FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

COASTAL STORM DAMAGE REDUCTION PROJECT
SURF CITY AND NORTH TOPSAIL BEACH
NORTH CAROLINA

Appendix B
Economic Analysis

Appendix B: Economic Analysis

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1.0 INTRODUCTION.

The total economic impact area for Surf City and North Topsail Beach is far-reaching. All of Top sail Island is important because of the transportation system. Residents and visitors must cross over one of two bridges over the Atlantic Intracoastal Waterway (AIWW) to gain access to the Town of Surf City and the Town of North Topsail Beach. The first is a swing bridge that provides access near the center of Surf City and NC Highways 210 and 50. The second is a high-rise bridge crossing the AIWW in the northern section of North Topsail Beach for NC Highway 210. The study area for coastal storm damage reduction, beach recreation use, and regional economic development (RED) are described in the sections below.

1.01 Coastal Storm Damage Study Area.

The towns of Surf City and North Topsail Beach, North Carolina are subject to damages from hurricanes and storm related erosion. The study area was limited to the area approximately 500 feet from the shoreline. This area includes commercial and residential structures located on ocean front lots, as well as two or three rows beyond the shoreline. Streets, highways, and utilities are also included in the area threatened by flood, waves, storm erosion, and long-term erosion. The study area begins at the Topsail Beach-Surf City town limits and covers a distance of about 17 miles, going the full length of the Surf City shoreline (6 miles) and the primary non-CBRA portion (3.8 miles) of North Topsail Beach. The coastal storm damage study area is divided into “reaches” of approximately 1,000 feet as shown in Figure B-1.

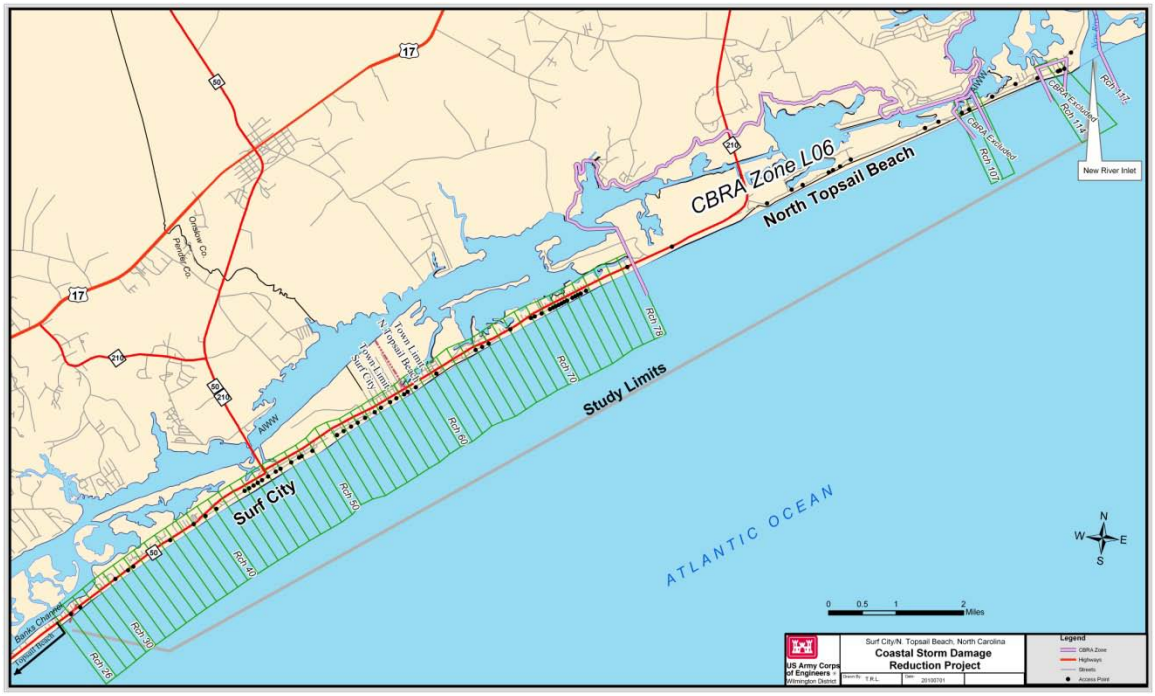


Figure B-1 Coastal Storm Damage Reduction Study Area

1.02 Recreation Day User Study Area

Overnight visitors come from as far away as 3,000 miles; however, the 46 counties listed in Table B-1 and shown in Figure B-2 were selected as being within a reasonable driving distance of Surf City and North Topsail Beach. The purpose of the survey of potential day users was to collect data that will show the frequency of visits and the total number of trips to Surf City and North Topsail Beach. It is expected that the analysis will show that persons from nearby counties will visit more frequently than persons from the more distant counties.

Table B-1 - North Carolina Counties within Driving Distance of Surf City and North Topsail Beach, NC

Anson	Edgecombe	Martin	Robeson
Beaufort	Franklin	Montgomery	Sampson
Bertie	Granville	Moore	Scotland
Bladen	Greene	Nash	Stanly
Brunswick	Halifax	New Hanover	Vance
Carteret	Harnett	Northampton	Wake
Chatham	Hertford	Onslow	Warren
Columbus	Hoke	Orange	Washington
Craven	Johnston	Pamlico	Wayne
Cumberland	Jones	Pender	Wilson
Duplin	Lee	Pitt	
Durham	Lenoir	Richmond	

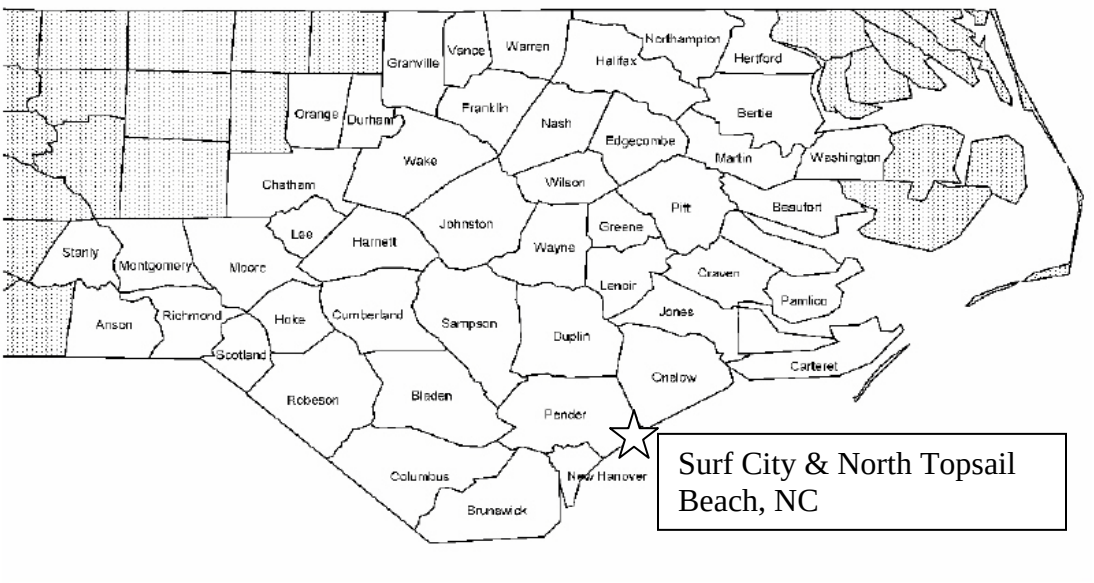


Figure B-2 – Recreation Demand Study Area

The recreation demand and methodology recommended for the beach user benefit analysis are presented in Appendix O –Recreation. According to the U. S. Census the population of the forty-five-county area grew from 3,036,000 in 1990 to 3,686,000 in 2000, an increase of more than 20 percent in the decade.

1.03 Regional Economic Impact Area

The local economic impact area includes all of Topsail Island and the nearby areas of both Pender County and Onslow County, North Carolina. Topsail Island includes not only Surf City and North Topsail Beach but also Topsail Beach on the south end of the island. Highways 50 and 210 connect the island to the mainland portion of the two counties. The boundaries of Pender and Onslow counties are shown in Figure B-2.

2.0 EXISTING ECONOMIC CONDITIONS:

2.01 Basic Economic Assumptions

This study is in compliance with the evaluation procedures outlined in the Water Resource Council's Economic and Environmental Principles and Guidelines (P&G) for Water and Related Land Resources Implementation Studies, dated 10 March 1983, and Corps of Engineers policy guidance on Coastal Storm Damage

Reduction, ER 1105-2-100, dated 22 April 2000. The following basic economic assumptions were used in the analysis of damages, benefits, and costs.

- **Interest rate.** The FY 2011 Federal interest rate is 4.125 percent.
- **Price level**. October 2010 price levels.
- **Period of Analysis.** The analysis is based on a 50-year period.

2.02 Demographics

Demographics for the existing economic conditions for the two-county study area include census data for population, housing, and personal income, which are shown in Table B-2. The full-time resident population was estimated to be nearly 2236 in 2000. Estimates of peak season population vary. According to the towns of Surf City and North Topsail Beach officials, the estimated peak summer time population of the two towns is greater than 30,000.

Table B-2 - Population, Income, Housing Summary

	Pender County	Onslow County	Surf City	North Topsail
Population year-round(2007 estimate)	50,430	169,302	1,766	898
Population year-round (2000 census)	41,082	150,355	1,393	843
Population peak season (Estimated)			15,438	15,000-20,000
Ave. Household size	2.49	2.72	2.02	1.87
Housing Units	20,798	55,726	2,578	2,085
Occupied year-round	16,054	48,122	689	451
Seasonal or vacant	4,744	7,604	1,889	1,634
In Labor Force	19,087	85,054	754	545
Civilian	18,972	52,670		
Unemployed	1,076	3,650		
Armed Forces	115	32,384		
Employment by Leading Industry				
Construction	2,468	5,022		
Manufacturing	2,632	2,682		
Retail trade	2,367	7,496		
Education, health & social services	2,704	10,865		
Per capita & Household Income				
Per capita money income	$17,882	$14,853	$25,242	$33,972
Median Household Income 1999	$35,902	$33,756	$40,521	$45,982

Source: U.S. Census Bureau (http://factfinder.census.gov) and U.S. Dept. of Commerce – Bureau of Economic Analysis (http://bea.doc.gov/bea)
Office of State Budget and Management (2007 population estimates)

2.03 Shoreline Ownership

Public ownership of the shore in the town of Surf City and North Topsail Beach includes dedicated roads and lands below mean high water (MHW) owned by the State of North Carolina. Other parcels are owned by the towns of Surf City and North Topsail Beach, including the Coastal Area Management Act (CAMA) public access points. The primary ownership of the 828 oceanfront parcels is private. Privately owned properties included in the Project are considered to be in fee simple ownership. Included within the project limits are single family residential units, multi family and condominium units, and commercial properties, including the fishing piers. Other information related to ownership of the shoreline is contained in the Real Estate Report.

2.04 Commercial and Recreational Fishing

The North Carolina Division of Marine Fisheries (NCDMF) reported nearly 600,000 pounds of commercial finfish and shellfish landings in the vicinity of New Topsail Inlet in both 2003 and 2004. Significant shellfish landings included over 200,000 pounds reported from Hampstead and over 100,000 pounds reported from Surf City in 2003. Finfish landings reported from Hampstead exceeded 100,000 pounds in both 2003 and 2004. The commercial value of all finfish and shellfish landings reported in the vicinity of New Topsail Inlet was nearly $800,000 in both 2003 and 2004.

Recreational fishing includes fishing from head boats, charter boats, private boats, piers, and the surf. Fishing from head boats is best in the winter months for snapper and grouper. Fishing from charter boats is excellent for King mackerel and bottomfish during the winter. Offshore, gulfstream species, like yellowfin tuna and Wahoo are available. Inside fishing has been successful for inshore species such as red drum, speckled trout, and flounder.

Private boat anglers can find bluefin tuna in the nearshore area, king mackerel and other bottomfish species in the offshore, and other species such as speckled trout, red drum, and flounder can be found in the inside areas of the creeks and Atlantic Intracoastal Waterway. NCDMF reports that shore fishing activity will be limited in this area.

2.05 Development Added to Existing Condition

The without project structure inventory assumes typical residential structures will be built on the 112 suitable vacant first row lots and an additional other 340 lots. Currently, there are vacant lots existing, but based on the established building patterns and the coastal North Carolina real estate market trends, it is expected that these structures will be built by the end of construction in 2018.

The typical residential structure presently constructed on Topsail Island has the following characteristics: two-story, approximately 2,100 square feet of heated space, built on a piling foundation, and includes no more than a small enclosure on the ground level to provide a staircase or elevator for access.

The value of these additional 450 structures is about $273,000 each, totaling approximately $160 million. This value is based on a typical residential structure of 2,100 square feet and a construction cost of $130.00 per square foot. It is also assumed that all these structures will meet building codes for piling depth and first-floor elevation.

2.06 Storm Related Emergency Costs

Information was collected from the officials of the towns, Pender County, Onslow County, state, and federal sources following recent hurricanes and storms. Benefits from prevention of emergency costs are estimated to have an equivalent annual value of $99,000 for Surf City and $235,000 for North Topsail Beach, for a total of $334,000 over the entire project length. This category of benefits is not very precise and is relatively minor compared to CSDR benefits (1 to 2%) and so, is dropped from the total.

Emergency costs prevented refer to expected annual expenditures that residents and governments are experiencing under the without project condition that a project would preclude. Other damages prevented include storm damages that are not covered under the National Flood Insurance Program, but represent financial drains on public and private storm victims that could be prevented. The items in this benefit category called emergency costs and other damages prevented include (1) beach scraping/pushing; (2) sandbagging: (3) emergency costs incurred by the North Carolina Department of Transportation; (4) damages to public property like water and electric utility distribution systems and public access walkways; (5) damages to private property other than structures and contents such as walkways, driveways, and cleanup costs; and, (6) post-storm recovery expenses and storm related expenses from increased police patrolling, inspections, and permits. These categories are described in detail below:

2.06.1 Beach Scraping/Pushing

Beach scraping/pushing refers to the practice of bull dozing a short dune or small berm in front of a residence or business so that it might offer some measure of protection from erosion. These costs are based on a bulldozer and operator pushing sand during two or three low tides. The practice requires a permit, and these records were used to help quantify these expenditures as project benefits. A large Coastal Storm Damage Reduction project would prevent the owners of the residence or business from incurring this expense. Figures B-3 and B-4 show scraping and pushing after hurricane Fran on Topsail Island in 1996.

Figure B- 3 - Post storm Beach Scraping – Emergency Costs

Figure B-4 - Beach scraping following Hurricane Fran

2.06.2 Sandbagging Structures

Sandbagging structures is another emergency measure that has been fairly commonplace over recent years in this area. An example of sandbagging is shown in Figure B-5. This requires a permit that is only granted if the property is in imminent danger of being lost to erosion.

Figure B-5 - Sandbags in place but threatened February 2005.

2.06.3 NCDOT Emergency Costs

Emergency costs incurred by the North Carolina Department of Transportation (NCDOT) represent the average costs to NCDOT for removing sand from the ocean front roads in the study area following the storms. Bulldozers push the sand overwashed from the storms off the roads and deposit it between the ocean front structures. From there, private home and business owners must pay to have the sand redistributed in front of their properties.

2.06.4 Damage to Public Property

Damages to public property include things like damages to the water and electric utility distribution systems, and public access walkways, bath houses, and parking lots. Since traditional structural and content damage curves do not apply to these types of damages, this damage prevented category is based on interviews with public works officials concerning storm related damages that could have been prevented by a large Coastal Storm Damage Reduction project.

2.06.5 Damage to Other Private Property

Damages to private property other than structures and contents include storm damages that are not covered under the National Flood Insurance Program. These include things like water damage to private walkways, driveways, steps, landscaping, automobiles, and private cleanup costs.

2.06.6 Post Storm Recovery Costs

Preventable post-storm recovery expenses are based on data from interviews with public officials regarding preventable debris removal costs incurred over the last five years of storms, and storm related expenses from increased police patrolling, inspections, and permits.

2.07 Determination of Structure Values

The value of residential structures is limited to replacement cost less depreciation. Replacement value is the maximum cost to the owner if a structure is destroyed. If a significantly depreciated structure is destroyed and replaced, the difference between the old and new value is a betterment where the additional cost is offset by the additional utility and comfort of the new construction. Other measures of property value include fair market value and the income producing value. These measures are not considered appropriate for

National Economic Development benefits to protection of beach property. Fair market value is influenced by proximity to the ocean or sound, corresponding views of the beach and ocean, and short-term fluctuations in the local real estate market. Basing value on income can also produce significantly higher estimates. It is assumed that rental income lost to the owner will be transferred to some other owner in an alternate location. Therefore, the loss of income is considered a regional economic loss and not a loss to the National Economic Development account.

2.07.1 Cost of Residential Construction.

The average cost of residential construction on Topsail Island was determined according to the quality of initial construction. Three quality levels were discussed with local homebuilders. The economy level of quality was estimated to cost $90.00 per heated square foot. Average quality costs approximately $130.00 per square foot. Custom quality costs approximately $140.00 per square foot. No structure was assigned a greater value regardless of the quality. The square footage areas for most structures were available at the Pender County and Onslow County tax offices.

2.07.2 Commercial Structure Values.

Values for commercial structures were based on visual surveys and talking to some business managers and owners. Pender County and Onslow County tax data was also used for comparison.

2.07.3 Value of Structures by Reach

The value of structures within the coastal storm damage study area is estimated to be $360,815,000 with a total value, including contents, estimated at $477,542,000. The value of structures by reach is shown in Table B-3A and B-3B. The estimated value of residential and commercial contents is discussed in paragraph 5.08.3 under the topic Variables Specific to Structure File.

Table B-3A – Value of Structures by Reach, Surf City

Values October 2010			
Reach	**Structures**	**Contents**	**Combined**
27	$ 6,081,800	$ 1,918,200	$ 8,000,000
28	$ 4,959,100	$ 1,605,500	$ 6,564,600
29	$ 5,136,500	$ 1,751,100	$ 6,887,600
30	$ 7,759,100	$ 2,689,200	$ 10,448,300
31	$ 7,856,500	$ 2,716,900	$ 10,573,400
32	$ 9,083,700	$ 2,919,900	$ 12,003,600
33	$ 8,077,900	$ 2,702,600	$ 10,780,500
34	$ 8,160,000	$ 2,781,500	$ 10,941,500
35	$ 7,292,600	$ 2,545,700	$ 9,838,300
36	$ 8,305,600	$ 2,862,500	$ 11,168,100
37	$ 6,393,500	$ 2,189,900	$ 8,583,400
38	$ 7,837,000	$ 2,682,100	$ 10,519,100
39	$ 7,344,900	$ 2,486,200	$ 9,831,100
40	$ 8,567,000	$ 2,945,500	$ 11,512,500
41	$ 8,876,600	$ 3,085,000	$ 11,961,600
42	$ 8,785,400	$ 3,005,000	$ 11,790,400
43	$ 10,840,000	$ 3,744,200	$ 14,584,200
44	$ 6,887,600	$ 2,410,400	$ 9,298,000
45	$ 8,894,000	$ 3,106,500	$ 12,000,500
46	$ 13,795,800	$ 4,801,200	$ 18,597,000
47	$ 8,968,900	$ 3,104,500	$ 12,073,400
48	$ 7,555,100	$ 2,649,200	$ 10,204,300
49	$ 9,364,600	$ 3,238,800	$ 12,603,400
50	$ 8,168,200	$ 2,815,300	$ 10,983,500
51	$ 4,081,500	$ 1,436,400	$ 5,517,900
52	$ 11,103,500	$ 3,817,000	$ 14,920,500
53	$ 7,758,100	$ 2,679,000	$ 10,437,100
54	$ 6,839,400	$ 2,333,500	$ 9,172,900
55	$ 6,790,200	$ 2,430,900	$ 9,221,100
56	$ 5,523,000	$ 1,913,100	$ 7,436,100
57	$ 5,670,700	$ 1,966,400	$ 7,637,100
58-SC	$ 3,915,400	$ 1,281,600	$ 5,197,000
Surf City Total	$ 246,673,200	$ 84,614,800	$ 331,288,000

Table B-3B– Value of Structures by Reach, North Topsail Beach

Values October 2010			
Reach	**Structures**	**Contents**	**Combined**
58-NTB	$ 1,705,000	$ 484,900	$ 2,189,900
59	$ 5,502,500	$ 1,603,500	$ 7,106,000
60	$ 5,530,200	$ 1,504,000	$ 7,034,200
61	$ 5,048,300	$ 1,395,400	$ 6,443,700
62	$ 9,130,900	$ 2,533,400	$ 11,664,300
63	$ 9,172,900	$ 2,599,000	$ 11,771,900
64	$ 7,222,900	$ 2,072,000	$ 9,294,900
65	$ 6,445,700	$ 1,832,100	$ 8,277,900
66	$ 4,917,100	$ 1,372,800	$ 6,289,900
67	$ 3,917,500	$ 1,086,800	$ 5,004,200
68	$ 4,549,000	$ 1,413,800	$ 5,962,900
69	$ 4,646,400	$ 1,300,000	$ 5,946,500
70	$ 7,157,300	$ 2,012,600	$ 9,169,800
71	$ 3,915,400	$ 1,071,400	$ 4,986,800
72	$ 4,922,200	$ 1,370,800	$ 6,293,000
73	$ 4,965,300	$ 1,404,600	$ 6,369,900
74	$ 5,025,800	$ 1,392,300	$ 6,418,100
75	$ 5,261,600	$ 1,432,300	$ 6,693,900
76	$ 4,257,900	$ 1,163,700	$ 5,421,500
77	$ 6,379,100	$ 1,835,200	$ 8,214,300
78	$ 4,470,100	$ 1,230,300	$ 5,700,400
North Topsail Beach Total	$ 114,143,100	$ 32,110,900	$ 146,254,000

2.07.4 Value of Structures by Type

When the 81 road segments (Type 64) are excluded, there are a total of 1,817 structures in the structure damage database. There are 19 structure types, including roads, in the study area; however, only three structure types (Types 56, 59, and 60) equal or exceed 10 percent of the total value. In addition, single story residences on pilings with small or no enclosure (Type 55), account for 119 structures and 6.27 percent of the total inventory value. Two-story residences on pilings with small or no enclosure (Type 56), account for 540 structures and 28.45 percent, including the 450 structures assumed to be added by 2018. Figure B-6 shows four newly constructed type 56 structures. Types 59 (1-story) and 60 (2-story), on pilings with partial to full enclosures, account for 432 (22.76 %) and 471 structures (24.82 %) respectively.

Descriptions of the four predominant structure types follow in Table B-4. For the complete set of structure type definitions see attachment B-1. The value of

structures in the study area is presented in Table B-5 by structure type. Table B-5 shows both the value and number of structures in each type

Table B-4 – Description of Four Significant Structure Types

Structure Type	Description of Significant Structure Types	Percent of Total Value and number of structures –Surf City & North Topsail Beach
55	Residential – 1-story, raised on pilings, small or no enclosure	6.3% 114
56	Residential – 2-story, raised on pilings, small or no enclosure	28.8% 520
59	Residential - 1-story, raised on pilings – partial to full enclosure	22.7% 410
60	Residential – 2-story, raised on pilings, partial to full enclosure	24.8% 448

Figure B- 6 - Four typical new structures (all Type 56) built in 2004 on Topsail Island, NC

Table B-5 – Value of Structures by Type In thousand dollars

Flood_Curve	Count		Structures	Contents	Combined
1	101		$ 8,492,100	$ 2,947,600	$ 11,439,700
2	76		$ 12,038,500	$ 3,981,000	$ 16,019,500
5	9		$ 1,042,700	$ 372,200	$ 1,414,800
11	1		$ 46,100	$ 16,400	$ 62,500
17	1		$ 172,200	$ 61,500	$ 233,800
24	2		$ 310,700	$ 110,700	$ 421,400
25	3		$ 159,900	$ 46,100	$ 206,100
33	1		$ 287,100	$ 102,500	$ 389,600
35	3		$ 470,600	$ 168,100	$ 638,700
38	6		$ 1,124,700	$ 532,100	$ 1,656,800
45	1		$ 35,900	$ 18,500	$ 54,300
49	1		$ 183,500	$ 65,600	$ 249,100
53	3		$ 345,500	$ 254,300	$ 599,800
55	114		$ 13,203,200	$ 4,499,800	$ 17,703,000
56	520		$ 160,540,800	$ 51,256,300	$ 211,797,200
59	410		$ 58,715,000	$ 20,073,400	$ 78,788,400
60	448		$ 96,734,400	$ 32,082,100	$ 128,816,500
62	31		$ 452,100	$ 136,400	$ 588,500
64	75		$ 6,458,000	$ -	$ 6,458,000
Totals	1,806		$ 360,815,000	$ 116,727,000	$ 477,542,000

2.08 Land Values

Land values in all North Carolina coastal counties are escalating in general due to increased population growth in the U.S. coastal regions. Lot sales in the Topsail Island portions of Pender and Onslow counties are designated as ocean front, second row, and interior lots. To prevent the influence of water view or proximity to the ocean overriding the value, only the interior lot values are used in the analysis. Following hurricane Ophelia in 2005, the town requested approval from FEMA to haul in approximately 22,000 cubic yards (29,000 tons) of sand to distribute over 7,000 linear feet of beach. This is not considered a long term solution or effective measure against long term erosion or coastal storm damage. Therefore, it is not practical to equate the cost of fill to the land value lost due to long term erosion. A summary of values for ocean front lots, second row lots, and interior lots is presented below.

2.08.1 Ocean front lots

Ocean front lots are higher in risk for storm damage and erosion but continue to be highly desirable. These values were not used in the land loss estimates.

2.08.2 Second row lots

These values were not used in the land loss estimates.

2.08.3 Interior lots

The value and desirability of interior lots vary greatly; however, values based on sold prices, continue to increase. Higher interior lot values may be due to the limited number of all vacant lots in Surf City and North Topsail Beach and the fact that interior lots are less susceptible to storm and erosion damages. This data supports the estimated value of $25.00 per square foot. Interior lot values are used to estimate the losses to land caused by long-term erosion. Sales data for interior lots is shown in Figure B-7.

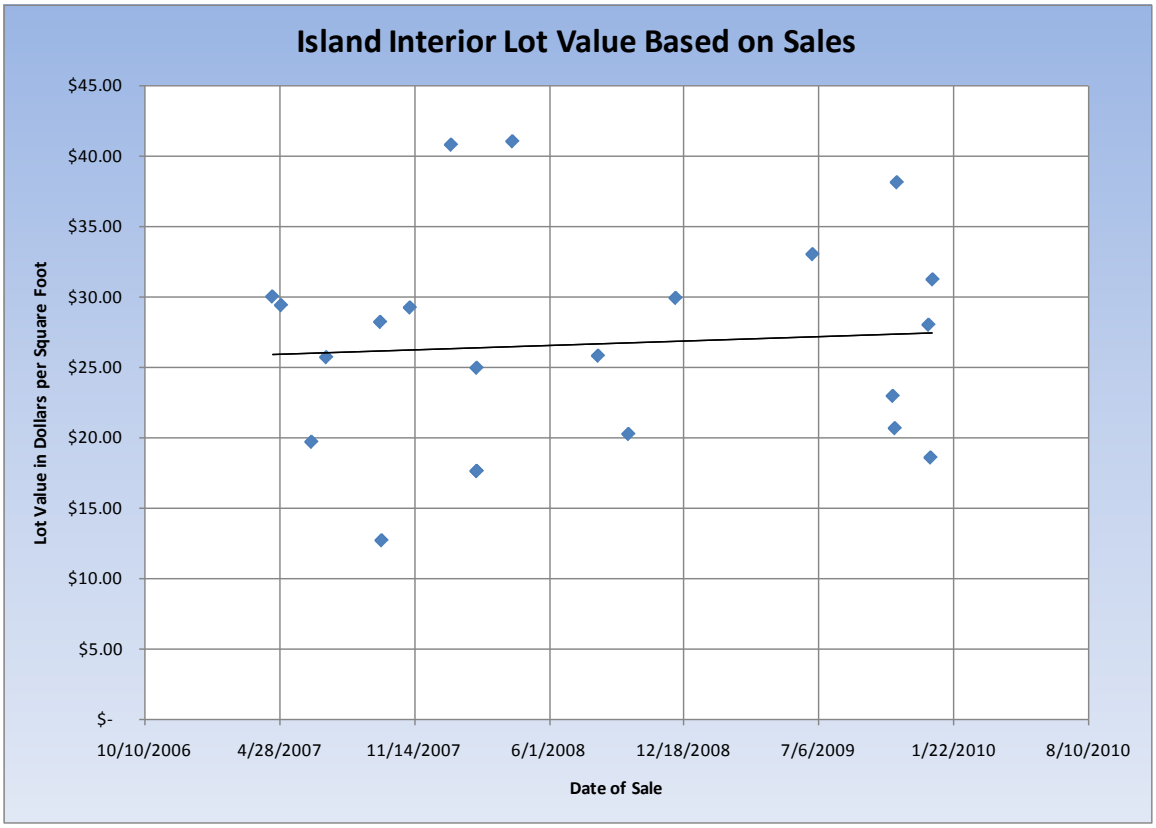


Figure B- 7- Interior Lot Sales in Dollars per Square Foot

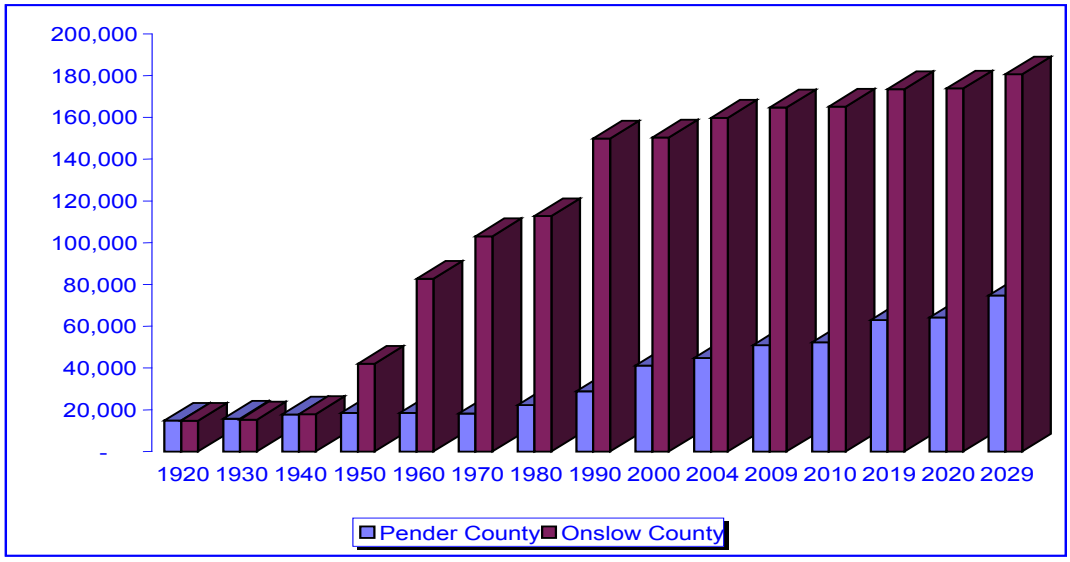
3.0 FUTURE ECONOMIC CONDITIONS (WITHOUT PROJECT)

3.01 Projected Population Growth

Projected population growth for Pender and Onslow counties are found at the North Carolina State Demographer's website. Figure B-8 shows both historical population from 1920 to 2000 and population projections for Pender and Onslow counties through 2029. Since all suitable lots are expected to be developed by the base year 2018, no additional growth in the number of residential or commercial structures is projected for the analysis. The assumptions used for structure replacement could result in fewer structures if storms destroyed a structure following its earlier replacement.

