NATIONAL LEVEE SAFETY PROGRAM

Summary of Costs Associated with Levee-related Activities

FINAL – NOVEMBER 2023

LEVEE COST ASSUMPTIONS

The information contained in this brochure comes from a variety of sources including historical bid and operation and maintenance data from U.S. Army Corps of Engineers (USACE) projects and levee sponsors, normalized for location adjustments. Site-specific levee conditions and operation and maintenance activities vary and therefore, many assumptions and professional judgments were made when developing the cost information.

Because of the large variability in each levee system, users of this brochure should view the low and high range of costs as a general guide. Actual costs will depend on levee-specific circumstances, and it should be noted that the costs provided in this brochure were based on riverine projects. ***Costs in this brochure represent a national average. Adjustments to account for specific local conditions should be made as necessary. Price level date of March 2023.***

OVERVIEW

Levee systems play a critical role in managing flood risk for the Nation. Approximately 25,000 miles of levees reduce risk for over 23 million people that live and work behind levee systems. These systems also reduce risk to over $2 trillion in property value and much of the Nation's critical infrastructure. Climate change, aging levee infrastructure, and increased population behind some levees are all factors making communities more reliant on a levee's ability to perform. Levees that successfully perform their intended flood risk reduction function are the result of diligence by those with levee responsibilities in completing a variety of construction, operation, and maintenance activities.

Prioritizing work on levees is often necessary, particularly when resources are limited. To make informed levee management decisions, as well as plan for future investments, it is important to understand costs associated with a levee activity. This brochure aims to help users with this understanding by providing high-level ranges of costs (e.g., Class 5) for common levee-related activities.

HOW TO USE THIS BROCHURE

This brochure is organized into four sections:

SECTION I. The first section contains information on costs that are typically associated with a levee project including construction, utility relocation, real estate, environmental, planning, engineering and design, and contingency. Calculating the cost for a levee project is also described in this section.

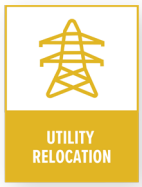
SECTION II. The second section contains cost information for routine and non-routine operation and maintenance activities as well as costs associated with flood fight activities.

SECTION III. The third section contains cost ranges (low – high) and cost assumptions for common levee construction activities such as construction of the levee embankment, floodwalls, closure structures (stoplog, swing gate and rolling gate), seepage control systems (seepage berm, relief well, cutoff wall), and interior drainage systems.

SECTION IV. The fourth section contains cost information related to warning and evacuation measures, including electronic and siren warning systems, community outreach, and evacuation plans.

SECTION I – COSTS ASSOCIATED WITH A LEVEE PROJECT

Construction costs include labor, material, and equipment for the physical construction of a levee. These costs typically make up the construction costs of a levee project. Construction costs can be determined using a variety of methods that provide various levels of detail and accuracy. In this brochure, high-level ranges of construction costs were determined from cost data collected from historical USACE projects for the following levee features and components: earthen embankments, floodwalls, closure structures, interior drainage systems, and seepage control systems. Cost estimating software or a cost estimating tool would be required for a more detailed construction cost estimate. USACE is currently working on tools to support more detailed costs estimates.



Utility relocation costs include activities related to the relocation of existing utilities (such as gas, water, sewer, fiber optic cables, etc.) within the levee project. Generally, utility lines should not be within or beneath a levee. If utility relocation costs are not known, these may be estimated based on 1% (for rural areas) to 5% (for urban areas) of the construction costs. These ranges were determined from historical USACE levee projects.

