

CHECKLIST

CONSTRUCTION IN THE CRITICAL AREA OF FLOOD CONTROL PROJECTS CONSTRUCTED BY THE CORPS OF ENGINEERS

GENERAL INFORMATION

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (1) Project general description, including project purpose. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (2) Construction schedules, duration of work. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (4) For permit purposes, drawings, topographic maps, and pictures of the existing location before any work is done. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (5) Vicinity map, site plan and general plan view showing the location of the project tied to the flood control works stationing, range landside or riverside, boring locations, construction equipment and material storage location, borrow areas if in the critical area of the flood control project, temporary flood control location. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (6) Subsurface investigations, including boring logs, in-situ and laboratory testing and geotechnical recommendations. |

PROJECT CONSIDERATIONS

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. EXCAVATIONS |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | A. EXCAVATIONS WITHIN THE LEVEE EMBANKMENT |

Design Considerations

- | | | | |
|--------------------------|--------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (1) Stability analysis including assumptions used, basis for selection of soil parameters, failure surfaces, and factors of safety for levee excavation. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (2) Design recommendations for excavation support system. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | (3) Design recommendation for pressure relief and dewatering control, including dewatering and relief wells design and complete modeling studies for dewatering system. |

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- (4) Design recommendation for temporary flood control system, including stability analyses for proposed ring levee.

Specifications

- (1) Excavation and excavation support.
- (2) Backfill, including materials, compaction requirements, and testing (including any boring holes, wells, and any other hole details).
- (3) Dewatering and pressure relief system, (dewatering wells, pressure relief wells), ground water control (piezometers), and pump test plan for dewatering and relief wells.
- (4) Soil stabilization.
- (5) Hydraulic fill.
- (6) Slope protection repair including stone protection and seeding and mulching.
- (7) Levee crown restoration.
- (8) Sources of rock materials for riprap, bedding, and aggregate surfacing.

Construction drawings

- (1) Limits of proposed excavation, excavation details, excavation support, cross sections and profiles.
- (2) Backfill details including backfill materials.
- (3) Details of foundation soil stabilization.
- (4) Proposed dewatering and pressure relief system, seepage cut-off and ground water control (piezometers) location and construction details.
- (5) Slope protection repair details.
- (6) Levee crown repair details.
- (7) Copies of any standard drawings referred to in the design or plans.

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**B. EXCAVATIONS RIVERSIDE OF THE FLOOD CONTROL PROJECT,
WITHIN CRITICAL AREA**

Design Considerations

(1) Design analysis and recommendations for retaining walls, and excavation support system.

(2) Stability analysis containing assumption used, bases for selection of soil parameters, failure surfaces and factors of safety for deep excavation affecting the flood control project.

(4) Design recommendation for pressure relief and dewatering control, including dewatering and relief wells design and complete modeling studies for dewatering system.

Specifications

(1) Excavation and excavation support requirements.

(2) Backfill, including materials, compaction requirements, testing, backfill and sealing of boring holes, power poles, wells, and any other hole details.

(3) Soil stabilization.

(4) Hydraulic fill.

(5) Demolition and removal specifications.

Construction Drawings

(1) Limits of proposed excavation, grading plans, excavation details, excavation support, cross sections and profiles for excavation and grading plans.

(2) Backfill of boring holes, power poles and any other holes details.

(3) Details of foundation soil stabilization.

(4) Copies of any standard drawings referenced to in the design or plans.

(5) Demolition and removal plans.

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**C. EXCAVATION LANDSIDE OF FLOOD CONTROL PROJECTS,
WITHIN CRITICAL AREA**

Design Considerations

(1) Underseepage analysis including river stages and permeability ratios considered, hydraulic grade line determination, piping and heave considerations.

(2) Stability analysis containing assumption used, basis for selection of soil parameters, failure surfaces and factors of safety for deep excavation which may affect the stability of the flood control project.

(3) Design recommendations for excavation support system.

(4) Design recommendation for pressure relief and dewatering control, including dewatering and relief well design and complete modeling studies for the dewatering system.

Specifications

(1) Excavation and excavation support.

(2) Backfill, including materials, compaction requirements, testing (including pipes bedding, backfill and sealing of boring holes, power poles, wells and any other hole details).

(3) Dewatering and pressure relief system, (dewatering wells, pressure relief wells), dewatering control (piezometers), ground water monitoring.

(4) Soil stabilization.

(5) Hydraulic fill.

Construction drawings

(1) Limits of proposed excavation, excavation details, excavation support, cross sections and profiles for excavation and grading plans.

(2) Backfill details including backfill materials, compaction requirements.

(3) Details of foundation soil stabilization.

(4) Proposed dewatering and pressure relief system, seepage cut-off and ground water control (piezometers) location and construction details.

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- (5) Copies of any standard drawings referred to in the design or plans.

2. PIPING SYSTEM

Design Considerations

- (1) In general, piping should not penetrate the levee embankment or its foundation but should be placed within the freeboard zone of the levee crest. Construction of a piping system through the levee embankment or the levee foundation must be justified and appropriate design information submitted.
- (2) Uplift calculations for pipes and other construction related to the piping system, based on underseepage analysis.
- (3) Loading cases for pipes and other construction related to the piping system.
- (4) Bedding requirements, and compatibility with the levee “critical area” soil zone requirements.

Specifications

- (1) Backfill, including materials, compaction requirements, testing.
- (2) Pipes and culverts including class of pipes and culverts, thickness, modulus of elasticity, SDR, type of pipe joints, length of pipe sections, bedding and backfill for pipes.
- (3) Flowable backfill.
- (4) Type of precast concrete manhole joints, details of the required O-ring.
- (5) Sluice and flap gates including design seating and unseating head.
- (6) Field joint testing requirements for reinforced concrete pipes.
- (7) Demolition and removal of existing structures.
- (8) Grouting requirements.
- (9) Sources of rock materials for concrete aggregate.