According to the North Carolina demographics office, the population of this 45-county recreation day user demand area is expected to reach 4.3 million in 2010, 5.0 million in 2020, and over 5.6 million in 2029. Therefore it is reasonable to expect recreation visitation at Surf City and North Topsail Beach to increase over the next 25 to 50 years.

Figure B- 8– Population Growth - Pender and Onslow Counties Actual 1920-2000 and Projected to-2029



3.02 Assumed Conditions at beginning of Period of Analysis Without Project Condition

The period of analysis begins when the project improvement is in place and the benefits to the public begin to accrue. It is assumed that this condition could occur by FY2018. All suitable vacant lots are expected to be developed by the base year in 2018; however, no additional growth in the number of residential or commercial structures is projected during the period of analysis. For the buildable lots to be developed by the base year 2018, an average of about 60 structures in the study area would be required per year. North Carolina CAMA regulations preclude replacement of a structure only after the lot is deemed unbuildable when set back restrictions dictate that structures cannot be put back on the lot. 15A NCAC 07H .2501 allows for a great deal of latitude for meeting rebuilding criteria following damages due to hurricanes or tropical storms. Issuing emergency permits for rebuilding on lots meeting a minimal setback restriction is generally the rule, not the exception in North Carolina. Common practice and historical evidence allow for rebuilding structures lost in storms provided setback restrictions are met. However, the analysis presented in this report limits the number of replacements to one. After long-term erosion has claimed more distance on the oceanfront lot than the building requires to be put back, our storm damage model ceases to reinstate the same property. This assumption will prevent the overestimation of the without project coastal storm damages.

3.03 Assumed Replacement of Residential Structures During Period of Analysis

It is assumed that all structures replaced in the study area as a result of coastal storm erosion damages will be similar to the existing distribution of residential and commercial use.

It is assumed that residential structures removed by long-term erosion will not be replaced during the 50-year period of analysis. Likewise, it is assumed that residential structures destroyed by wave, flood, or storm erosion will be replaced in the economic damage model (GRANDUC) by a residential structure that meets the following building codes and standards in place by flood plain regulations. This includes a setback requirement of at least sixty feet from the established line of vegetation. A minimum lot depth of 100 feet is required to replace a structure. Because of uncertainty, a structure can be replaced only once in GRANDUC during the period of analysis. Replacement residential structures are assumed to have only parking, storage, and normal provision for access on the ground level. The first living floor will be elevated on pilings, well above the Base Flood Elevation or high enough to accommodate under-house parking, whichever is greater. Pilings for all first row replacement structures will be 16 feet below grade or 5 feet below mean sea level. These replacement

structures are assumed to have the same characteristics as the typical house now being built on vacant lots (Figure B-6).

3.04 Assumed Replacement of Commercial Structures During Period of Analysis

Commercial structures that are replaced in the economic damage model during the period of analysis will be identical to the structure destroyed except for the first floor elevation. The first floor elevation of commercial structures will be set at ten feet above "ground" (on-grade) elevation. This assumption incorporates the enforcement of the damage reduction regulations including flood plain management and building codes now in force. When taken out, structure types 5-54 (flood damage curve numbers) are assumed to be replaced by the same type with the same value. These types include apartments (type 5), hotels (type 27), and motels (type 33), Condominiums are assigned to one of these three types. It is assumed that commercial or multi-family zoning will remain the same for the replacement structures.

3.05 Summary of Future Without Project Economic Conditions

In summary, the future economic conditions are assumed to have the same distribution of residential use and commercial development as the existing condition. Structures that are significantly damaged or destroyed are assumed to be replaced by more damage-resistant structures of the same type but replaced no more than one time. All structures not damaged or destroyed are assumed to remain without any modification. No "teardowns" are built into the analysis where older structures are assumed to be torn down/demolished and replaced by more expensive units based on investment speculation related to the high demand for coastal real estate.

4.0 COASTAL STORM DAMAGES WITHOUT PROJECT

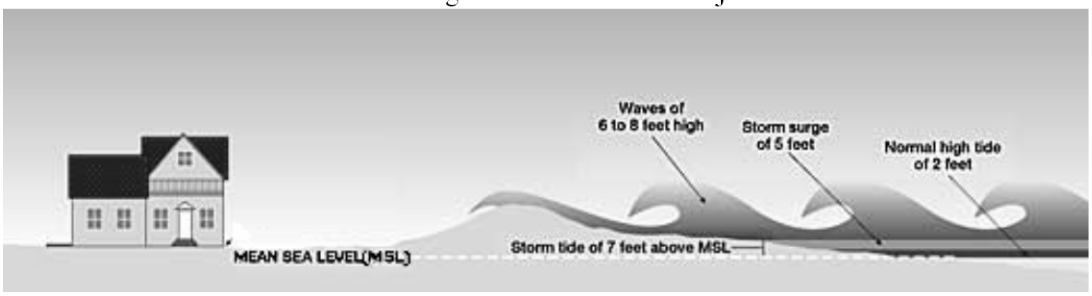
The accumulated present value of coastal storm damages over the 50-year period of analysis without a damage reduction project totals $400,850,000 in October 2010 price levels. These damages are shown by damage category and reach segment in Table B-6. Average annual damages (average annual equivalent amounts, 50-yrs, 4.125%) are calculated by using the 50-year interest and amortization factor as shown in Table B-7.

4.01 Damage Categories Defined

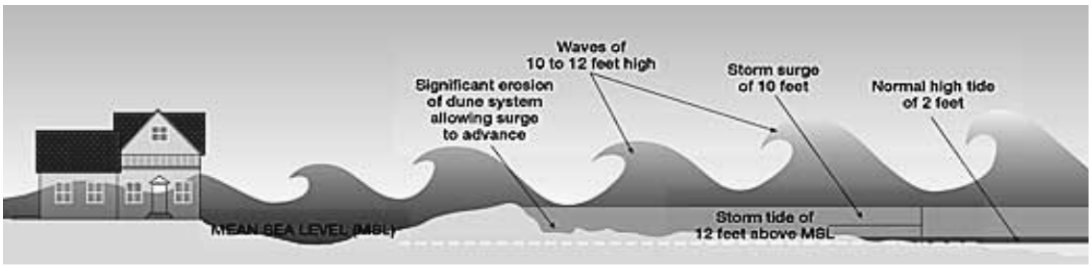
Figure B- 9 graphically shows the impact of tides, storm surge, and wave action that may occur during minimal and major hurricanes. (USACE, Mobile District, 1999). It should be noted that hurricane wind speed, the deciding factor in storm category by FEMA, does not determine the level of damages in the storm damage model. The impact of wind is not shown in the figure and wind damage is not estimated in the storm damage model. The present value of damages in each of the four damage categories is presented in Table B-6 and in Figure B-12. Coastal storm damages are calculated under with and without project conditions for damages to structures and contents, roadways, and land lost due to long-term erosion.

In many cases damages are calculated for more than one category since storms frequently generate flood inundation, waves, and storm erosion simultaneously. The damage model, GRANDUC, calculates damages in all the appropriate categories and selects the category with the greatest damage and ignores the other damages. This technique prevents the overestimation or double counting of damages.

Storm Surge in Minimal and Major Hurricanes



In a Category I Hurricane, the storm surge will usually cause damage to beach dunes and structures placed on the seaward side of the dune line.



In a Category III Hurricane, the combined wave attack and storm surge erodes the dunes, exposing coastal structures to the most damaging effects of the surge. Although his wind speeds only placed Georges in Category II, the storm surge estimates were in line with Category III.

Courtesy of Escambia County Department of Public Safety.

Figure B- 9 Hurricane Surge and Wave Impacts

4.01 Damage Categories Defined (continued)

4.01.1 Storm Erosion

Storm erosion damages result from the undermining of structure pilings and foundations due to hurricane and tropical storms. Damages due to storm induced erosion are the major damages that are generally computed by the economic damage model. The first element in determining the potential impact of storm induced erosion on the amount of damage to a coastal structure is how much of the protective beach (either existing or projected) remains in front of and under the structure during the storm. If the storm induced erosion only reaches the front of the building, damage due to storm erosion is assumed to be zero and any damage to the structure would be that caused by either wave impact or inundation.

Earlier analyses for previous coastal storm damage studies along the coast of North Carolina, predicted that once the 0.5 foot point of erosion reaches the mid-point of the buildings supported on piles, all protective measures fronting the building have been removed exposing the building to the full brunt of the storm including direct wave impact and inundation. Due to the nature of the results obtained from the numerical storm erosion model (SBEACH), the landward extent of the impact of the storm erosion has been interpreted as the landwardmost point where the storm profile is 0.5 foot below the pre-storm profile. This particular standard for storm induced erosion or zone of influence was established by the developers of the SBEACH (Coastal & Hydraulics Laboratory formerly the Coastal Engineering Research Center) when the model was applied to the formulation of the storm damage reduction project for Panama City Beach, Florida.

The analysis of Surf City and North Topsail Beach is founded on using an erosion indicator of 2.0 feet for both the with and without project beach profiles. The 0.5 foot erosion indicator is used rarely and only for structures with slab foundations or roadbeds.

While the vertical scour around the ocean front piles may not cause the building to collapse, the open exposure caused by the storm induced erosion and lowering of the beach fronting the building is judged to be sufficient to result in complete loss of the economic value of the building even though the building may be left standing. The loss of the economic value of the building may come from the inability of the owner to reestablish a useable sewer system or obtain potable water. In these cases, the building will eventually have to be torn down. The damage associated with this condition has been broadly termed erosion damage, however, as demonstrated by the explanation provided above, the cause of the damage is not limited to erosion, rather it is due to the conditions created by the erosion that exposes the building to the maximum forces of the storm. A typical

new structure on the ocean front is required to be built with piling depths 16 feet below the surface of the ground or 5 feet below mean sea level whichever is a greater depth. Oceanfront structures built prior to 1986 are assumed to have piling depths of 8 feet below the ground. The storm damage structure inventory includes 160 homes on short pilings (8-foot depth), 141 homes on long pilings (16-foot depth or –5 feet m.s.l.), and 186 homes on concrete slab foundations. The remainder of the structures are built on pilings with varying sizes of enclosures.

4.01.2 Flood

Flood damages are caused by inundation related to rises in tide and storm surge. Damages begin when flooding and overwash reaches the structure or enclosure.

4.01.3 Wave

Wave damages result from waves over and above the storm surge making contact with the structures. Waves impacting the structure three feet or more above the first living area elevation are expected to result in total loss of the structure. Figure B-10 illustrates the effect of both flood from storm surge and waves.

4.01.4 Land lost or Long Term Erosion (LTE)

Land losses result from long-term erosion based on the analysis of historical erosion including rises in sea level. Land lost to long-term erosion is computed by multiplying the expected annual loss of land in acres by the value of nearshore interior lots. Fill material was also considered to reduce land losses due to long-term erosion. However, in the formulation of alternative plans, no suitable upland borrow sites were identified. Therefore, the cost of fill is not considered a practical limiting factor or substitute for the value of interior lots in the calculation of land lost or long term erosion.

4.01.5 Summary of Damages

Examples of coastal storm erosion damage at Surf City and North Topsail Beach are shown in Figure B-10 The present value of coastal storm damages by damage category and reach is shown in table B-6 and figure B-11for the without project condition.

Figure B-10- Coastal storm damage after Hurricane Fran 1996

Table B-6 – Present Value of Coastal Storm Damages (Without Project)

	Damages					
	Present Value					
Reach	Erosion	Flood	Wave	Land	Total Damage	Annual Total
27	$ 5,952,000	$ 2,000	$ -	$ 220,000	$ 6,174,000	$ 294,000
28	$ 282,000	$ -	$ -	$ 110,000	$ 392,000	$ 19,000
29	$ 6,688,000	$ 2,000	$ -	$ 134,000	$ 6,823,000	$ 324,000
30	$ 4,531,000	$ 6,000	$ -	$ 223,000	$ 4,760,000	$ 226,000
31	$ 2,627,000	$ 1,000	$ -	$ 410,000	$ 3,038,000	$ 144,000
32	$ 1,827,000	$ 28,000	$ -	$ 671,000	$ 2,526,000	$ 120,000
33	$ 3,539,000	$ 25,000	$ -	$ 315,000	$ 3,880,000	$ 184,000
34	$ 1,473,000	$ 32,000	$ -	$ 118,000	$ 1,624,000	$ 77,000
35	$ 4,431,000	$ 58,000	$ -	$ 118,000	$ 4,607,000	$ 219,000
36	$ 2,784,000	$ 28,000	$ 1,000	$ 118,000	$ 2,931,000	$ 139,000
37	$ 5,341,000	$ 22,000	$ -	$ 126,000	$ 5,489,000	$ 261,000
38	$ 8,291,000	$ 27,000	$ 83,000	$ 137,000	$ 8,539,000	$ 406,000
39	$ 7,195,000	$ 74,000	$ 32,000	$ 402,000	$ 7,703,000	$ 366,000
40	$ 9,579,000	$ 64,000	$ 196,000	$ 581,000	$ 10,419,000	$ 495,000
41	$ 8,679,000	$ 18,000	$ 10,000	$ 402,000	$ 9,109,000	$ 433,000
42	$ 6,479,000	$ 7,000	$ 4,000	$ 406,000	$ 6,896,000	$ 328,000
43	$ 11,281,000	$ 16,000	$ 39,000	$ 477,000	$ 11,814,000	$ 562,000
44	$ 10,592,000	$ 112,000	$ 225,000	$ 1,181,000	$ 12,110,000	$ 576,000
45	$ 9,217,000	$ 171,000	$ 1,000	$ 1,065,000	$ 10,454,000	$ 497,000
46	$ 6,893,000	$ 154,000	$ 5,000	$ 1,071,000	$ 8,124,000	$ 386,000
47	$ 12,860,000	$ 179,000	$ 129,000	$ 1,411,000	$ 14,578,000	$ 693,000
48	$ 14,691,000	$ 170,000	$ 78,000	$ 1,785,000	$ 16,724,000	$ 795,000
49	$ 17,408,000	$ 51,000	$ 18,000	$ 1,995,000	$ 19,472,000	$ 926,000
50	$ 11,500,000	$ 41,000	$ -	$ 1,142,000	$ 12,683,000	$ 603,000
51	$ 2,563,000	$ 144,000	$ 260,000	$ 848,000	$ 3,815,000	$ 181,000
52	$ 13,934,000	$ 73,000	$ 1,632,000	$ 1,007,000	$ 16,646,000	$ 792,000
53	$ 12,409,000	$ 38,000	$ 1,250,000	$ 1,461,000	$ 15,157,000	$ 721,000
54	$ 7,088,000	$ 11,000	$ 858,000	$ 1,421,000	$ 9,377,000	$ 446,000
55	$ 3,554,000	$ 65,000	$ 170,000	$ 913,000	$ 4,702,000	$ 224,000
56	$ 669,000	$ 50,000	$ 216,000	$ 626,000	$ 1,561,000	$ 74,000
57	$ 4,216,000	$ 46,000	$ 266,000	$ 1,556,000	$ 6,083,000	$ 289,000
58	$ 6,044,000	$ 54,000	$ 282,000	$ 1,750,000	$ 8,131,000	$ 387,000
59	$ 5,261,000	$ 41,000	$ 542,000	$ 1,511,000	$ 7,355,000	$ 350,000
60	$ 7,129,000	$ 28,000	$ 723,000	$ 1,327,000	$ 9,207,000	$ 438,000
61	$ 3,374,000	$ 70,000	$ 710,000	$ 673,000	$ 4,827,000	$ 230,000
62	$ 7,823,000	$ 13,000	$ 34,000	$ 1,254,000	$ 9,123,000	$ 434,000
63	$ 6,000,000	$ 72,000	$ 131,000	$ 939,000	$ 7,141,000	$ 340,000
64	$ 5,880,000	$ 108,000	$ 1,115,000	$ 1,425,000	$ 8,528,000	$ 406,000
65	$ 5,728,000	$ 97,000	$ 596,000	$ 1,080,000	$ 7,501,000	$ 357,000
66	$ 5,092,000	$ 46,000	$ 241,000	$ 884,000	$ 6,262,000	$ 298,000
67	$ 7,372,000	$ 9,000	$ 218,000	$ 1,482,000	$ 9,082,000	$ 432,000
68	$ 4,133,000	$ 138,000	$ 685,000	$ 854,000	$ 5,811,000	$ 276,000
69	$ 4,181,000	$ 343,000	$ 544,000	$ 645,000	$ 5,714,000	$ 272,000
70	$ 3,384,000	$ 136,000	$ 893,000	$ 565,000	$ 4,978,000	$ 237,000
71	$ 3,826,000	$ 15,000	$ 816,000	$ 914,000	$ 5,570,000	$ 265,000
72	$ 11,061,000	$ 1,000	$ 769,000	$ 1,640,000	$ 13,470,000	$ 641,000
73	$ 10,119,000	$ 1,000	$ 757,000	$ 1,522,000	$ 12,398,000	$ 590,000
74	$ 8,862,000	$ 4,000	$ 705,000	$ 1,141,000	$ 10,712,000	$ 509,000
75	$ 3,145,000	$ 76,000	$ 307,000	$ 987,000	$ 4,514,000	$ 215,000
76	$ 2,626,000	$ 36,000	$ 144,000	$ 962,000	$ 3,767,000	$ 179,000
77	$ 3,418,000	$ 119,000	$ 223,000	$ 922,000	$ 4,682,000	$ 223,000
78	$ 3,031,000	$ 38,000	$ 267,000	$ 531,000	$ 3,867,000	$ 184,000
Subtotal	$ 336,062,000	$ 3,160,000	$ 16,175,000	$ 45,458,000	$ 400,850,000	$ 19,061,000
107	$ 3,743,000	$ 15,000	$ 802,000	$ 900,000	$ 5,460,000	$ 260,000
108	$ 10,867,000	$ 1,000	$ 748,000	$ 1,614,000	$ 13,230,000	$ 629,000
114	$ 9,920,000	$ 1,000	$ 738,000	$ 1,495,000	$ 12,154,000	$ 578,000
115	$ 8,704,000	$ 3,000	$ 686,000	$ 1,125,000	$ 10,518,000	$ 500,000
Total	$ 369,296,000	$ 3,180,000	$ 19,149,000	$ 50,592,000	$ 442,212,000	$ 21,028,000

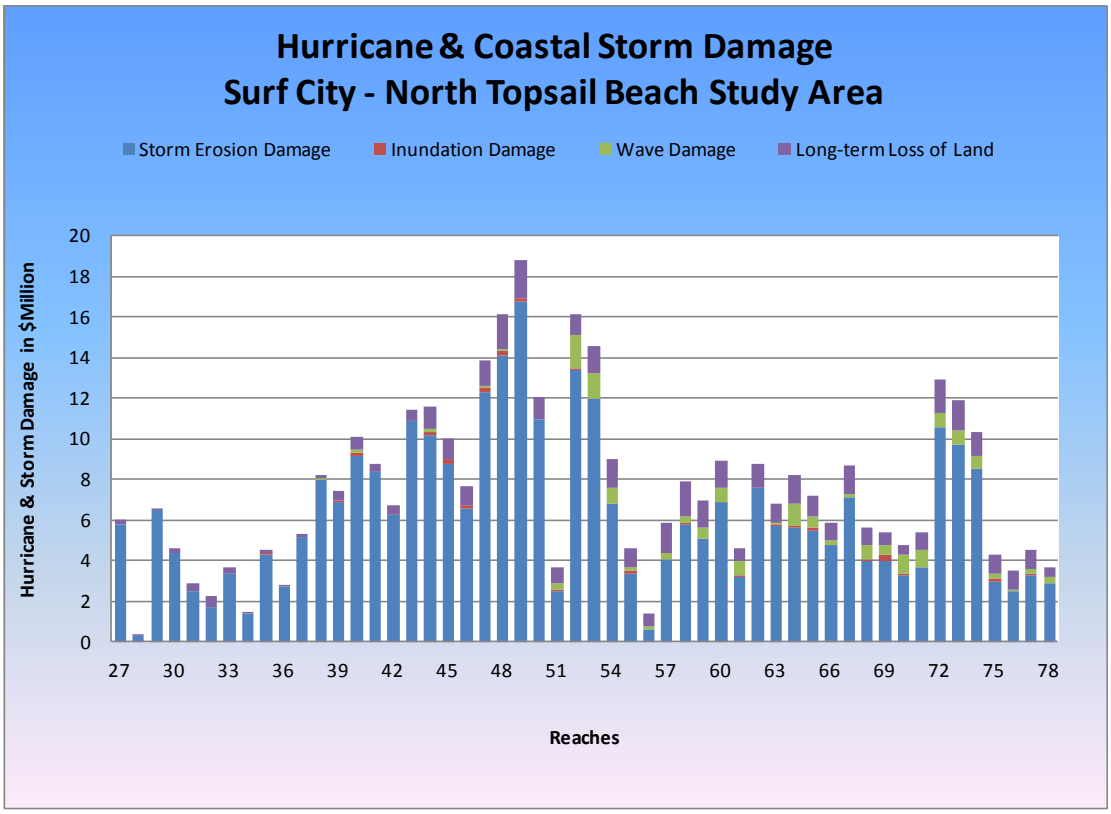


Figure B- 11 - Present Value of Coastal Storm Damages by Damage Category – Without Project Condition

Table B-7 – Average Annual Coastal Storm Damages (Without Project)

Base Condition Coastal Storm Damages - Average Annual Equivalent Amount					
Reach	**Total Damage**	**Storm Erosion**	**Flood**	**Wave**	**Land Lost**
27-78	$19,061,000	$ 15,980,000	$150,000	$769,000	$2,262,000

5.0. ECONOMIC VARIABLES, ASSUMPTIONS, AND METHODOLOGY APPLIED IN COASTAL STORM DAMAGE MODEL (GRANDUC)

In the Wilmington District Coastal Storm Damage Model the economic input includes a set of general global data that applies to the entire analysis, the estimated base year when damage reduction measures could be in place, flood damage curves, erosion damage curves, miscellaneous benefits to be included, and the variable inputs for each structure in the structure inventory data base or structure file. More information on the General Risk and Uncertainty – Coastal model (GRANDUC) is presented in Appendix D Coastal Engineering.

5.01 General Global Data

Based on the general economic assumptions, the global values are as follows:

- Interest Rate –4- 1/8 percent.
- Price Level –October 2010 price level.
- Economic Period of Analysis – 50 years beyond the base year.
- Wave damage assumption – waves three feet above the first floor elevation will result in the total loss of the structure.

5.02 Base Year

The Base Year is defined as the first year coastal storm damage reduction measures could be in effect. It is expected that damage reduction measures could be implemented by 2018.

5.03 Interior Lot Value per Square Foot

Long term erosion damages or land losses are based on the estimated value of interior lots. The data on lots actually sold support a value of $25.00 per square foot at the October 2010 price level.

5.04 Initial Benefits

The economic damage model (GRANDUC) allows the entry of initial benefits – such as "Benefits during Construction." At the time of the scoping runs, the detailed construction schedule had not been developed. Therefore, no initial benefits were included in the analysis.

5.05 Other Annual Benefits

GRANDUC also allows for the addition of other type of NED benefits – such as "Recreation." The final determination of recreation benefits was not completed in time to include in the model runs. The recreation benefits were added external to the GRANDUC model calculation. The estimated recreation benefits are presented in Appendix O – Recreation. No other "Annual Benefits" for recreation were added to the GRANDUC model. This also supports the formulation of the NED Plan using coastal storm damage reduction benefits alone.

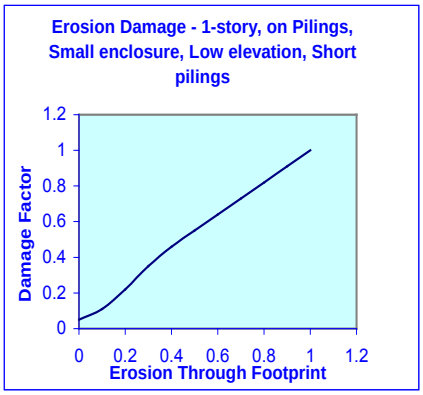
5.06 Flood Damage Curves

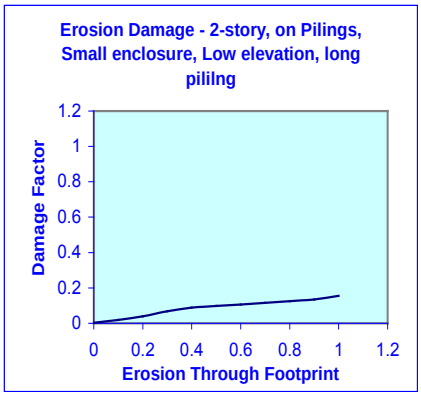
Flood damages due to inundation are determined by the combined height of the storm still water level and a superimposed wave height. Based on the elevation of this combined height and the elevation of the structures first floor, the amount of inundation damage is determined from a standard set of inundation damage curves. Unless the predicted amount of storm induced erosion is sufficient to completely erode the ocean front dune, the residual height of the seaward edge of the beach is generally sufficient to limit the height of the wave that could be transmitted across the beach face without breaking. Accordingly, since the conditions necessary to cause a prediction of significant inundation related damages is rather severe, damages due to the inundation (combined storm still water level and wave height) rarely controls.

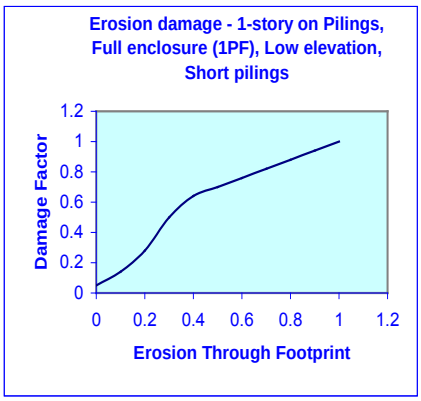
5.07 Erosion Damage Curves

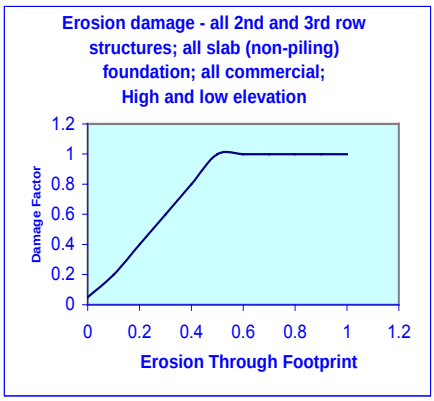
Based on the significant number of first row structures, sample erosion curves are shown by structure type in Figures 12, 13, 14, and 15. A complete set of erosion types and associated erosion curves are found in attachment B-2 to this appendix. The erosion-damage curves used for this analysis are compilations of curves assigned for each part of the structure. The enclosure is given a value of 40 percent of the entire structure and the rest of the structure is given a value of 60 percent of the entire structure value. These percentages were then used to weight the damage curves for the home and the enclosure and derive a composite damage curve.

Figures -12, 13, 14, and 15 Composite Erosion Damage Curves









5.08 Variables Specific to Structure File

Table B- 8 - Sample Structure File

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Reach	ID_USACE	REF-FRNT of LOT	LOT_LENGTH	LOT_WIDTH	REF_FRNT of STRUC	STRUC_LENGTH	Attack Angle Ratio	STRUC_TYPE	STRUC_VALUE	CONTENT_VALUE	GRELEV_SUR	FFLOOR_ELEV	ACTIVE	EROSION TYPE	ARMOR	FLANKING
3	003OCEA2103A	0	150	83	247	35		56	$225,000	$90,000	7.4	17.6	1	24	-1	2.0
3	003OCEA2104A	504	150	111	431	35		56	$225,000	$90,000	5.9	18.5	1	31	-1	2.0

The structure file shown in Table B-8 describes the value of each structure, the horizontal and vertical location of the structure within the coastal damage

model, and specifies which flood damage curve and erosion damage curve is appropriate for the structure. As illustrated in Figure B-16, the lot distance (Col. 3) and structure distance (Col. 6) are measured from a “Reference Line” established in the coastal storm generation models and incorporated into the GRANDUC model. The structure length (Col. 7) defines the structure footprint used in the storm erosion estimates.

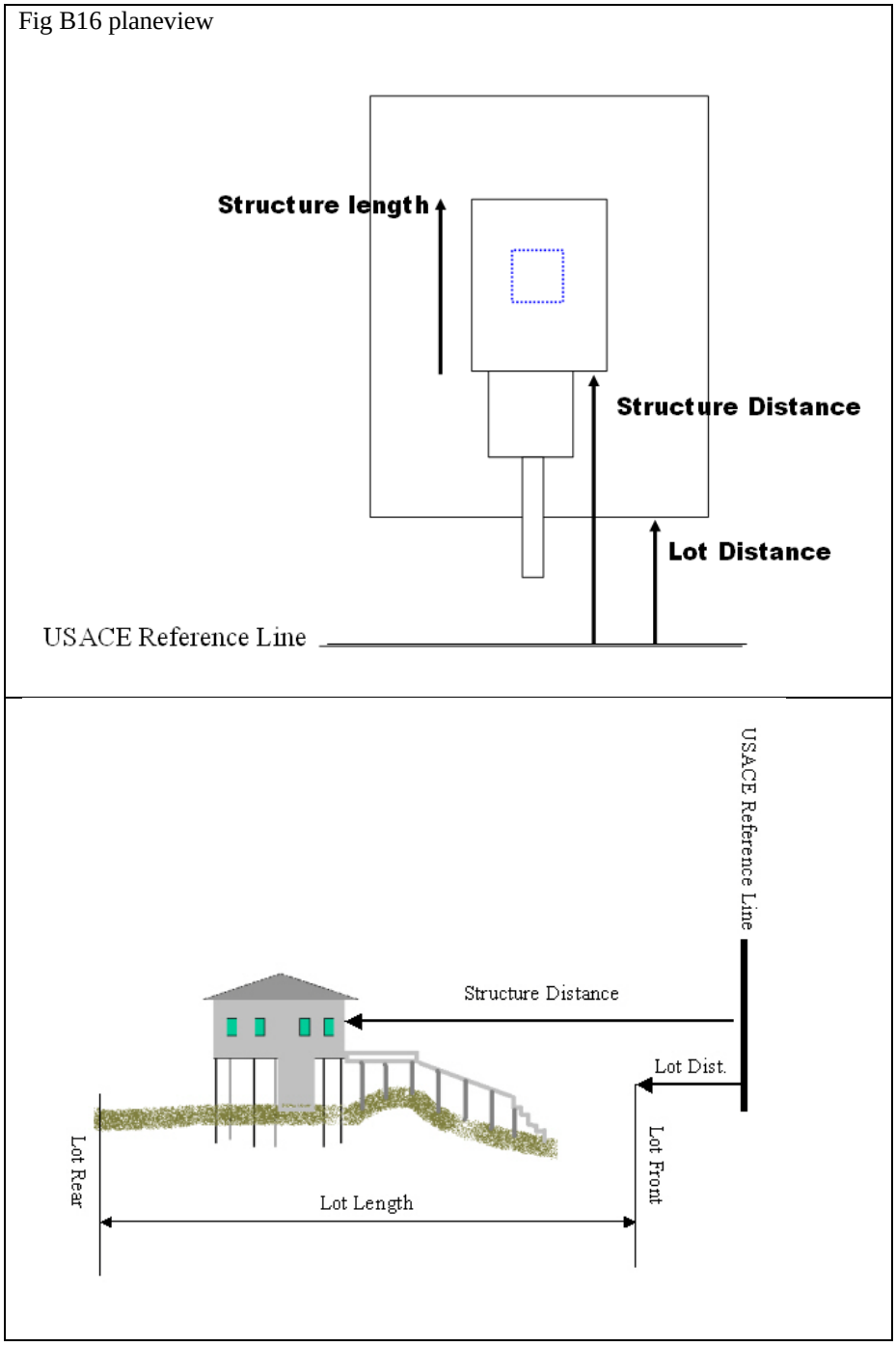


Figure B-16 Illustrations of Structure and Lot Distances Entered into GRANDUC model (plane view and side view).