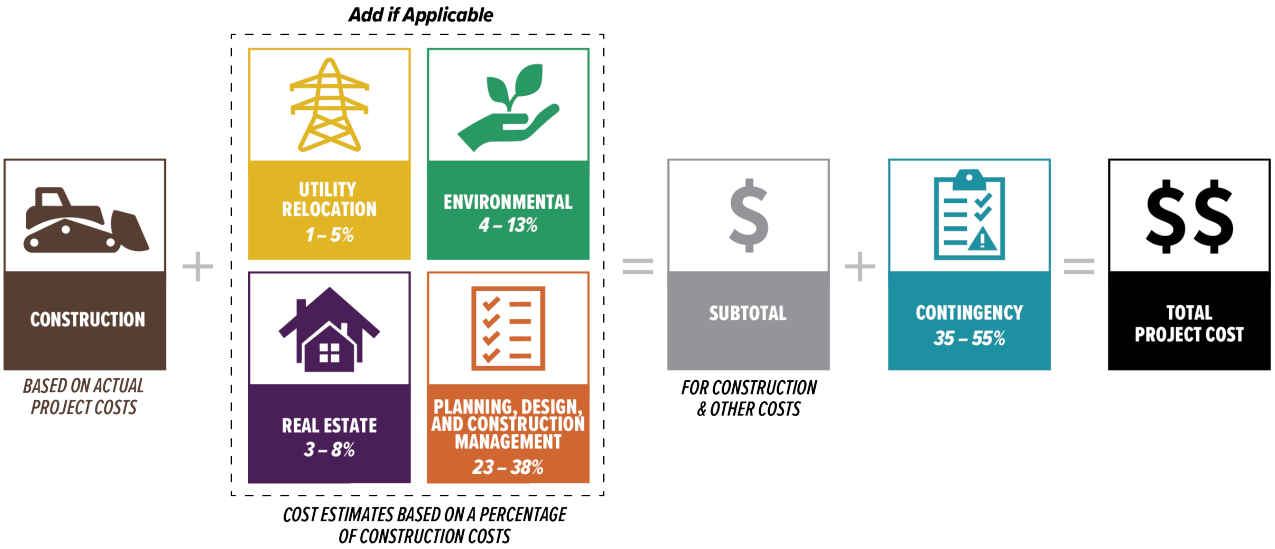
Real estate costs include the purchase of real estate necessary for levee projects such as for the footprint of the levee project and operation and maintenance corridors. If real estate costs are not known, these may be estimated based on 3% (for rural areas) to 8% (for urban areas) of the construction costs. These ranges were determined from historical USACE levee projects but can vary considerably relative to the local real estate market.

Environmental costs include environmental mitigation and regulatory efforts such as performing mitigation activities or obtaining regulatory permits. Local environmental conditions within the levee project will have a significant impact on these costs. If environmental costs are unknown, they may be estimated based on 4% (Midwestern U.S. project areas) to 13% (Western U.S. project areas) of the construction costs. These ranges were determined from historical USACE levee projects in these areas.

Planning, design, and construction management costs include labor to conduct investigations, engineering design and analysis, engineering management during planning, and construction management. These costs typically range from 23% (for larger projects) to 38% (for smaller projects).

