associated with 44 CFR §65.10(b). Proponent may need to design changes to utility prior to abandonment (e.g. fill structure with flowable fill).
- I. The Proponent shall install and maintain suitable markers or signs indicating the location of the utility where it crosses the levee, pilot channel, or river and where the utility changes direction within USIBWC-controlled property. The markers or signs should be a minimum height of 5 feet. No markers are to be installed on the levee slopes or within 15 feet from the toe of the levee.
- J. See "*Appendix A-Design and Construction Requirements for All Projects*" for bridge and additional utility crossing requirements.
- K. Overhead Wire Utility Crossings
 - (1) The overhead transmission lines shall be constructed and maintained in such a manner as to provide a minimum vertical clearance (at the temperature of 60° Fahrenheit) of not less than 28 feet above the levee height and at least 22 feet above the floodway BFE.
 - (2) No structure (poles or guy wires) shall be located closer than 35 feet from the toes of any levee. No structure (poles or otherwise) shall be located closer than 15 feet from the top of any channel bank.
 - (3) Guy wires may be anchored within the USIBWC-controlled property and shall be installed in such a manner that they do not interfere with the operation and/or maintenance of the channels, levees, or related structures. A witness post, not less than 5 feet high, shall be installed by each anchor or the cable shall be wrapped up to a point at least 5 feet above the ground with a brightly colored material to make it obviously visible.
 - (4) It shall be the Proponent's responsibility to maintain the areas clear of brush within a 10 foot radius of each pole, under the guy wires, and around the anchors on both sides of the levee and within USIBWC-controlled property.
- L. Utilities Crossing Under Levees.
 - (1) The Design Report, including a seepage analysis, shall certify that the utilities below the levee do not expose the levee to any risks associated with 44 CFR §65.10(b)(3) and (4).

- (2) When installing utilities by directional drilling, the Proponent shall furnish information addressing the following concerns and give specific dimensions, distances, pressures, weights, and all other pertinent data.
 - (a) Comprehensive understanding of the subsurface soil and groundwater conditions to a minimum depth of 20 feet below the lowest pipe elevation
 - (b) Locations of the pipe penetration entry and exit
 - (c) Allowable uplift pressures
 - (d) Drilling procedures and onsite quality control monitoring during drilling operation
 - (e) Grouting of the pipe annulus, backfilling of any excavated areas, and repair of the construction-staging areas
- (3) When utility installation is under both levees and the river or pilot channel, the entry and exit location, when located landside of a levee, shall be set back sufficiently from the landside levee toe to ensure that: (a) the utility reaches its maximum depth, and (b) the utility is no less than 300 feet landside from the levee centerline. The utility shall be constructed in a straight alignment for a minimum distance of 15 feet beyond the landside of the levee toe.

8. O&M Road on top of Levee.

- A. The finished gravel O&M road shall be at least 16 feet wide. The O&M road shall be on top of any earthen levees or on the landside of any floodwalls as well as on all ramps.
- B. The gravel surface of the O&M road shall be a minimum of 6 inches thick and be designed as an aggregate roadway surface (i.e., gravel road), not as general flexbase below asphalt. USIBWC can provide our standard specifications for this gravel but use of this specification is not required.
- C. The finished gravel road shall slope 2% toward the riverside if on an earthen levee and 2% toward the landside if behind a floodwall. A consistent cross slope is preferred to a crown since the crown is not maintained during grading.
- D. Geotextile cannot be placed between the levee's impervious section and the gravel O&M road material.
- E. No structure may end within or adjacent to the edge of the O&M road unless it is safe for passing traffic (e.g. headwall parallel to levee) and can be regularly graded with a motor grader. USIBWC may require signs or reflectors (e.g. OM4-3, OM2-2V, or OM3) meeting Federal Highway Administration's (FHWA) Manual of Uniform Traffic Control Devices (MUTCD) adjacent to any such structures.

- 9. Ramps.** Riverside ramps along the levee shall be designed as sections cut out of the levee instead of as roads skewed away from the levee. See USIBWC Standard Drawing SD-25084 for reference. Some ramps adjacent to structures will have different geometry

due to site conditions. Outgrant permitted landside ramps shall be designed to meet the site conditions but in no way shall negatively affect the levees.