5.08.1 Structure Type – flood damage curve

Structure type denotes the flood damage curve that is to be used with each sturucture. A description of all structure types, both residential and commercial are attached to this appendix, Attachment B-1. Residential structure types for all residential structures in the study area were based on visual observation by district personnel including documentation with digital photographs. Descriptions included the number of levels (1,1.5, or 2 story), type of foundation (P=on pilings, N=not on pilings), if piling foundation what is the size of enclosure (S=small <300SF; P=partial >300SF; F=full; or N=none). Commercial business types include hotels, motels, garages, etc. A complete list of the commercial and residential business types used is found in Attachment B-1 to this appendix.

5.08.2 Structure Value

Structure values are entered in dollars based on the replacement cost less depreciation. Determinations of commercial structure values and description of the business type were made by district personnel with additional checking against tax records. Structure values represent the replacement value less depreciation at the current price levels. The district personnel consulted with local real estate agents, appraisers, business owners, and building contractors as needed. While some information on structures was obtained from the Pender County and Onslow County tax offices; replacement costs are based on site-specific building cost for Topsail Island.

5.08.3 Content Value

Contents to residential structures include personal possessions, including furniture, clothing, dishes, cooking utensils, linens, jewelry, stereo equipment, etc. For homeowners' insurance coverage, the standard coverage for contents is 50 percent of the dwelling coverage. For beach communities like Topsail Beach, Surf City, and North Topsail Beach, the estimated value of contents of an average residential structure would be less than 50 percent of the value of the structure. The main factor in this conclusion is that nearly 75 percent of the structures are not owner-occupied year round. Many of the seasonal 75 percent are rented to vacationers during the spring and summer beach season. Contents include beds, furniture, reclining chairs, color cable televisions, VCR's and DVD players, microwave ovens, clothes washers and dryers, and telephones. Built-in appliances are included in the value of the structure. Contents for residential structures are estimated to be 40 percent of the structure value. This percentage is consistent with a detailed Residential Flood Damage survey taken in the Northern Gulf Coast (USACE, Mobile District, 1999). This area is similar to Topsail Island and is primarily single-family residential structures. Based on the 1999 survey, content damage was

reported in 81 of 192 cases, with a mean content-to-structure damage of about 35 percent.

Estimates of values of contents of commercial structures in the primary study area are based on interviews with businessmen and insurance agents familiar with the Topsail Island oceanfront, as well as empirical data collected for past studies. Businesses are entered into the damage model with a code for type of commercial activity. Each type of business has a unique content factor applied to its structural values. After weighing responses from motel managers and insurance agents in the study area, this is considered appropriate. It is also consistent with the commercial content data that originally came from a Galveston District study but were updated by the Wilmington District to reflect North Carolina beach data.

5.08.4 Elevation at ground

Ground elevations for the vast majority of North Topsail Beach were taken from FEMA elevation certificates. Elevations for Surf City were established by surveys and in some cases were estimated from 2-foot contour maps. The Wilmington District contracted with the engineering and surveying firm of Greenhorne & O'Mara, Inc. to perform survey work on Topsail Island. The field surveys were completed during the week of May 19-23, 2003.

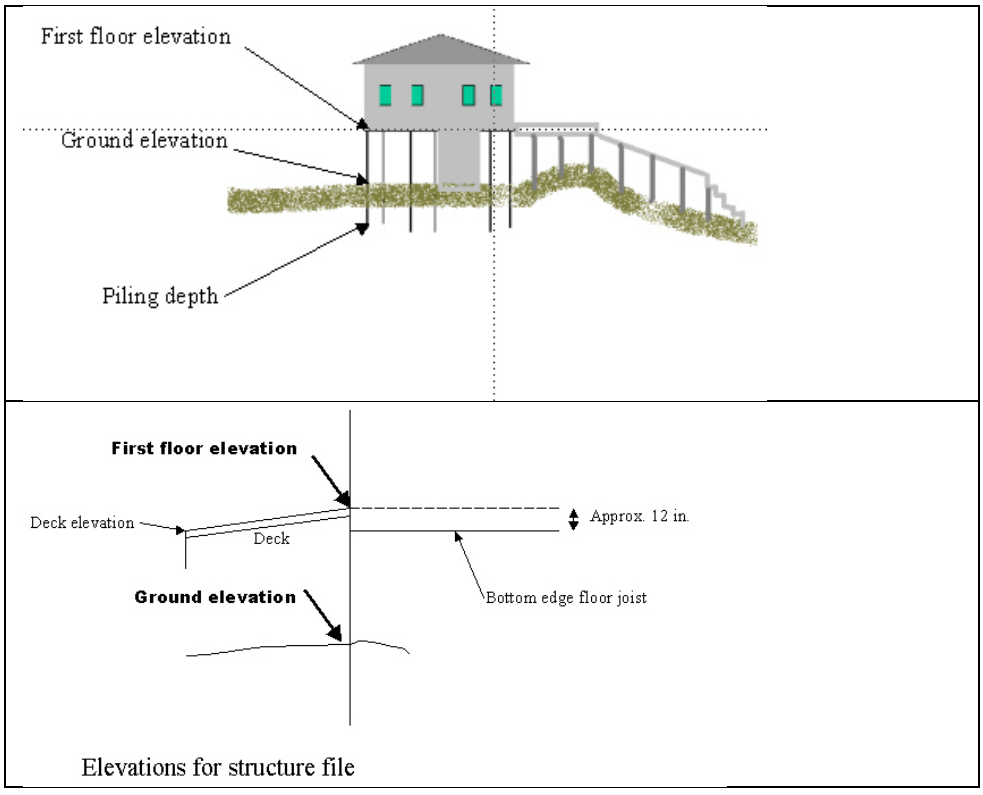


Figure B- 17 - Illustration of Residential Structure Elevations

5.08.5 Elevation at First Floor

The first-floor elevations were taken from FEMA elevation certificates or surveyed by the location of the front entry threshold as shown in Figure B-18. First floor elevations were surveyed under contract with the engineering and surveying firm Greenhorne & O'Mara, Inc.for the Surf City and North Topsail Beach study area. Data collected by North Carolina State University students for FEMA following hurricane Fran in 1996 were also compared and used for missing structures. In these cases the first floor elevation was adjusted by one foot to get the top of the floor joist versus the bottom of floor joist measured by NCSU. In a few cases first floor elevations were estimated by adding 10 or 12 feet to the ground elevations. Likewise, this assumption was used to indicate the first floor elevation of all structures replaced during the period of analysis.

5.08.6 Erosion Type

The erosion type in the structure file directs which erosion curve is used to calculate storm erosion damages. Variables include type of foundation, depth of piling penetration, type of shoreline (see Figure B-18), and the size of any enclosures around the piling foundation. The type of foundation on Topsail Island is mostly residential built on pilings. Most commercial and some residential structures are built on a slab foundation.

The historical effects of long-term and storm related erosion on oceanfront structures along the beaches of North Carolina are not well documented. Very little data exists on how these structures react to storm forces of varying degrees of intensity. This lack of data has lead to the designing of erosion-damage curves comprised largely through professional judgment. The state of the art of modeling these relationships is improving, however, following the hurricanes of 1996-1999 along the North Carolina coast. Researchers like Spencer Rogers of North Carolina Sea Grant have begun collecting and analyzing data and publishing papers on this subject. In his report, “Erosion Damage Thresholds in North Carolina,” Mr. Rogers derived storm induced damage curves based on observed changes over time in coastal construction in North Carolina (Attachment B-4).

The curves used in this analysis are derived from these erosion-damage curves and are based on field data including the following structure characteristics:

❶Oceanfront or not
❷Number of stories
❸On piles or not, long or short piles
❹ Type of enclosure (none, finished, unfinished)
❺Size of the under house enclosure (none, small, partial, fully enclosed)

❻High or low existing dune (potential to undermine 1st row structures) see illustration in Figure B-18.
❼Structure type (commercial or residential)

For this analysis, these data were collected for every structure along the oceanfront and first row of development back from the oceanfront, along with their elevation and depreciated replacement value. The following further describes the four-character coding scheme of structure types used for this study, which was originally developed by a North Carolina State University team of researchers including Mr. Rogers. Descriptions included the number of levels (1,1.5, or 2 story), type of foundation (P=on pilings, N=not on pilings), if piling foundation what is the size of enclosure (S=small <300SF; P=partial >300SF; F=full; or N=none) and the quality of the enclosure (F=finished, N-unfinished, "blank"=unknown). These codes are assigned upon field inspection of each structure and matched with both an appropriate erosion-damage curve and an inundation-damage curve. The decision matrix used in the field is included in Attachment B-2.

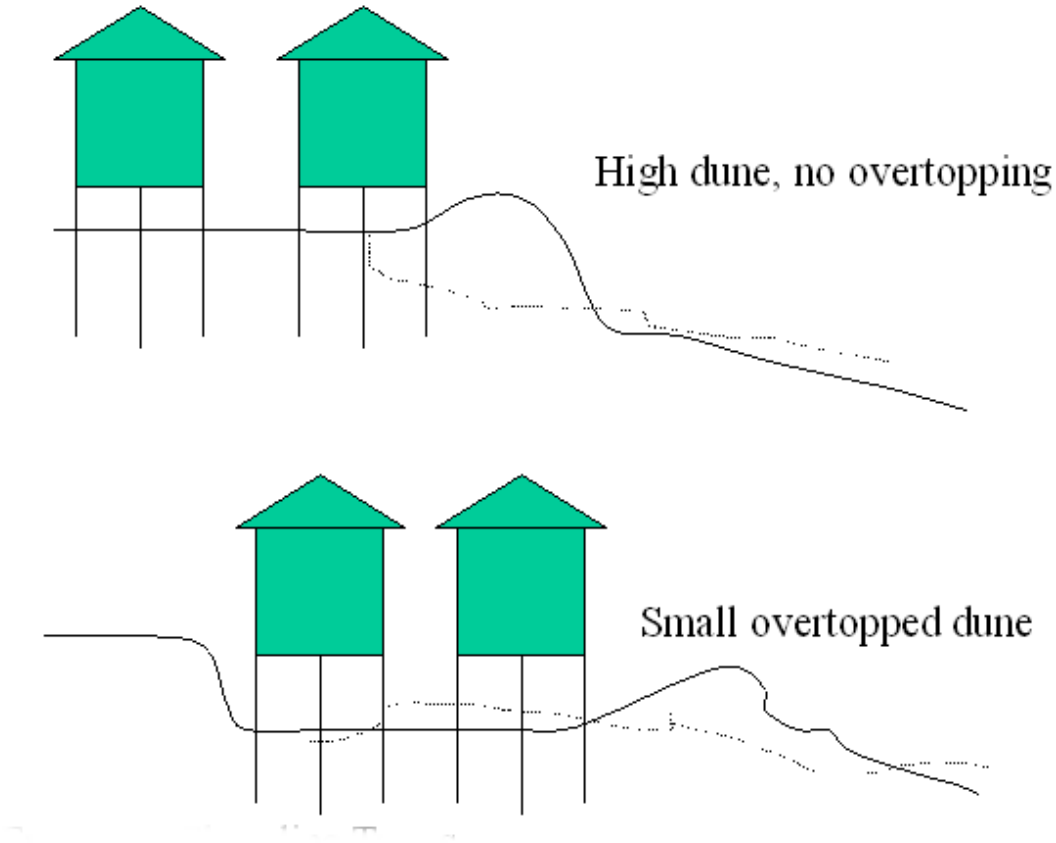


Figure B-18 - Shoreline Types with High and Low Elevation

5.08.7 Erosion Indicator

An indicator of erosion is measured as the vertical distance between the pre-storm and post-storm beach profile as shown in Figure B-19. The erosion damage curves are read based on how far the “erosion indicator” has proceeded through the structure footprint. In this analysis two erosion indicators were used. The most frequently used indicator is the 2-foot indicator. This indicator was chosen after consideration and interpretation of work by Spencer Rogers, North Carolina Sea Grant (Attachment B-4). For a limited number of structures built on concrete slab foundations and all street and roads, an erosion indicator of 0.5 feet was used. The work by Spencer Rogers, North Carolina Sea Grant, also introduces the possible use of a 4-foot erosion indicator. While use of the 4-foot indicator is not considered appropriate for the beach profiles of Surf City and North Topsail Beach, alternative analyses were run for the Topsail Beach General Re-evaluation Report and did not seriously impact the economic feasibility of the NED plan.

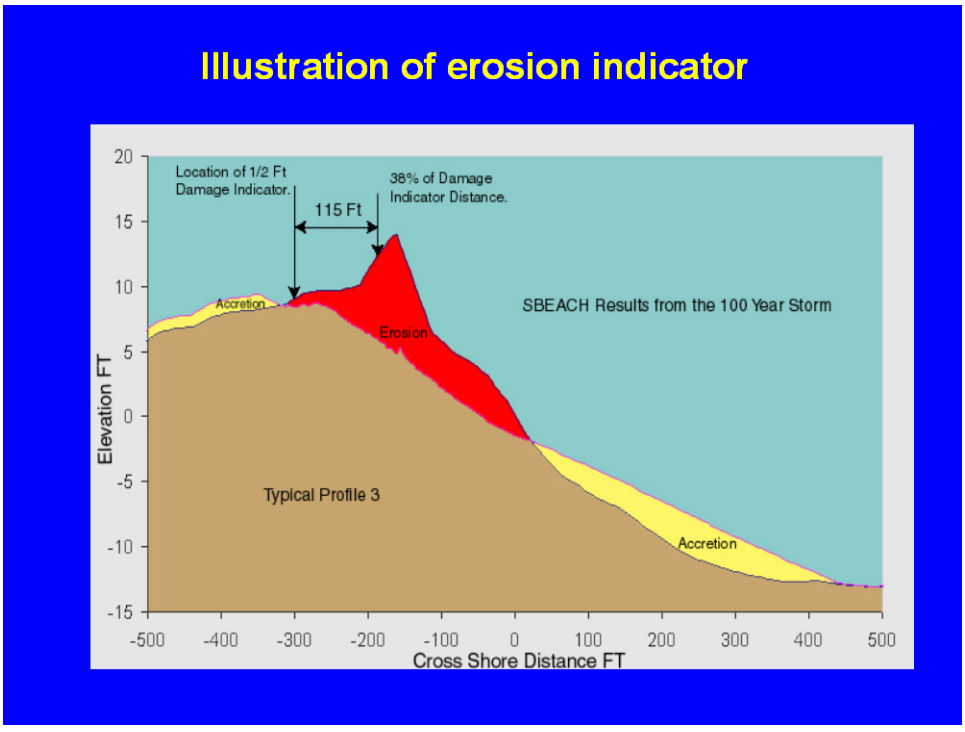


Figure B-19 - Illustration of erosion Indicator

The report “Erosion Damage Thresholds in North Carolina” by Spencer Rogers of the North Carolina Sea Grant is attached to this appendix as Attachment B-4.

6.0. ALTERNATIVES TO REDUCE COASTAL STORM DAMAGES

Expected storm and erosion related damages are first computed for the without project condition, then again for the various plans of improvement over approximately 10 miles of the primary study area. Structural, non-structural, and no action alternatives were considered. Structural plans include beach fill plans which have potential to prevent the progressive erosion of the shoreline, reduce damages caused by erosion, flooding, and wave impact during coastal storms, decrease storm related emergency expenditures, and increase the quality of recreational opportunities in the area. No action is also an alternative. However, the no action plan does not preclude emergency measures of dealing with erosion, such as beach scraping and sandbagging, but, in the long run, these emergency measures are assumed to be ineffective.

6.01 Structural Plans

Structural alternatives evaluated included various combinations of berm and dune heights. For example, Plan 1150 includes a dune height of 11 feet and a berm width of 50 feet. The initial array and the final array of plans are shown in Table B-9 below.

The continuous section between reach 58 and reach 78 were found to be feasible for several beach and dune alternatives. The two separate groups, reaches 103 to 105 and reaches 113-115 were not incrementally feasible for beachfill and excluded from further study.

Table B-9 - Economic Comparisons, Accumulated Present Value Amounts

Initial Array of Plans compared @ Dec 04 & 5-3/8%	Initial PV Net Benefits @ Dec 04 & 5-3/8%		Final Array of Plans compared @ Jan 05 & 5-3/8%	Final PV Benefits @ Jan 05 & 5-3/8%	Final PV Costs @ Jan 05 & 5-3/8%	Final PV Net Benefits @ Jan 05 & 5-3/8
50	$127,918,906					
100	$145,153,980					
150	$150,997,603					
1125	$139,831,147					
1150	$143,834,869		1150	$ 232,736,623	$ 98,214,372	$134,522,251
1175	$148,539,323					
1325	$171,819,955					
1350	$170,998,193		1350	$ 263,768,009	$105,229,962	$158,538,047
1375	$167,426,693					
			1450	$ 271,728,277	$111,442,663	$160,285,614
1525*	$178,870,873					
1550	$174,056,978		**1550**	$ 280,191,291	$114,804,658	$165,386,633
1575	$168,701,068		1575	$ 284,257,490	$125,623,007	$158,634,483
			1650	$ 280,577,629	$121,578,509	$158,999,120
			1750	$ 285,877,003	$125,762,429	$160,114,574

*Net benefits in this table were based on using identical unit costs for borrow material. However, it is estimated that costs for building a 25 ft dune and berm plan are at least 8% higher than for building plans with berm widths of greater than 25 ft. One of the primary reasons for the greater unit cost under a 25 ft plan is the additional equipment that is needed to move pipe along the beach as the dredge is pumping, since the narrow berm width does not allow pumping at one location for as long. Using the higher unit cost, the net benefit of the 1525 plan is about $167 million dollars.

All beach nourishment plans shown have positive net NED benefits; however, the plan with the greatest net NED benefits is Plan 1550 (see footer for table B-9). The NED Plan is defined as the alternative that maximizes net NED benefits. Therefore, Plan 1550 is designated as the NED Plan.

6.02 Non-structural Plans

The non-structural plans consist of retreats, relocations, and demolitions applied to threatened structures on an individual case-by-case basis. However, none of the non-structural plans were found to be feasible. Figure B-20 shows one of the rare non-structural projects involving the raising of a structure. A general description of the non-structural analysis is presented in the main report.

Figure B- 20 Topsail Island home raised on piling foundation 2004.

7.0 ECONOMICS OF NED PLAN (PLAN 1550)

7.01 Economic Damages – remaining with plan

A major consideration in evaluating any plan is the estimated damages remaining with the project plan. The accumulated present value of remaining damages for Plan 1550 is presented in Table B-10. A summary of average annual equivalent remaining damages is shown in Table B-11.

Table B-10 – Present Value of Remaining Damages with NED Plan

Reach	Erosion	Flood	Wave	Land	Total Damages
27	$ 278,000	$ 24,000	$ -	$ -	$ 302,000
28	$ 37,000	$ -	$ -	$ -	$ 38,000
29	$ 534,000	$ 2,000	$ -	$ -	$ 536,000
30	$ 1,546,000	$ 7,000	$ -	$ -	$ 1,552,000
31	$ 1,732,000	$ 2,000	$ -	$ -	$ 1,734,000
32	$ 540,000	$ 34,000	$ -	$ -	$ 574,000
33	$ 998,000	$ 27,000	$ -	$ -	$ 1,025,000
34	$ 963,000	$ 36,000	$ -	$ -	$ 998,000
35	$ 379,000	$ 77,000	$ -	$ -	$ 456,000
36	$ 311,000	$ 37,000	$ -	$ -	$ 348,000
37	$ 501,000	$ 25,000	$ -	$ -	$ 527,000
38	$ 620,000	$ 50,000	$ 14,000	$ -	$ 685,000
39	$ 558,000	$ 104,000	$ 9,000	$ -	$ 670,000
40	$ 454,000	$ 108,000	$ 54,000	$ -	$ 616,000
41	$ 947,000	$ 26,000	$ 5,000	$ -	$ 979,000
42	$ 1,329,000	$ 11,000	$ 4,000	$ -	$ 1,345,000
43	$ 1,328,000	$ 24,000	$ 18,000	$ -	$ 1,370,000
44	$ 956,000	$ 195,000	$ 6,000	$ -	$ 1,158,000
45	$ 240,000	$ 183,000	$ -	$ -	$ 423,000
46	$ 166,000	$ 204,000	$ -	$ -	$ 370,000
47	$ 701,000	$ 235,000	$ 4,000	$ -	$ 939,000
48	$ 974,000	$ 214,000	$ 15,000	$ -	$ 1,202,000
49	$ 846,000	$ 112,000	$ 2,000	$ -	$ 960,000
50	$ 195,000	$ 64,000	$ -	$ -	$ 259,000
51	$ 366,000	$ 211,000	$ 84,000	$ -	$ 662,000
52	$ 2,108,000	$ 122,000	$ 824,000	$ -	$ 3,054,000
53	$ 811,000	$ 122,000	$ 936,000	$ -	$ 1,869,000
54	$ 490,000	$ 95,000	$ 577,000	$ -	$ 1,161,000
55	$ 318,000	$ 126,000	$ 27,000	$ -	$ 470,000
56	$ 175,000	$ 77,000	$ 43,000	$ -	$ 294,000
57	$ 605,000	$ 77,000	$ 75,000	$ -	$ 758,000
58	$ 575,000	$ 142,000	$ 83,000	$ -	$ 800,000
59	$ 432,000	$ 106,000	$ 207,000	$ -	$ 745,000
60	$ 786,000	$ 48,000	$ 322,000	$ -	$ 1,155,000
61	$ 365,000	$ 75,000	$ 225,000	$ -	$ 665,000
62	$ 1,107,000	$ 30,000	$ 5,000	$ -	$ 1,141,000
63	$ 325,000	$ 126,000	$ 33,000	$ -	$ 484,000
64	$ 464,000	$ 190,000	$ 338,000	$ -	$ 992,000
65	$ 490,000	$ 190,000	$ 335,000	$ -	$ 1,015,000
66	$ 572,000	$ 55,000	$ 165,000	$ -	$ 792,000
67	$ 1,743,000	$ 19,000	$ 104,000	$ -	$ 1,867,000
68	$ 396,000	$ 235,000	$ 259,000	$ -	$ 889,000
69	$ 588,000	$ 499,000	$ 392,000	$ -	$ 1,479,000
70	$ 493,000	$ 185,000	$ 392,000	$ -	$ 1,069,000
71	$ 502,000	$ 62,000	$ 461,000	$ -	$ 1,024,000
72	$ 743,000	$ 62,000	$ 536,000	$ -	$ 1,341,000
73	$ 725,000	$ 51,000	$ 422,000	$ -	$ 1,198,000
74	$ 539,000	$ 47,000	$ 400,000	$ -	$ 986,000
75	$ 188,000	$ 138,000	$ 38,000	$ -	$ 364,000
76	$ 199,000	$ 55,000	$ 111,000	$ -	$ 364,000
77	$ 378,000	$ 180,000	$ 52,000	$ -	$ 611,000
78	$ 627,000	$ 91,000	$ 95,000	$ -	$ 813,000
	$ 34,243,000	$ 5,217,000	$ 7,672,000	$ -	$ 47,128,000

Table B-11 – Remaining Average Annual Coastal Storm Damages with Plan 1550 (NED Plan)

Remaining Coastal Storm Damages - Average Annual Equivalent Amount					
Reach	**Storm Erosion**	**Flood**	**Wave**	**Land**	**Total Damage**
27-78	$1,628,000	$ 248,000	$365,000	$0	$2,241,000

7.02 Economic Benefits

The primary benefits to the NED plan are the coastal storm damage reduction benefits. The total damage reduction benefits are computed by subtracting the remaining damages from the total without project damages. Coastal storm damage reduction benefits total $16,820,000 and are shown by type in Table B-12.

7.02.1 Coastal Storm Damage Reduction Benefits

Table B-12 – Average Annual Coastal Storm Damage Reduction Benefits with Plan 1550 (NED Plan)

Category of Damages Reduced				Total Benefits
Storm Erosion	**Flood-Inundation**	**Wave**	**Long-Term-Erosion**	
$14,352,000	($98,000)	$404,000	$2,162,000	$16,820,000

7.02.2 Reduced Emergency Costs Benefits

Benefits from reduction of emergency costs are estimated to have an equivalent annual value of $99,000 for Surf City and $235,000 for North Topsail Beach, for a total of $334,000 over the entire project length based on records from hurricanes Bertha, Fran, Bonnie, and Floyd*. This category of benefits is not very precise and is relatively minor compared to CSDR benefits (1 to 2%) and so, is dropped from the total.*

Emergency cost reductions refer to expected annual expenditures that residents and governments are experiencing under the without project condition that a project would preclude. Other damage reductions include storm damages that are not covered under the National Flood Insurance Program, but represent financial drains on public and private storm victims that a large beach nourishment project could reduce. The categories lumped into this benefit called emergency costs and other damages reduced include (1) beach scraping/pushing; (2) sandbagging: (3) emergency costs incurred by the North

Carolina Department of Transportation; (4) damages to public property; (5) damages to private property other than structures and contents; and, (6) post-storm recovery expenses.

7.02.3 Benefits During Construction

Construction of NED Plan could begin following contract award 30 September 2014. Allowing for environmental constraints, construction could begin in December 2014 and continue for approximately six months for each consecutive environmental dredging window. Construction is assumed to continue through 30 April of each year of initial construction. This construction schedule would provide significant benefits from the project in 2018 (the base year). The project would be expected to be completed in 2018 prior to hurricane season and the peak recreation season.

Table B-13 Benefits During Construction for Plan 1550

PERIODS	MONTH	Activity	HSDR Benefits	HSDR Benefits	REC Benefits	REC Benefits	Interest Factors	HSDR Benefits with Interest	REC Benefits with Interest
1	NOV	MOB					1.165146	$0	$0
2	DEC	Dredge					1.160914	$0	$0
3	JAN						1.156697	$0	$0
4	FEB						1.152495	$0	$0
5	MAR						1.148308	$0	$0
6	APR	DE-MOB					1.144137	$0	$0
7	MAY	Till, DP, WO				$1,250,000	1.139981	$0	$1,424,976
8	JUN			$841,000		$1,250,000	1.135840	$955,241	$1,419,800
9	JUL			$841,000	25% REC	$1,250,000	1.131714	$951,771	$1,414,642
10	AUG		25% HSDR	$841,000	Benefits	$1,250,000	1.127603	$948,314	$1,409,503
11	SEP		Benefits	$841,000			1.123506	$944,869	$0
12	OCT			$841,000			1.119425	$941,437	$0
13	NOV	MOB					1.115359	$0	$0
14	DEC	Dredge					1.111307	$0	$0
15	JAN						1.107270	$0	$0
16	FEB						1.103248	$0	$0
17	MAR						1.099240	$0	$0
18	APR	DE-MOB					1.095247	$0	$0
19	MAY	Till, DP, WO				$2,500,000	1.091269	$0	$2,728,172
20	JUN			$1,682,000		$2,500,000	1.087304	$1,828,846	$2,718,261
21	JUL			$1,682,000	50% REC	$2,500,000	1.083355	$1,822,203	$2,708,387
22	AUG		50% HSDR	$1,682,000	Benefits	$2,500,000	1.079419	$1,815,583	$2,698,548
23	SEP		Benefits	$1,682,000			1.075498	$1,808,988	$0
24	OCT			$1,682,000			1.071591	$1,802,417	$0
25	NOV	MOB					1.067699	$0	$0
26	DEC	Dredge					1.063820	$0	$0
27	JAN						1.059956	$0	$0
28	FEB						1.056105	$0	$0
29	MAR						1.052269	$0	$0
30	APR	DE-MOB					1.048447	$0	$0
31	MAY	Till, DP, WO				$3,750,000	1.044638	$0	$3,917,393
32	JUN			$2,523,000		$3,750,000	1.040843	$2,626,048	$3,903,162
33	JUL			$2,523,000	75% REC	$3,750,000	1.037062	$2,616,508	$3,888,984
34	AUG		75% HSDR	$2,523,000	Benefits	$3,750,000	1.033295	$2,607,004	$3,874,857
35	SEP		Benefits	$2,523,000			1.029542	$2,597,533	$0
36	OCT			$2,523,000			1.025802	$2,588,098	$0
37	NOV	MOB					1.022075	$0	$0
38	DEC	Dredge					1.018363	$0	$0
39	JAN						1.014663	$0	$0
40	FEB						1.010977	$0	$0
41	MAR						1.007305	$0	$0
42	APR	DE-MOB					1.003646	$0	$0
43	MAY	Till, DP, WO	BASE YEAR BENEFITS 100 percent HSDR Benefits	$0	BASE Year 100 percent Recreation Benefits		1.000000	$0	$0
						Accumulated	PV	$26,854,859	$32,106,684
						4-1/8%	I&A - 50yrs	0.047551	0.047551
						Ave Ann Benefits		**$1,276,975**	**$1,526,705**
						During Construction		**$1,277,000**	**$1,527,000**

7.02.4 Recreation Benefits

Recreation benefits are based on the incremental change in demand with varying project conditions. Positive benefits derived from increased recreation visitation or improved recreation experience. The average annual equivalent recreation benefits for the NED plan were computed to be $12.7 million for Surf City and $7.9 million for North Topsail Beach for a total of $20.5 million. The recreation benefit analysis is presented in Appendix – O.

7.02.5 Commercial and Recreational Fishing Impacts:

The economic impacts of the NED plan or other nourishment plans on commercial and recreational fishing during construction are not expected to be significant. Impacts on shore fishing would be limited to the area where material is being placed on the beach. This localized and temporary impact can easily be avoided by anglers in the area. Nearshore fishing boats can operate around the dredging equipment operating in the area. The beach nourishment plan is not expected to impact inside fishing or the operation of commercial fishing boats operating inside or going through New Topsail Inlet. Unless there is extreme weather, the ocean going dredge will operate continuously. Therefore, the economic impact of commercial and recreational fishing is not expected to change with the project construction.

7.02.6 Summary of Benefits to NED Plan

A summary of the coastal storm damage reduction benefits, and recreation benefits is shown in Table B-14. Benefits during construction were computed primarily because the plan is expected to be constructed during three and one-half dredging windows and each increment would be completed prior to hurricane and peak recreation season.

Table B-14 - Summary of Benefits to NED Plan

Benefit Category	Average Annual Amount in Dollars
Hurricane & Storm Damage Reduction	$16.820,000
Reduced Emergency Costs	None claimed
Benefits during Construction	$2,804,000
Recreation (Appendix O)	$20,505,000
Total Average Annual NED Benefits	$40,129,000

7.03 Project Costs for NED Plan

Project first costs include the cost of construction, mobilization and demobilization, real estate, planning and engineering studies, supervision and administration, and interest during the four environmental dredging windows and construction period.

Determination of the economic costs of the plan consists of four basic steps. First, project First Costs are computed. First Costs include expenditures for project design and initial construction and related costs of supervision and administration. First Costs also include the lands, easements, and rights of way for initial project construction and periodic nourishment.

7.03.1 First Costs

Total First Costs are estimated to be $123,135,000 as presented in Appendix N Cost Engineering.