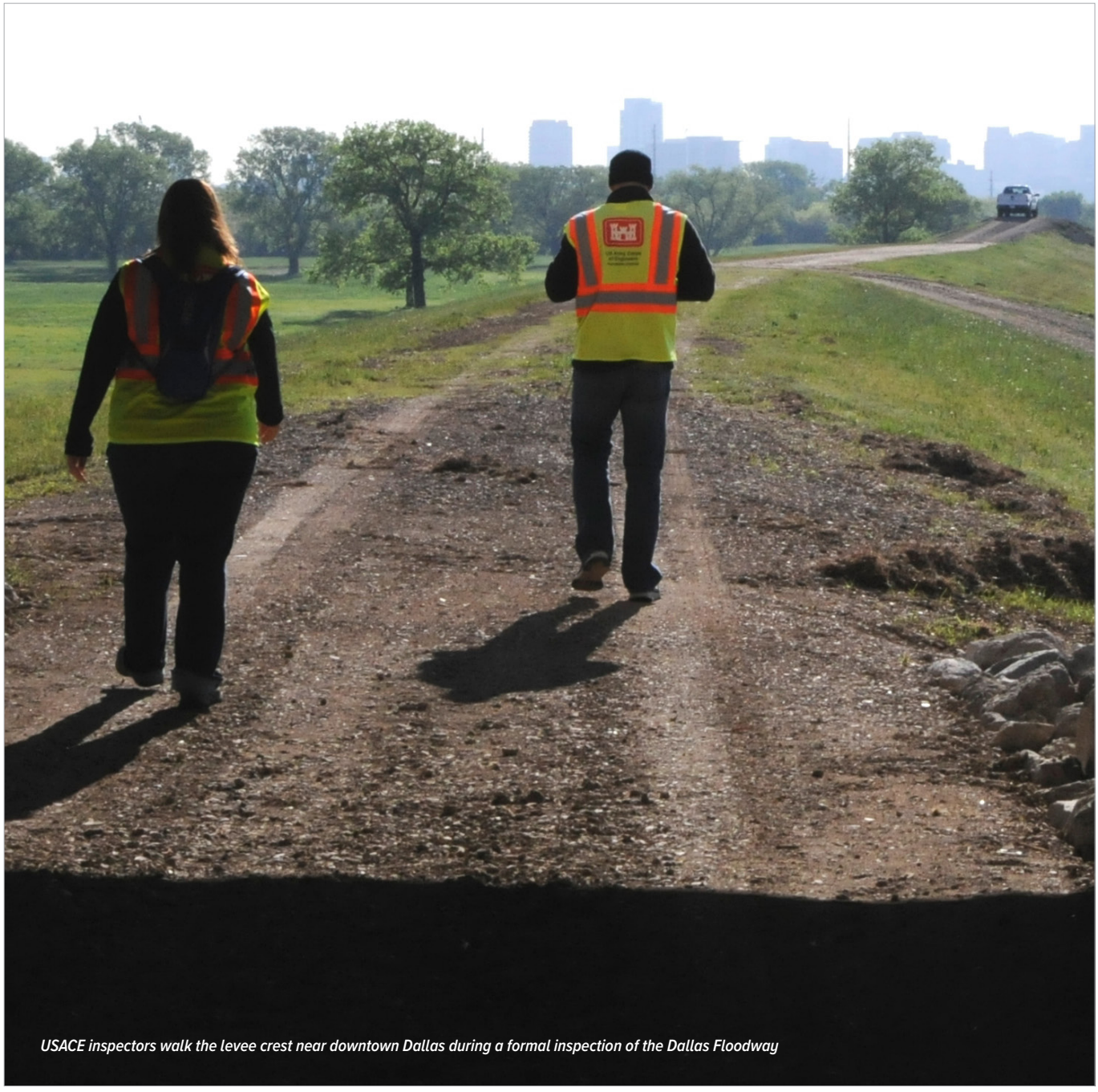
Project contingency costs are used to account for uncertainty associated with cost estimates. These costs are typically determined using a cost risk analysis that considers scope/technical risks, construction risks, contract acquisition strategy, and external risks. For high-level estimates like those contained in this brochure, a project contingency of 35% (simple project with minimal scope, construction, and external risks) to 55% (complex project with significant scope, construction, and external risks) can be applied. This contingency is applied to all cost factors.

HOW IS THE TOTAL COST DETERMINED FOR A LEVEE PROJECT?



SECTION II – COMMON OPERATION AND MAINTENANCE ACTIVITIES

The following section presents cost ranges for many routine and non-routine operation and maintenance and flood fight activities. Completing routine operation and maintenance activities, such as inspections, mowing, animal control and minor repairs, allows levee systems to remain in good working condition. Non-routine operation and maintenance activities, such as pipe or slope repairs, may be necessary due to age or repeated loading of the levee system. The cost ranges for operation and maintenance activities are heavily influenced by the level of effort required for each specific activity, labor costs, and equipment costs.



USACE inspectors walk the levee crest near downtown Dallas during a formal inspection of the Dallas Floodway

