Mississippi Valley Division,
Regional Planning and Environment Division South

Tangipahoa Parish, Louisiana Feasibility Study

Appendix C – Tangipahoa Parish Feasibility Study Cost Engineering Appendix

August 2024

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SECTION 1

Tangipahoa Parish – Final Array of Alternatives

1.1 STRUCTURAL MEASURES – LEVEES, ROADWAY RAISE, SNAGGING & CLEARING

A variety of different structural measures were evaluated using rough order of magnitude costs to determine whether the economic benefits existed to support them. The majority were screened at this higher level because the benefits did not support developing the measure any further. There were four structural alternatives that were close enough to being economically justified, that they were determined to be a part of the final array. These included the Tangipahoa Levee, Washley Levee, Little Chappepeela Creek Road Raise, and Snagging & Clearing.

1.1.1 Cost Estimate Development

Cost estimates for the final array of structural alternatives (Alternatives 3, 4, 6, 7a, and 7b) were developed based on readily available USACE data and quantities provided by the project delivery team (PDT) and were developed using MCACES MII cost estimating software. The cost estimates used the standard approaches for a feasibility estimate structure regarding labor, equipment, materials, crews, unit prices, quotes, and sub and prime contractor markups. This philosophy was taken wherever practical within the time constraints. It was supplemented with estimating information from other sources, where necessary, such as quotes, bid data, Architect-Engineer (A-E) estimates and previously approved similar studies such as South Central Coastal. The estimates assume a typical application of tiered subcontractors. All the construction work (e.g., levee construction, snagging & clearing, etc.) is common to the Gulf Coast region. The construction sites are accessible from land and access is easily provided from various local highways.

Historical cost pricing data was very useful to the feasibility study in developing costs for the levees, floodwall, pump station, cutoff wall under railroad, road raise, and snagging and clearing within all final array alternatives. Cost estimates for the final array of channel improvements and clearing and snagging features were developed at a Class 4 level of effort utilizing largely parametric unit prices from sources such as historical Government and Commercial bid data, the 2022 RS Means Cost Data Books and other available historical cost data sources. Historical unit costs for the representative channel improvements were reviewed for reasonableness and then applied to the revised quantities to develop new total costs for the channel improvements.

The intent of the cost estimate was to provide or convey a “fair and reasonable” estimate and where cost detail was provided, it depicted the local market conditions. The construction work (e.g., levees, floodwalls, levees, excavation, dewatering, pilings, rock, etc.) is common

to the Gulf Coast region. The construction sites are mostly accessible from land. Site access is easily provided from US Hwy 190, Interstate I-55, Interstate I-12, and other various local highways.

Because all the structural alternatives were screened, no additional or detailed costs estimates will be developed, and their designs will not progress. The focus has been shifted to developing non-structural plans.

1.1.2 Estimate Structure

The estimates have been subdivided by alternative and each estimate contains U.S. Army Corps of Engineers (USACE) feature Work Breakdown Structure (WBS) codes. Each WBS cost is subdivided into base cost, contingency and total cost.

1.1.3 Bid Competition

It is assumed there will not be an economically saturated market, and that bidding competition will be present.

1.1.4 Contract Acquisition Strategy

There is no declared contract acquisition plan/type at this time. It is assumed that the contract acquisition strategy will be similar to past projects with some negotiated contracts, with a focus and preference for small business/8(a) along with some large, unrestricted design-bid-build contracts.

1.1.5 Labor Shortages

It is assumed there will be a normal labor market pulled from the Gulf Coast region.

1.1.6 Labor Rates

Local labor market wages are above the local Davis-Bacon Wage Determination, so actual rates have been used. This is based on local information and payroll data received from MVN District construction representatives and estimators with experiences in past years.

1.1.7 Materials

As parametric unit costs were used for the major construction items such as concrete, steel H-piling and sheet piling, silt fence, reinforcing steel, etc., no material quotes were obtained at this time. It is assumed that materials, except for borrow material, will be purchased as part of the construction contract and prices include delivery of materials.