10. Minimum Soil Requirements.

- A. Project designers may establish more stringent standards, but soil (clay) used in construction or repair of the levees shall meet these minimum requirements:
- (1) Soils - Clay (CL or CH per ASTM D2487)
 - (2) Flowable fill (controlled low strength materials, CLSM, flowfill, and soil cement) may be used as backfill as long as the Design Report evaluates the seepage through the levee around the flowable fill and placement of flowable fill will not affect USIBWC's operations and maintenance of the levee.
 - (3) Crumb Test (ASTM D6572) - Grade 1 (non-dispersive)
 - (4) Pinhole Test (ASTM D4647) - ND1 or ND2
 - (5) Double Hydrometer (ASTM D4221) - Percent dispersive less than 30
 - (6) At least 60% passing a US Standard No. 200 sieve
 - (7) One hundred percent (100%) of the dry material passing the 1 inch sieve
 - (8) Borrow source in situ clay shall not be blended with any other material if it meets USIBWC's minimum requirements.
 - (9) All material placed at or greater than optimum moisture content

11. Required Reports.

- A. A Design Report shall be provided demonstrating that this project meets 44 CFR §65.10(b) and USACE EM 1110-2-1913 and that it will not negatively affect any USIBWC structures. See "[Appendix E-Design Report Requirements](#)" for guidance on Design Reports.
- B. If project, or part of project, is within a river floodplain, a Drainage Report is required describing hydraulic modeling and results to show that the water surface elevation from the design flood does not increase above the threshold limits established by the USIBWC and that the maximum deflection of flood flows by the project is not more than +5% towards either the U.S. or to Mexico. Refer to "[Appendix H-Requirements for Projects On the Rio Grande and Colorado River Floodplains](#)" for additional information.
- C. Work within the floodplain may require concurrence with Mexico if work is on an international reach of a river. This concurrence may require weeks or months of communications. Design work may continue during this period, but in no instance, shall construction proceed until concurrence is reached with Mexico.
- D. USIBWC will use sound engineering judgment to determine which reports are required. For example, if a Proponent wishes to place a conduit 5 feet below the our levee, a seepage analysis will be required. But if the Proponent wishes to place a conduit 25 ft under the levee, it is unlikely a seepage analysis will be required because seepage caused by the conduit at that depth would be minimal. Now if the conduit will be 15 feet below the foundation of the levee, a seepage analysis may be required based on site and project conditions. Every situation is evaluated individually to ensure that USIBWC structures are protected while minimizing the work required by Proponents.

- E. See "*Appendix F-Hydraulic Modeling Methodology*" for guidance on hydraulic modeling and the required report.

12. Drawings.

- A. USIBWC-controlled property boundary shall be clearly shown on Proponent's drawings.
 - (1) USIBWC-controlled property includes all property for which USIBWC holds a property interest including, but limited to, USIBWC property and land for which USIBWC holds an easement for flowage, flood control, or other use.
- B. Project coordinate system, survey units used, datum, and grid to ground conversion shall also be shown.
- C. Drawings shall be of sufficient detail to determine exactly what is proposed, how it is to be constructed, and by whom.
- D. In any operation involving earthwork, such as an excavation, drilling or boring, cross sections and profile of the proposed works must be furnished.
- E. Any drawings showing project or project component interaction with USIBWC structures shall be drawn to scale.
- F. Drawings must be signed and sealed by a professional engineer, duly licensed in the state(s) where the project is to be constructed.