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Construction drawings

- (1) Backfill details including backfill materials.
- (2) Details of pipelines and other utility lines including excavation, excavation support, backfill materials, bedding materials, closure devices.
- (3) Grouting details, showing cross sections and limits.
- (4) Details of concrete pipe cradles including reinforcing details and details next to gatewell structures.
- (5) Pipe connections to existing structures.
- (6) Details showing concrete collars connecting dissimilar pipes.
- (7) Details showing air vents and vacuum breaks for pipe siphons and locations.
- (8) Waterstop details.
- (9) Construction, contraction and monolith joints details.
- (10) Precast concrete manhole to cast in place base slab details, if any.
- (11) Demolition and removal plans.
- (12) Copies of any standard drawings referred to in the design or plans.

3. STRUCTURES

Design Considerations

- (1) Uplift calculations based on underseepage analysis.
- (2) Loading cases for construction and appropriate factors of safety.
- (3) Design of shallow or deep foundations, including bearing capacity and settlement analysis if the construction is located within the levee embankment, or in the critical area of flood control projects and creates potential seepage problems
- (4) Design of reinforced concrete substructure walls and earth bearing structural floor slabs. Identify appropriate lateral earth loads.

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- (5) Design recommendations for foundations on expansive soils.
- (6) Design analysis for retaining walls and excavation support system.

Specifications

- (1) Backfill, including materials, compaction requirements, and testing.
- (2) Spread footings, mat foundations, deep foundations, including drilled piers, and pile foundations if the constructions is located within the levee embankment, or in the critical area of flood control projects and creates potential seepage problems.
- (3) Flowable backfill.
- (4) Roughened horizontal construction joints for substructure reinforced concrete walls.
- (5) Demolition and removal of existing structures.
- (6) Grouting requirements.
- (7) Sources of rock materials for concrete aggregate (if a flood protection structure), riprap, and bedding.
- (8) Type of precast concrete manhole joints.

Construction drawings

- (1) Backfill details including backfill materials, compaction requirements, testing.
- (2) Shallow and deep foundation details including drilled piers and piles, foundation filling and backfilling, hydraulic fill, construction techniques and remedial details for slab foundations and drilled shaft foundation, control of pile driving operations, field pile tests including axial tests and monotonic lateral load test for constructions located within the levee embankment, or in the critical area of flood control projects which can create potential seepage problems.
- (3) Grouting details.
- (4) Reinforcement details for substructure walls and slabs, piles, etc.
- (5) Waterstop details.

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- (6) Construction, contraction and monolith joints details.
- (7) Details of soil subgrade for structure slab.
- (8) Demolition and removal plans.
- (9) Copies of any standard drawings referred to in the design or plans.
- (10) Details of retaining walls.
- (11) Buried tank including concrete slabs and hold down straps.
- (12) Pressure relief valves details and locations in structural floor slab of large tanks, etc.

4. DIRECTIONAL DRILLING

Directional drilling is not allowed in the levee embankment and in the flood control project foundation. If directional drilling is proposed on the riverside or landside of the flood control project, the following should be included in the submittal.

Specifications

- (1) Plan of operation and schedule.
- (2) Drilling fluid.
- (3) Pilot hole drilling procedures.
- (4) Bit pressures.
- (5) Plan for insertion and pullback.
- (6) Hydrostatic tests.

Construction Drawings

- (1) Sealing of annular space between the pipeline and directional drilled shaft.
- (2) Plan for insertion of the prepared bore hole. dewatering drying and purging, depth of drilling, entrance and exit points, backfill at the entry and exit sites, coating protection.

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5. INTERIM FLOOD PROTECTION AND CONTINGENCY PLAN

Design Considerations

- (1) Stability analysis containing assumptions used, basis for selection of soil parameters, failure surfaces and factors of safety for temporary flood control projects.
- (2) Design recommendation for pressure relief and dewatering control, including dewatering and relief wells design and complete modeling studies for the dewatering system.

Specifications

- (1) Backfill, including materials, compaction requirements and testing.
- (2) Levee slope protection repair including stone protection and seeding and mulching after removal of temporary flood control project.
- (3) Flood contingency plan if no other temporary flood control is provided, including: measures proposed to protect area under construction, monitoring of river level, river stage at which plan will be activated, materials and equipment to be used to activate plan, and personnel contact and telephone number to activate plan.

Construction drawings

- (1) Temporary flood control details.

6. HYDRAULIC CONSIDERATIONS

Design Considerations

- (1) Description of project impact to water quality and the runoff hydrographs.
- (2) Calculations for pump station hydraulic design including support calculations for expected inflows, ponding areas and outlet design.
- (3) Plots of energy and hydraulic grade lines.
- (4) Description of hydraulic and hydrologic models/analysis used and model sensitivity, data sources for hydraulic models, design assumptions, plot of energy and hydraulic grade lines, H&H coefficient selection, if the project has any impact on FEMA floodway/floodplain.

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- (5) Calculations for hydraulic jump location and magnitude.
- (6) Scour computations for bridges located in the foreshore area of flood control projects. Calculations should be included for contraction, abutment, and pier scour.
- (7) Scour calculations for utility poles and other features to be located riverside of the flood control projects.

Construction Drawings

- (1) Plans for temporary and permanent erosion control.
- (2) Water surface elevations for the design flood and 100 year event clearly shown on profiles and sections for construction affecting FEMA floodplain/floodway or having an impact on the existing hydraulic/hydrology.
- (3) Plans for temporary and permanent erosion control.
- (4) Bridge general layout and details in the vicinity of the levee.

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