Cost quotes are used on major construction items when available. It could not be confirmed if there were adequate borrow sources that could be used for the levee construction, so a recent nearby levee project commercial borrow cost was used when developing the levee estimates.

1.1.8 Quantities

Quantities for levees, road raises, and clearing and grubbing channel improvements were provided by MVS Civil Section. Quantities for pump stations were provided by MVS H&H Branch.

The PDT decided that for each alternative a comprehensive quantity of each levee feature would be provided. Alternatives 5 and 6 contained levee features. The levee elevation varies depending on location. The preliminary assumptions are that the levee has a 10 ft wide levee crown and side slopes of 1V:5H. The existing elevations were obtained from the LIDAR raster dataset. Since the levee design elevation was variable, the designer calculated the area per station and multiplied it by the length. Quantities for levee construction were developed by the civil designer for the various alternatives and are provided in the Engineering Appendix.

Within Alternatives 7a and 7a.1, the various channel improvement and clearing and snagging feature quantities were developed using the LIDAR raster dataset. The preliminary design assumed a bank elevation depending on the location, required bottom width dependent on the channel requirements, and a typical bank at a 1V:3H slope. Staging areas were scoped and provided along with potential access points. The design parameters and quantities for each representative channel were provided by the civil designer to meet the required design depths for each feature and costs were developed for each representative channel for each feature within the alternative.

1.1.9 Equipment

Rates used are based on the latest USACE EP-1110-1-8, Region III (2022). Adjustments are made for fuel and facility capital cost of money (FCCM). Full FCCM/Cost of Money rate is the latest available. The MII program takes the EP-recommended discount, but no other adjustments have been made to the FCCM. Equipment was chosen based on historical knowledge of similar projects.

1.1.10 Fuels

Fuels (e.g., gasoline and diesel fuel) for rental equipment were based on local market averages for the Gulf Coast area. The fuel rates were reviewed over a period of time and a composite, conservative cost was used. Due to the volatility of fuel and significant potential escalation of fuel rate, conservative costs were used in the estimates.

1.1.11 Crews

Major crew and productivity rates were developed and studied by senior USACE estimators familiar with the type of work. The work is typical to the Gulf Coast area and is well understood by CEMVS cost engineers. The crews and productivity rates were checked by local CEMVS estimators and comparisons with historical cost data were referenced. Crews and productivity rates were adjusted as necessary based upon those findings to reflect reasonable crew sizes and production rates.

Major crews are used for hauling, earthwork, piling, pump stations, floodwalls, and concrete slope pavement. Most crew work hours are assumed to be 10 hours, 5 days/week.

1.1.12 Unit Prices

The unit prices found within the various project estimates fluctuate within a range between similar construction unit prices. Such pricing data was used for items such as pump stations, floodwall concrete, earthwork, roadway pavement, transitions, and piling. Variances are a result of differing haul distances (by truck or barge), small or large business markups, subcontracted items, designs and estimates by others. Unit prices were used in the development of the various cost estimates and are based upon historical data of recent jobs with a similar size and scope.

1.1.13 Relocation Costs

Relocation costs are defined as the relocation of public roads, bridges, railroads, and utilities required for project purposes. Because the alternatives were screened, relocations were not considered.

1.1.14 Mobilization

Contractor mobilization and demobilization are based on the assumption that most of the contractors will be coming from within the Gulf Coast or Southern Region. Mobilization and Demobilization costs are based upon historical studies and detailed Government estimates with relevant historical cost pricing data, which are typically in the range of 3-5% of the construction costs. With undefined acquisition strategies and assumed individual project limits, the estimates utilize a 5% value of Cost to Prime for Mobilization and Demobilization for all alternatives.

1.1.15 Field Office Overhead

The estimated percentages for Field Office Overhead vary based upon the type of work being completed, as “Clearing and Snagging” field overhead differs from “Floodwall” field overhead. The rates were based upon estimating and negotiation experience, and consultation with local construction representatives. The estimates used a field office overhead rate based on the average of relevant jobs with a similar scope and magnitude. Different percentages are used when considering the scope of work for each feature. However, when reviewing historical cost pricing data, a range of 15 -25% is typically used. The field office overhead rate of 15% was used for the prime contractors, which was based on historical projects.