Routine Operation and Maintenance				
PROJECT	ACTIVITY	UNIT COST		UNIT OF MEASURE
		LOW	HIGH	
GENERAL	Inspections (costs may exceed range provided)	$500	$14,000	per inspection
	Overhead costs - building, maintenance yard, equipment, staffing (Levee Districts), etc.	$2,000	$50,000	per lump sum
	Emergency planning and/or exercises	$1,000	$13,000	per each
	Channel Maintenance – silt/sediment removal	$20	$30	per cubic yard
	Channel Maintenance – scour and erosion repairs	$4	$37	per square foot
	Channel Maintenance – vegetation control beyond levee toe	$0.10	$0.30	per square foot
EARTHEN EMBANKMENT	Grass Mowing (assume 5 mowings/year)	$65	$500	per acre
	Animal Control/Burrow Repairs (assume 10 burrow repairs/year)	$350	$2,500	per each
	Tree Removal	$300	$6,500	per each
	Crown Maintenance (e.g. gravel, rutting, depressions, etc.)	$1	$2	per square foot
	Embankment Repairs (minor erosion, turf repairs, etc.)	$1	$2	per square foot
	Embankment Slide Repairs - slough/slide repairs	$19	$68	per cubic yard
FLOODWALL	Floodwall Concrete Surface Maintenance (repairing of spalls, expansion joint repairs, crack repairs, etc.)	$11	$18	per square foot
CLOSURE STRUCTURE	Closure Structure Maintenance (storage/security, trial closures, engine/motor maintenance)	$600	$5,900	per structure
SEEPAGE CONTROL SYSTEM	Toe Drainage System Maintenance	$0.50	$16	per linear foot
	Relief Well Maintenance	$350	$6,900	per each
INTERIOR DRAINAGE SYSTEM	Interior Drainage System Maintenance (operating gates to ensure operability during flood conditions; lubricating hinges, wheels, gaskets/seals, etc.; debris/sediment clean-up at inlets and outlets; riprap maintenance, cutting, spraying; concrete surface maintenance; painting)	$530	$22,000	per structure
	Video Inspection of Pipes	$500	$5,500	per conduit/pipe
	Pump Station Maintenance (periodic operations to ensure operability during flood conditions; lubricating hinges, wheels, gaskets/seals, etc.; trash rack/rake maintenance; pump maintenance; engine/motor maintenance; debris clean-up at inlets and outlets)	$2,000	$11,000	per pump station
	Pump Station Fuel/Energy Costs (operating pumps/motors/ generators)	$4,500	$22,000	per pump station
	Pump Station Electricity Costs	$4,500	$22,000	per pump station

Rehabilitation of 128 existing relief wells just south of Cape Girardeau, Missouri

Non-Routine Operation and Maintenance				
PROJECT	ACTIVITY	UNIT COST		UNIT OF MEASURE
		LOW	HIGH	
GENERAL	Channel Project Debris Removal from Channel and Bridge Pilings	$18	$75	per cubic yard
EARTHEN EMBANKMENT	Embankment Slope Repairs (riprap/other revetment)	$180	$450	per linear foot
SEEPAGE CONTROL SYSTEM	Major Rehabilitation of Toe Drains	$500	$1,000	per each
	Major Rehabilitation of Relief Wells	$15,000	$60,000	per each
INTERIOR DRAINAGE SYSTEM	High Density Polyethylene Lining of Damaged Pipes	$70	$750	per linear foot

USACE engineers measure erosion spots following a high flow event along a levee system in West Virginia

Flood Fight Activities			
ACTIVITY	UNIT COST		UNIT OF MEASURE
	LOW	HIGH	
Preparation for Flood Emergencies	$2,100	$27,000	per event
Temporary Flood Barriers (sand, sandbags, HESCOs, etc.)	$10,000	$20,000	per event
Temporary Pumps	$50,000	$75,000	per event
Temporary Lights	$10,000	$20,000	per event
Inspections During Flood Events	$25,000	$75,000	per event

SECTION III – RANGES FOR COMMON LEVEE CONSTRUCTION ACTIVITIES

Earthen Embankment

Defined as: a compacted embankment to reduce flooding on the landward side of a levee system or leveed area. For most levees, earthen embankments can be the primary (or even only) physical feature. The most common type of embankment levee is a homogeneous earthen (i.e., one soil type) compacted embankment.

View of an earthen embankment in Kentucky

EARTHEN EMBANKMENT CONSTRUCTION COSTS
PER LINEAR FOOT

PROJECT	5-FOOT LEVEE HEIGHT	15-FOOT LEVEE HEIGHT
	$19.00 – $204.00	$114.00 – $1,224.00
	CONSTRUCTION COST ASSUMPTIONS » *Embankment construction: 1V:3H side slopes; 10-foot crest width* » *Base construction cost range: $3.80 - $40.80 per cubic yard of in place material* » *5-foot levee height: 5 cubic yards per linear foot* » *15-foot levee height: 30 cubic yards per linear foot* » *Lower construction costs are typically where embankment borrow material is readily available at the project site.* » *Higher construction costs are typically where embankment borrow material is not readily available at the project site and offsite borrow with long haul distances are needed.*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$0.19 – $10.20	$1.14 – $61.20
	$0.57 – $16.32	$3.42 – $97.92
	$0.76 – $26.52	$4.56 – $159.12
	$4.37 – $77.52	$26.22 – $465.12
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	$24.89 – $334.56	$149.34 – $2,007.36
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$8.71 – $184.01	$52.27 – $1,104.05
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	$34 – $520	$200 – $3,100