Table B-15 – Summary of Expenditures During Construction

PERIODS	MONTH	Activity	MOB	DE-MOB	Dredge	Real Estate	T, DP, WO	PED	Const Mgt	Total
1	NOV	MOB	$1,149,500					$109,571	$68,179	$1,327,250
2	DEC	Dredge			$6,208,938	$326,750		$109,571	$68,179	$6,713,438
3	JAN				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
4	FEB				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
5	MAR				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
6	APR	DE-MOB		$1,149,500			$548,875	$109,571	$68,179	$1,876,125
7	MAY	Till, DP, WO					$548,875	$109,571	$68,179	$726,625
8	JUN									$0
9	JUL									$0
10	AUG									$0
11	SEP									$0
12	OCT									$0
13	NOV	MOB	$1,149,500					$109,571	$68,179	$1,327,250
14	DEC	Dredge			$6,208,938	$326,750		$109,571	$68,179	$6,713,438
15	JAN				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
16	FEB				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
17	MAR				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
18	APR	DE-MOB		$1,149,500			$548,875	$109,571	$68,179	$1,876,125
19	MAY	Till, DP, WO					$548,875	$109,571	$68,179	$726,625
20	JUN									$0
21	JUL									$0
22	AUG									$0
23	SEP									$0
24	OCT									$0
25	NOV	MOB	$1,149,500					$109,571	$68,179	$1,327,250
26	DEC	Dredge			$6,208,938	$326,750		$109,571	$68,179	$6,713,438
27	JAN				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
28	FEB				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
29	MAR				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
30	APR	DE-MOB		$1,149,500			$548,875	$109,571	$68,179	$1,876,125
31	MAY	Till, DP, WO					$548,875	$109,571	$68,179	$726,625
32	JUN									$0
33	JUL									$0
34	AUG									$0
35	SEP									$0
36	OCT									$0
37	NOV	MOB	$1,149,500					$109,571	$68,179	$1,327,250
38	DEC	Dredge			$6,208,938	$326,750		$109,571	$68,179	$6,713,438
39	JAN				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
40	FEB				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
41	MAR				$6,208,938	$326,750		$109,571	$68,179	$6,713,438
42	APR	DE-MOB		$1,149,500			$548,875	$109,571	$68,179	$1,876,125
43	MAY	Till, DP, WO					$548,875	$109,571	$68,179	$726,625
										$0
										$0
										$0
										$0
			$4,598,000	$4,598,000	$99,343,000	$5,228,000	$4,391,000	$3,068,000	$1,909,000	$123,135,000

7.03.2 Interest During Construction

Interest during construction accounts for the opportunity cost of capital incurred during the construction period. The cost of the project to be amortized is the investment incurred up to the time that the project begins to produce benefits, or the time when it is placed in operation. The investment cost at that time is the sum of construction and other initial costs plus interest during construction. Costs incurred during the construction period should be increased by adding compound interest at the applicable project discount rate from the date the expenditures are made to the beginning of the period of analysis (base year). The addition of interest during construction insures that costs and benefits are evaluated on an equivalent time basis (ER 1105-2-100, Appendix D).

Construction could begin in December 2014 and be completed on or before 30 April 2018. The interest on expenditures prior to the completion of the plan will be calculated at 4—1/8 percent interest. The expenditures by month, the cost of construction plus interest, and the net interest during construction (IDC) is shown in Table B-14 and Figure B-21.

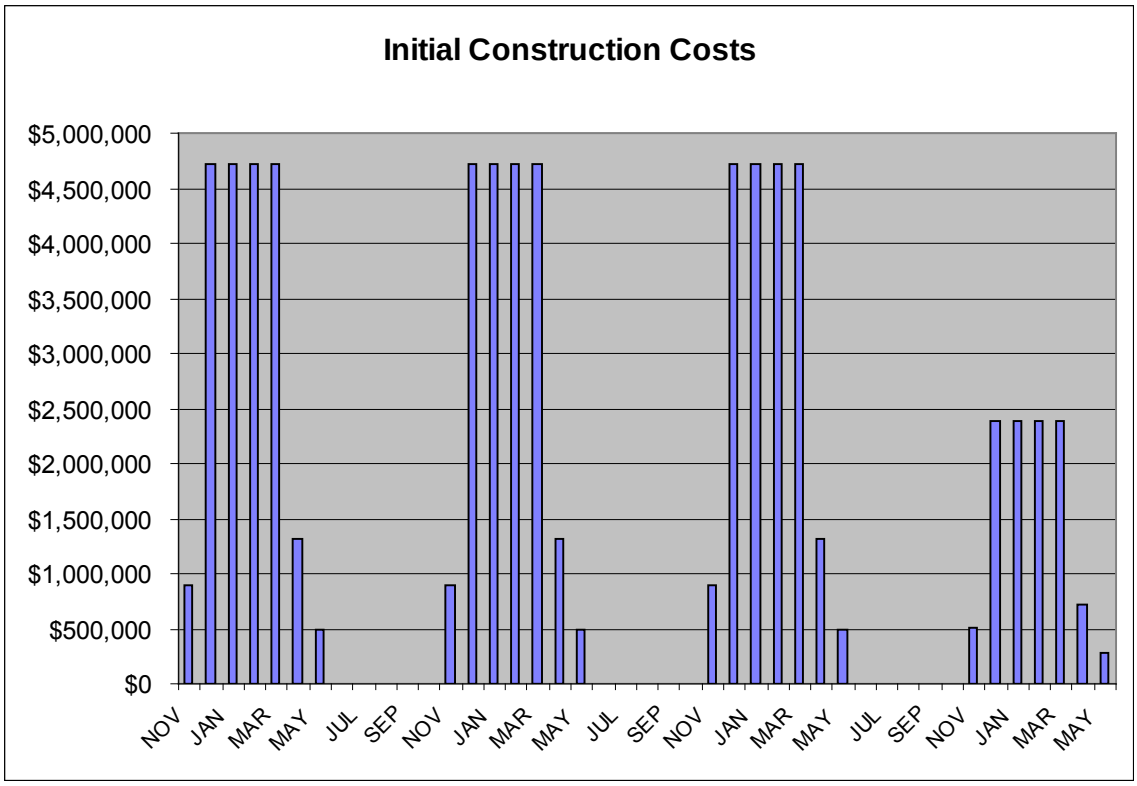


Figure B-21 - Distribution of Initial Construction Costs

Table B-16 Calculation of Interest during Construction for NED Plan

	IDC=		$9,512,574
PERIODS	MONTHS	Expenditures	PW AMT.
1	1.155031276	$1,327,250	$1,533,015
2	1.151074458	$6,713,438	$7,727,666
3	1.147131194	$6,713,438	$7,701,194
4	1.143201439	$6,713,438	$7,674,811
5	1.139285147	$6,713,438	$7,648,520
6	1.13538227	$1,876,125	$2,130,119
7	1.131492764	$726,625	$822,171
8	1.127616582	$0	$0
9	1.123753679	$0	$0
10	1.119904009	$0	$0
11	1.116067526	$0	$0
12	1.112244187	$0	$0
13	1.108433945	$1,327,250	$1,471,169
14	1.104636756	$6,713,438	$7,415,910
15	1.100852576	$6,713,438	$7,390,505
16	1.097081359	$6,713,438	$7,365,187
17	1.093323061	$6,713,438	$7,339,956
18	1.089577637	$1,876,125	$2,044,184
19	1.085845045	$726,625	$789,002
20	1.08212524	$0	$0
21	1.078418177	$0	$0
22	1.074723814	$0	$0
23	1.071042107	$0	$0
24	1.067373012	$0	$0
25	1.063716487	$1,327,250	$1,411,818
26	1.060072487	$6,713,438	$7,116,730
27	1.056440972	$6,713,438	$7,092,350
28	1.052821896	$6,713,438	$7,068,054
29	1.049215219	$6,713,438	$7,043,841
30	1.045620897	$1,876,125	$1,961,716
31	1.042038888	$726,625	$757,172
32	1.038469151	$0	$0
33	1.034911642	$0	$0
34	1.03136632	$0	$0
35	1.027833144	$0	$0
36	1.024312071	$0	$0
37	1.020803061	$1,327,250	$1,354,861
38	1.017306071	$6,713,438	$6,829,621
39	1.013821061	$6,713,438	$6,806,224
40	1.01034799	$6,713,438	$6,782,908
41	1.006886816	$6,713,438	$6,759,672
42	1.0034375	$1,876,125	$1,882,574
43	1	$726,625	$726,625
	Totals	$123,135,000	$132,647,574
		IDC	$9,512,574
		rounded	$9,513,000

7.03.3 Total Investment Cost

The total investment cost of the NED plan is equal to the initial construction plus interest during construction. Therefore, total investment cost is equal to $132,648,000 as shown in Table B-16. The cost of future nourishment is shown separately.

7.03.4 Present Value of Future Nourishment Costs

The accumulated present value of all nourishment cost is calculated by discounting all cash flows in future years back to the base year 2018 at the appropriate interest rate. The accumulated present worth of all future nourishment is $80,696,000 as shown in Table B-18.

Table B-17 Project Annual Costs – Plan 1550 NED (October 2010 price levels)

interest rate =	4.125%	years of analysis =	50
ITEM	**YEAR**	**AMOUNT**	**PRESENT VALUE, 2014**
Total Investment Cost	2014	$132,648,000	$132,648,000
Renourishment	2020	$20,866,000	$16,372,000
Renourishment	2026	$27,724,000	$17,069,000
Renourishment	2032	$27,724,000	$13,393,000
Renourishment	2038	$27,724,000	$10,508,000
Renourishment	2044	$27,724,000	$8,245,000
Renourishment	2050	$27,724,000	$6,470,000
Renourishment	2056	$46,053,000	$8,639,000
Total Investment Cost, Present Value			$213,344,000
Annual Costs			
Interest & Amortization @ 4-1/8%			$10,145,000
Monitoring			$505,000
OMRR&R			$52,000
Total Annual Cost			$10,702,000
Cost level	Oct-10		

7.04 Average Annual Project Costs for NED Plan

Average annual project costs are comprised of the interest and amortization of both the total investment (including interest during construction) and total accumulated present worth of the future nourishment. In addition to interest and amortization (I&A), annual costs include the operation and maintenance and the required annual monitoring cost.

7.04.1 I&A of Total Investment

Total investment is converted to an average annual equivalent value by amortizing the investment over the 50-year period of analysis. The 50-year interest and amortization (I&A) factor at 4 – 1/8 percent is 0.047551.
The annual interest and amortization of the total investment is $6,308,000 as shown in Table B-18.

7.04.2 Annual OMRR&R

The non-Federal average annual repair cost refers to the sponsor's expense of repairing the berm, replacing any destroyed beach access walkways following storms, and replanting and fertilizing dune vegetation as necessary. The annual cost of operation and maintenance is estimated to be $52,000.

7.04.3 Annual Monitoring

Monitoring is an additional annual cost that is estimated to be $505,000.

7.04.4 I&A of Future Nourishment

The accumulated present value of future nourishment is converted to an average annual equivalent value by amortizing the present value over the 50-year period of analysis. The 50-year interest and amortization (I&A) factor at 4 – 1/8 percent is 0.047551. The annual interest and amortization of the future nourishment is $3,837,000 as shown in Table B-18.

Table B- 18 - Summary of Initial Construction & Annual Costs - NED Plan

Cost Elements	Cost in Dollars – October 2010 price level
Initial Construction	$123,135,000 (reference Appendix N)
Interest during Construction	$ 9,513,000 (Table B-14)
Total Investment Cost	$132,648,000
Interest & Amortization 50yr, 4-1/8%	$6,308,000
Present Value Future Nourishment	$80,696,000
Interest & Amortization 50yr, 4-1/8%	$3,837,000
Annual Monitoring Costs	$505,000
Annual OMRR&R	$52,000
PV Initial and Future Construction	$213,344,000 (Table B-17)
Total Average Annual Cost	**$10,702,000**

7.05 Benefit/Cost Comparison for NED Plan

The Plan 1550 beachfill is expected to decrease the estimated annual expected coastal storm damages from $19,061,000 to $2,241,000. The difference of $16,820,000 is the Plan 1550 storm damage reduction benefits. The annual recreation benefits are estimated to be $20,505,000. Benefits during construction are $59,000,000 with an annual equivalent of $2,804,000. Total annual benefits summarized in Table B-19 are $40,129,000. The damage totals in Table B-19 are based on the selection of the highest of the three damage estimates added to the coastal storm damage total and the remaining two estimates are ignored to ensure no double counting of damages or benefits. The negative amount computed for flood in Table B-19 results from flood inundation damages to structures that were assumed to be destroyed by waves in the without-project condition This multi-step process ensures that damage and benefits are not overstated in the estimates and in no way should be interpreted that the with-project condition is inducing damages in one damage category.

Table B-19 Project Annual Benefits – Plan 1550 NED (October 2010 price levels)

Benefit Category	Expected Annual Benefit
Coastal Storm Damage Reduction	
Storm Erosion	$14,352,000
Flood*	($98,000)
Wave	$404,000
Land and Long Term Erosion	$2,162,000
Subtotal, rounded	$16,820,000
Recreation	$20,505,000
Sub Total Annualized Benefits	$37,325,000
Benefits During Construction, Annual Equivalent	$2,804,000
Total Annual Benefits	**$40,129,000**

* Note: Benefit reported as negative due to change in damage category.

Total average annual equivalent benefits to the NED plan equal $40,129,000 including recreation benefits. When compared to the average annual cost of $10,702,000, the net benefits over cost equals $29,427,000. The benefit-to-cost ratio is 3.7 to 1.0 as shown in Table B-20.

Table B-20 Annual Benefits, Costs, and Benefit-Cost Ratio – NED Plan

NED Plan	Benefits[1]	Costs	Net Benefits	Benefit/Cost Ratio
1550	$40,129,000	$10,702,000	$29,427,000	3.7

8.0. REGIONAL ECONOMIC DEVELOPMENT (RED) IMPACTS

The following regional economic impacts will be addressed based on the interest of the local sponsor and the surrounding Pender and Onslow counties. Local governments seek to preserve the tax base and encourage the growth in overall property values, to create stability in the labor force and the employment of the labor force. The steady growth of the local community and surrounding region is considered a worthy goal by the state and local governments. Displacement of people, businesses and farms in the study area is not a desirable outcome that sometimes may result from either continued storm damages or even some types of construction.

[1] Coastal storm damage reduction benefits plus recreation benefits.

8.01 Preserve Tax Base and, Property Values

Real property, including land and structures, in the town of Surf City and North Topsail Beach is subject to property tax by Pender County or Onslow County and the town. The tax base and property values will be preserved with implementation of a coastal storm damage reduction plan. Land loss and long-term erosion eventually renders lots unbuildable with a significantly lower economic value. Typically, the tax valuation of the ocean front lots is severely reduced to reflect the diminished utility of the land. Lower tax valuations may result in lower county and town tax revenues unless there is offsetting development in other areas**.**

8.02 Employment Stability

Tourism is highly valued as a source of employment and income. Employment related to recreation can be less than ideal because of the seasonal nature of recreation and tourism. Increased recreation visitation may improve the income of service industries in the two-county study area. It is unlikely that employment will be significantly impacted with or without storm damage reduction measures. Gains or losses in income or employment are considered regional impacts.

8.03 Community and Regional Growth

Implementation of effective damage reduction measures will ensure that the current growth trends in population and recreation visitation will continue. Protection of the streets and highways in the study area preserve community cohesion and encourage the tourism industry on the island, including the towns of Surf City and North Topsail Beach.

8.04 Displacement of People, Businesses, and Farms

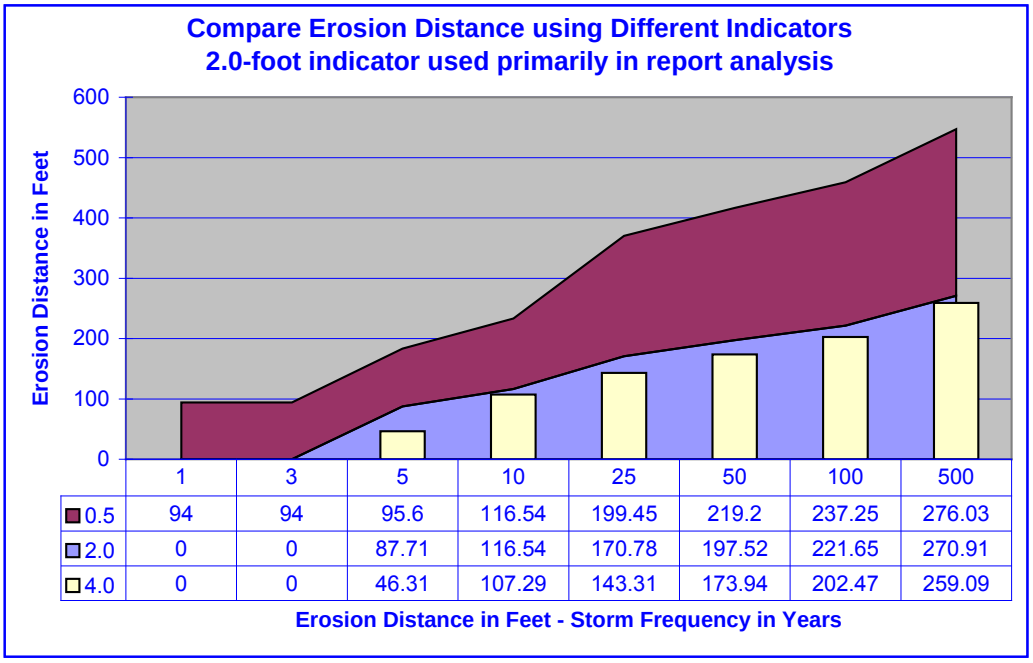
Implementation of damage reduction measures under consideration is not expected to displace people, businesses, or farms.

9.0 UNCERTAINTY AND SENSITIVITY OF ANALYSIS TO VARIATION OF VALUES AND ASSUMPTIONS

9.01 Coastal Storm Damage Reduction

9.01.1 Erosion indicators (Topsail Beach example)

In order to illustrate the effect of using different erosion indicators, the results of the Topsail Beach NED plan is shown in Figure B-22 and Table B-21 for the Topsail Beach NED plan. Analyses prior to Topsail Beach used the 0.5-foot indicator exclusively. The storm erosion damages presented in this report are based on using the 2.0-foot erosion indicator for 98.5 percent of the structures. The 0.5-foot indicator was used to estimate storm erosion damages to streets, highway, and structures built on concrete slab foundations. The 2.0-foot erosion indicator was used for 597 structures including the 34 commercial structures. Support for this assumption was found in "Erosion Damage Thresholds in North Carolina" (Attachment B-4, pages 12-13) by Spencer Rogers, dated 21 April 2002. An erosion threshold of 2 feet or less may generate more realistic damage estimates than using an erosion threshold of 4 feet when using the SBEACH model. The 0.5-foot erosion indicator was used for 6 single-story homes built on slab foundations, 3 two-story homes built on slabs, and the 27 street segments. Likewise, Surf City and North Topsail Beach used the 2.0 foot indicator in virtually all cases except for structures built on concrete slabs.



	1	3	5	10	25	50	100	500
0.5	94	94	95.6	116.54	199.45	219.2	237.25	276.03
2.0	0	0	87.71	116.54	170.78	197.52	221.65	270.91
4.0	0	0	46.31	107.29	143.31	173.94	202.47	259.09

Figure B-22 – Compare Erosion Distance using Different Indicators

Table B- 21 – Sensitivity Analysis - Erosion Indicators

		HSDR benefits	Erosion	Flood	Wave	Land	Costs	B/C Ratio
Base	Totals	$ 135,347,131	$ 113,186,049	$ 2,282,826	$ 5,214,450	$ 14,663,809	$ -	N/A
Base_4ft_sel		$ 130,866,658	$ 110,113,473	$ 2,129,122	$ 5,203,235	$ 13,420,826	$ -	N/A
Percentage change		3.31%	2.71%	6.73%	0.22%	8.48%	#DIV/0!	
Base_4ft_all		$ 116,875,279	$ 95,403,732	$ 2,240,801	$ 5,910,281	$ 13,320,463	$ -	N/A
Percentage change		13.65%	15.71%	1.84%	-13.34%	9.16%	#DIV/0!	
RemD1550	Totals	$ 13,226,516	$ 7,351,470	$ 3,555,428	$ 2,316,568	$ 3,045	$ 55,892,000	N/A
RemD1550_4ft_sel		$ 12,832,179	$ 7,130,600	$ 3,367,687	$ 2,330,848	$ 3,045	$ 55,892,000	N/A
Percentage change		2.98%	3.00%	5.28%	-0.62%	0.00%	0.00%	
RemD1550_4ft_all		$ 10,798,196	$ 4,810,061	$ 3,450,991	$ 2,534,156	$ 2,990	$ 55,892,000	N/A
Percentage change		18.36%	34.57%	2.94%	-9.39%	1.81%	0.00%	
Benefits1550	Totals	$ 122,120,615	$ 105,834,579	$ (1,272,602)	$ 2,897,882	$ 14,660,764	$ (55,892,000)	2.18
Benefits1550_4ft_sel		$ 118,034,479	$ 102,982,873	$ (1,238,565)	$ 2,872,387	$ 13,417,781	$ (55,892,000)	2.11
Percentage change		3.35%	2.69%	2.67%	0.88%	8.48%	0.00%	
Benefits1550_4ft_all		$ 106,077,083	$ 90,593,671	$ (1,210,190)	$ 3,376,125	$ 13,317,473	$ (55,892,000)	1.90
Percentage change		13.14%	14.40%	4.90%	-16.50%	9.16%	0.00%	

Estimates presented in GRR (2.0 ft indicator with a few 0.5-ft indicators for slab const. and roads)
Assume 4ft erosion indicator for selected structures (1st row post-1986 construction)
Assume 4ft erosion indicator for ALL structures

9.01.2 Erosion Damage Curves

Erosion Damage curves, erosion distance, structure distance, and the erosion damage indicator combine to produce estimates of storm damage erosion. The risk and uncertainty of several parameters is addressed in the GRANDUC modeling procedures and included in Appendix D.

9.02 Exclude Recreation Benefits

When the $22,032,000 average annual recreation benefits are excluded, the benefit to cost ratio is reduced. In this case, the benefits to coastal storm damage reduction are $18,097,000 annually. Based on the average annual costs of $10,702,000, the remaining benefits would be $7,395,000 resulting in a BCR of 1.7 to 1.

9.03 Interest Rate

In compliance with Executive Order 12893, all benefits and costs were computed using a 7.0 percent interest rate for comparison in the final report. When the average annual benefits to the NED plan at 7 percent are compared to the 4.125 percent total average annual benefits increased very slightly to $41,669,000 or less than 2 percent. Average annual costs increased to $14,227,000, resulting in net benefits of $27,442,000 and a benefit-to-cost ratio of 2.9 counting all NED benefits. The BCR at 4.125 percent was 3.7 to 1.

9.04 Land Values

Interior land values were based on actual sales data over a three-year period; however, recent market fluctuations raise the question of how sensitive the economic justification of the NED plan is to rising or falling land values. If the interior land values at Wrightsville Beach, a beach 30 miles south of the study area, were used the BCR for the plan would rise to 3.0 to 1 for CSDR benefits alone and up to 5.0 to 1 with all benefits including recreation. On the other hand, if land values dropped to $20.00 per square foot the result would be to lower the BCR to 1.2 to 1 for CSDR benefits alone and 3.4 to 1 including recreation benefits. The probability of values rising is greater than falling beyond the present market conditions.

Structure Type	Building inventory codes	Old Code	Flood Curve Type	Content value factor
COMMERCIAL				
Apartments		001	5	1.4
Appliances		002	6	1.75
Auto Dealership		003	7	1.18
Auto Junk Yard		004	8	6
Auto Parts		005	9	3.33
Bait Stand		006	10	1.67
Bank		007	11	1.39
Barber Shop		008	12	1.118
Beauty Shop		009	46	1.375
Boat Stalls		010	13	2
Book Store		011	14	2.68
Bowling Alley		012	15	1.515
Business, Pole Shed (farm), Garage, Frame Tobacco Barn		013,071, 011A,076	16	2.664,1.5,1.4,1.9
Church		014	17	1.47
Cleaners		015	18	2.385
Cleaners-sub		016	47	3.176
Clinic-medical		017	19	2.5
Clothing		018	50	3.575
Dentist Office		019	51	2.647
Depart.Store		020	20	2.765
Doctor's Office		021	21	1.845
Drug, Super		022	48	2.533
Funeral Home		023	22	1.176
Furniture		024	23	1.946
Garage, Stable, Animal Barn		025,077	24	1.606,1.4
Hall, Organiz, Pool House		026	25	1.176
Hardware		027	26	3.5
Hotel		028	27	2.724
Jewelry, Greenhouse		029,012A	28	8.5, 1.2
Laundry		030	29	2
Liquor		031	30	1.52
Lumber		032	31	2.198
Market, Super, Poultry Houses		033,078	32	2.7,2.8
Market, Drive		034	49	1.923
Motel		035	33	1.5
Newspaper		036	34	3.125
Office Bldg.		037	35	1.588

Structure Type	Building inventory codes	Old Code	Flood Curve Type	Content value factor
Post Office, Fertilizer Tank, Swimming Pool, Tennis Courts		038,075, 013A,014A	36	1.176,1.4,1.15,0
Private Club		039	37	1.32
Restaurant		040	38	2.66
Rest Home		041	39	2
School		042	40	1.294
Service Station		043	41	1.524
Theater		044	42	1.796
Theater, Drive In		045	52	1.376
TV Station		046	43	1.699
Tavern		047	44	1.416
Variety Store, Pierhouse		048	53	2.67
Wash-a-teria (bathhouse)		049	54	2.235
Warehouse, Storage Building (farm&res), Bulk Tobacco Barn (farm)		050,072, 010A,074	45	3.47,1.5,1.5,1.5
Grain Bin		073	65	3.5
RESIDENTIAL				
Res type 1A	1NNN		1	*
Res type 2A	1NF, 2NNN, 2NF, 3PF, 3NN		2	*
Res type 3A			3	*
Res type 4A			4	*
Res type 1H	1PN		55	*
Res type 2H	2PN, 3PN		56	*
Res type 4H&3H			57	*
Res type 1B			58	*
Res type 1HL	1PF, 1PP, 1PS		59	*
Res type 2HL	2PF, 2PP, 2PS, 3PP, 3PS		60	*
Res type 4HL			61	*
5A Mobile Homes			62	*
Upper floors			63	*
Highways			64	

Key to GRANDUC Residential and Highway Structure Types

plus Condos upper floors & Highways

Structure Types - Coastal Residential

Enter Type in Col. 9 of Structure File

Enter GRANDUC Flood Types **Flood Curve Types**	for	**Description**	**Acceptable Floor Elevations**
1	⇨	**One story**	0-6 feet
58	⇨	**One story with Basement**	0-9 feet
55	⇨	**One story High-raised**	4-15 feet
59	⇨	**One story High-raised with 1/2 living area below**	0-6 feet
2	⇨	**Two story (essentially 2 full stories)**	0-6 feet
n/a		Two story with Basement	0-9 feet
56	⇨	**Two story High-raised**	4-15 feet
60	⇨	**Two story High-raised with 1/2 living area below**	0-6 feet
3	⇨	**Split level - All space in living area**	0
n/a		Split level - Garage on lowest level	0
n/a		Split level - 1/2 garage 1/2 living area on lowest level	0-4 feet
4	⇨	**1 1/2 story**	0-6 feet
n/a		1 1/2 story with Basement	0-9 feet
57	⇨	**1 1/2 story High-raised**	4-15 feet
61	⇨	**1 1/2 story High-raised with 1/2 living area below**	0-6 feet
62	⇨	**Mobile Home**	0-6 feet
63	⇨	**Residential Condos - upper floors**	
64	⇨	**Highways**	

All residential structures have a set content percentage of 30 %, 40 %, or 50 %.