Overhead assumptions may include costs for the superintendent, the office manager, pickup trucks, periodic travel costs, communications, temporary offices (contractor and Government), office furniture, office supplies, computers and software, as-built drawings and minor designs, tool trailers, staging setup, camp/facility/kitchen maintenance and utilities, utility service, toilets, safety equipment, security and fencing, small hand and power tools,

project signs, traffic control, surveys, temporary fuel tank station, generators, compressors, lighting and minor miscellaneous items.

1.1.16 Home Office Overhead

The estimated percentages vary based upon consideration of 8(a), small business and unrestricted prime contractors. The rates were based upon estimating and negotiating experience, and consultation with local construction representatives. Different percentages are used when considering the contract acquisition strategy regarding small business 8(a), competitive small business and large business, high to low, respectively. For Home Office Overhead a percentage of 10% was assumed.

1.1.17 Bond

The Bond interest rate was assumed to be 1.5%, applied against the prime contractor, assuming large contracts. There was no differentiation between large and small businesses.

1.1.18 Real Estate Costs

Real Estate (RE) costs were developed and provided by the Realty Specialist and placed in WBS-01 Lands and Damages. The RE cost for each alternative includes land costs, acquisition costs (including acquisition of agricultural land for borrow) and 30% for contingencies. Realty Specialist did not provide RE costs for the Road Raise alternative. It was screened before the information was required.

1.1.19 Environmental Costs

Environmental costs were provided by the Environmental team and placed in Work Breakdown Structure WBS-06 Fish and Wildlife Facilities. The Environmental costs for each alternative include only mitigation of the flood protection alignment footprint.

1.1.20 Cultural Resources Costs

Cultural Resources (CR) costs were not provided by the Archaeologist-Natural/Cultural Resources Analyst because the structural alternatives were screened. For borrow sites, known or identified cultural resource sites will be avoided.

1.1.21 Pre-Construction Engineering and Design (PED)

The PED cost included such costs as USACE project management, engineering, planning, designs, investigations, studies, reviews, value engineering (VE) and engineering during construction. Historically, a rate of approximately 12% for Engineering and Design (E&D) portion, plus small percentages for other support functions, is applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis have reported values ranging from 10% to 15% for E&D. Additional support functions might include project management, engineering, planning, designs, investigations, studies, reviews, and VE. A PED rate of 18% was applied for this project.

1.1.22 Supervision and Administration (S&A)

Historically, a range from 5% to 15%, depending on project size and type, has been applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis report values ranging from 7.5% to 10%. Consideration is given that a portion of the Supervision and Administration (S&A) effort could be performed by contractors. An S&A rate of 10% was applied for this project.

1.1.23 Contingencies

Contingencies for the final array of structural alternatives were developed using the USACE Abbreviated Cost Risk Analysis (ARA) program. An ARA is a qualitative approach used by the PDT to address key risk concerns for major features of work and their impact to cost and schedule drivers such as Project Scope Growth, Acquisition Strategy, Construction Elements, Quantities, Specialty Fabrication or Equipment, Cost Estimate Assumptions and External Project Risks. A separate ARA was conducted for all Alternatives, with each analysis resulting in a composite risk contingency of ranging between 72 to 35%.

1.1.24 Escalation

The escalation for the structural items taken from the historical cost pricing data were based upon the latest version of the USACE Engineering Manual (EM) 1110-2-1304, “Civil Works Construction Cost Index System (CWCCIS)”.

1.1.25 Hazardous, Toxic and Radioactive Waste (HTRW)

Phase 1 surveys have not been performed, but the risk of finding HTRW in the mostly rural and residential areas that are along the alignment is low. At this time there is no reason to believe HTRW will be found, therefore, the estimates do not include costs for any potential HTRW.

1.1.26 Cost Estimates

The final array of structural alternatives, which were all eventually screened, consisted of Alternatives 3, 4, 5, 6, 7a, and 7a.1 and the future without project conditions. Tables 1-1 through 1-5 show the baseline project cost for each structural alternative in the final array. All costs are at October 2023 price levels.