Floodwall (Specifically T-Wall)

Defined as: a concrete wall constructed to reduce flooding. Floodwalls are normally constructed instead of, or to supplement, an earthen levee embankment where land required for levee construction is too expensive or unavailable.

View of a recently constructed floodwall

FLOODWALL (T-WALL) CONSTRUCTION COSTS
PER LINEAR FOOT

PROJECT	5-FOOT WALL HEIGHT	15-FOOT WALL HEIGHT
	$3,000.00 – $6,600.00	$12,900.00 – $22,400.00
	CONSTRUCTION COST ASSUMPTIONS » *5-foot floodwall height: ground supported (e.g., shallow foundation)* » *15-foot floodwall height: supported with piles to depths of 60 feet (low) to 80 feet (high)* » *Lower construction costs are typical where there are good foundation conditions (strong impervious soils).* » *Higher construction costs are typical where there are poor foundation conditions (weak impervious soils or pervious soils).*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$30.00 – $330.00	$129.00 – $1,120.00
	$90.00 – $528.00	$387.00 – $1,792.00
	$120.00 – $858.00	$516.00 – $2,912.00
	$690.00 – $2,508.00	$2,967.00 – $8,512.00
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	$3,930.00 – $10,824.00	$16,899.00 – $36,736.00
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$1,375.50 – $5,953.20	$5,914.65 – $20,204.80
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	$5,300 – $17,000	$23,000 – $57,000

Closure Structures

Defined as: a temporary structure put in place at openings along an embankment/floodwall to prevent floodwaters from flowing through the opening. Openings are typically for vehicular, rail, or pedestrian access through the embankment/floodwall when the river/stream is at normal levels (non-flood). Common types of closure structures include stoplog, swing gate, and rolling gate.

STOPLOG CLOSURE STRUCTURE

View of a stoplog closure structure in place

STOPLOG CLOSURE CONSTRUCTION COSTS
PER SQUARE FOOT OF CLOSURE AREA

	$1,550.00 – $4,750.00
	CONSTRUCTION COST ASSUMPTIONS » *Cost is per square foot of the closure area. Measured by multiplying closure height by closure width in profile view.* » *Costs include all labor, material, and equipment for closure structure construction.* » *Smaller stoplog closure structures may have a higher cost per square foot of closure area.* » *Larger stoplog closure structures may have a lower cost per square foot of closure area.*
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*
	$15.50 – $237.50
	$46.50 – $380.00
	$62.00 – $617.50
	$356.50 – $1,805.00
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***
$	$2,030.50 – $7,790.00
+	***CONTINGENCY BASED ON SUBTOTAL***
	$710.68 – $4,284.50
=	***TOTAL PROJECT COST*** *(ROUNDED)*
$$	$2,700 – $12,000

SWING GATE CLOSURE STRUCTURE

View of a swing gate closure structure in the open position along the Ohio River

ROLLING GATE CLOSURE STRUCTURE

View of a rolling gate closure structure in the open position in Louisiana

SWING GATE CLOSURE CONSTRUCTION COSTS

PER SQUARE FOOT OF CLOSURE AREA

	$890.00 – $7,700.00
	CONSTRUCTION COST ASSUMPTIONS » *Swing gate closure structure construction using fabricated steel* » *Cost is per the square foot of the closure area. Measured by closure height multiplied by closure width in profile view.* » *Costs include all labor, material, and equipment for closure structure construction.* » *Smaller swing gate closure structures may have a higher cost per square foot of closure area.* » *Larger swing gate closure structures may have a lower cost per square foot of closure area.*
+	***POTENTIAL ADDITIONAL COSTS** (IF APPLICABLE)*
	$8.90 – $385.00
	$26.70 – $616.00
	$35.60 – $1,001.00
	$204.70 – $2,926.00
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***
$	**$1,165.90 – $12,628.00**
+	***CONTINGENCY BASED ON SUBTOTAL***
	$408.07 – $6,945.40
=	***TOTAL PROJECT COST** (ROUNDED)*
$$	**$1,600 – $20,000**