FLOOD DAMAGE CURVES BY TYPE OF STRUCTURE

Flood Type 1

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-1	0
-6	0.005	0	0.112
-1	0.01	1	0.24
0	0.093	2	0.364
1	0.136	3	0.429
2	0.233	4	0.46
5	0.361	5	0.52
10	0.523	10	0.865
15	0.725	15	0.955
16	0.8	16	1
20	0.85	17	1
24	0.85	24	1

Flood Type 2

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-7	0
-6	0.003	-1	0
-1	0.006	0	0.073
0	0.07	1	0.178
1	0.091	2	0.259
2	0.145	3	0.303
5	0.25	4	0.4
10	0.36	5	0.5
15	0.54	10	0.58
16	0.57	15	0.82
20	0.675	16	0.86
24	0.765	17	1
		24	1

Flood Type 3

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-1	0
-6	0	0	0.034
-1	0	1	0.153
0	0.028	2	0.213
1	0.048	3	0.253
2	0.07	4	0.32
5	0.202	5	0.44
10	0.43	10	0.716
15	0.618	15	0.907
16	0.666	16	0.936
20	0.776	17	0.943
24	0.84	24	1

Flood Type 4

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-1	0
-6	0.004	0	0.093
-1	0.007	1	0.21
0	0.079	2	0.312
1	0.109	3	0.366
2	0.18	4	0.43
5	0.29	5	0.51
10	0.42	10	0.8
15	0.5	15	0.87
16	0.505	16	0.88
20	0.595	17	1
24	0.75	24	1

Flood Type 5

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.15
1	0.195
2	0.212
3	0.23
4	0.254
5	0.289
6	0.318
7	0.346
9	0.42
11	0.505
13	0.58
14	0.61
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 6

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.14
2	0.23
3	0.315
4	0.38
5	0.44
6	0.505
7	0.56
9	0.63
10	0.655
12	0.71
14	0.75
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 7

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.035
1	0.064
2	0.091
3	0.135
4	0.195
5	0.292
6	0.428
7	0.575
8	0.675
10	0.777
12	0.866
14	0.94
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 8

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.07
1	0.14
2	0.21
3	0.26
4	0.279
5	0.28
6	0.289
8	0.309
9	0.32
10	0.33
12	0.349
14	0.38
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 9

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.105
2	0.19
3	0.268
4	0.324
5	0.369
6	0.41
8	0.49
10	0.55
12	0.61
13	0.64
14	0.667
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 10

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.06
1	0.1
2	0.124
3	0.16
4	0.232
5	0.37
6	0.54
7	0.74
8	0.832
10	0.9
12	0.93
14	0.936
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 11

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.01
1	0.05
2	0.132
3	0.21
4	0.23
5	0.242
6	0.26
7	0.278
8	0.3
10	0.35
12	0.394
14	0.45
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 12

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.07
2	0.146
3	0.245
4	0.311
5	0.385
6	0.45
7	0.52
8	0.571
10	0.667
12	0.748
14	0.819
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 13

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.09
2	0.13
3	0.17
4	0.21
5	0.26
6	0.32
7	0.37
8	0.425
10	0.521
12	0.6
14	0.655
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 14

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.09
1	0.17
2	0.235
3	0.294
4	0.36
5	0.483
6	0.61
7	0.752
8	0.837
10	0.871
12	0.91
14	0.92
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 15

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.24
1	0.3
2	0.327
3	0.35
4	0.393
5	0.461
6	0.549
7	0.62
8	0.681
10	0.752
12	0.809
14	0.851
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 16

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.037
1	0.085
2	0.152
3	0.216
4	0.269
5	0.345
6	0.444
7	0.548
8	0.641
10	0.768
12	0.87
14	0.945
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 17

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.12
1	0.165
2	0.19
3	0.218
4	0.248
5	0.28
6	0.32
7	0.37
8	0.425
10	0.529
12	0.63
14	0.73
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 18

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.11
2	0.19
3	0.27
4	0.39
5	0.52
6	0.68
7	0.841
8	0.954
10	0.98
12	0.982
14	0.985
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 19

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.07
1	0.161
2	0.272
3	0.37
4	0.415
5	0.466
6	0.49
7	0.52
8	0.549
10	0.592
12	0.635
14	0.68
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 20

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.15
1	0.201
2	0.286
3	0.366
4	0.435
5	0.495
6	0.552
7	0.615
8	0.666
10	0.751
12	0.84
14	0.973
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 21

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.02
1	0.07
2	0.168
3	0.26
4	0.34
5	0.43
6	0.51
7	0.58
8	0.645
10	0.77
12	0.859
14	0.95
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 22

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.17
1	0.245
2	0.31
3	0.38
4	0.465
5	0.545
6	0.625
7	0.705
8	0.775
10	0.841
12	0.876
14	0.915
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 23

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.147
1	0.251
2	0.341
3	0.4
4	0.442
5	0.472
6	0.497
7	0.524
8	0.554
10	0.622
12	0.679
14	0.739
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 24

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.03
1	0.072
2	0.121
3	0.168
4	0.202
5	0.241
6	0.28
7	0.32
8	0.365
10	0.458
12	0.545
14	0.636
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 25

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.015
1	0.033
2	0.06
3	0.105
4	0.178
5	0.233
6	0.3
7	0.36
8	0.43
10	0.568
12	0.695
14	0.821
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 26

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.103
2	0.185
3	0.248
4	0.288
5	0.327
6	0.37
7	0.415
8	0.465
10	0.548
12	0.638
14	0.724
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 27

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.11
1	0.21
2	0.3
3	0.37
4	0.42
5	0.465
6	0.51
7	0.56
8	0.61
10	0.7
12	0.79
14	0.88
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 28

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.07
1	0.16
2	0.27
3	0.37
4	0.44
5	0.51
6	0.57
7	0.63
8	0.7
10	0.8
12	0.876
14	0.92
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 29

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.12
2	0.204
3	0.29
4	0.37
5	0.45
6	0.52
7	0.598
8	0.65
10	0.732
12	0.816
14	0.899
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 30

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.08
1	0.13
2	0.17
3	0.21
4	0.249
5	0.29
6	0.349
7	0.4
8	0.455
10	0.56
12	0.65
14	0.74
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 31

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.03
1	0.058
2	0.081
3	0.13
4	0.2
5	0.28
6	0.35
7	0.42
8	0.498
10	0.637
12	0.78
14	0.92
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 32

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.06
1	0.192
2	0.349
3	0.482
4	0.561
5	0.641
6	0.72
7	0.8
8	0.857
10	0.901
12	0.922
14	0.94
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 33

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.1
1	0.164
2	0.21
3	0.28
4	0.363
5	0.455
6	0.54
7	0.63
8	0.7
10	0.749
12	0.79
14	0.829
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 34

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.02
1	0.069
2	0.122
3	0.187
4	0.245
5	0.302
6	0.36
7	0.41
8	0.46
10	0.56
12	0.66
14	0.76
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 35

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.26
1	0.349
2	0.41
3	0.48
4	0.545
5	0.604
6	0.66
7	0.714
8	0.763
10	0.825
12	0.879
14	0.932
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 36

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.08
2	0.095
3	0.103
4	0.113
5	0.125
6	0.135
7	0.145
8	0.158
10	0.181
12	0.21
14	0.239
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 37

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.06
1	0.185
2	0.334
3	0.44
4	0.485
5	0.53
6	0.57
7	0.61
8	0.66
10	0.741
12	0.825
14	0.905
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 38

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.08
1	0.199
2	0.318
3	0.43
4	0.52
5	0.59
6	0.66
7	0.73
8	0.787
10	0.86
12	0.93
14	0.968
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 39

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.12
1	0.205
2	0.27
3	0.34
4	0.413
5	0.49
6	0.55
7	0.62
8	0.68
10	0.78
12	0.88
14	0.975
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 40

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.22
2	0.29
3	0.34
4	0.39
5	0.44
6	0.48
7	0.529
8	0.573
10	0.66
12	0.745
14	0.83
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 41

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.065
1	0.128
2	0.205
3	0.278
4	0.327
5	0.374
6	0.42
7	0.47
8	0.517
10	0.614
12	0.705
14	0.802
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 42

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.02
1	0.075
2	0.163
3	0.21
4	0.221
5	0.231
6	0.242
7	0.25
8	0.251
10	0.252
12	0.261
14	0.27
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 43

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.03
1	0.06
2	0.085
3	0.11
4	0.14
5	0.17
6	0.2
7	0.231
8	0.27
10	0.338
12	0.405
14	0.47
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 44

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.03
1	0.13
2	0.455
3	0.631
4	0.665
5	0.679
6	0.691
7	0.701
8	0.715
10	0.74
12	0.76
14	0.781
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 45

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.12
2	0.23
3	0.336
4	0.43
5	0.51
6	0.59
7	0.68
8	0.741
10	0.801
12	0.86
14	0.905
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 46

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.01
1	0.06
2	0.114
3	0.232
4	0.33
5	0.418
6	0.5
7	0.6
8	0.67
10	0.74
12	0.81
14	0.875
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 47

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.04
1	0.059
2	0.07
3	0.101
4	0.22
5	0.39
6	0.56
7	0.75
8	0.88
10	0.925
12	0.941
14	0.961
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 48

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.18
2	0.36
3	0.495
4	0.569
5	0.635
6	0.7
7	0.775
8	0.826
10	0.855
12	0.876
14	0.901
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 49

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.02
1	0.14
2	0.255
3	0.375
4	0.495
5	0.6
6	0.708
7	0.828
8	0.911
10	0.97
12	0.98
14	0.995
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 50

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.05
1	0.187
2	0.431
3	0.595
4	0.66
5	0.72
6	0.773
7	0.83
8	0.87
10	0.911
12	0.94
14	0.964
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 51

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.02
1	0.05
2	0.091
3	0.155
4	0.245
5	0.358
6	0.5
7	0.662
8	0.781
10	0.84
12	0.865
14	0.891
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 52

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.01
1	0.012
2	0.019
3	0.029
4	0.06
5	0.091
6	0.13
7	0.169
8	0.21
10	0.28
12	0.351
14	0.421
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 53

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.045
1	0.106
2	0.179
3	0.244
4	0.295
5	0.345
6	0.392
7	0.433
8	0.48
10	0.572
12	0.66
14	0.745
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 54

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.06
1	0.2
2	0.395
3	0.524
4	0.58
5	0.625
6	0.67
7	0.716
8	0.76
10	0.835
12	0.905
14	0.971
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0.0001

Flood Type 55

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-14	0.01	-14	0.007
-5	0.035	-13	0.008
-1	0.055	-6	0.06
0	0.093	-2	0.125
1	0.136	-1	0.13
2	0.233	0	0.14
3	0.36	1	0.26
4	0.39	2	0.38
5	0.455	3	0.52
10	0.536	4	0.635
15	0.735	5	0.78
16	0.8	10	0.945
20	0.85	14	1
24	1	24	1

Flood Type 56

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-14	0.006	-14	0.011
-6	0.025	-13	0.012
-2	0.033	-6	0.045
-1	0.035	-1	0.094
0	0.07	0	0.101
1	0.091	1	0.187
2	0.145	2	0.286
3	0.229	3	0.38
4	0.253	4	0.45
5	0.29	5	0.534
10	0.369	10	0.633
15	0.548	16	0.86
20	0.675	17	1
24	1	24	1

Flood Type 57

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-14	0.007	-14	0.001
-6	0.03	-6	0.04
-1	0.04	-2	0.082
0	0.079	0	0.093
1	0.109	1	0.21
2	0.186	2	0.312
3	0.28	3	0.43
4	0.302	4	0.54
5	0.336	5	0.673
10	0.431	10	0.81
15	0.503	14	0.86
16	0.505	16	0.88
20	0.595	17	1
24	1	24	1

Flood Type 58

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0.01	-8	0.005
-2	0.05	-3	0.115
0	0.1	-2	0.125
1	0.14	-1	0.13
2	0.223	0	0.2
3	0.258	1	0.34
4	0.278	2	0.48
5	0.327	3	0.52
10	0.536	4	0.635
13	0.632	5	0.78
16	0.8	10	0.945
17	0.835	13	0.992
20	0.85	14	1
24	1	24	1

Flood Type 59

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-6	0.002	-1	0
0	0.007	0	0.021
1	0.035	1	0.112
2	0.055	2	0.157
7	0.165	3	0.198
8	0.2	4	0.243
9	0.208	5	0.282
10	0.317	7	0.322
11	0.421	8	0.377
12	0.452	10	0.542
16	0.61	12	0.717
17	0.625	13	0.82
20	0.677	17	0.952
24	1	24	1

Flood Type 60

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-6	0.001	-1	0
0	0.004	0	0.014
1	0.022	1	0.068
6	0.099	2	0.098
7	0.102	3	0.126
8	0.126	4	0.154
9	0.158	5	0.179
10	0.208	7	0.205
12	0.317	8	0.251
13	0.355	10	0.402
16	0.433	12	0.536
17	0.447	17	0.674
20	0.548	22	0.866
24	1	24	1

Flood Type 61

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-1	0
-6	0.002	0	0.016
0	0.005	3	0.148
1	0.027	5	0.211
7	0.125	7	0.241
8	0.152	8	0.282
10	0.27	9	0.343
11	0.346	10	0.444
12	0.37	11	0.54
13	0.406	12	0.625
16	0.49	13	0.73
17	0.513	17	0.85
20	0.567	22	0.895
24	1	24	1

Flood Type 62

Inundation in feet	Structure Damage	Inundation in feet	Content Damage
-24	0	-24	0
-7	0	-1	0
-6	0.005	0	0.06
-3	0.01	1	0.215
-1	0.03	2	0.316
0	0.08	3	0.365
1	0.272	4	0.5
2	0.417	5	0.63
3	0.6	6	0.74
4	0.93	7	0.82
5	0.96	8	1
10	0.978	24	1
11	0.98		
24	1		

Flood Type 63

Inundation in feet	Structure Damage
-24	0
-14	0
-13	0
-2	0
-1	0
1	0
2	0
3	0
14	0
16	0
19	0
21	0
22	0
24	0

Inundation in feet	Content Damage
-24	0
-10	0
-7	0
-3	0
0	0
5	0
7	0
8	0
9	0
12	0
13	0
16	0
24	0

Flood Type 64

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.0065
1	0.013
2	0.023
3	0.033
4	0.038
5	0.042
7	0.052
10	0.066
12	0.077
15	0.095
18	0.113
20	0.125
24	0.15

Inundation in feet	Content Damage
-24	0
0	0
24	0

Flood Type 65

Inundation in feet	Structure Damage
-24	0
-1	0
0	0.028
1	0.085
2	0.152
3	0.216
5	0.345
7	0.548
8	0.641
9	0.708
10	0.768
11	0.826
15	1
20	1
24	1

Inundation in feet	Content Damage
-24	0
0	0
24	0

Attachment B-2 – Erosion Damage Curves

Decision tree for assigning Erosion Curves to Structures

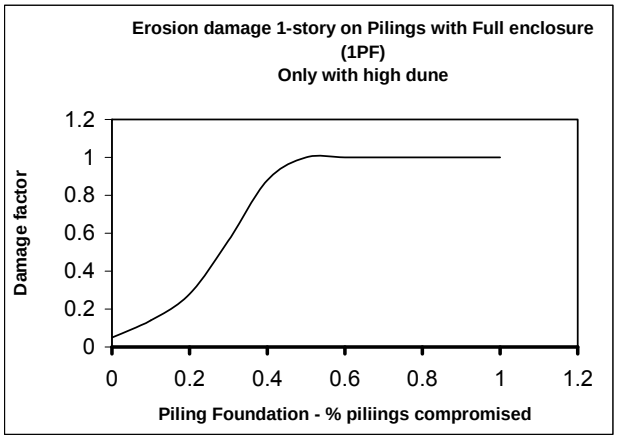
Ocean-front	Building Code	Ground Elevation	Piling Length	Erosion Curve #
		for short pilings high if ≥12 feet NGVD	assume short if building date is prior 1986	
		for long pilings high if ≥16 feet NGVD		
Yes, or 1	1PF	high	both	1
Yes, or 1	1PF	low	short	2
Yes, or 1	1PF	low	long	3
Yes, or 1	2PF	high	both	4
Yes, or 1	2PF	low	short	5
Yes, or 1	2PF	low	long	6
Yes, or 1	3PF	high	both	7
Yes, or 1	3PF	low	long	8
Yes, or 1	3PF	low	short	9
Yes, or 1	1PP	high	both	10
Yes, or 1	1PP	low	long	11
Yes, or 1	1PP	low	short	12
Yes, or 1	2PP	high	both	13
Yes, or 1	2PP	low	long	14
Yes, or 1	2PP	low	short	15
Yes, or 1	3PP	high	both	16
Yes, or 1	3PP	low	short	17
Yes, or 1	3PP	low	long	18
Yes, or 1	1PS	high	both	19
Yes, or 1	1PS	low	long	20
Yes, or 1	1PS	low	short	21
Yes, or 1	2PS	high	both	22
Yes, or 1	2PS	low	short	23
Yes, or 1	2PS	low	long	24
Yes, or 1	3PS	high	both	25
Yes, or 1	3PS	low	long	26
Yes, or 1	3PS	low	short	27
Yes, or 1	1PN,2PN,3PN	high	both	28
Yes, or 1	1PN,2PN,3PN	low	long	29
Yes, or 1	1PN,2PN,3PN	low	short	30
No, or 0	Any	Any	Any	31
Yes, or 1	1NN, 2NN, 3NN, 1NF, 2NF, & all commercial structures	Any	Any	31
Yes, or 1	Upper Floors	any	both	32
Yes, or 1	mobile, utility, pools	any	both	33
Yes, or 1	highways	any	N/A	34

* if dune elevation ≥16 feet do not need to assign long or short pilings because they have the same erosion curve.

1PF high dune Curve #1

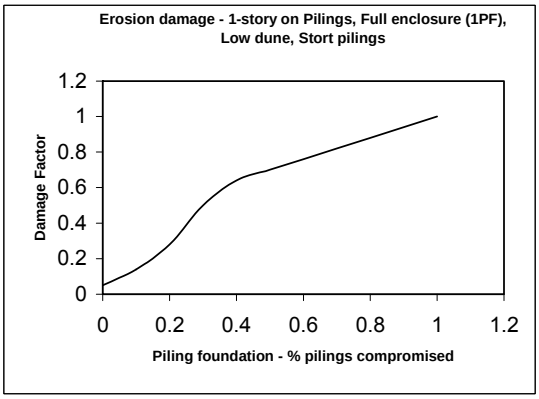
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.4	0.05	0.6	0.05	0.05
0.1	0.4	0.2	0.6	0.1	0.14
0.2	0.4	0.4	0.6	0.2	0.28
0.3	0.4	0.8	0.6	0.4	0.56
0.4	0.4	1	0.6	0.8	0.88
0.5	0.4	1	0.6	1	1
0.6	0.4	1	0.6	1	1
0.7	0.4	1	0.6	1	1
0.8	0.4	1	0.6	1	1
0.9	0.4	1	0.6	1	1
1	0.4	1	0.6	1	1

**Assume high dune Elevation equal or exceed 12 feet above NGVD.



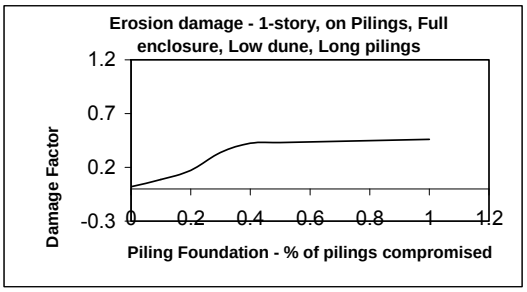
1PF low elevation, short pilings Curve #2

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.4	0.05	0.6	0.05	0.05
0.1	0.4	0.2	0.6	0.1	0.14
0.2	0.4	0.4	0.6	0.2	0.28
0.3	0.4	0.8	0.6	0.3	0.5
0.4	0.4	1	0.6	0.4	0.64
0.5	0.4	1	0.6	0.5	0.7
0.6	0.4	1	0.6	0.6	0.76
0.7	0.4	1	0.6	0.7	0.82
0.8	0.4	1	0.6	0.8	0.88
0.9	0.4	1	0.6	0.9	0.94
1	0.4	1	0.6	1	1

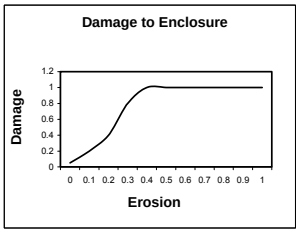


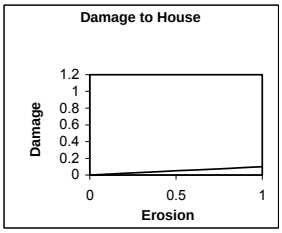
1PF low elevation, long piling Curve #3

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.4	0.05	0.6	0	0.02
0.1	0.4	0.2	0.6	0.01	0.086
0.2	0.4	0.4	0.6	0.02	0.172
0.3	0.4	0.8	0.6	0.03	0.338
0.4	0.4	1	0.6	0.04	0.424
0.5	0.4	1	0.6	0.05	0.43
0.6	0.4	1	0.6	0.06	0.436
0.7	0.4	1	0.6	0.07	0.442
0.8	0.4	1	0.6	0.08	0.448
0.9	0.4	1	0.6	0.09	0.454
1	0.4	1	0.6	0.1	0.46



*these graphs are for the appendices for the Bogue 933 project.

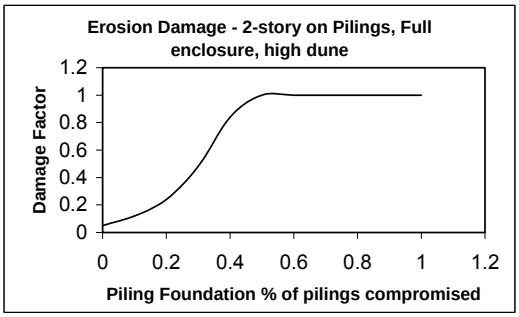




2PF high dune Curve #4

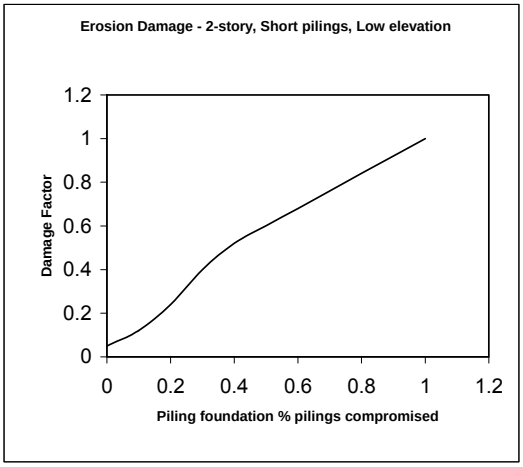
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0.05	0.05
0.1	0.2	0.2	0.8	0.1	0.12
0.2	0.2	0.4	0.8	0.2	0.24
0.3	0.2	0.8	0.8	0.4	0.48
0.4	0.2	1	0.8	0.8	0.84
0.5	0.2	1	0.8	1	1
0.6	0.2	1	0.8	1	1
0.7	0.2	1	0.8	1	1
0.8	0.2	1	0.8	1	1
0.9	0.2	1	0.8	1	1
1	0.2	1	0.8	1	1

**Assume high dune



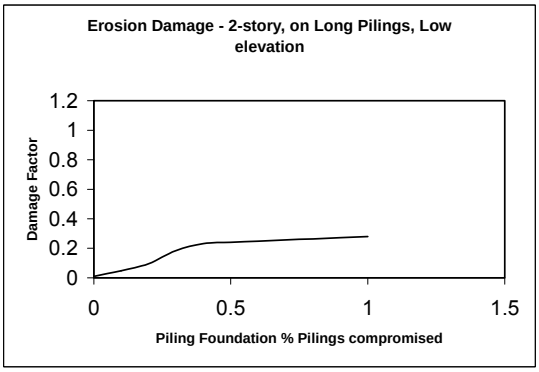
2PF low elevation (<12) and short pilings (<=8 Curve #5

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0.05	0.05
0.1	0.2	0.2	0.8	0.1	0.12
0.2	0.2	0.4	0.8	0.2	0.24
0.3	0.2	0.8	0.8	0.3	0.4
0.4	0.2	1	0.8	0.4	0.52
0.5	0.2	1	0.8	0.5	0.6
0.6	0.2	1	0.8	0.6	0.68
0.7	0.2	1	0.8	0.7	0.76
0.8	0.2	1	0.8	0.8	0.84
0.9	0.2	1	0.8	0.9	0.92
1	0.2	1	0.8	1	1



2PF Low elevation (<16) and long pilings (>=8 Curve #6

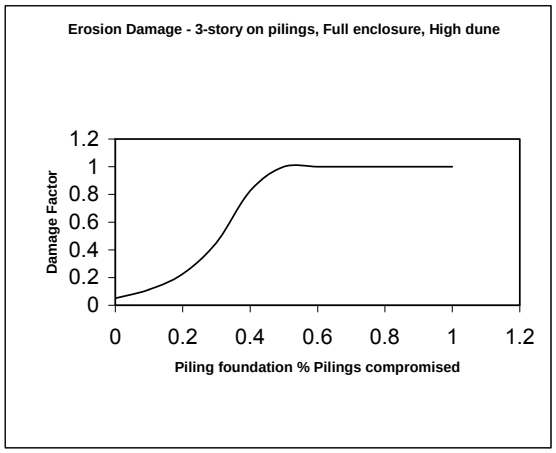
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0	0.01
0.1	0.2	0.2	0.8	0.01	0.048
0.2	0.2	0.4	0.8	0.02	0.096
0.3	0.2	0.8	0.8	0.03	0.184
0.4	0.2	1	0.8	0.04	0.232
0.5	0.2	1	0.8	0.05	0.24
0.6	0.2	1	0.8	0.06	0.248
0.7	0.2	1	0.8	0.07	0.256
0.8	0.2	1	0.8	0.08	0.264
0.9	0.2	1	0.8	0.09	0.272
1	0.2	1	0.8	0.1	0.28



3PF high dune Curve #7

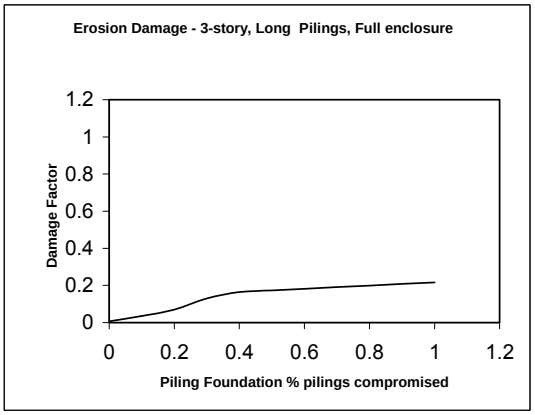
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.13	0.05	0.87	0.05	0.05
0.1	0.13	0.2	0.87	0.1	0.113
0.2	0.13	0.4	0.87	0.2	0.226
0.3	0.13	0.8	0.87	0.4	0.452
0.4	0.13	1	0.87	0.8	0.826
0.5	0.13	1	0.87	1	1
0.6	0.13	1	0.87	1	1
0.7	0.13	1	0.87	1	1
0.8	0.13	1	0.87	1	1
0.9	0.13	1	0.87	1	1
1	0.13	1	0.87	1	1

**Assume high dune



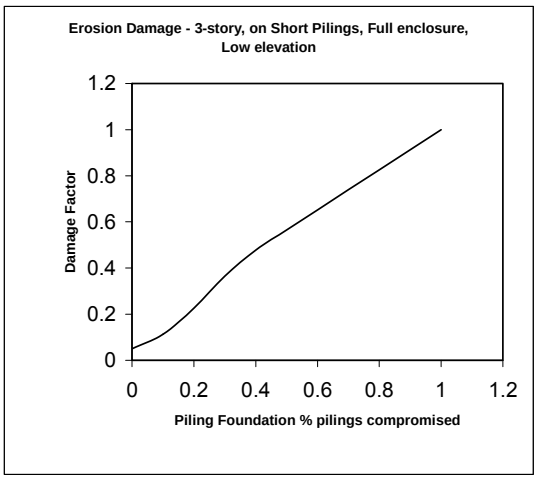
3PF low dune, long pilings Curve #8

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.13	0.05	0.87	0	0.0065
0.1	0.13	0.2	0.87	0.01	0.0347
0.2	0.13	0.4	0.87	0.02	0.0694
0.3	0.13	0.8	0.87	0.03	0.1301
0.4	0.13	1	0.87	0.04	0.1648
0.5	0.13	1	0.87	0.05	0.1735
0.6	0.13	1	0.87	0.06	0.1822
0.7	0.13	1	0.87	0.07	0.1909
0.8	0.13	1	0.87	0.08	0.1996
0.9	0.13	1	0.87	0.09	0.2083
1	0.13	1	0.87	0.1	0.217



3PF low dune, short pilings Curve #9

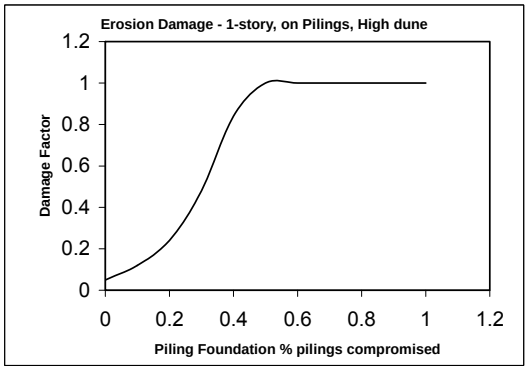
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.13	0.05	0.87	0.05	0.05
0.1	0.13	0.2	0.87	0.1	0.113
0.2	0.13	0.4	0.87	0.2	0.226
0.3	0.13	0.8	0.87	0.3	0.365
0.4	0.13	1	0.87	0.4	0.478
0.5	0.13	1	0.87	0.5	0.565
0.6	0.13	1	0.87	0.6	0.652
0.7	0.13	1	0.87	0.7	0.739
0.8	0.13	1	0.87	0.8	0.826
0.9	0.13	1	0.87	0.9	0.913
1	0.13	1	0.87	1	1



1PP High dune, long or short pilings Curve #10

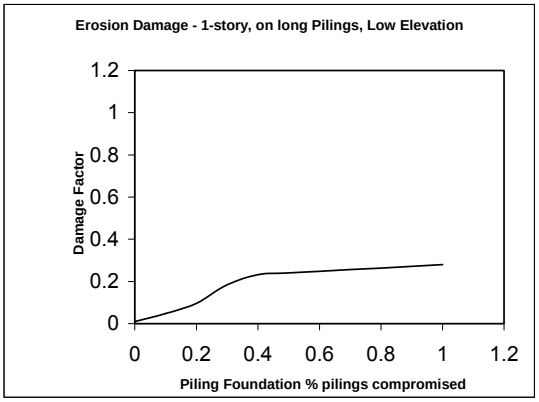
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0.05	0.05
0.1	0.2	0.2	0.8	0.1	0.12
0.2	0.2	0.4	0.8	0.2	0.24
0.3	0.2	0.8	0.8	0.4	0.48
0.4	0.2	1	0.8	0.8	0.84
0.5	0.2	1	0.8	1	1
0.6	0.2	1	0.8	1	1
0.7	0.2	1	0.8	1	1
0.8	0.2	1	0.8	1	1
0.9	0.2	1	0.8	1	1
1	0.2	1	0.8	1	1

**Assume high dune



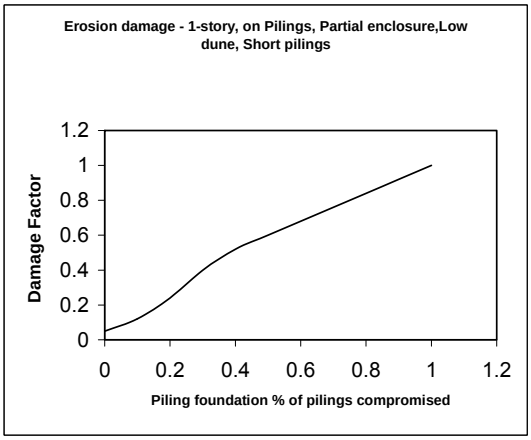
1PP Low elevation and long pilings Curve #11

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0	0.01
0.1	0.2	0.2	0.8	0.01	0.048
0.2	0.2	0.4	0.8	0.02	0.096
0.3	0.2	0.8	0.8	0.03	0.184
0.4	0.2	1	0.8	0.04	0.232
0.5	0.2	1	0.8	0.05	0.24
0.6	0.2	1	0.8	0.06	0.248
0.7	0.2	1	0.8	0.07	0.256
0.8	0.2	1	0.8	0.08	0.264
0.9	0.2	1	0.8	0.09	0.272
1	0.2	1	0.8	0.1	0.28



1PP low elevation, short pilings Curve #12

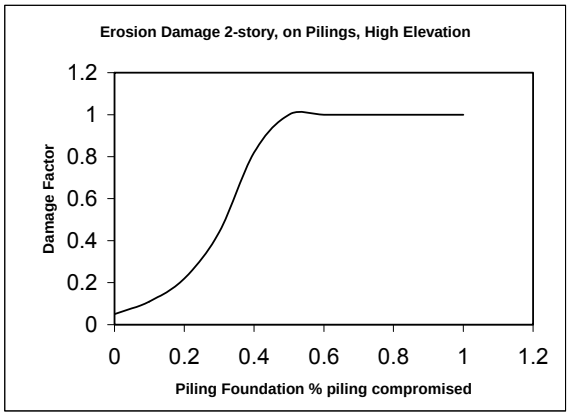
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.2	0.05	0.8	0.05	0.05
0.1	0.2	0.2	0.8	0.1	0.12
0.2	0.2	0.4	0.8	0.2	0.24
0.3	0.2	0.8	0.8	0.3	0.4
0.4	0.2	1	0.8	0.4	0.52
0.5	0.2	1	0.8	0.5	0.6
0.6	0.2	1	0.8	0.6	0.68
0.7	0.2	1	0.8	0.7	0.76
0.8	0.2	1	0.8	0.8	0.84
0.9	0.2	1	0.8	0.9	0.92
1	0.2	1	0.8	1	1



2PP high elevation, short or long piling Curve #13

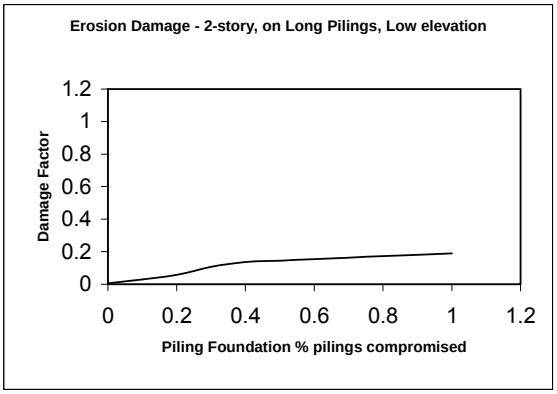
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0.05	0.05
0.1	0.1	0.2	0.9	0.1	0.11
0.2	0.1	0.4	0.9	0.2	0.22
0.3	0.1	0.8	0.9	0.4	0.44
0.4	0.1	1	0.9	0.8	0.82
0.5	0.1	1	0.9	1	1
0.6	0.1	1	0.9	1	1
0.7	0.1	1	0.9	1	1
0.8	0.1	1	0.9	1	1
0.9	0.1	1	0.9	1	1
1	0.1	1	0.9	1	1