Table C: 1-1: Alternative 6 – Little Chappapeela Creek Road Raise

Feature	Cost	Contingency	Total
01 Lands and Damages	*	$0	*
06 Fish and Wildlife Facilities	$373,000	$220,000	$593,000
08 Roads, Railroads, & Bridges	$3,200,000	$1,888,000	$5,088,000

Feature	Cost	Contingency	Total
30 Planning, Engineering & Design	$643,000	$379,000	$1,022,000
31 Construction Management	$357,000	$211,000	$568,000
TOTAL	$4,573,000	$2,698,000	**$7,271,000**

Table C: 1-2: Alternative 4 – Tangipahoa River Levee (SPTR - 1A & 1B)

Feature	Cost	Contingency	Total
01 Lands and Damages	$1,406,000	$0	$1,406,000
06 Fish and Wildlife Facilities	$2,004,000	$1,443,000	$3,447,000
11 Levees and Floodwalls	$3,795,000	$2,732,000	$6,527,000
30 Planning, Engineering & Design	$1,044,000	$752,000	$1,796,000
31 Construction Management	$580,000	$418,000	$998,000
TOTAL	$8,829,000	$5,345,000	**$14,174,000**

Table C: 1-3: Alternative 3 – Washley Levee -2.2

Feature	Cost	Contingency	Total
01 Lands and Damages	$4,120,000	$0	$4,120,000
06 Fish and Wildlife Facilities	$22,939,000	$11,011,000	$33,950,000
11 Levees and Floodwalls	$51,979,000	$24,950,000	$76,929,000
13 Pumping Plant	$30,584,000	$14,680,000	$45,264,000
30 Planning, Engineering & Design	$18,990,000	$9,115,000	$28,105,000
31 Construction Management	$10,550,000	$5,064,000	$15,614,000
TOTAL	**$139,162,000**	**$64,820,000**	**$203,982,000**

Table C: 1-4: Alternative 7a – Snagging & Clearing Tangipahoa River

Feature	Cost	Contingency	Total
01 Lands and Damages	$1,380,000	$0	$1,380,000
06 Fish and Wildlife Facilities	$1,408,000	$493,000	$1,901,000
09 Channels & Canals	$7,042,000	$2,465,000	$9,507,000
30 Planning, Engineering & Design	$1,521,000	$532,000	$2,053,000
31 Construction Management	$845,000	$296,000	$1,141,000
TOTAL	$12,196,000	$3,786,000	**$15,982,000**

Table C: 1-5: Alternative 7b – Snagging & Clearing Tangipahoa and Chappepeela Creek

Feature	Cost	Contingency	Total
01 Lands and Damages	$3,550,000	$0	$3,550,000
06 Fish and Wildlife Facilities	$2,346,000	$821,000	$3,167,000
09 Channels & Canals	$11,730,000	$4,106,000	$15,836,000
30 Planning, Engineering & Design	$2,534,000	$887,000	$3,421,000
31 Construction Management	$1,408,000	$493,000	$1,901,000
TOTAL	$21,568,000	$6,307,000	**$27,875,000**

1.1.27 NED Plan/Tentatively Selected Plan

The final array of alternatives was compared based on a variety of factors such as input from economics, hydraulic impacts, and non-Federal sponsor coordination. Structural alternatives were all screened, so a nonstructural plan was selected as the Tentatively Selected Plan (TSP).

1.2 NONSTRUCTURAL MEASURES – RAISING AND DRY FLOODPROOFING

With the structural alternatives screened, nonstructural formulation was the focus of the team to help the residents of Tangipahoa Parish. The following four plans were included in the final array of alternatives:

Plan 1: Nonstructural NED Plan - Maximize Net NED benefits by Aggregation Group and Floodplain area.

Plan 2: NED + OSE Increment 1 - 50-year Flood Event plus upper bound to include SoVi communities.

Plan 3A: (First Increment) 1st increment above NED, addresses more frequent flooding while maintaining emphasis on NED benefits and addressing other social effects.