ROLLING GATE CLOSURE CONSTRUCTION COSTS

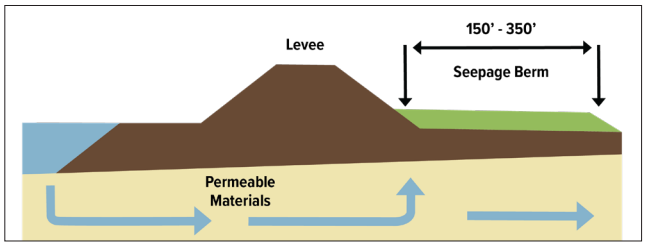
PER SQUARE FOOT OF CLOSURE AREA

	$1,000.00 – $12,720.00
	CONSTRUCTION COST ASSUMPTIONS » *Rolling gate closure structure construction using fabricated steel* » *Cost is per square foot of the closure area. Measured by closure height multiplied by closure width in profile view.* » *Costs include all labor, material, and equipment for closure structure construction.* » *Smaller rolling gate closure structures may have a higher cost per square foot of closure area.* » *Larger rolling gate closure structures may have a lower cost per square foot of closure area.*
+	***POTENTIAL ADDITIONAL COSTS** (IF APPLICABLE)*
	$10.00 – $636.00
	$30.00 – $1,017.60
	$40.00 – $1,653.60
	$230.00 – $4,833.60
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***
$	**$1,310.00 – $20,860.80**
+	***CONTINGENCY BASED ON SUBTOTAL***
	$458.50 – $11,473.44
=	***TOTAL PROJECT COST** (ROUNDED)*
$$	**$1,800 – $32,000**

Seepage Control System

Defined as: a feature installed to resist, cutoff, or collect the internal movement of water (e.g., underseepage) that can occur beneath a levee, which can cause poor performance of a levee. Common types of seepage control systems include seepage berms, relief wells, and cutoff walls.

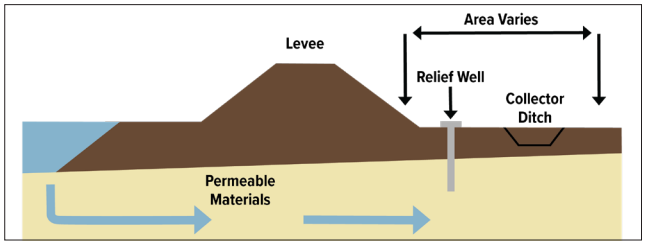
SEEPAGE BERM



SEEPAGE BERM CONSTRUCTION COSTS
PER LINEAR FOOT

PROJECT	*100-FOOT WIDTH*	*300-FOOT WIDTH*
	$60.00 – $170.00	**$180.00 – $508.00**
	CONSTRUCTION COST ASSUMPTIONS » *Berm construction: 2.5-foot average height* » *Base construction cost range: $6.50 - $18.40 per cubic yard of in place material* » *100-foot width: 9.2 cubic yards per linear foot* » *300-foot width: 27.6 cubic yards per linear foot* » *Lower construction costs are typically where berm borrow material is readily available at the project site.* » *Higher construction costs are typically where berm borrow material is not readily available at the project site and offsite borrow with long haul distances are needed.*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$0.60 – $8.50	**$1.80 – $25.40**
	$1.80 – $13.60	**$5.40 – $40.64**
	$2.40 – $22.10	**$7.20 – $66.04**
	$13.80 – $64.60	**$41.40 – $193.04**
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	**$78.60 – $278.80**	**$235.80 – $833.12**
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$27.51 – $153.34	**$82.53 – $458.22**
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	**$110 – $430**	**$320 – $1,300**