**Assume high dune



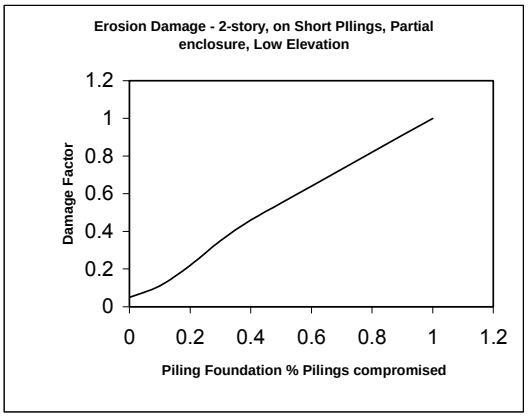
2PP low elevation and long pilings Curve #14

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0	0.005
0.1	0.1	0.2	0.9	0.01	0.029
0.2	0.1	0.4	0.9	0.02	0.058
0.3	0.1	0.8	0.9	0.03	0.107
0.4	0.1	1	0.9	0.04	0.136
0.5	0.1	1	0.9	0.05	0.145
0.6	0.1	1	0.9	0.06	0.154
0.7	0.1	1	0.9	0.07	0.163
0.8	0.1	1	0.9	0.08	0.172
0.9	0.1	1	0.9	0.09	0.181
1	0.1	1	0.9	0.1	0.19



2PP low elevation and short pilings Curve #15

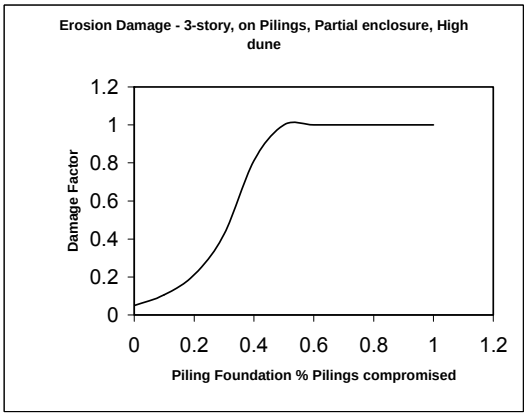
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0.05	0.05
0.1	0.1	0.2	0.9	0.1	0.11
0.2	0.1	0.4	0.9	0.2	0.22
0.3	0.1	0.8	0.9	0.3	0.35
0.4	0.1	1	0.9	0.4	0.46
0.5	0.1	1	0.9	0.5	0.55
0.6	0.1	1	0.9	0.6	0.64
0.7	0.1	1	0.9	0.7	0.73
0.8	0.1	1	0.9	0.8	0.82
0.9	0.1	1	0.9	0.9	0.91
1	0.1	1	0.9	1	1



3PP high dune, short or long pilings Curve #16

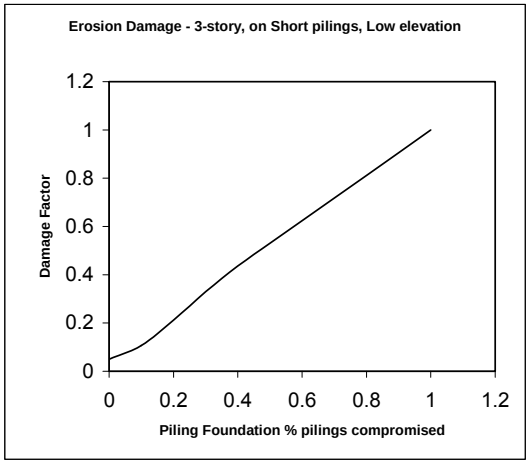
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.06	0.05	0.94	0.05	0.05
0.1	0.06	0.2	0.94	0.1	0.106
0.2	0.06	0.4	0.94	0.2	0.212
0.3	0.06	0.8	0.94	0.4	0.424
0.4	0.06	1	0.94	0.8	0.812
0.5	0.06	1	0.94	1	1
0.6	0.06	1	0.94	1	1
0.7	0.06	1	0.94	1	1
0.8	0.06	1	0.94	1	1
0.9	0.06	1	0.94	1	1
1	0.06	1	0.94	1	1

**Assume high dune



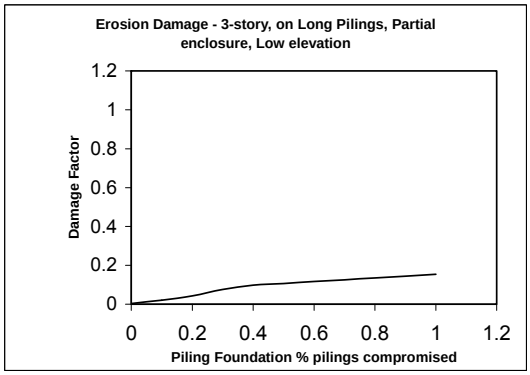
3PP low elevation, short pilings Curve #17

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.06	0.05	0.94	0.05	0.05
0.1	0.06	0.2	0.94	0.1	0.106
0.2	0.06	0.4	0.94	0.2	0.212
0.3	0.06	0.8	0.94	0.3	0.33
0.4	0.06	1	0.94	0.4	0.436
0.5	0.06	1	0.94	0.5	0.53
0.6	0.06	1	0.94	0.6	0.624
0.7	0.06	1	0.94	0.7	0.718
0.8	0.06	1	0.94	0.8	0.812
0.9	0.06	1	0.94	0.9	0.906
1	0.06	1	0.94	1	1



3PP low elevation, long pilings Curve #18

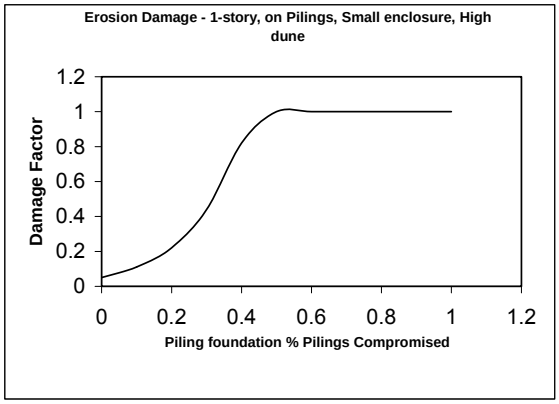
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.06	0.05	0.94	0	0.003
0.1	0.06	0.2	0.94	0.01	0.0214
0.2	0.06	0.4	0.94	0.02	0.0428
0.3	0.06	0.8	0.94	0.03	0.0762
0.4	0.06	1	0.94	0.04	0.0976
0.5	0.06	1	0.94	0.05	0.107
0.6	0.06	1	0.94	0.06	0.1164
0.7	0.06	1	0.94	0.07	0.1258
0.8	0.06	1	0.94	0.08	0.1352
0.9	0.06	1	0.94	0.09	0.1446
1	0.06	1	0.94	0.1	0.154



1PS high dune Curve #19

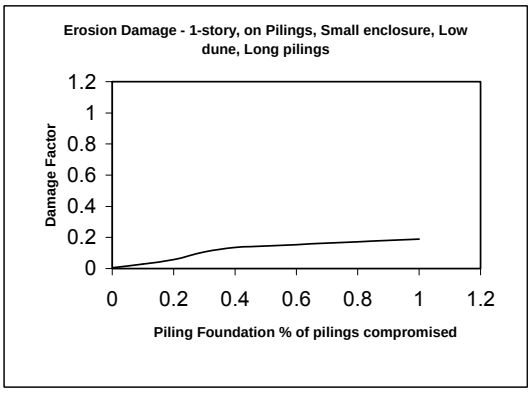
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0.05	0.05
0.1	0.1	0.2	0.9	0.1	0.11
0.2	0.1	0.4	0.9	0.2	0.22
0.3	0.1	0.8	0.9	0.4	0.44
0.4	0.1	1	0.9	0.8	0.82
0.5	0.1	1	0.9	1	1
0.6	0.1	1	0.9	1	1
0.7	0.1	1	0.9	1	1
0.8	0.1	1	0.9	1	1
0.9	0.1	1	0.9	1	1
1	0.1	1	0.9	1	1

**Assume high dune



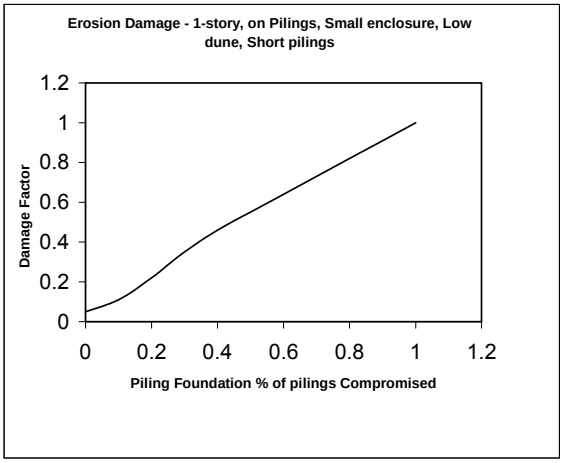
1PS low dune, long pilings Curve #20

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0	0.005
0.1	0.1	0.2	0.9	0.01	0.029
0.2	0.1	0.4	0.9	0.02	0.058
0.3	0.1	0.8	0.9	0.03	0.107
0.4	0.1	1	0.9	0.04	0.136
0.5	0.1	1	0.9	0.05	0.145
0.6	0.1	1	0.9	0.06	0.154
0.7	0.1	1	0.9	0.07	0.163
0.8	0.1	1	0.9	0.08	0.172
0.9	0.1	1	0.9	0.09	0.181
1	0.1	1	0.9	0.1	0.19



1PS low dune, short pilings Curve #21

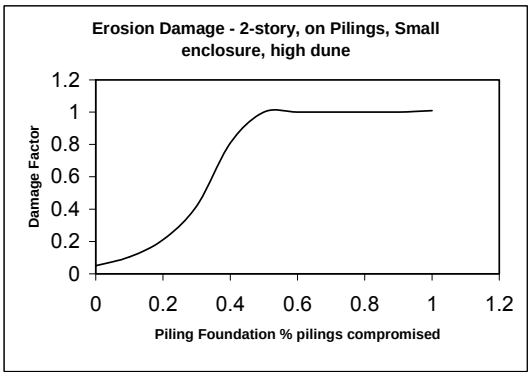
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.1	0.05	0.9	0.05	0.05
0.1	0.1	0.2	0.9	0.1	0.11
0.2	0.1	0.4	0.9	0.2	0.22
0.3	0.1	0.8	0.9	0.3	0.35
0.4	0.1	1	0.9	0.4	0.46
0.5	0.1	1	0.9	0.5	0.55
0.6	0.1	1	0.9	0.6	0.64
0.7	0.1	1	0.9	0.7	0.73
0.8	0.1	1	0.9	0.8	0.82
0.9	0.1	1	0.9	0.9	0.91
1	0.1	1	0.9	1	1



2PS high dune, short or long pilings Curve #22

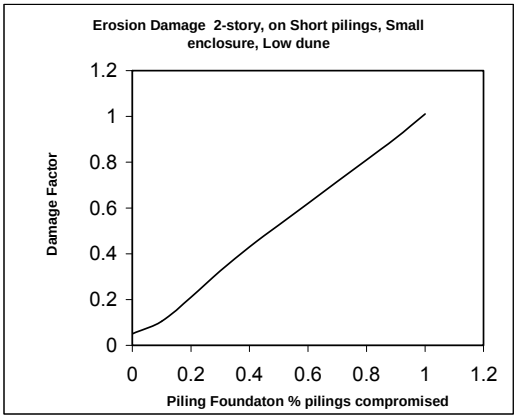
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.05	0.05	0.95	0.05	0.05
0.1	0.05	0.2	0.95	0.1	0.105
0.2	0.05	0.4	0.95	0.2	0.21
0.3	0.05	0.8	0.95	0.4	0.42
0.4	0.05	1	0.95	0.8	0.81
0.5	0.05	1	0.95	1	1
0.6	0.05	1	0.95	1	1
0.7	0.05	1	0.95	1	1
0.8	0.05	1	0.95	1	1
0.9	0.05	1	0.95	1	1
1	0.06	1	0.95	1	1.0

**Assume high dune



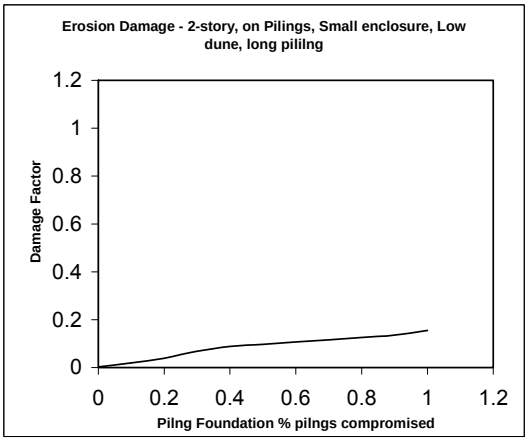
2PS low dune, short pilings Curve #23

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.05	0.05	0.95	0.05	0.05
0.1	0.05	0.2	0.95	0.1	0.105
0.2	0.05	0.4	0.95	0.2	0.21
0.3	0.05	0.8	0.95	0.3	0.325
0.4	0.05	1	0.95	0.4	0.43
0.5	0.05	1	0.95	0.5	0.525
0.6	0.05	1	0.95	0.6	0.62
0.7	0.05	1	0.95	0.7	0.715
0.8	0.05	1	0.95	0.8	0.81
0.9	0.05	1	0.95	0.9	0.905
1	0.06	1	0.95	1	1.0



2PS Low elevation, long pilings Curve #24

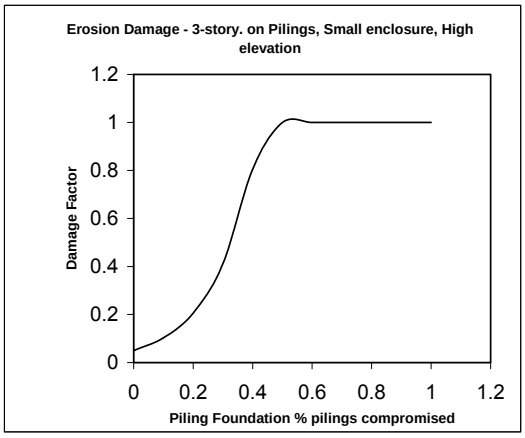
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.05	0.05	0.95	0	0.0025
0.1	0.05	0.2	0.95	0.01	0.0195
0.2	0.05	0.4	0.95	0.02	0.039
0.3	0.05	0.8	0.95	0.03	0.0685
0.4	0.05	1	0.95	0.04	0.088
0.5	0.05	1	0.95	0.05	0.0975
0.6	0.05	1	0.95	0.06	0.107
0.7	0.05	1	0.95	0.07	0.1165
0.8	0.05	1	0.95	0.08	0.126
0.9	0.05	1	0.95	0.09	0.1355
1	0.06	1	0.95	0.1	0.2



3PS high elevation, long or short pilings Curve #25

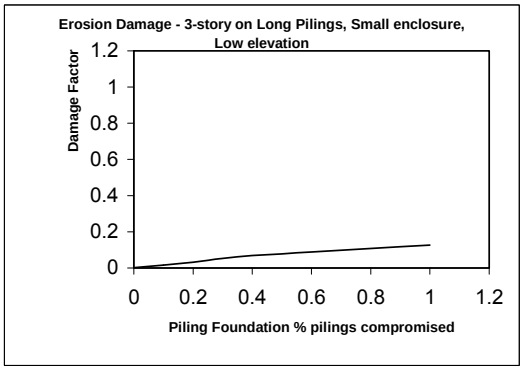
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.03	0.05	0.97	0.05	0.05
0.1	0.03	0.2	0.97	0.1	0.103
0.2	0.03	0.4	0.97	0.2	0.206
0.3	0.03	0.8	0.97	0.4	0.412
0.4	0.03	1	0.97	0.8	0.806
0.5	0.03	1	0.97	1	1
0.6	0.03	1	0.97	1	1
0.7	0.03	1	0.97	1	1
0.8	0.03	1	0.97	1	1
0.9	0.03	1	0.97	1	1
1	0.03	1	0.97	1	1

**Assume high dune



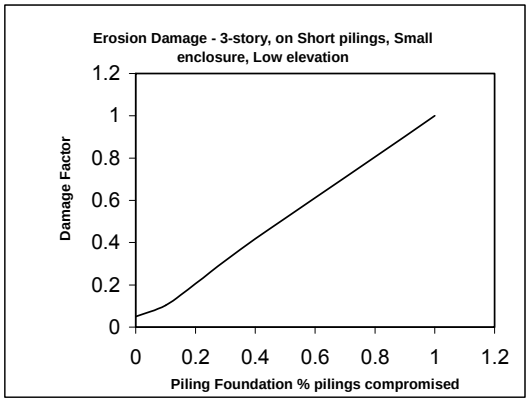
3PS low elevation, long pilings Curve #26

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.03	0.05	0.97	0	0.0015
0.1	0.03	0.2	0.97	0.01	0.0157
0.2	0.03	0.4	0.97	0.02	0.0314
0.3	0.03	0.8	0.97	0.03	0.0531
0.4	0.03	1	0.97	0.04	0.0688
0.5	0.03	1	0.97	0.05	0.0785
0.6	0.03	1	0.97	0.06	0.0882
0.7	0.03	1	0.97	0.07	0.0979
0.8	0.03	1	0.97	0.08	0.1076
0.9	0.03	1	0.97	0.09	0.1173
1	0.03	1	0.97	0.1	0.127



3PS low elevation, short pilings Curve #27

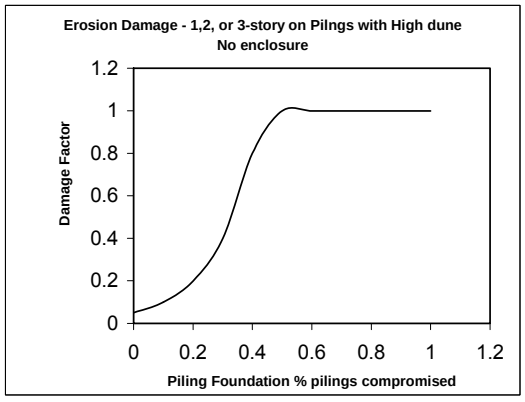
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0.03	0.05	0.97	0.05	0.05
0.1	0.03	0.2	0.97	0.1	0.103
0.2	0.03	0.4	0.97	0.2	0.206
0.3	0.03	0.8	0.97	0.3	0.315
0.4	0.03	1	0.97	0.4	0.418
0.5	0.03	1	0.97	0.5	0.515
0.6	0.03	1	0.97	0.6	0.612
0.7	0.03	1	0.97	0.7	0.709
0.8	0.03	1	0.97	0.8	0.806
0.9	0.03	1	0.97	0.9	0.903
1	0.03	1	0.97	1	1



1PN, 2PN, 3PN on high dune Curve #28

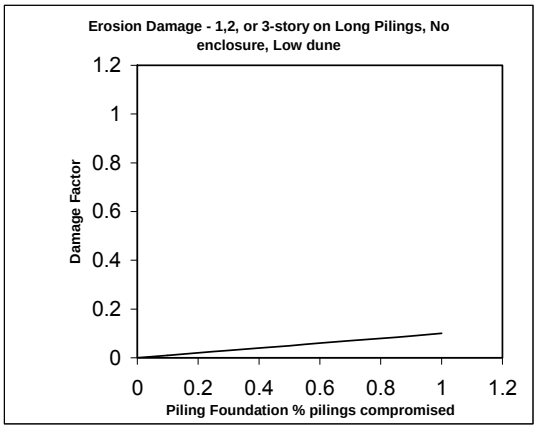
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0	0.05	1	0.05	0.05
0.1	0	0.2	1	0.1	0.1
0.2	0	0.4	1	0.2	0.2
0.3	0	0.8	1	0.4	0.4
0.4	0	1	1	0.8	0.8
0.5	0	1	1	1	1
0.6	0	1	1	1	1
0.7	0	1	1	1	1
0.8	0	1	1	1	1
0.9	0	1	1	1	1
1	0	1	1	1	1

**Assume high dune



1PN, 2PN, 3PN on low dune with long pilings Curve #29

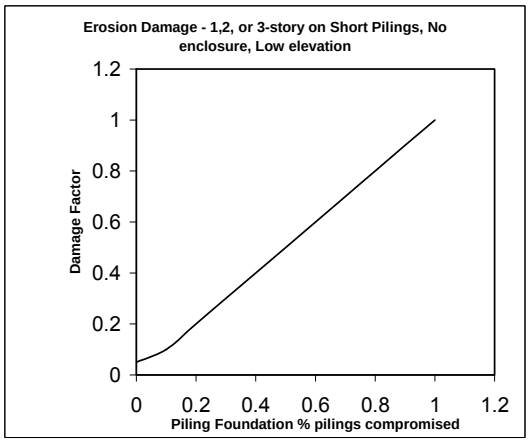
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0	0.05	1	0	0
0.1	0	0.2	1	0.01	0.01
0.2	0	0.4	1	0.02	0.02
0.3	0	0.8	1	0.03	0.03
0.4	0	1	1	0.04	0.04
0.5	0	1	1	0.05	0.05
0.6	0	1	1	0.06	0.06
0.7	0	1	1	0.07	0.07
0.8	0	1	1	0.08	0.08
0.9	0	1	1	0.09	0.09
1	0	1	1	0.1	0.1



Curve #30

1PN, 2PN, 3PN low elevation and short pilings

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0	0.05	1	0.05	0.05
0.1	0	0.2	1	0.1	0.1
0.2	0	0.4	1	0.2	0.2
0.3	0	0.8	1	0.3	0.3
0.4	0	1	1	0.4	0.4
0.5	0	1	1	0.5	0.5
0.6	0	1	1	0.6	0.6
0.7	0	1	1	0.7	0.7
0.8	0	1	1	0.8	0.8
0.9	0	1	1	0.9	0.9
1	0	1	1	1	1

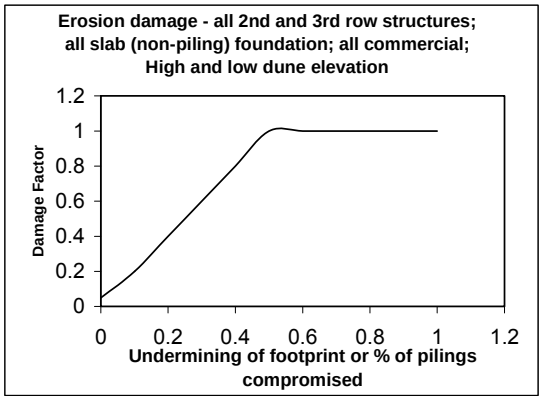


Curve #31

1NN, 2NN, 3NN, 1NF, 2NF, and all 2nd and 3rd row houses and commercial properties

Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0	0.05	1	0.05	0.05
0.1	0	0.2	1	0.2	0.2
0.2	0	0.4	1	0.4	0.4
0.3	0	0.8	1	0.6	0.6
0.4	0	1	1	0.8	0.8
0.5	0	1	1	1	1
0.6	0	1	1	1	1
0.7	0	1	1	1	1
0.8	0	1	1	1	1
0.9	0	1	1	1	1
1	0	1	1	1	1

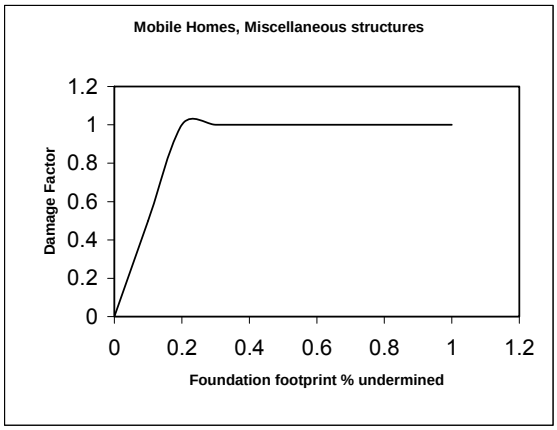
This curve is applied at any elevation



Curve #33

Mobile homes, utility buildings, oceanfront residential decks
detached decks, gazebos, pools, detached garages, buried public utilities

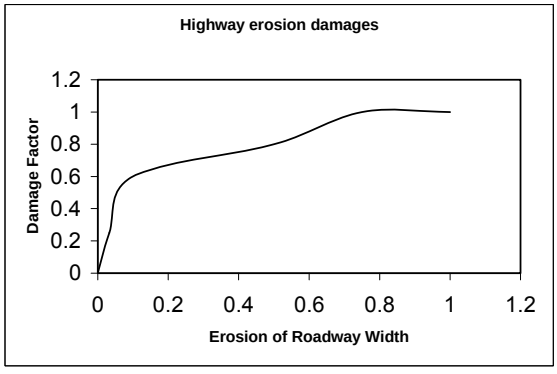
Erosion factor	Value to enclosure	damage to enclosure	value to house	damage to house	composite damage
0	0	0	1	0	0
0.1	0	0	1	0.5	0.5
0.2	0	0	1	1	1
0.3	0	0	1	1	1
0.4	0	0	1	1	1
0.5	0	0	1	1	1
0.6	0	0	1	1	1
0.7	0	0	1	1	1
0.8	0	0	1	1	1
0.9	0	0	1	1	1
1	0	0	1	1	1