Plan 3B: (Second Increment) 2nd increment above NED, focuses on a balanced approach between flood frequency, flood hazard depth, other social effects, and NED benefits as well as critical infrastructure.

Plan 3C: (Third Increment) 3rd increment above NED, focuses more on other social effects with a lesser emphasis on NED benefits.

Plan 4: NED + Upper bound for entire parish, not just Socially vulnerable at 50-year flood event.

Plan 5: 10% AEP Floodplain Buyout - All structures in 10% AEP floodplain

1.2.1 Cost Estimate Development

The cost estimates residential elevations for the final array of nonstructural alternatives were prepared using parametric cost taken from the Residential Elevation Cost Template developed by the National Nonstructural Committee (NNC) and the Cost Engineering Mandatory Center of Expertise (Cost MCX). The MCACES template was updated with the latest Cost Book, New Orleans Labor Rates, and the most recent Equipment Book for Region 3. Using that MII, per square foot unit prices were pulled for cost to elevate residential structures on a slab or crawlspace foundation based on the size (under 2,000 SF, between 2,000 and 2,999 SF, and more than 3,000 SF) and the amount raised (between 2 feet and 12 feet). The cost per square foot to raise an eligible residential structure to the target height was multiplied by the footprint square footage of each structure to compute the costs to elevate the structure.

The cost estimates for nonresidential dry floodproofing for the final array of nonstructural alternatives were prepared using parametric cost taken from the Residential Elevation Cost Template developed by the National Nonstructural Committee (NNC) and the Cost Engineering Mandatory Center of Expertise (Cost MCX). The MCACES template was updated with the latest Cost Book, New Orleans Labor Rates, and the most recent Equipment Book for Region 3. Using that MII, per square foot unit prices were pulled for cost to dry floodproof a nonresidential structure.

1.2.2 Estimate Structure

The estimates have been subdivided by alternative and each estimate contains U.S. Army Corps of Engineers (USACE) feature Work Breakdown Structure (WBS) codes. Each WBS cost is subdivided into base cost, contingency and total cost.

1.2.3 Bid Competition

It is assumed there will not be an economically saturated market, and that bidding competition will be present. It was discussed during the Abbreviated Risk Analysis meeting that there is a risk the number of contractors in the area that could do the work would not be sufficient if all other studies being done in the area all proceed with nonstructural plans.

1.2.4 Contract Acquisition Strategy

The project will use the traditional method of implementation. The “traditional method” of implementation is generally described in publications of the USACE National Floodproofing Committee and Flood Risk Management Planning Center of Expertise. Under the traditional method, the USACE District utilizes a federal procurement to obtain design and construction contractors for the various floodproofing and elevation measures. The Government will procure contracts that will allow a contractor to perform floodproofing work on multiple structures through a series of one or more task orders and who will be responsible for all work associated with flood risk mitigation approval of the engineering plans for each structure to final inspection.

1.2.5 Labor Shortages

It is assumed there will be a normal labor market pulled from the Gulf Coast region.

1.2.6 Labor Rates

Local labor market wages are above the local Davis-Bacon Wage Determination, so actual rates have been used. This is based on local information and payroll data received from MVN District construction representatives and estimators with experiences in past years.

1.2.7 Materials

Cost quotes are used on major construction items when available. Material price quotes were also taken from previous job, historical data and the MII Cost Book. It was assumed that materials will be purchased as part of the contract. The estimate does not anticipate government furnished materials. Prices include delivery of materials.

1.2.8 Quantities

A structure inventory of residential and non-residential structures for the study area was obtained through the National Structure Inventory (NSI) version 2022. Economics estimated the number of square feet per total structure, along with other characteristics, such as one or two-story, slab or pier foundations, etc.

1.2.9 Equipment

Rates used are based on the latest USACE EP-1110-1-8, Region III (2022). Adjustments are made for fuel and facility capital cost of money (FCCM). Full FCCM/Cost of Money rate is the latest available. The MII program takes the EP-recommended discount, but no other

adjustments have been made to the FCCM. Equipment was chosen based on historical knowledge of similar projects.

