Mississippi Valley Division,
Regional Planning and Environment Division South

St. Tammany Parish, Louisiana Feasibility Study

Appendix D – Annex 7 - Structural Assumptions for the Optimized TSP

May 2023

Structural Assumption Annex

- General Structural Assumptions
  - Structural Geotechnical Assumptions
    - All structural design estimates are based on soil characteristics from previous boring investigations.
    - No pile load test was assumed for the T-walls, access gates, or control gates; unless component is part of a referenced project.
    - Pile load tests were assumed in referenced pump station project components, referenced roller gate project components, and referenced lift gate project components. These referenced projects were used to generate scalable quantity estimates.
  - Structural Hydraulic Assumptions
    - All structural design estimates are based on hydraulic information for the 50-year design elevations provided by Hydraulics, Hydrology, and Coastal Engineering (HH&C) Branch.
    - Unit weight of water for estimates is 62.4 pcf. Unit weight of water will be refined during PED.
  - Structural superiority
    - Structural superiority was not considered for the design elevations of structures. Design estimates are considered conservative and structural superiority will be added during PED.
  - Seismic Design
    - Since it is not considered a governing load, seismic design was not performed on any of the structures. Seismic calculations will be incorporated during PED.
  - Coastal Design
    - All structures are in coastal region and HSDRRS design criteria was applied.
  - Concrete Design
    - All concrete is assumed to be 4,000 psf normal reinforced concrete with 60 ksi deformed rebar.
  - Steel Design
    - Steel strength is assumed to be 50 ksi carbon steel for gates components, piles, and misc. pump station components.
  - Foundation Design
    - Pile depth, size, and batter were designed based on largest T-wall stem height.
    - Piles are assumed to be 50 ksi 18” pipe piles with ½” member thickness for all structures except pump stations. Piles spacing in both directions is assumed 5 ft.
    - Pile batter is assumed to be 1:2 for all piles, for all structures.

        - Pile batter, length, spacing, and size will all be refined at next design level.
    - Slope Pavement
        - Slope pavement is assumed at transition between T-walls and levees. Slope pavement between gates and levees or other structures is included in gate quantities.
        - Slope pavement design is based off MRL Carrollton Phase III District Floodwall project.
    - Sheet Piles
        - All structures are assumed to have PZ 22 steel sheet piles that extend 30 feet deep from base of slab. Where T-walls or other structures transition to levees, sheet piles extend 20 feet into the levee section.
    - Excavation
        - Area of excavation is assumed to be the footprint of the structure. Depth of the excavation is assumed to be the depth of the slab of the structure.
    - Construction Access
        - Where access is required, access roads are assumed to be 25 ft with gravel surface.
    - TRS
        - Temporary Retaining Structure lengths are assumed to be equal to the perimeter of the footprint of the structure. Depth of sheet pile is assumed to extend 30 feet from base of slab.
        - No pile interference check between piles and sheet pile was performed and will be considered during PED.
    - Environmental Design Considerations
        - All structures are assumed to be designed to minimize adverse environmental impact.
    - Bypass Channels
        - All control structures that are in navigable waterways are assumed to have a bypass channel that matches the original cross-section of the original channel.
- T-Walls
    - Ground surface elevations
        - LIDAR information was used to determine ground surface elevations. Estimated design ground surface elevations for each reach were taken as the average elevation for each reach.
    - Configuration
        - All T-walls are assumed to be pile founded with sheet pile seepage cutoff and a 3 ft thick slab. Slab widths range from 10 ft to 20 ft wide. Stem thicknesses range from 1.5 to 2.5 ft thick. No finish type has been specified.
        - Top of slab elevation is assumed to be even with ground surface.

- Design
  - T-wall quantities for each derived from governing load condition on largest stem elevation within that reach (18 ft).
  - Standard HSDRRS load cases were used in T-wall pile design.
  - Governing loading condition is Freeboard (TOW) + Impervious Uplift + Debris.
  - No barge impact is assumed and barge activity is not common in the project area.
- Go-bye
  - Monoliths are based off similar design of NOV-NF-W-06B.5, Magnolia Pump Station.
- Right of Way offset
  - Right of way offset for T-walls is assumed to be 25 feet from the center line of the wall alignment in both directions.

- Access Gates
  - Configuration
    - Access gates are assumed to be roller gates type unless site conditions require otherwise.
    - All gate monoliths are assumed pile founded with sheet pile seepage cutoff and a 3 ft thick slab by 10 feet wide slab. No finish type has been specified.
    - Top of slab elevation is assumed to be even with grade elevation.
    - Gate monoliths include 3 feet wide x 3 feet deep concrete end columns for attachment of gate hinge and closure hardware. Column heights match the design height of the adjacent T-wall, structure, or levee.
  - Design
    - All access gate designs are based on Avondale Shipyard Floodwall roller gate design (2015). The Avondale gate was scaled based on the areas of the gate skin plates.
  - Swing Gates
    - Gates at St. Tammany Trace and Railroad crossing were assumed to be swing gates due to site constrictions. Swing gate quantities were scaled from referenced roller gate project cited above.
- Sluice Gate Design
  - Sluice gates concrete and steel quantities were scaled from comparable gate structures. Refinement to sluice gate design will be performed during PED.
  - All gate sluice gate monoliths are assumed pile founded with sheet pile seepage cutoff and a 3 feet thick slab by 10 feet wide slab, similar to T-wall monolith. No finish type has been specified.
    Top of slab elevation is assumed to be at elevation necessary for hydraulic requirement through the line of protection.

- Lift Gate Design
    - All lift gate concrete, steel, riprap, and excavation quantities are based off (and scaled from) estimated amounts from Texas Coastal lift gate design estimates.
    - All lift gates are assumed to be in navigable waterways.
- Sector Gate Design
    - All sector gate concrete, steel, riprap, and excavation quantities are based off (and scaled from) estimated amounts from the Morganza to the Gulf, GIWW West Sector Gate.
    - Sector gates are assumed to be in navigable waterways.
- Pump Stations
    - Configuration
        - Pump stations were located as determined by hydraulic design of the risk reduction system.
    - Design
        - Bayou Liberty and Bayou Bonfouca Pump Stations quantities were based off (and scaled from) the 95 % design of Westshore Lake Pontchartrain Reserve Relief Canal Pump Station.
        - All pump stations other than Bayou Liberty and Bayou Bonfouca were based off (and scaled from) the 65% design of Westshore Lake Pontchartrain Prescott Road Pump Station.
        - All pump stations were scaled based on CFS.
- Bridges
    - New bridges are assumed to be placed at the intersection of Mile Branch and the following streets/crossings
        - W. 19th, W. 21st, W. 23rd, W. 25th, W. 27th, W. 28th, W. 29th avenues, and the St. Tammany Trace.
    - Existing bridges are assumed to be demoed completely.
    - Distance from abutment to abutment for each new bridge is assumed to be equal to distance between crowns as determined by channel design (80 ft).
    - All proposed street crossings except 21st Avenue are based off of Carney Bridge quantities from Comite Diversion Project.
    - Proposed W. 21st Avenue bridge crossing quantities at Mile Branch were determined by scaling Carney Bridge quantities based on existing W. 21st Avenue bridge width.
    - Proposed St. Tammany Trace pedestrian bridge crossing quantities were determined by scaling Carney Bridge quantities based on existing Trace bridge width.