Highway erosion damages

Curve #34

erosion	damage
0	0
0.033	0.25
0.1	0.6
0.5	0.8
0.75	1
1	1



Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
27	027S_SH3016A	0	107	140	57	35	1	59	$ 113,001	$ 40,355	20.3	31.6	1	1	-1	0.5
27	027S_SHHWY	110	64	1000	130	24	1	64	$ 42,450	$ -	16.22	16.2	1	34	-1	0.5
27	027BEEC0105A	280	80	90	269	30	1	1	$ 84,005	$ 30,000	10	13.6	1	31	-1	0.5
27	027BEEC0106A	280	80	90	284	40	1	59	$ 224,013	$ 80,000	9	17.5	1	31	-1	2
27	027HISP0105A	280	80	90	274	30	1	60	$ 190,411	$ 68,000	8	16.6	1	31	-1	2
27	027HISP0106A	280	80	90	281	35	1	59	$ 235,213	$ 84,000	8	16.4	1	31	-1	2
27	027OLEA0099A	186	174	77	213	45	1	59	$ 600,000	$ 180,000	22.2	28.3	1	31	-1	0.5
27	027OLEA0098A	190	174	77	210	40	1	56	$ 809,000	$ 242,700	20	32	1	31	-1	2
27	027OLEA0100A	190	174	77	210	40	1	56	$ 740,000	$ 222,000	20	32	1	31	-1	2
27	027S_SH2817A	186	174	77	223	55	1	59	$ 252,014	$ 90,000	19.5	29.3	1	31	-1	0.5
27	027S_SH2821A	186	174	77	196	55	1	59	$ 246,414	$ 88,000	19.4	28.8	1	31	-1	0.5
27	027S_SH2903A	186	174	77	196	25	1	59	$ 87,365	$ 31,200	19.1	24.9	1	31	-1	0.5
27	027S_SH2903G	276	74	77	249	30	1	24	$ 23,396	$ 8,355	14	14	1	31	-1	0.5
27	027S_SH2905A	186	174	77	216	35	1	59	$ 302,417	$ 108,000	20.3	29.5	1	31	-1	0.5
27	027S_SH2911A	186	94	90	200	40	1	56	$ 400,000	$ 120,000	24.6	26.2	1	31	-1	0.5
27	027S_SH3003A	186	94	90	178	40	1	59	$ 120,967	$ 43,200	20.5	25.6	1	31	-1	0.5
27	027S_SH3005A	186	94	90	174	35	1	59	$ 84,005	$ 30,000	20	25.2	1	31	-1	0.5
27	027S_SH3008A	0	125	90	83	20	1	60	$ 50,000	$ 10,000	19.4	24.7	1	28	-1	0.5
27	027S_SH3011A	186	94	90	191	25	1	1	$ 1,000	$ -	18.6	18.6	1	31	-1	0.5
27	027S_SH2819A	186	174	77	140	40	1	56	$ 590,000	$ 177,000	8	20	1	31	-1	2
27	027S_SHFF02A	186	94	90	120	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
27	027S_SHFF03A	186	94	90	140	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
27	027S_SHHWY	0	64	1000	115	34	1	64	$ 105,868	$ -	18.6	18.6	1	34	-1	0.5
-999																
28	028BLAN0109A	360	90	91	358	40	1	59	$ 156,809	$ 56,000	8	20.7	1	31	-1	2
28	028S_SH2719A	236	214	91	317	30	1	2	$ 488,348	$ 174,400	13.2	17.1	1	31	-1	0.5
28	028S_SH2719B	236	214	91	175	20	1	45	$ 35,000	$ 17,500	13.2	13.2	1	31	-1	2
28	028S_SH2721A	236	214	91	265	55	1	55	$ 207,212	$ 74,000	15	24	1	31	-1	2
28	028S_SH2723A	236	214	91	251	55	1	55	$ 206,092	$ 73,600	16.1	23.9	1	31	-1	2
28	028S_SH2725A	236	214	91	247	30	1	55	$ 95,205	$ 34,000	16.2	25.4	1	31	-1	2
28	028S_SH2735A	236	214	91	260	40	1	59	$ 352,820	$ 126,000	16.8	26.6	1	31	-1	2
28	028S_SH2805A	236	214	91	234	30	1	59	$ 67,204	$ 24,000	22.5	24.3	1	31	-1	2
28	028S_SH2807A	236	214	91	228	30	1	2	$ 112,006	$ 40,000	22.3	22.3	1	31	-1	0.5
28	028S_SHFF01A	210	450	91	265	40	1	56	$ 315,125	$ 109,150	16	28	1	24	-1	2
28	028S_SHFF02A	210	450	91	265	40	1	56	$ 315,125	$ 109,150	16	28	1	24	-1	2
28	028_S_SH0107	236	214	91	250	40	1	56	$ 595,000	$ 178,500	15	27	1	31	-1	2
28	028OLEA0098A	210	360	91	265	40	1	56	$ 730,000	$ 219,000	16	28	1	24	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
28	028OLEA0100A	210	450	91	265	40	1	56	$ 740,000	$ 222,000	16	28	1	24	-1	2
28	028S_SHFF05A	210	450	91	265	40	1	56	$ 315,125	$ 109,150	16	28	1	31	-1	2
28	028S_SHHWY	0	64	1000	165	34	1	64	$ 105,868	$ -	16.6	16.6	1	34	-1	0.5
-999																
29	029CHAN0128A	240	160	100	279	30	1	56	$ 113,001	$ 40,355	11	14.5	1	31	-1	2
29	029S_SH2610A	0	180	83	103	30	1	59	$ 201,611	$ 72,000	17.8	26.3	1	10	-1	0.5
29	029S_SH2612A	0	180	83	112	20	1	59	$ 235,213	$ 84,000	17.4	26.1	1	10	-1	0.5
29	029S_SH2614A	0	180	83	118	25	1	59	$ 162,409	$ 58,000	17	25.5	1	10	-1	0.5
29	029S_SH2615A	240	160	100	301	35	1	60	$ 113,001	$ 40,355	13.2	24.7	1	31	-1	0.5
29	029S_SH2618A	0	180	83	136	20	1	60	$ 332,659	$ 118,800	16.3	25.4	1	4	-1	0.5
29	029S_SH2620A	0	180	83	138	25	1	60	$ 113,001	$ 40,355	15.6	25.6	1	4	-1	0.5
29	029S_SH2622A	0	180	83	129	25	1	60	$ 254,254	$ 90,800	13.7	22.2	1	4	-1	0.5
29	029S_SH2625A	240	160	100	256	35	1	60	$ 220,653	$ 78,800	16	24.7	1	31	-1	0.5
29	029S_SH2626A	0	180	83	137	30	1	59	$ 224,013	$ 80,000	14.3	23.8	1	19	-1	0.5
29	029S_SH2701A	240	160	100	266	30	1	55	$ 49,283	$ 17,600	15.2	22.8	1	31	-1	0.5
29	029S_SH2702A	0	180	83	136	25	1	59	$ 189,291	$ 67,600	16	25.6	1	10	-1	0.5
29	029S_SH2704A	0	180	83	133	30	1	59	$ 123,207	$ 44,000	16.1	25	1	10	-1	0.5
29	029S_SH2705A	240	160	100	280	25	1	60	$ 280,016	$ 100,000	14.7	25.1	1	31	-1	0.5
29	029S_SH2707A	240	160	100	285	25	1	60	$ 268,815	$ 96,000	14.6	25.6	1	31	-1	0.5
29	029S_SH2708A	0	180	83	125	40	1	59	$ 145,608	$ 52,000	15.9	25.3	1	10	-1	0.5
29	029S_SH2711A	240	160	100	271	40	1	56	$ 580,000	$ 174,000	17	25.4	1	31	-1	2
29	029S_SH2712A	0	180	83	144	20	1	60	$ 201,611	$ 72,000	16.7	26	1	22	-1	0.5
29	029S_SH2714A	0	180	83	151	25	1	59	$ 151,209	$ 54,000	16.1	26.3	1	19	-1	0.5
29	029S_SHFF01A	240	160	100	300	40	1	56	$ 315,125	$ 109,150	14	26	1	31	-1	0.5
29	029S_SHFF02A	240	160	100	300	40	1	56	$ 315,125	$ 109,150	14	26	1	31	-1	0.5
29	029S_SHFF03A	240	160	100	280	40	1	56	$ 315,125	$ 109,150	14	26	1	31	-1	0.5
29	029S_SHHWY	170	64	1000	185	34	1	64	$ 105,868	$ -	13.3	13.3	1	34	-1	0.5
-999																
30	030CHAN0102A	240	150	67	284	20	1	59	$ 179,210	$ 64,000	13	16	1	31	-1	0.5
30	030CHAN0104A	240	150	67	297	30	1	60	$ 336,019	$ 120,000	14	18.3	1	31	-1	0.5
30	030CHAN0130A	240	150	67	293	14	1	60	$ 302,417	$ 108,000	10	11.4	1	31	-1	2
30	030S_SH2419A	240	150	67	277	30	1	60	$ 244,174	$ 87,200	17.7	28.5	1	31	-1	0.5
30	030S_SH2421A	240	150	67	274	45	1	60	$ 156,809	$ 56,000	14.5	25.2	1	31	-1	0.5
30	030S_SH2420A	0	180	59	136	30	1	56	$ 168,010	$ 60,000	15.1	24.8	1	28	-1	0.5
30	030S_SH2423A	240	150	67	281	35	1	56	$ 358,420	$ 128,000	15.1	24.6	1	31	-1	0.5
30	030S_SH2422A	0	180	59	136	30	1	56	$ 179,210	$ 64,000	14.2	24.4	1	28	-1	0.5
30	030S_SH2424A	0	180	59	135	25	1	56	$ 168,010	$ 60,000	14.3	24.4	1	28	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
30	030S_SH2425A	240	150	67	271	30	1	56	$ 257,615	$ 92,000	13	23.8	1	31	-1	0.5
30	030S_SH2426A	0	180	59	134	30	1	56	$ 179,210	$ 64,000	15.2	24.4	1	28	-1	0.5
30	030S_SH2427A	240	150	67	271	40	1	59	$ 100,806	$ 36,000	12.8	22.2	1	31	-1	0.5
30	030S_SH2428A	0	180	59	134	30	1	56	$ 168,010	$ 60,000	15.4	24.4	1	28	-1	0.5
30	030S_SH2430A	0	180	59	131	30	1	56	$ 179,210	$ 64,000	15.2	24.2	1	28	-1	0.5
30	030S_SH2501A	240	150	67	275	40	1	60	$ 227,373	$ 81,200	15.7	24.9	1	31	-1	0.5
30	030S_SH2502A	0	180	59	127	30	1	60	$ 280,016	$ 100,000	17.8	28	1	4	-1	0.5
30	030S_SH2503A	240	150	67	272	30	1	60	$ 244,174	$ 87,200	16.3	26	1	31	-1	0.5
30	030S_SH2504A	0	180	59	141	25	1	60	$ 336,019	$ 120,000	17.8	27.7	1	4	-1	0.5
30	030S_SH2505A	240	150	67	271	30	1	60	$ 244,174	$ 87,200	15.5	26.8	1	31	-1	0.5
30	030S_SH2506A	0	180	59	141	25	1	60	$ 241,934	$ 86,400	16.9	26.6	1	4	-1	0.5
30	030S_SH2507A	240	150	67	271	30	1	60	$ 224,013	$ 80,000	15.9	26.3	1	31	-1	0.5
30	030S_SH2508A	0	180	59	137	25	1	60	$ 255,375	$ 91,200	15.6	25.3	1	4	-1	0.5
30	030S_SH2510A	0	180	59	141	20	1	59	$ 100,806	$ 36,000	13.4	23.1	1	4	-1	0.5
30	030S_SH2512A	0	180	59	102	55	1	59	$ 313,618	$ 112,000	12.3	21.6	1	19	-1	0.5
30	030S_SH2514A	0	180	59	106	40	1	59	$ 112,006	$ 40,000	12.3	20.7	1	1	-1	0.5
30	030S_SH2602A	0	180	59	112	30	1	59	$ 224,013	$ 80,000	14.9	23.5	1	1	-1	0.5
30	030S_SH2604A	0	180	59	110	25	1	60	$ 229,613	$ 82,000	16.9	27.1	1	4	-1	0.5
30	030S_SH2608A	0	180	59	105	25	1	60	$ 211,692	$ 75,600	17.6	26.3	1	13	-1	0.5
30	030S_SHFF01A	240	150	67	280	40	1	56	$ 315,125	$ 109,150	12	24	1	31	-1	2
30	030KATE0102A	240	150	67	270	40	1	56	$ 310,000	$ 93,000	12	24	1	31	-1	2
30	030KATE0104A	240	150	67	275	40	1	56	$ 300,000	$ 90,000	12	24	1	31	-1	2
30	030S_SHFF04A	0	180	59	130	40	1	56	$ 315,125	$ 109,150	12	24	1	22	-1	2
30	030S_SHHWY	180	64	1000	195	34	1	64	$ 105,868	$ -	14.2	14.2	1	34	-1	0.5
-999																
31	031S_SH2309A	270	130	56	291	60	1	2	$ 362,901	$ 129,600	13.6	22	1	31	-1	0.5
31	031S_SH2310A	0	210	56	156	30	1	55	$ 62,724	$ 22,400	11.7	20.5	1	30	-1	2
31	031S_SH2311A	270	130	56	299	30	1	59	$ 100,806	$ 36,000	14	23.7	1	31	-1	0.5
31	031S_SH2312A	0	210	56	153	25	1	56	$ 209,452	$ 74,800	12.4	21.4	1	28	-1	0.5
31	031S_SH2313A	270	130	56	302	25	1	60	$ 224,013	$ 80,000	15.6	25.5	1	31	-1	0.5
31	031S_SH2314A	0	210	56	149	25	1	56	$ 196,011	$ 70,000	12.8	21.5	1	28	-1	0.5
31	031S_SH2316A	0	210	56	144	45	1	59	$ 168,010	$ 60,000	13.3	23.1	1	19	-1	0.5
31	031S_SH2317A	270	130	56	295	60	1	59	$ 162,409	$ 58,000	13.4	23.2	1	31	-1	0.5
31	031S_SH2318A	0	210	56	154	25	1	60	$ 155,689	$ 55,600	15.5	25.7	1	22	-1	0.5
31	031S_SH2319A	270	130	56	308	30	1	59	$ 103,046	$ 36,800	14	23.6	1	31	-1	0.5
31	031S_SH2320A	0	210	56	159	35	1	59	$ 98,566	$ 35,200	12.9	22	1	19	-1	0.5
31	031S_SH2321A	270	130	56	298	50	1	59	$ 137,768	$ 49,200	13.1	22.8	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
31	031S_SH2322	0	210	56	160	40	1	56	$ 560,000	$ 168,000	14	26	1	28	-1	0.5
31	031S_SH2323A	270	130	56	304	30	1	59	$ 136,648	$ 48,800	15.6	27.7	1	31	-1	0.5
31	031S_SH2324A	0	210	56	163	35	1	55	$ 86,245	$ 30,800	13.7	21.4	1	28	-1	0.5
31	031S_SH2325A	270	130	56	296	45	1	59	$ 94,085	$ 33,600	15	24.5	1	31	-1	0.5
31	031S_SH2326A	0	210	56	153	35	1	59	$ 100,806	$ 36,000	14.5	22.8	1	10	-1	0.5
31	031S_SH2403A	270	130	56	320	35	1	59	$ 145,608	$ 52,000	14.6	25.3	1	31	-1	0.5
31	031S_SH2404A	0	210	56	157	25	1	60	$ 392,022	$ 140,000	14.4	24.3	1	4	-1	0.5
31	031S_SH2405A	270	130	56	298	35	1	59	$ 112,006	$ 40,000	15	25.1	1	31	-1	0.5
31	031S_SH2406A	0	210	56	148	40	1	59	$ 156,809	$ 56,000	19	23.5	1	19	-1	0.5
31	031S_SH2407A	270	130	56	302	30	1	60	$ 190,411	$ 68,000	13.9	25	1	31	-1	0.5
31	031S_SH2408A	0	210	56	159	40	1	59	$ 179,210	$ 64,000	14.2	23.4	1	19	-1	0.5
31	031S_SH2410A	0	210	56	156	35	1	55	$ 112,006	$ 40,000	15.1	24.1	1	28	-1	0.5
31	031S_SH2411A	270	130	56	297	35	1	59	$ 190,411	$ 68,000	14.1	23	1	31	-1	0.5
31	031S_SH2412A	0	210	56	159	15	1	60	$ 201,611	$ 72,000	15.1	24.3	1	4	-1	0.5
31	031S_SH2413A	270	130	56	300	35	1	60	$ 280,016	$ 100,000	12	24.6	1	31	-1	0.5
31	031S_SH2414A	0	210	56	160	25	1	56	$ 134,408	$ 48,000	16.2	25.8	1	28	-1	0.5
31	031S_SH2417A	270	130	56	288	30	1	60	$ 244,174	$ 87,200	15.9	26	1	31	-1	0.5
31	031S_SH2415A	270	130	56	291	30	1	60	$ 358,420	$ 128,000	17	25.8	1	31	-1	0.5
31	031S_SH2416A	0	210	56	156	25	1	60	$ 168,010	$ 60,000	15.6	25.8	1	4	-1	0.5
31	031S_SH2418A	0	210	56	141	35	1	55	$ 156,809	$ 56,000	16.2	25.3	1	28	-1	0.5
31	031S_SHFF05A	270	200	56	300	40	1	56	$ 315,125	$ 109,150	13	25	1	31	-1	2
31	031S_SHFF04A	270	200	56	320	40	1	56	$ 315,125	$ 109,150	13	25	1	31	-1	2
31	031S_SHFF01A	270	200	56	300	40	1	56	$ 315,125	$ 109,150	13	25	1	31	-1	2
31	031S_SHFF02A	0	200	56	175	40	1	56	$ 315,125	$ 109,150	13	25	1	22	-1	2
31	031S_SHFF03A	0	200	56	175	40	1	56	$ 315,125	$ 109,150	13	25	1	22	-1	2
31	031S_SHHWY	200	64	1000	215	34	1	64	$ 105,868	$ -	13.7	13.7	1	34	-1	0.5
-999																
32	032S_OA0025A	340	110	207	371	40	1	55	$ 257,615	$ 92,000	13	23.6	1	31	-1	0.5
32	032S_SH2109A	230	110	62	259	45	1	55	$ 178,090	$ 63,600	11.8	20.9	1	31	-1	2
32	032S_SH2110A	0	170	333	97	25	1	55	$ 72,804	$ 26,000	10	18.4	1	32	-1	2
32	032S_SH2119A	230	110	62	238	45	1	55	$ 112,006	$ 40,000	9.7	17.8	1	31	-1	2
32	032S_SH2203A	230	110	62	246	45	1	59	$ 75,044	$ 26,800	11.3	19.7	1	31	-1	2
32	032S_SH2205A	230	110	62	242	45	1	55	$ 89,605	$ 32,000	10.5	18.3	1	31	-1	2
32	032S_SH2207A	230	110	62	254	35	1	60	$ 113,001	$ 40,355	12	26.3	1	31	-1	0.5
32	032S_SH2209A	230	110	62	247	40	1	59	$ 188,171	$ 67,200	12.3	22.8	1	31	-1	0.5
32	032S_SH2209S	0	0	0	312	15	1	1	$ 12,195	$ 4,355	14	15.7	1	31	-1	0.5
32	032S_SH2211A	230	110	62	245	30	1	59	$ 78,404	$ 28,000	11.6	20.5	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
32	032S_SH2216A	0	170	333	117	25	1	59	$ 168,010	$ 60,000	13.3	24.1	1	10	-1	0.5
32	032S_SH2301A	230	220	76	260	40	1	56	$ 175,000	$ 52,500	12.7	24.3	1	31	-1	2
32	032S_SH2308A	0	170	333	124	30	1	55	$ 58,243	$ 20,800	11.7	20.4	1	30	-1	2
32	032SAND0016A	340	110	207	349	40	1	56	$ 308,018	$ 110,000	13	20.4	1	31	-1	0.5
32	032SHEL0009A	340	110	207	359	40	1	56	$ 313,618	$ 112,000	11	20	1	31	-1	0.5
32	032S_SHFF01A	230	110	62	265	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF02A	230	110	62	265	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF03A	230	110	62	265	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF04A	230	220	76	275	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF05A	230	220	76	275	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SH2305A	230	220	76	275	40	1	56	$ 350,000	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF07A	230	220	76	285	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SHFF08A	230	110	76	120	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
32	032S_SH2306A	0	110	76	120	40	1	56	$ 240,000	$ 72,000	10	22	1	29	-1	2
32	032S_SH2304A	0	110	76	120	40	1	56	$ 260,000	$ 78,000	10	22	1	29	-1	2
32	032S_SH2302A	0	110	76	120	40	1	56	$ 250,000	$ 75,000	10	22	1	29	-1	2
32	032S_SH2216A	0	110	76	120	40	1	56	$ 275,000	$ 82,500	10	22	1	29	-1	2
32	032S_SH2214A	0	110	76	120	40	1	56	$ 220,000	$ 66,000	10	22	1	29	-1	2
32	032S_SH2212A	0	110	76	120	40	1	56	$ 398,000	$ 119,400	10	22	1	29	-1	2
32	032S_SH2210A	0	110	76	120	40	1	56	$ 375,000	$ 112,500	10	22	1	29	-1	2
32	032S_SH2208A	0	125	50	130	40	1	56	$ 290,000	$ 87,000	10	22	1	29	-1	2
32	032S_SH2206A	0	110	76	120	40	1	56	$ 220,000	$ 66,000	10	22	1	29	-1	2
32	032S_SH2204A	0	110	76	120	40	1	56	$ 280,000	$ 84,000	10	22	1	29	-1	2
32	032S_SH2202A	0	110	76	120	40	1	56	$ 280,000	$ 84,000	10	22	1	29	-1	2
32	032S_SH2116A	0	110	75	120	40	1	56	$ 295,000	$ 88,500	10	22	1	29	-1	2
32	032S_SH2114A	0	110	75	120	40	1	56	$ 320,000	$ 96,000	10	22	1	29	-1	2
32	032S_SH2112A	0	110	75	120	40	1	56	$ 295,000	$ 88,500	10	22	1	29	-1	2
32	032S_SHHWY	150	64	1000	165	34	1	64	$ 105,868	$ -	11.5	11.5	1	34	-1	0.5
-999																
33	033ELIZ0001A	345	50	100	348	25	1	60	$ 212,812	$ 76,000	12	20.8	1	31	-1	0.5
33	033S_SH1917A	240	200	57	310	30	1	60	$ 257,615	$ 92,000	9.1	20.3	1	31	-1	2
33	033S_SH1919A	240	120	57	304	30	1	60	$ 336,019	$ 120,000	9.1	20.1	1	31	-1	2
33	033S_SH1920A	0	80	71	141	40	1	59	$ 224,013	$ 80,000	9	18.9	1	2	-1	2
33	033S_SH1921A	240	200	57	302	30	1	60	$ 336,019	$ 120,000	8.9	20.1	1	31	-1	2
33	033S_SH1923A	240	200	57	315	35	1	59	$ 125,447	$ 44,800	8.7	20.7	1	31	-1	2
33	033S_SH1924A	0	80	71	131	35	1	59	$ 380,822	$ 136,000	10.3	19.9	1	11	-1	2
33	033S_SH1925A	240	200	57	310	20	1	59	$ 144,488	$ 51,600	11.8	21.3	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
33	033S_SH1926A	0	80	71	138	40	1	56	$ 290,000	$ 87,000	10.3	19.6	1	29	-1	2
33	033S_SH1928A	0	80	71	125	40	1	56	$ 475,000	$ 142,500	10	22	1	29	-1	2
33	033S_SH2001A	240	200	57	304	45	1	59	$ 168,010	$ 60,000	12.5	22.1	1	31	-1	0.5
33	033S_SH2002A	0	80	71	134	35	1	59	$ 134,408	$ 48,000	9.9	18.9	1	12	-1	2
33	033S_SH2003A	240	200	57	317	25	1	60	$ 190,411	$ 68,000	13.3	22.8	1	31	-1	0.5
33	033S_SH2004A	0	80	71	126	30	1	55	$ 140,008	$ 50,000	13.9	20.2	1	28	-1	0.5
33	033S_SH2007A	240	200	57	290	25	1	59	$ 210,572	$ 75,200	11.6	21.3	1	31	-1	2
33	033S_SH2008A	0	80	71	121	20	1	60	$ 224,013	$ 80,000	17.8	23.4	1	13	-1	0.5
33	033S_SH2010A	0	80	71	125	35	1	59	$ 112,006	$ 40,000	10.1	19.6	1	21	-1	2
33	033S_SH2011A	240	200	57	274	35	1	59	$ 112,006	$ 40,000	9.7	20.6	1	31	-1	2
33	033S_SH2012A	0	80	71	124	35	1	59	$ 134,408	$ 48,000	9.9	19.5	1	2	-1	2
33	033S_SH2013A	240	200	57	276	40	1	59	$ 114,247	$ 40,800	9.1	17.1	1	31	-1	2
33	033S_SH2014A	0	80	71	118	40	1	59	$ 100,806	$ 36,000	10.4	21.2	1	21	-1	2
33	033S_SH2015A	240	200	57	251	40	1	56	$ 300,000	$ 90,000	8.7	17.2	1	31	-1	2
33	033S_SH2016A	0	80	71	115	40	1	59	$ 156,809	$ 56,000	10.5	19.8	1	12	-1	2
33	033S_SH2018A	0	80	71	110	40	1	59	$ 168,010	$ 60,000	10.3	19.8	1	2	-1	2
33	033S_SH2101A	240	200	50	271	30	1	60	$ 235,213	$ 84,000	12	21.9	1	31	-1	0.5
33	033S_SH2102A	0	200	71	108	40	1	56	$ 100,000	$ 30,000	11.6	20.7	1	29	-1	2
33	033S_SH2103A	240	200	50	267	30	1	60	$ 227,373	$ 81,200	11.4	21.6	1	31	-1	2
33	033S_SH2104A	0	80	71	104	25	1	60	$ 179,210	$ 64,000	11.5	21.4	1	5	-1	2
33	033S_SH2106A	0	80	71	102	20	1	55	$ 72,804	$ 26,000	12.4	15.5	1	28	-1	0.5
33	033S_SH2107A	240	200	50	266	35	1	59	$ 190,411	$ 68,000	16	25.9	1	31	-1	0.5
33	033S_SH2105A	240	200	50	271	25	1	59	$ 239,694	$ 85,600	12.8	23.3	1	31	-1	0.5
33	033SHEL0007A	345	200	100	359	30	1	56	$ 190,411	$ 68,000	9	21.7	1	31	-1	2
33	033S_SH1925A	240	200	57	310	40	1	56	$ 560,000	$ 168,000	9	21	1	31	-1	2
33	033S_SH2009A	240	200	57	280	40	1	56	$ 250,000	$ 75,000	9	21	1	31	-1	2
33	033S_SH2005A	240	200	57	300	40	1	56	$ 240,000	$ 72,000	9	21	1	31	-1	2
33	033S_SH2006A	0	80	71	110	40	1	56	$ 240,000	$ 72,000	13	25	1	28	-1	2
33	033S_SHHWY	160	64	1000	175	34	1	64	$ 105,868	$ -	10.5	10.5	1	34	-1	0.5
-999																
34	034PELI0108A	75	75	80	400	30	1	60	$ 113,001	$ 40,355	13	19.9	1	31	-1	0.5
34	034S_SH1811A	125	130	56	306	35	1	59	$ 123,207	$ 44,000	8.3	17.3	1	31	-1	2
34	034S_SH1813A	125	130	56	311	45	1	2	$ 183,690	$ 65,600	11	10.6	1	31	-1	2
34	034S_SH1814A	0	80	83	138	35	1	59	$ 168,010	$ 60,000	10.3	20.7	1	12	-1	2
34	034S_SH1815A	125	130	56	322	45	1	59	$ 134,408	$ 48,000	11	18.7	1	31	-1	2
34	034S_SH1816A	0	80	83	143	35	1	59	$ 299,057	$ 106,800	13	23.8	1	1	-1	0.5
34	034S_SH1820A	230	130	83	178	35	1	60	$ 113,001	$ 40,355	19	26.4	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
34	034S_SH1821A	125	130	56	328	30	1	60	$ 268,815	$ 96,000	12	25.1	1	31	-1	0.5
34	034S_SH1822A	0	80	83	178	35	1	60	$ 113,001	$ 40,355	19	26.5	1	22	-1	0.5
34	034S_SH1824A	0	80	83	149	30	1	59	$ 128,807	$ 46,000	11.8	21.4	1	21	-1	2
34	034S_SH1825A	310	130	56	325	40	1	56	$ 315,125	$ 109,150	9.9	22	1	31	-1	2
34	034S_SH1826A	0	80	83	146	35	1	60	$ 441,305	$ 157,600	12.9	22.1	1	1	-1	0.5
34	034S_SH1827A	125	130	56	323	45	1	59	$ 159,049	$ 56,800	9.7	19.3	1	31	-1	2
34	034S_SH1829A	125	130	56	309	40	1	59	$ 80,645	$ 28,800	9.1	17.6	1	31	-1	2
34	034S_SH1830A	0	80	83	148	25	1	59	$ 474,907	$ 169,600	11.4	20	1	11	-1	2
34	034S_SH1831A	125	130	56	308	45	1	59	$ 145,608	$ 52,000	9.9	18.9	1	31	-1	2
34	034S_SH1834A	0	80	83	130	40	1	56	$ 265,000	$ 79,500	11	23	1	29	-1	2
34	034S_SH1901A	125	130	56	317	40	1	59	$ 134,408	$ 48,000	8.5	18.8	1	31	-1	2
34	034S_SH1902A	0	80	83	145	30	1	59	$ 144,488	$ 51,600	9	20.7	1	21	-1	2
34	034S_SH1905A	125	130	56	311	30	1	60	$ 244,174	$ 87,200	12	23.2	1	31	-1	0.5
34	034S_SH1906A	0	80	83	135	40	1	56	$ 600,000	$ 180,000	11	23	1	29	-1	2
34	034S_SH1908A	0	80	83	167	25	1	60	$ 302,417	$ 108,000	10.4	20.9	1	5	-1	2
34	034S_SH1909A	125	130	56	324	40	1	59	$ 134,408	$ 48,000	9.1	20.8	1	31	-1	2
34	034S_SH1912A	0	80	83	149	30	1	59	$ 132,168	$ 47,200	8.7	18.7	1	21	-1	2
34	034S_SH1914A	0	80	83	147	35	1	59	$ 190,411	$ 68,000	9.4	18.8	1	12	-1	2
34	034S_SH1916A	0	80	83	158	25	1	56	$ 224,013	$ 80,000	8.8	18.2	1	29	-1	2
34	034S_SHFF07A	125	130	56	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SH1913A	125	130	56	320	40	1	56	$ 329,000	$ 98,700	10	22	1	31	-1	2
34	034S_SHFF05A	125	130	56	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SHFF04A	125	130	56	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SHFF03A	125	130	56	305	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SHFF02A	125	130	56	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SHFF01A	125	130	56	315	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
34	034S_SHHWY	220	64	1000	235	34	1	64	$ 105,868	$ -	9.9	9.9	1	34	-1	0.5
-999																
35	035S_SH1618A	0	130	67	117	30	1	59	$ 118,727	$ 42,400	7.3	18.7	1	2	-1	2
35	035S_SH1619A	290	120	56	322	30	1	59	$ 112,006	$ 40,000	14	22.6	1	31	-1	0.5
35	035S_SH1622A	0	130	67	155	35	1	60	$ 113,001	$ 40,355	13	23.3	1	22	-1	0.5
35	035S_SH1622X	0	130	67	155	35	1	60	$ 113,001	$ 40,355	13	23.3	1	22	-1	0.5
35	035S_SH1623A	290	120	56	355	30	1	60	$ 319,218	$ 114,000	15	23.4	1	31	-1	0.5
35	035S_SH1625A	290	120	56	356	40	1	55	$ 90,725	$ 32,400	15	22.1	1	31	-1	0.5
35	035S_SH1701A	290	120	56	310	40	1	59	$ 145,608	$ 52,000	9.1	20.7	1	31	-1	2
35	035S_SH1702A	0	130	67	131	25	1	60	$ 235,213	$ 84,000	6.7	19.6	1	24	-1	2
35	035S_SH1703A	290	120	56	316	50	1	59	$ 168,010	$ 60,000	8.7	20.2	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
35	035S_SH1704A	0	130	67	125	30	1	59	$ 123,207	$ 44,000	7	19.3	1	2	-1	2
35	035S_SH1706A	0	130	67	159	14	1	60	$ 78,404	$ 28,000	7.7	21.6	1	5	-1	2
35	035S_SH1707A	290	120	56	346	25	1	59	$ 179,210	$ 64,000	14	22.7	1	31	-1	0.5
35	035S_SH1708A	0	130	67	141	30	1	59	$ 161,289	$ 57,600	8.5	23.2	1	22	-1	2
35	035S_SH1709A	290	120	56	325	30	1	59	$ 336,019	$ 120,000	13	23.1	1	31	-1	0.5
35	035S_SH1710A	0	130	67	160	25	1	60	$ 113,001	$ 40,355	16	24.7	1	19	-1	0.5
35	035S_SH1711A	290	120	56	320	35	1	60	$ 196,011	$ 70,000	8.6	19.2	1	31	-1	2
35	035S_SH1713A	290	120	56	314	35	1	59	$ 104,838	$ 37,440	8.5	18.6	1	31	-1	2
35	035S_SH1715A	290	120	56	340	30	1	60	$ 302,417	$ 108,000	13	22.8	1	31	-1	0.5
35	035S_SH1716A	0	130	67	143	25	1	59	$ 201,611	$ 72,000	13.6	23.9	1	10	-1	2
35	035S_SH1801A	290	120	56	347	25	1	60	$ 224,013	$ 80,000	13	22.3	1	31	-1	0.5
35	035S_SH1802A	0	130	67	140	35	1	59	$ 246,414	$ 88,000	11.5	22	1	3	-1	2
35	035S_SH1803A	290	120	56	338	40	1	59	$ 92,965	$ 33,200	9.8	17.7	1	31	-1	2
35	035S_SH1806A	0	130	67	140	20	1	60	$ 336,019	$ 120,000	12.5	22.2	1	4	-1	2
35	035S_SH1806X	0	130	67	138	20	1	60	$ 113,001	$ 40,355	19	23.4	1	1	-1	0.5
35	035S_SH1807A	290	120	56	341	20	1	60	$ 184,811	$ 66,000	13	21.2	1	31	-1	0.5
35	035S_SH1812A	0	130	67	138	40	1	60	$ 448,026	$ 160,000	11.4	21.1	1	6	-1	2
35	035S_SHFF03A	0	130	67	165	40	1	56	$ 315,125	$ 109,150	7	19	1	24	-1	2
35	035S_SHFF05A	290	120	56	330	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
35	035S_SH1627A	290	120	56	320	40	1	56	$ 250,000	$ 105,000	7	19	1	31	-1	2
35	035S_SHFF01A	290	120	56	340	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
35	035S_SHFF07A	290	120	56	310	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
35	035S_SH1712A	0	130	67	160	40	1	56	$ 325,000	$ 97,500	7	19	1	29	-1	2
35	035S_SHFF02A	290	120	56	340	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