1.2.10 Fuels

Fuels (e.g., gasoline and diesel fuel) for rental equipment were based on local market averages for the Gulf Coast area. The fuel rates were reviewed over a period of time and a composite, conservative cost was used. Due to the volatility of fuel and significant potential escalation of fuel rate, conservative costs were used in the estimates.

1.2.11 Crews

Major crew and productivity rates were developed by Cost MCX in the MII Template. The work is typical to the Gulf Coast area and is well understood by CEMVS cost engineers. The crews and productivity rates were checked by local CEMVS estimators and comparisons with historical cost data were referenced. Crews and productivity rates were adjusted as necessary based upon those findings to reflect reasonable crew sizes and production rates. Most crew work hours are assumed to be 12 hours, 6 days/week.

1.2.12 Unit Prices

The unit prices found within the various project estimates fluctuate within a range between similar construction unit prices. Variances are a result of differing haul distances, small or large business markups, subcontracted items, designs and estimates by others. Unit prices were used in the development of the various cost estimates and are based upon historical data of recent jobs with a similar size and scope.

1.2.13 Relocation Costs

Not applicable.

1.2.14 Mobilization

Contractor mobilization and demobilization (mob/demob) assume that most of the contractors will be coming from within the Gulf Coast/Southern region. Minimal equipment is required for the nonstructural work.

1.2.15 Field Office Overhead

The rates were based upon estimating and negotiation experience, and consultation with local construction representatives. The estimates used a field office overhead rate based on the average of relevant jobs with a similar scope and magnitude. Different percentages are used when considering the scope of work for each feature. However, when reviewing historical cost pricing data, a range of 15 -25% is typically used. The field office overhead rate of 15% was used for the prime contractors, which was based on historical projects.

1.2.16 Home Office Overhead

The estimated percentages vary based upon consideration of 8(a), small business and unrestricted prime contractors. The rates were based upon estimating and negotiating experience, and consultation with local construction representatives. Different percentages are used when considering the contract acquisition strategy regarding small business 8(a), competitive small business and large business, high to low, respectively. For Home Office Overhead a percentage of 10% was assumed.

1.2.17 Bond

The Bond interest rate was assumed to be 1.5%, applied against the prime contractor, assuming large contracts. There was no differentiation between large and small businesses.

1.2.18 Real Estate Costs

Real Estate (RE) costs were developed and provided by the Realty Specialist and placed in WBS-01 Lands and Damages. The RE cost for each alternative includes administration costs and relocation for rental properties (assume one third of properties to be rentals) and 30% for contingencies.

1.2.19 Environmental Costs

Not applicable.

1.2.20 Cultural Resources Costs

Cultural Resources (CR) costs were not provided by the Archaeologist-Natural/Cultural Resources Analyst. Cultural surveys are required for each structure and are being pushed off to PED. The cost of these surveys is captured in the WBS 18 Account. Depending on what the cultural surveys find, could impact how the structure is elevator or floodproofed. It is unknown the number of structures that will qualify for special cultural considerations. This risk is captured in the Abbreviated Risk Analysis.

1.2.21 Pre-Construction Engineering and Design (PED)

The PED cost included such costs as USACE project management, engineering, planning, designs, investigations, studies, reviews, value engineering (VE) and engineering during construction. Historically, a rate of approximately 12% for Engineering and Design (E&D) portion, plus small percentages for other support functions, is applied against the estimated construction costs. Other USACE civil works districts such as St. Paul, Memphis and St. Louis have reported values ranging from 10% to 15% for E&D. Additional support functions might include project management, engineering, planning, designs, investigations, studies, reviews, and VE. A PED rate of 14% was applied for this project.

1.2.22 Supervision and Administration (S&A)

Historically, a range from 5% to 15%, depending on project size and type, has been applied against the estimated construction costs. Other USACE civil works districts such as St. Paul,

Memphis and St. Louis report values ranging from 7.5% to 10%. Consideration is given that a portion of the Supervision and Administration (S&A) effort could be performed by contractors. An S&A rate of 8% was applied for this project.