13. Geotechnical Testing/Boreholes in Levees.

- A. All boreholes within USIBWC levees shall be backfilled with a bentonite slurry.
- B. Other geotechnical sampling locations shall be backfilled with existing levee material but Proponent shall remember that levees are topped with a gravel O&M road.
- C. If new material is required for backfill, it shall meet USIBWC's minimum soil requirements

14. Construction/Materials Testing.

- A. Minimum Levee Testing Requirements are available in "*Appendix D-Minimum Levee Embankment Testing Requirements.*" These requirements are the minimum; if the project designer determines that more frequent testing or more stringent requirements are necessary, they shall govern. All tests shall be signed and stamped by a registered engineer licensed in the state where work is being completed. Upon completion of the construction, a copy of all completed tests and associated forms shall be provided to USIBWC.
- B. USIBWC has found that the lifts of levee earthen embankments form significantly better bonds and the soil is easier to work with when a Standard Proctor is used.
- C. Method B shall be used on all Proctors (D698 and D1557).
- D. Grain Size Analysis (ASTM D7928) shall use sieves sized 2 inch, 1 inch, 3/8 inch, 4, 10, 20, 40, 60, 140 and 200 at a minimum.
- E. Grain size analysis (ASTM D7928) includes hydrometer testing of material below 200 sieve.

15. Levee Construction or Repair.

- A. Construction shall be performed by excavating into the existing levee to create a series of keys and benches with the bench placed within the slope rather than constructed at the toe of the slope. Benches shall not exceed a two (2) foot high vertical section.
- B. Fill shall be placed in horizontal layers only. The levee embankment is to be raised in 8 inch loose (6 inch compacted) lifts. The fill material placed within the levee embankment slopes shall be compacted as required. If the minimum compaction is not achieved, the lifts shall be reworked. To ensure proper compaction of the sides of the levee, the compacted fill for the levee embankment is to be overbuilt a minimum of 2 feet past the final slopes and grades and then trimmed to the finished grade. The overbuild is not required within 4 feet of any structure.
- C. Surfaces to receive fill shall be monitored for moisture content. Whenever the surface to receive fill is either too dry or too wet, the moisture content of the surface shall be appropriately adjusted prior to placing the next fill lift. Once the levee has been placed to required lines and grades and has passed all required soils and density tests, the material shall be allowed to dry out. Levee slopes shall be trimmed to final slopes and grades while clay is still within allowable moisture content for placement. To ensure a competent finished top lift, the completed top lift shall be at least 3 inches thick after compaction. If the final cut reduces the thickness of the top lift to less than 3 inches, re-scarify the top lift to a depth of at least 6 inches and then re-compact the section.
- D. Ramps shall be constructed in the same manner as the levee. Unauthorized ramps or ramps that do not meet design and construction standards must be removed or modified at the cost of the ramp-owner.
- E. The clay may not be covered until the surface has dried and a USIBWC representative has ensured that the requirements listed below are met:
 - (1) The levee shall be cut, graded, and/or finished to a smooth plane surface. The finished levee embankment shall be a hard, competent, solid soil mass. The dried clay shall not be brittle, crumbly, or friable. The final product shall be a hard, competent, solid soil mass. There are some clayey materials that even though they fulfill the levee soil requirements, do not hold together after 24 to 36 hours of drying time. If the levee material becomes soft and/or friable after drying, it shall be removed and replaced with material that produces a hard, competent, solid soil mass.
 - (2) The levee typical sections shall be maintained throughout the work zone. No deviations in cross section shall be greater than 3 inches longitudinally unless shown on the drawings. The sides of the levee shall not have a wavy appearance.
 - (3) Placement practices throughout each fill zone of the levee shall be such that the embankment will be free from lenses, pockets, streaks, and layers of material differing in texture, gradation, or classification from surrounding material of the same material type. If within the same material type lenses, pockets, streaks, or layers are encountered, the clay shall be reworked in order to form a homogeneous blend of the materials.
 - (4) The finished levee embankment shall be homogenous in material and compaction characteristics. No evidence of placement layers/lifts shall be visible in the final

product. Each lift of fill shall be thoroughly bounded to the prior lift/subgrade. In no instance shall any two lifts be able to be easily separated.