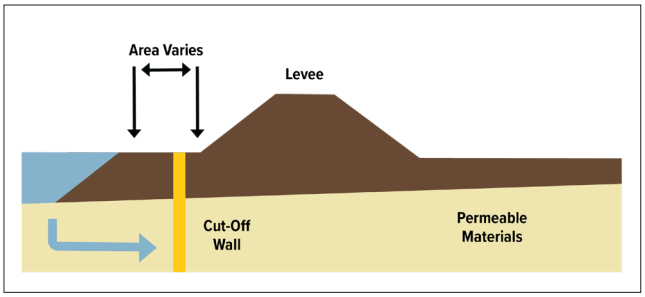
RELIEF WELL



RELIEF WELL CONSTRUCTION COSTS
PER VERTICAL LINEAR FOOT

PROJECT	*8-INCH DIAMETER*	*12-INCH DIAMETER*
	$650.00 – $1,180.00	**$750.00 – $1,250.00**
	CONSTRUCTION COST ASSUMPTIONS » *Relief well construction using stainless steel* » *Depth, diameter, and quantity of relief wells can impact the construction costs (e.g., lower depths and/or quantity can have a higher cost per vertical linear foot).* » *Foundation conditions can impact relief well construction costs. If the foundation is highly variable, pilot holes may be needed during construction at each relief well location to finalize the relief well design.*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$6.50 – $59.00	**$7.50 – $62.50**
	$19.50 – $94.40	**$22.50 – $100.00**
	$26.00 – $153.40	**$30.00 – $162.50**
	$149.50 – $448.40	**$172.50 – $475.00**
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	**$851.50 – $1,935.20**	**$982.50 – $2,050.00**
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$298.03 – $1,064.36	**$343.88 – $1,127.50**
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	**$1,100 – $3,000**	**$1,300 – $3,200**

CUTOFF WALL



CUTOFF WALL CONSTRUCTION COSTS
PER HORIZONTAL LINEAR FOOT

PROJECT	40-FOOT DEPTH	100-FOOT DEPTH
	$680.00 – $1,320.00	$3,300.00 – $4,500.00
	CONSTRUCTION COST ASSUMPTIONS » *Cutoff wall construction: 3-foot width with varying amounts of bentonite (4% - 7%)* » *The vertical depth of the cutoff wall will impact the construction costs. Cutoff wall projects with deeper vertical depths greater than 70 feet may have higher construction costs.* » *Foundation conditions can impact cutoff wall construction costs. If the foundation is highly variable or consists of poor soils (e.g., weak soils or very coarse-grained soils), cutoff wall construction costs can increase.*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$6.80 – $66.00	$33.00 – $225.00
	$20.40 – $105.60	$99.00 – $360.00
	$27.20 – $171.60	$132.00 – $585.00
	$156.40 – $501.60	$759.00 – $1,710.00
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	$890.80 – $2,164.80	$4,323.00 – $7,380.00
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$238.00 – $726.00	$1,155.00 – $2,475.00
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	$1,100 – $2,900	$5,500 – $9,900