1.2.23 Contingencies

Contingencies for the final array of structural alternatives were developed using the USACE Abbreviated Cost Risk Analysis (ARA) program. An ARA is a qualitative approach used by the PDT to address key risk concerns for major features of work and their impact to cost and schedule drivers such as Project Scope Growth, Acquisition Strategy, Construction Elements, Quantities, Specialty Fabrication or Equipment, Cost Estimate Assumptions and External Project Risks. A separate ARA was conducted for Nonstructural Alternatives, with the analysis resulting in a composite risk contingency of 48%.

1.2.24 Escalation

The escalation for the structural items taken from the historical cost pricing data were based upon the latest version of the USACE Engineering Manual (EM) 1110-2-1304, “Civil Works Construction Cost Index System (CWCCIS)”.

1.2.25 Hazardous, Toxic and Radioactive Waste (HTRW)

The cost estimate does not include cost for any Hazardous, Toxic, and Radioactive Waste (HTRW) mitigation. A Phase I Environmental Site Assessment will be conducted prior to structure being approved for floodproofing or house raising. Any HTRW discovered will need to be remediated at the cost of the homeowner. This would be no cost to the Government.

1.2.26 Cost Estimates

The final array of nonstructural alternatives, consisted of Alternatives 1, 2, 3a, 3b, 3c, 4 and 5. Tables 1-6 through 1-12 show the baseline project cost for each nonstructural alternative in the final array. All costs are at October 2023 price levels.

Table C: 1-6: Plan 1 – Nonstructural NED Plan

Feature	Cost	Contingency	Total
01 Lands and Damages	$17,910,000	$0	$17,910,000
18 Cultural Resources Preservation	$597,000	$287,000	$884,000
19 Buildings, Grounds & Utilities	$180,747,000	$86,759,000	$267,506,000
30 Planning, Engineering & Design	$25,305,000	$12,146,000	$37,451,000
31 Construction Management	$14,460,000	$6,941,000	$21,401,000
TOTAL	$239,019,000	$106,133,000	$345,152,000

Table C: 1-7: Plan 2 – Nonstructural NED Plan + OSE Increment 1

Feature	Cost	Contingency	Total
01 Lands and Damages	$20,730,000	$0	$20,730,000
18 Cultural Resources Preservation	$691,000	$332,000	$1,023,000
19 Buildings, Grounds & Utilities	$207,708,000	$99,700,000	$307,408,000
30 Planning, Engineering & Design	$29,079,000	$13,958,000	$43,037,000
31 Construction Management	$16,617,000	$7,976,000	$24,593,000
TOTAL	$274,825,000	$121,966,000	$396,791,000

Table C: 1-8: Plan 3a – First Increment

Feature	Cost	Contingency	Total
01 Lands and Damages	$20,250,000	$0	$20,250,000
18 Cultural Resources Preservation	$675,000	$324,000	$999,000
19 Buildings, Grounds & Utilities	$199,365,000	$95,695,000	$295,060,000
30 Planning, Engineering & Design	$27,911,000	$13,397,000	$41,308,000
31 Construction Management	$15,949,000	$7,656,000	$23,605,000
TOTAL	$264,150,000	$117,072,000	$381,222,000

Table C: 1-9: Plan 3b – Second Increment

Feature	Cost	Contingency	Total
01 Lands and Damages	$32,640,000	$0	$32,640,000
18 Cultural Resources Preservation	$1,088,000	$522,000	$1,610,000
19 Buildings, Grounds & Utilities	$310,599,000	$149,088,000	$459,687,000
30 Planning, Engineering & Design	$43,484,000	$20,872,000	$64,356,000
31 Construction Management	$24,848,000	$11,927,000	$36,775,000
TOTAL	$412,659,000	$182,409,000	$595,068,000