- (5) No holes, pop-outs, pockmarks, grooves, depressions, or other voids greater than ½ inch in depth normal to the slope face shall be permitted. Separation of two lifts shall not be allowed. Pop-outs formed during cutting of the levee slope when there is nonuniform compaction of the levee embankment. Areas of holes, pop-outs, pockmarks, grooves, depressions, or other voids less than ½ inch in depth normal to the slope face that are numerous or frequent (longer than one foot or common across the slope) shall also be repaired. Cracking of clay is normal, however, cracking into small fragments that can easily be removed by hand from the levee are not acceptable. Acceptable clay embankment shall crack in a manner that "locks" the cracked pieces together.
- F. During ASTM D6938 nuclear density tests, the probe shall extend through both the newly added lift and the scarified prior lift (e.g., 6" lift plus 3" scarification equals probe of 9", minimum). Tests into scarified and compacted subgrade shall be taken at a 12 inch depth. Include IBWC Forms 241 for all days when nuclear density tests are performed.
- G. Excess fill brought on site, contaminated material, and material that does not meet requirements shall be hauled away from the project site and disposed of per Federal, state, and local requirements.
 - (1) No soil or other material shall be left in the floodplain.

16. Completion of Construction.

- A. Upon completion of any construction with USIBWC-controlled property, the worksite area shall be left in a clean and neat condition with all debris and excess material removed from the site.
- B. Upon completion of the construction, complete surveys, signed and stamped by a registered surveyor, shall be provided to USIBWC. Survey data shall be provided in pdf format with supporting data in a comma delimited ASCII file. Data shall be identified by point number, northing, easting, elevation, and description. The survey units used, coordinate system, datum, name of the individual/company who performed the survey, and date of survey shall be noted in both the pdf and ASCII file. Survey boundaries, breaklines, and other relevant data shall be exported from an AutoCAD Civil 3D file to an xml file.
- C. Upon completion of construction, as built (record drawings) shall be provided for the whole project. Drawings shall be in Adobe pdf and shall be sized to at least ANSI B (11"x17") although fullsize drawings (ANSI D 22"x34") are preferred. Drawings shall be provided at a resolution not less than 300 dpi.
- D. Upon completion of construction work, a copy of all completed tests in Adobe pdf shall be provided to USIBWC. Tests shall be provided at a resolution not less than 300 dpi.

17. Conditions.

- A. Proponent's project shall not hinder or impair USIBWC's ability to perform maintenance or flood operations.

- B. The USIBWC does not assume any responsibility or liability regarding damages that could be caused to the work, property, or persons in the project area as a consequence of river flood flows or the surface conditions of USIBWC-owned property. The USIBWC does not warrant that any of its property is suitable for any type of work or activity and project proponents are responsible for assessing the condition of the land before commencing work.
- C. Any damage caused by the proposed works to either the banks of the river, USIBWC's structures, or USIBWC's property shall be repaired by Proponent, at the Proponent's cost, to the USIBWC's satisfaction.
- D. The USIBWC will not alter its normal or flood operations criteria as a result of the proposed works.
- E. Proponent is responsible for keeping their structures free of debris accumulation at all times. Proponent shall dispose of all debris in accordance with all applicable environment laws and regulations. In addition, Proponent is responsible for all costs associated with debris removal.
- F. Proponent shall finalize and submit to the USIBWC an Operation and Maintenance (O&M) Plan for their project. It should be noted that the USIBWC will not be the agency responsible for performing operations and maintenance of the Proponent's project.

18. USIBWC Resources and Information. Requirements for work, forms, and standard drawings are available on USIBWC's website at www.ibwc.gov/resources-info/.

- A. The following documents are available for download on that site:
 - (1) Appendix A - Design and Construction Requirements for All Projects
 - (2) Appendix B - Land Boundary Project Requirements
 - (3) Appendix C - Requirements for Projects on or Affecting a USIBWC Flood Control Structure
 - (4) Appendix D - Minimum Levee Testing Requirements
 - (5) Appendix E - Design Report Requirements
 - (6) Appendix F - Hydraulic Modeling Methodology
 - (7) Appendix G - Reseeding USIBWC Property
 - (8) Appendix H - Floodplain Requirements
- B. Please contact our Realty Office (realty@ibwc.gov) to discuss which requirements apply to your project. Do not wait until you are ready to construct your project. Contact them well in advance so they can discuss our requirements.

Approved:
RAMON
MACIAS

Digitally signed by
RAMON MACIAS
Date: 2024.01.30
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January 30, 2024

Ramon Macias, III, P.E. Engineering
for
Dr. Maria-Elena Giner, P.E.
Commissioner

Date