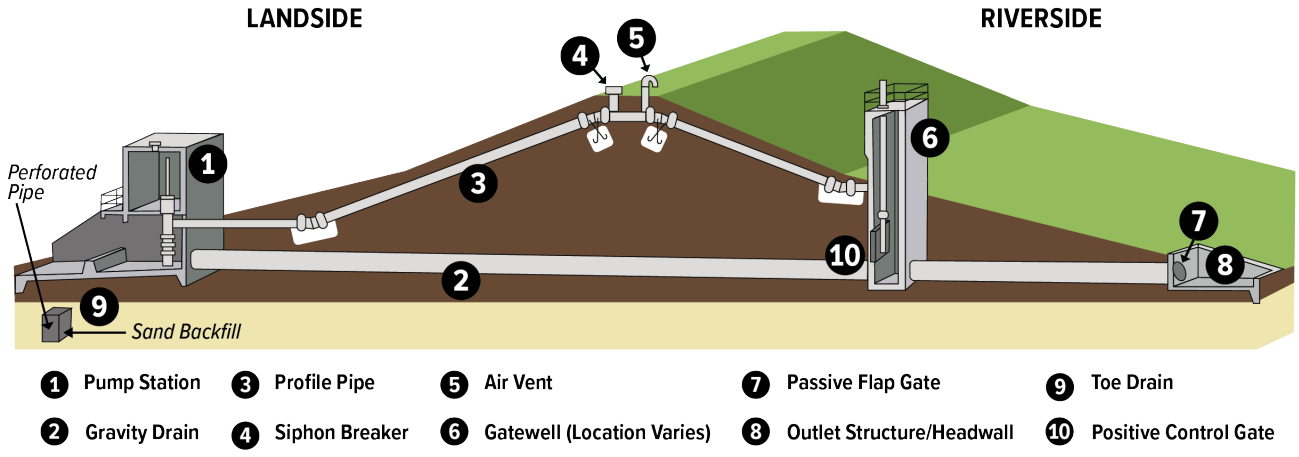
Interior Drainage System

Defined as: infrastructure that usually includes storage areas, gravity pipes, pumping stations, or a combination of these to control interior drainage. Gravity pipes are pipes beneath the levee designed with the intent to pass flow during normal conditions. During flood conditions, gravity pipes are normally closed off with a gate to prevent passing flood waters into the interior. (Diagram shown on next page.)

INTERIOR DRAINAGE SYSTEM CONSTRUCTION COSTS
PER UNIT

PROJECT	48-INCH DIAMETER	72-INCH DIAMETER
	$696,000.00 – $862,000.00	$1,209,000.00 – $1,367,000.00
	CONSTRUCTION COST ASSUMPTIONS » *Interior drainage system construction: demolition of existing interior drainage system, earthwork for a new interior drainage system with inlet, outlet, sluice gate, flap gate, gatewell, and 150 linear feet of reinforced concrete pipe.* » *Cost is based on a system with one pipe. Some systems consist of a singular pipe and other systems can consist of multiple pipes and associated structures, which would influence costs accordingly.* » *Lower construction costs are typical where temporary flood protection (due to opening in the levee system during construction) is not required to prevent flooding during construction.* » *Higher construction costs are typical where temporary flood protection (due to opening in the levee system during construction) is required to prevent flooding during construction.*	
+	***POTENTIAL ADDITIONAL COSTS*** *(IF APPLICABLE)*	
	$6,960.00 – $43,100.00	$12,090.00 – $68,350.00
	$20,880.00 – $68,960.00	$36,270.00 – $109,360.00
	$27,840.00 – $112,060.00	$48,360.00 – $177,710.00
	$160,080.00 – $327,560.00	$278,070.00 – $519,460.00
=	***SUBTOTAL FOR CONSTRUCTION AND OTHER COSTS***	
$	$911,760.00 – $1,413,680.00	$1,583,790.00 – $2,241,880.00
+	***CONTINGENCY BASED ON SUBTOTAL***	
	$319,116.00 – $777,524.00	$554,326.50 – $1,233,034.00
=	***TOTAL PROJECT COST*** *(ROUNDED)*	
$$	$1,200,000 – $2,200,000	$2,100,000 – $3,500,000

INTERIOR DRAINAGE SYSTEM



SECTION IV – COMMON WARNING AND EVACUATION ACTIVITIES

Some of the most cost-effective measures for reducing consequences of a potential flood event include activities related to evacuations. Activities geared towards improving a community's evacuation effectiveness include warning systems, community outreach, and evacuation planning.

ELECTRONIC WARNING *(REVERSE 911, BROADCAST, ETC.)*	$44,000 startup
	$0.14 per person
	$290,000 maximum
SIREN WARNING SYSTEM	$22,000 per square mile *(urban area only)*
	$43,000 minimum *(all systems ≤ 2 square miles)*
COMMUNITY OUTREACH	$11 per person
	$72,000 minimum
	$1,400,000 maximum
EVACUATION PLAN	$29,000 per square mile
	$72,000 minimum
	$720,000 maximum

ADDITIONAL LEVEE-RELATED RESOURCES

» NATIONAL LEVEE SAFETY PROGRAM
http://www.leveesafety.org

» NATIONAL LEVEE DATABASE
https://levees.sec.usace.army.mil/#/

» FEDERAL EMERGENCY MANAGEMENT AGENCY – LIVING WITH LEVEES
https://www.fema.gov/flood-maps/living-levees

» U.S. ARMY CORPS OF ENGINEERS LEVEE SAFETY PROGRAM
https://www.usace.army.mil/Missions/Civil-Works/Levee-Safety-Program/

For more information on how cost estimations, assumptions, and considerations were determined, contact:
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