Table C: 1-10: Plan 3c – Third & Final Increment

Feature	Cost	Contingency	Total
01 Lands and Damages	$37,020,000	$0	$37,020,000
18 Cultural Resources Preservation	$1,234,000	$592,000	$1,826,000
19 Buildings, Grounds & Utilities	$346,827,000	$166,477,000	$513,304,000
30 Planning, Engineering & Design	$48,556,000	$23,307,000	$71,863,000
31 Construction Management	$27,746,000	$13,318,000	41,064,000
TOTAL	$461,383,000	$203,694,000	$665,077,000

Table C: 1-11: Plan 4 – Nonstructural NED + Upper Bound for Entire Parish

Feature	Cost	Contingency	Total
01 Lands and Damages	$38,280,000	$0	$38,280,000
18 Cultural Resources Preservation	$1,276,000	$612,000	$1,888,000
19 Buildings, Grounds & Utilities	$361,370,000	$173,458,000	$534,828,000
30 Planning, Engineering & Design	$50,592,000	$24,284,000	$74,876,000
31 Construction Management	$28,910,000	$13,877,000	$42,787,000
TOTAL	$480,428,000	$212,231,000	$692,659,000

Table C: 1-12: Plan 5 – 10% AEP Floodplain Buyout

Feature	Cost	Contingency*	Total
01 Lands and Damages	$468,046,000	$76,512,000	$544,558,000
19 Buildings, Grounds & Utilities	$38,803,000	$18,625,000	$57,428,000
30 Planning, Engineering & Design	$5,432,000	$2,607,000	$8,039,000
31 Construction Management	$3,104,000	$1,490,000	$4,594,000
TOTAL	$515,385,000	$99,234,000	$614,619,000

*48% contingency applied to 19, 30, and 31 accounts. 25% contingency applied to replacement cost and 50% contingency applied to condemnation costs in 01 account.

1.2.27 NED Plan/Tentatively Selected Plan

Nonstructural plans 2, 4, and 5 were screened. The final array of alternatives was compared based on a variety of factors such as input from economics and non-Federal sponsor coordination.

The federal TSP is Plan 3b, the Total Benefits Plan, which includes nonstructural elevation and dry floodproofing measures on a total of 1,088 structures, located in the 0.1 (59 aggregates), 0.04 (13 aggregates), or 0.02 (7 aggregates) AEP floodplain to 0.01 AEP BFE in the Tangipahoa Parish study area. Flood risk and residual risk from coastal storm surge were estimated to be reduced to:

- 1006 elevations of residential structures
- 82 floodproofing of nonresidential structures

The reduction in damages would be achieved by elevating residential structures up to 13 feet above ground surface and floodproofing nonresidential structures up to 3 feet above ground surface. During implementation, each structure would be individually surveyed. Participation in the TSP is 100 percent voluntary. This plan is estimated to have an annual cost of $22.12 million (total project cost of $597.09 million including interest during construction), a BCR 1.39, and net benefits of $8.63 million at the current Federal discount rate (FDR) of 2.75 percent and 2024 Price Level.

SECTION 2
List of Acronyms and Abbreviations

PDT	Project Delivery Team
MCACES	Micro-Computer Aided Cost Estimating System
A-E	Architect-Engineer
USACE	U.S. Army Corps of Engineers
WBS	Work Breakdown Structure
MVN	New Orleans District
CEMVS/MVS	St. Louis District
LIDAR	Light Detection and Ranging
EP	Engineer Pamphlet
FCCM	Facility Capital Cost Of Money
RE	Real Estate
CR	Cultural Resources
PED	Pre-Construction Engineering and Design
VE	Value Engineering
E&D	Engineering and Design
S&A	Supervision and Administration
ARA	Abbreviated Risk Analysis
EM	Engineering Manual
CWCCIS	Civil Works Construction Cost Index System
HTRW	Hazardous, Toxic and Radioactive Waste
TSP	Tentatively Selected Plan
NED	National Economic Development
OSE	Other Social Effects
SoVi	Socially Vulnerable
AEP	Annual Exceedance Probability
NNC	National Nonstructural Committee
Cost MCX	Cost Engineering Mandatory Center of Expertise
NSI	National Structure Inventory

BFE	Base Flood Elevation
BCR	Benefit-To Cost Ratios
FDR	Federal Discount rate