35	035S_SHHWY	220	64	1000	235	34	1	64	$ 105,868	$ -	8.5	8.5	1	34	-1	0.5
-999																
36	036S_SH1519A	310	125	59	356	35	1	59	$ 156,809	$ 56,000	16	23.9	1	31	-1	0.5
36	036S_SH1520A	0	150	77	172	30	1	60	$ 179,210	$ 64,000	11.7	22.6	1	23	-1	2
36	036S_SH1521A	310	125	59	354	30	1	60	$ 263,215	$ 94,000	15	23.5	1	31	-1	0.5
36	036S_SH1522A	0	150	77	163	30	1	60	$ 224,013	$ 80,000	8.8	19.2	1	6	-1	2
36	036S_SH1523A	310	125	59	349	35	1	60	$ 332,659	$ 118,800	15	14.7	1	31	-1	0.5
36	036S_SH1524A	0	150	77	163	45	1	59	$ 336,019	$ 120,000	10	19.5	1	3	-1	2
36	036S_SH1525A	310	125	59	355	20	1	60	$ 240,814	$ 86,000	15	23.9	1	31	-1	0.5
36	036S_SH1526A	0	150	77	190	30	1	60	$ 285,616	$ 102,000	14	21.6	1	22	-1	0.5
36	036S_SH1527A	310	125	59	345	30	1	60	$ 241,486	$ 86,240	14	24	1	31	-1	0.5
36	036S_SH1528A	0	150	77	189	25	1	60	$ 301,073	$ 107,520	15	21.7	1	22	-1	0.5
36	036S_SH1529A	310	125	59	347	35	1	1	$ 77,284	$ 27,600	10.7	10.7	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
36	036S_SH1530A	0	150	77	211	25	1	60	$ 113,001	$ 40,355	14	21.9	1	22	-1	0.5
36	036S_SH1531A	310	125	59	334	45	1	1	$ 98,566	$ 35,200	10.7	10.7	1	31	-1	2
36	036S_SH1534A	0	150	77	177	25	1	60	$ 616,035	$ 220,000	11.6	23	1	6	-1	2
36	036S_SH1535A	310	125	59	341	45	1	59	$ 96,325	$ 34,400	11	23.6	1	31	-1	2
36	036S_SH1538A	0	150	77	129	40	1	59	$ 168,010	$ 60,000	9.6	19.7	1	2	-1	2
36	036S_SH1539A	310	125	59	347	35	1	55	$ 291,217	$ 104,000	9.1	22.5	1	31	-1	2
36	036S_SH1540A	0	150	77	145	45	1	59	$ 145,608	$ 52,000	11.7	19.9	1	21	-1	2
36	036S_SH1601A	310	125	59	358	45	1	59	$ 294,577	$ 105,200	19	25.4	1	31	-1	0.5
36	036S_SH1605A	310	125	59	344	25	1	60	$ 196,011	$ 70,000	11.6	22.9	1	31	-1	2
36	036S_SH1606A	0	150	77	140	35	1	59	$ 128,807	$ 46,000	11.2	21	1	21	-1	2
36	036S_SH1609A	310	125	59	336	40	1	56	$ 197,131	$ 70,400	18.1	18.1	1	31	-1	0.5
36	036S_SH1610A	0	150	77	145	45	1	59	$ 526,430	$ 188,000	8.2	21.3	1	11	-1	2
36	036S_SH1613A	310	125	59	334	30	1	60	$ 227,373	$ 81,200	10.1	20	1	31	-1	2
36	036S_SH1615A	310	125	59	322	30	1	60	$ 392,022	$ 140,000	14	23.1	1	31	-1	0.5
36	036S_SH1614A	0	150	77	125	40	1	56	$ 600,000	$ 180,000	7.8	19.1	1	29	-1	2
36	036S_SHFF01A	310	125	59	350	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
36	036S_SHFF04A	310	125	59	360	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
36	036S_SHFF03A	0	150	77	185	40	1	56	$ 315,125	$ 109,150	10	22	1	24	-1	2
36	036S_SH1604A	0	125	59	350	40	1	56	$ 320,000	$ 96,000	10	22	1	29	-1	2
36	036S_SHHWY	250	64	1000	270	24	1	64	$ 105,868	$ -	9.3	9.3	1	34	-1	0.5
-999																
37	037S_SH1403A	290	140	77	280	35	1	59	$ 89,605	$ 32,000	9.3	20.2	1	31	-1	2
37	037S_SH1405A	290	140	77	282	40	1	59	$ 113,001	$ 40,355	13	23	1	31	-1	0.5
37	037S_SH1404A	0	230	63	125	30	1	60	$ 156,809	$ 56,000	13	25.2	1	22	-1	0.5
37	037S_SH1407A	290	140	77	284	40	1	56	$ 113,001	$ 40,355	14	23	1	31	-1	0.5
37	037S_SH1406A	0	230	63	127	20	1	59	$ 201,611	$ 72,000	12.1	21.7	1	19	-1	0.5
37	037S_SH1410A	0	230	63	144	40	1	56	$ 170,000	$ 51,000	12.8	24	1	28	-1	0.5
37	037S_SH1408A	0	230	63	151	25	1	60	$ 201,611	$ 72,000	10.9	20.2	1	6	-1	2
37	037S_SH1411A	290	140	77	298	35	1	60	$ 168,010	$ 60,000	11	22.4	1	31	-1	2
37	037S_SH1412A	0	230	63	140	30	1	60	$ 263,215	$ 94,000	12	21.9	1	1	-1	0.5
37	037S_SH1414A	0	230	63	138	30	1	60	$ 190,411	$ 68,000	10.4	20.9	1	6	-1	2
37	037S_SH1416A	0	230	63	134	40	1	59	$ 134,408	$ 48,000	10.3	19.7	1	21	-1	2
37	037S_SH1420A	0	230	63	142	30	1	59	$ 448,026	$ 160,000	10.3	21.5	1	3	-1	2
37	037S_SH1421A	290	140	77	338	30	1	1	$ 87,365	$ 31,200	9.2	9.2	1	31	-1	2
37	037S_SH1502A	0	230	63	151	20	1	60	$ 234,093	$ 83,600	12.3	21.6	1	4	-1	0.5
37	037S_SH1504A	0	230	63	149	20	1	60	$ 224,013	$ 80,000	10.4	20.4	1	24	-1	2
37	037S_SH1505A	290	140	77	340	25	1	55	$ 151,209	$ 54,000	13.5	18.3	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
37	037S_SH1506A	0	230	63	145	40	1	59	$ 96,325	$ 34,400	9.3	19	1	21	-1	2
37	037S_SH1507A	290	140	77	324	45	1	59	$ 156,809	$ 56,000	13.1	23.9	1	31	-1	0.5
37	037S_SH1508A	0	230	63	151	40	1	59	$ 108,646	$ 38,800	10.2	20.4	1	21	-1	2
37	037S_SH1509A	290	140	77	360	25	1	60	$ 181,450	$ 64,800	15.2	25.2	1	31	-1	0.5
37	037S_SH1510A	0	230	63	159	40	1	59	$ 145,608	$ 52,000	10.7	20.3	1	21	-1	2
37	037S_SH1511A	290	140	77	364	25	1	60	$ 126,567	$ 45,200	14.4	21.5	1	31	-1	0.5
37	037S_SH1512A	0	230	63	168	35	1	59	$ 280,016	$ 100,000	12.8	23.4	1	1	-1	0.5
37	037S_SH1515A	290	140	77	351	30	1	60	$ 179,210	$ 64,000	12.2	21.2	1	31	-1	0.5
37	037S_SH1516A	0	230	63	170	30	1	56	$ 260,975	$ 93,200	12.1	22.3	1	28	-1	0.5
37	037S_SH1517A	290	140	77	340	40	1	59	$ 123,207	$ 44,000	12	21	1	31	-1	0.5
37	037S_SH1518A	0	230	63	170	40	1	56	$ 580,000	$ 174,000	11.4	23	1	29	-1	2
37	037S_SHFF01A	290	140	77	290	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
37	037S_SHFF02A	290	140	77	325	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
37	037S_SHFF03A	0	125	70	135	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
37	037S_SHHWY1	250	64	200	265	34	1	64	$ 21,169	$ -	8.8	8.8	1	34	-1	0.5
37	037S_SHHWY2	220	64	300	235	34	1	64	$ 31,765	$ -	8.8	8.8	1	34	-1	0.5
37	037S_SHHWY3	200	64	500	215	34	1	64	$ 52,934	$ -	8.8	8.8	1	34	-1	0.5
-999																
38	038KARE0104A	370	70	100	377	25	1	60	$ 192,651	$ 68,800	11	11.2	1	31	-1	2
38	038LORE0104A	370	70	100	374	25	1	56	$ 184,811	$ 66,000	14	24	1	31	-1	0.5
38	038ROSE0103A	370	70	100	375	30	1	59	$ 178,090	$ 63,600	11	10.5	1	31	-1	2
38	038S_SH1318A	0	210	56	143	35	1	55	$ 123,207	$ 44,000	13	21.8	1	28	-1	0.5
38	038S_SH1320A	0	210	56	128	45	1	59	$ 240,814	$ 86,000	10.7	24	1	3	-1	2
38	038S_SH1323A	270	100	67	303	25	1	60	$ 268,815	$ 96,000	8.8	17.8	1	31	-1	2
38	038S_SH1322A	0	210	56	113	40	1	59	$ 252,014	$ 90,000	10.4	20.2	1	3	-1	2
38	038S_SH1325A	270	100	67	307	35	1	59	$ 134,408	$ 48,000	8.1	16.9	1	31	-1	2
38	038S_SH1326A	0	210	56	152	35	1	60	$ 267,695	$ 95,600	13	22.2	1	4	-1	0.5
38	038S_SH1324A	0	210	56	128	35	1	59	$ 224,013	$ 80,000	8.9	17.5	1	3	-1	2
38	038S_SH1327A	270	100	67	316	25	1	59	$ 156,809	$ 56,000	7.9	17.3	1	31	-1	2
38	038S_SH1329A	270	100	67	294	25	1	60	$ 240,814	$ 86,000	8.7	20.6	1	31	-1	2
38	038S_SH1328A	0	210	56	104	30	1	60	$ 201,611	$ 72,000	14	20.8	1	4	-1	0.5
38	038S_SH1331A	270	100	67	290	40	1	59	$ 184,811	$ 66,000	9.1	19.6	1	31	-1	2
38	038S_SH1330A	0	210	56	123	45	1	59	$ 194,891	$ 69,600	11.2	20.9	1	3	-1	2
38	038S_SH1333A	270	100	67	308	25	1	56	$ 222,893	$ 79,600	9	19	1	31	-1	2
38	038S_SH1332A	0	210	56	136	35	1	60	$ 138,888	$ 49,600	12.5	23.3	1	4	-1	0.5
38	038S_SH1334A	0	210	56	124	45	1	59	$ 112,006	$ 40,000	10.3	18.8	1	21	-1	2
38	038S_SH1336A	0	210	56	125	35	1	60	$ 140,008	$ 50,000	11.1	24.1	1	23	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
38	038S_SH1338A	0	210	56	104	40	1	59	$ 201,611	$ 72,000	9.2	19.3	1	8	-1	2
38	038S_SH1340A	0	210	56	120	45	1	55	$ 112,006	$ 40,000	8.9	18.4	1	29	-1	2
38	038S_SH1342A	0	210	56	125	45	1	55	$ 154,569	$ 55,200	8.5	18.1	1	29	-1	2
38	038S_SH1344A	0	210	56	132	40	1	59	$ 190,411	$ 68,000	9.1	19.6	1	3	-1	2
38	038S_SH1346A	0	210	56	99	35	1	59	$ 125,447	$ 44,800	8	17.3	1	2	-1	2
38	038S_SH1348A	0	210	56	98	40	1	56	$ 328,000	$ 98,400	7.7	20	1	29	-1	2
38	038S_SH1401A	270	170	115	281	30	1	60	$ 302,417	$ 108,000	12	22.5	1	31	-1	0.5
38	038S_SH1350A	0	210	56	117	35	1	59	$ 179,210	$ 64,000	11	20.7	1	2	-1	2
38	038S_SH1402A	0	210	56	131	40	1	56	$ 710,000	$ 213,000	11.8	24.5	1	29	-1	2
38	038S_SHFF04A	270	170	115	280	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
38	038S_SHFF05A	270	170	115	300	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
38	038S_SHFF01A	270	170	140	320	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
38	038S_SHFF02A	370	70	100	380	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
38	038S_SHFF03A	270	170	115	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
38	038S_SHHWY	190	64	1000	215	34	1	64	$ 105,868	$ -	7.8	7.8	1	34	-1	0.5
-999																
39	039S_SH1202A	0	230	59	93	35	1	59	$ 302,417	$ 108,000	10.4	21.5	1	20	-1	2
39	039S_SH1203A	290	170	125	315	50	1	59	$ 212,812	$ 76,000	7.9	16.8	1	31	-1	2
39	039S_SH1204A	0	230	59	108	30	1	59	$ 204,972	$ 73,200	9.9	21.6	1	20	-1	2
39	039S_SH1205A	290	170	125	323	30	1	60	$ 224,013	$ 80,000	7	19.1	1	31	-1	2
39	039S_SH1206A	0	230	59	83	35	1	2	$ 392,022	$ 140,000	10.6	10.6	1	31	-1	2
39	039S_SH1210A	0	230	59	155	45	1	59	$ 234,093	$ 83,600	12	21.4	1	19	-1	0.5
39	039S_SH1212A	0	230	59	108	60	1	59	$ 201,611	$ 72,000	8.8	17.9	1	3	-1	2
39	039S_SH1214A	0	230	59	121	45	1	59	$ 224,013	$ 80,000	9.7	17.9	1	3	-1	2
39	039S_SH1216A	0	230	59	100	55	1	59	$ 336,019	$ 120,000	10.1	22.3	1	20	-1	2
39	039S_SH1218A	0	230	59	118	35	1	55	$ 120,967	$ 43,200	8.3	19.6	1	30	-1	2
39	039S_SH1220A	0	230	59	127	40	1	56	$ 380,000	$ 114,000	8.4	20.6	1	29	-1	2
39	039S_SH1222A	0	230	59	141	30	1	60	$ 385,302	$ 137,600	7.2	19.2	1	6	-1	2
39	039S_SH1224A	0	230	59	149	30	1	60	$ 362,901	$ 129,600	10	20.9	1	15	-1	2
39	039S_SH1226A	0	230	59	171	30	1	60	$ 316,978	$ 113,200	14	22.6	1	4	-1	0.5
39	039S_SH1306A	0	230	59	176	45	1	59	$ 250,894	$ 89,600	16	23.6	1	10	-1	0.5
39	039S_SH1308A	0	230	59	180	25	1	60	$ 259,855	$ 92,800	16	23.6	1	13	-1	0.5
39	039S_SH1311A	290	170	125	397	30	1	56	$ 201,611	$ 72,000	15	24.5	1	31	-1	0.5
39	039S_SH1313A	290	170	125	388	30	1	56	$ 208,332	$ 74,400	13	26	1	31	-1	0.5
39	039S_SH1314A	0	230	59	160	40	1	56	$ 350,000	$ 105,000	8	20	1	29	-1	2
39	039S_SHFF03A	290	170	125	325	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
39	039S_SH1310A	0	230	59	160	40	1	56	$ 250,000	$ 75,000	8	20	1	29	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
39	039S_SHFF05A	290	170	125	365	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
39	039S_SHFF04A	0	230	59	170	40	1	56	$ 315,125	$ 109,150	8	20	1	24	-1	2
39	039S_SHFF02A	290	170	125	320	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
39	039S_SHFF01A	290	170	125	320	40	1	56	$ 315,125	$ 109,150	0	20	1	31	-1	2
39	039N_TOHWY	350	64	600	365	34	1	64	$ 63,519	$ -	8.7	8.7	1	34	-1	0.5
39	039S_SHHWY1	220	64	200	335	34	1	64	$ 21,169	$ -	8.7	8.7	1	34	-1	0.5
39	039S_SHHWY2	250	64	200	265	34	1	64	$ 21,169	$ -	8.7	8.7	1	34	-1	0.5
39	039S_SHHWY3	240	64	600	255	34	1	64	$ 63,519	$ -	8.7	8.7	1	34	-1	0.5
-999																
40	040S_SH1105A	300	115	55	341	25	1	60	$ 236,333	$ 84,400	18.5	29.6	1	31	-1	0.5
40	040S_SH1108A	0	240	53	165	40	1	56	$ 420,000	$ 126,000	8.5	16.6	1	29	-1	2
40	040S_SH1107A	300	115	55	344	30	1	60	$ 113,001	$ 40,355	9	20.4	1	31	-1	2
40	040S_SH1110A	0	240	53	164	30	1	60	$ 268,815	$ 96,000	11	20	1	6	-1	2
40	040S_SH1111A	300	115	55	334	30	1	60	$ 212,812	$ 76,000	8	19.8	1	31	-1	2
40	040S_SH1112A	0	240	53	119	45	1	59	$ 134,408	$ 48,000	8.8	17.3	1	2	-1	2
40	040S_SH1113A	300	115	55	336	45	1	59	$ 134,408	$ 48,000	8.1	16.6	1	31	-1	2
40	040S_SH1114A	0	240	53	126	20	1	60	$ 246,414	$ 88,000	10.9	19.4	1	24	-1	2
40	040S_SH1117A	300	115	55	327	50	1	59	$ 267,695	$ 95,600	7.9	16	1	31	-1	2
40	040S_SH1115A	300	115	55	324	30	1	60	$ 267,695	$ 95,600	8	19.8	1	31	-1	2
40	040S_SH1116A	0	240	53	147	30	1	56	$ 302,417	$ 108,000	11	22.6	1	29	-1	2
40	040S_SH1118A	0	240	53	106	40	1	59	$ 95,205	$ 34,000	9	17.8	1	23	-1	2
40	040S_SH1119A	300	115	55	331	45	1	59	$ 145,608	$ 52,000	7.6	15.7	1	31	-1	2
40	040S_SH1120A	0	240	53	89	45	1	59	$ 108,646	$ 38,800	8.7	17.5	1	2	-1	2
40	040S_SH1121A	300	115	55	322	30	1	60	$ 225,133	$ 80,400	7	19	1	31	-1	2
40	040S_SH1122A	0	240	53	116	40	1	59	$ 134,408	$ 48,000	12.3	23.4	1	1	-1	0.5
40	040S_SH1123A	300	115	55	316	40	1	59	$ 96,325	$ 34,400	6.7	15.2	1	31	-1	2
40	040S_SH1124A	0	240	53	106	45	1	59	$ 168,010	$ 60,000	11.4	19.7	1	3	-1	2
40	040S_SH1126A	0	240	53	111	45	1	59	$ 89,605	$ 32,000	10.8	20.7	1	2	-1	2
40	040S_SH1127A	300	140	56	322	30	1	59	$ 113,001	$ 40,355	6.1	16.2	1	31	-1	2
40	040S_SH1128A	0	240	53	117	40	1	59	$ 201,611	$ 72,000	10.8	20.7	1	3	-1	2
40	040S_SH1129A	300	140	56	309	45	1	59	$ 192,651	$ 68,800	6.6	15.7	1	31	-1	2
40	040S_SH1130A	0	240	53	112	40	1	59	$ 190,411	$ 68,000	10.7	24.3	1	11	-1	2
40	040S_SH1132A	0	240	53	103	45	1	55	$ 145,608	$ 52,000	9.1	19.3	1	30	-1	2
40	040S_SH1136A	0	240	53	106	20	1	60	$ 280,016	$ 100,000	12	23.3	1	22	-1	0.5
40	040S_SH1138A	0	240	53	104	40	1	59	$ 313,618	$ 112,000	11.3	22.1	1	3	-1	2
40	040S_SH1139A	300	140	56	312	40	1	59	$ 224,013	$ 80,000	6.6	15.5	1	20	-1	2
40	040S_SH1140A	0	240	53	98	50	1	59	$ 224,013	$ 80,000	11.3	22.1	1	3	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
40	040S_SH1142A	0	240	53	97	30	1	2	$ 224,013	$ 80,000	9.8	9.8	1	30	-1	2
40	040S_TO1126A	415	25	55	401	30	1	59	$ 68,324	$ 24,400	5	14.1	1	31	-1	2
40	040S_SH1334A	0	240	53	145	40	1	56	$ 155,000	$ 46,500	7	19	1	29	-1	2
40	040S_SHFF03A	300	115	55	320	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SH1106A	0	240	53	150	40	1	56	$ 360,000	$ 108,000	7	19	1	29	-1	2
40	040S_SHFF02A	300	115	55	340	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SHFF08A	300	140	56	330	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SHFF04A	300	140	56	325	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SHFF06A	300	140	56	330	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SHFF07A	300	140	56	320	40	1	56	$ 315,125	$ 109,150	7	19	1	31	-1	2
40	040S_SHHWY	230	64	1000	245	34	1	64	$ 105,868	$ -	9.2	9.2	1	34	-1	0.5
-999																
41	041S_SH1003A	340	150	67	373	25	1	60	$ 280,016	$ 100,000	11.4	21.7	1	31	-1	2
41	041S_SH1004A	0	150	50	153	40	1	59	$ 201,611	$ 72,000	9.7	18.4	1	31	-1	2
41	041S_SH1007A	340	150	67	375	30	1	59	$ 246,414	$ 88,000	12.6	21.3	1	31	-1	0.5
41	041S_SH1008A	0	225	50	142	55	1	59	$ 222,893	$ 79,600	15.2	24.4	1	10	-1	0.5
41	041S_SH1010A	0	225	50	132	35	1	59	$ 134,408	$ 48,000	12.5	24.2	1	19	-1	0.5
41	041S_SH1011A	340	150	67	388	30	1	60	$ 212,812	$ 76,000	8.9	17.4	1	31	-1	2
41	041S_SH1012A	0	225	50	189	30	1	60	$ 268,815	$ 96,000	13	23.5	1	22	-1	0.5
41	041S_SH1013A	340	150	67	376	35	1	59	$ 168,010	$ 60,000	9.9	18.8	1	31	-1	2
41	041S_SH1014A	0	225	50	168	50	1	60	$ 224,013	$ 80,000	7.2	18.6	1	24	-1	2
41	041S_SH1015A	340	150	67	367	30	1	60	$ 194,891	$ 69,600	10.7	19.8	1	31	-1	2
41	041S_SH1016A	0	225	50	142	45	1	59	$ 336,019	$ 120,000	11	21.4	1	3	-1	2
41	041S_SH1018A	0	225	50	142	35	1	60	$ 282,256	$ 100,800	11	20.2	1	6	-1	2
41	041S_SH1019A	340	150	67	365	25	1	60	$ 162,409	$ 58,000	11.7	21.4	1	31	-1	2
41	041S_SH1020A	0	225	50	134	45	1	60	$ 181,450	$ 64,800	12.7	22.4	1	4	-1	0.5
41	041S_SH1022A	0	225	50	138	35	1	59	$ 339,379	$ 121,200	13.3	21.4	1	1	-1	0.5
41	041S_SH1023A	340	150	67	363	25	1	60	$ 263,215	$ 94,000	8	18.7	1	31	-1	2
41	041S_SH1024A	0	225	50	157	40	1	60	$ 263,215	$ 94,000	13.3	21.7	1	4	-1	2
41	041S_SH1025A	340	150	67	339	35	1	59	$ 168,010	$ 60,000	14	22.9	1	31	-1	0.5
41	041S_SH1026A	0	225	50	137	30	1	60	$ 201,611	$ 72,000	13	22.5	1	4	-1	0.5
41	041S_SH1026X	0	225	50	138	30	1	60	$ 201,611	$ 72,000	13	22.5	1	4	-1	0.5
41	041S_SH1027A	340	150	67	328	40	1	59	$ 201,611	$ 72,000	15.4	24.3	1	31	-1	0.5
41	041S_SH1032A	0	225	50	136	45	1	59	$ 241,934	$ 86,400	10.1	22.4	1	20	-1	2
41	041S_SH1100A	0	225	50	139	25	1	60	$ 336,019	$ 120,000	9.3	19.7	1	3	-1	2
41	041S_SH1102A	0	225	50	124	45	1	60	$ 436,825	$ 156,000	9.6	21.3	1	24	-1	2
41	041S_SH1103A	340	150	67	334	45	1	55	$ 96,325	$ 34,400	16.2	25.1	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
41	041S_SH0918A	0	225	50	170	25	1	60	$ 224,013	$ 80,000	16	23.4	1	4	-1	0.5
41	041S_SH0919A	340	150	67	383	30	1	59	$ 114,247	$ 40,800	11.9	22	1	31	-1	2
41	041S_SH0920A	0	225	50	160	50	1	60	$ 336,019	$ 120,000	13.6	24.1	1	4	-1	0.5
41	041S_SH0922A	0	225	50	152	40	1	59	$ 201,611	$ 72,000	12.2	23.7	1	1	-1	0.5
41	041S_SH1006A	0	225	50	175	40	1	56	$ 302,000	$ 90,600	9	21	1	29	-1	2
41	041S_SHFF04A	340	150	67	370	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
41	041S_SHFF05A	340	150	67	360	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
41	041S_SH1002A	0	225	50	180	40	1	56	$ 248,000	$ 74,400	9	21	1	29	-1	2
41	041S_SHFF03A	340	150	67	370	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
41	041S_SHFF06A	340	150	67	360	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
41	041S_SHHWY	250	64	1000	265	34	1	64	$ 105,868	$ -	8.3	8.3	1	34	-1	0.5
-999																
42	042CROS0101A	350	70	77	445	40	1	60	$ 113,001	$ 40,355	9	18.7	1	31	-1	2
42	042CROS0107A	350	70	77	373	40	1	60	$ 113,001	$ 40,355	9	18.6	1	31	-1	2
42	042CROS0201A	350	80	77	369	40	1	60	$ 113,001	$ 40,355	9	18.1	1	31	-1	2
42	042S_SH0712A	0	200	71	166	30	1	60	$ 280,016	$ 100,000	14.7	24.9	1	4	-1	0.5
42	042S_SH0713A	350	180	77	383	45	1	59	$ 138,888	$ 49,600	16.5	25.7	1	31	-1	0.5
42	042S_SH0801A	350	180	77	371	30	1	60	$ 201,611	$ 72,000	17	27.2	1	31	-1	0.5
42	042S_SH0802A	0	200	71	151	40	1	56	$ 525,000	$ 157,500	16	25.2	1	28	-1	0.5
42	042S_SH0803A	350	180	77	382	30	1	60	$ 224,013	$ 80,000	18	28.1	1	31	-1	0.5
42	042S_SH0804A	0	200	71	144	50	1	59	$ 179,210	$ 64,000	15.5	24.8	1	19	-1	0.5
42	042S_SH0805A	350	180	77	377	30	1	60	$ 224,013	$ 80,000	18.9	29	1	31	-1	0.5
42	042S_SH0806A	0	200	71	179	30	1	60	$ 291,217	$ 104,000	15	24.5	1	1	-1	0.5
42	042S_SH0807A	350	180	77	381	35	1	59	$ 123,207	$ 44,000	19.4	28.1	1	31	-1	0.5
42	042S_SH0809A	350	180	77	391	30	1	60	$ 263,215	$ 94,000	8.9	18.6	1	31	-1	2
42	042S_SH0810A	0	200	71	178	30	1	60	$ 268,815	$ 96,000	11.5	20.8	1	14	-1	2
42	042S_SH0814A	0	200	71	217	30	1	60	$ 301,073	$ 107,520	13	21.3	1	4	-1	0.5
42	042S_SH0904A	0	230	71	164	40	1	60	$ 716,841	$ 256,000	10.4	18.8	1	20	-1	2
42	042S_SH0906A	0	230	71	166	40	1	60	$ 716,841	$ 256,000	10.5	18.9	1	20	-1	2
42	042S_SH0908A	0	230	71	167	40	1	60	$ 716,841	$ 256,000	10.4	18.6	1	20	-1	2
42	042S_SH0910A	0	200	71	168	40	1	60	$ 716,841	$ 256,000	10.2	18.4	1	20	-1	2
42	042S_SH0914A	0	230	71	219	35	1	60	$ 113,001	$ 40,355	13	21.4	1	4	-1	0.5
42	042S_SH0915A	350	370	77	379	35	1	56	$ 113,001	$ 40,355	9	18.7	1	31	-1	2
42	042S_SH0915X	350	100	77	378	35	1	56	$ 113,001	$ 40,355	10	18.7	1	31	-1	2
42	042S_SH0916A	0	200	71	160	70	1	59	$ 278,896	$ 99,600	11.6	20.5	1	11	-1	2
42	042S_SHFF01A	0	230	71	180	40	1	56	$ 315,125	$ 109,150	10	22	1	24	-1	2
42	042S_SH0812A	0	230	71	200	40	1	56	$ 630,000	$ 189,000	10	22	1	29	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
42	042S_SHFF03A	350	200	77	40	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
42	042S_SHFF04A	350	200	77	40	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
42	042S_SHHWY	280	64	1000	295	34	1	64	$ 105,868	$ -	8.1	8.1	1	34	-1	0.5
42	042CROSHWY	420	64	300	435	34	1	64	$ 42,966	$ -	8.1	8.1	1	34	-1	0.5
-999																
43	043S_SH0506A	0	200	63	125	40	1	60	$ 435,705	$ 155,600	14	25.2	1	4	-1	0.5
43	043S_SH0507A	320	150	64	297	40	1	1	$ 100,806	$ 36,000	17.1	17.1	1	31	-1	0.5
43	043S_SH0508A	0	200	63	131	40	1	60	$ 582,433	$ 208,000	14	24.8	1	4	-1	0.5
43	043S_SH0510A	0	200	63	136	30	1	60	$ 376,677	$ 134,520	14	24.7	1	4	-1	0.5
43	043S_SH0512A	0	200	63	141	35	1	60	$ 368,501	$ 131,600	13	24.8	1	4	-1	0.5
43	043S_SH0608A	0	200	63	156	30	1	60	$ 200,491	$ 71,600	10.3	21.5	1	14	-1	2
43	043S_SH0609A	320	150	64	359	30	1	60	$ 280,016	$ 100,000	11.5	21.9	1	31	-1	2
43	043S_SH0610A	0	200	63	129	60	1	59	$ 201,611	$ 72,000	11.8	20.3	1	3	-1	2
43	043S_SH0612A	0	200	63	138	40	1	59	$ 113,001	$ 40,355	11.2	19.7	1	12	-1	2
43	043S_SH0612G	0	0	0	220	30	1	59	$ 113,001	$ 40,355	10	17.5	1	12	-1	2
43	043S_SH0613A	320	150	64	380	30	1	59	$ 235,213	$ 84,000	8	19	1	31	-1	2
43	043S_SH0614A	0	200	63	145	35	1	59	$ 285,616	$ 102,000	9	17.5	1	3	-1	2
43	043S_SH0701A	320	150	64	378	45	1	59	$ 392,022	$ 140,000	9	17	1	31	-1	2
43	043S_SH0702A	0	45	63	119	40	1	56	$ 680,000	$ 204,000	16.8	28	1	28	-1	0.5
43	043S_SH0703A	320	150	64	377	40	1	60	$ 336,019	$ 120,000	13.1	21.6	1	31	-1	0.5
43	043S_SH0704A	0	200	63	139	25	1	60	$ 133,288	$ 47,600	15.2	24	1	4	-1	0.5
43	043S_SH0706A	0	200	63	154	35	1	60	$ 434,585	$ 155,200	14.1	24.2	1	4	-1	0.5
43	043S_SH0708A	10	200	63	155	50	1	59	$ 113,001	$ 40,355	13.5	24.7	1	10	-1	0.5
43	043S_SH0709A	320	150	64	384	30	1	60	$ 113,001	$ 40,355	14.5	24.7	1	31	-1	0.5
43	043S_SH0710A	0	200	63	157	50	1	60	$ 560,032	$ 200,000	14.3	24.8	1	4	-1	0.5
43	043CHARFF01A	400	150	100	405	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF11A	320	150	64	380	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF01A	320	150	64	300	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF07A	0	200	63	150	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
43	043S_SHFF04A	320	150	50	350	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF06A	320	150	64	350	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF10A	320	150	64	380	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF05A	0	200	63	150	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
43	043S_SHFF03A	0	200	63	145	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
43	043S_SHFF12A	320	150	64	380	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF08A	320	150	64	370	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF02A	320	150	50	330	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
43	043S_SHFF01A	320	150	64	310	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHFF13A	320	150	64	390	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
43	043S_SHHWY	220	64	1000	235	34	1	64	$ 105,868	$ -	7.3	7.3	1	34	-1	0.5
-999																
44	044DURH0103A	400	50	133	365	25	1	60	$ 113,001	$ 40,355	6	16.7	1	31	-1	2
44	044DURH0104G	360	50	75	371	25	1	1	$ 12,195	$ 4,355	6	6.5	1	31	-1	2
44	044DURH0104A	400	50	133	376	30	1	1	$ 113,001	$ 40,355	6	8.4	1	31	-1	2
44	044HIGH0105A	400	50	67	407	35	1	1	$ 113,001	$ 40,355	8	10.9	1	31	-1	2
44	044HIGH0105X	400	50	67	430	20	1	1	$ 113,001	$ 40,355	7	10.7	1	31	-1	2
44	044RALE0105A	400	50	133	411	40	1	1	$ 113,001	$ 40,355	7	8.7	1	31	-1	2
44	044RALE0106A	400	50	133	408	30	1	2	$ 113,001	$ 40,355	6	10.3	1	31	-1	2
44	044S_SH0301A	300	90	74	316	40	1	60	$ 247,534	$ 88,400	8	19	1	31	-1	2
44	044S_SH0302A	0	180	77	140	35	1	60	$ 358,420	$ 128,000	18	25.2	1	4	-1	0.5
44	044S_SH0303A	300	90	74	331	30	1	60	$ 265,455	$ 94,800	8	17.4	1	31	-1	2
44	044S_SH0304A	0	180	77	128	30	1	60	$ 255,375	$ 91,200	17	26.8	1	4	-1	0.5
44	044S_SH0305A	300	120	48	334	30	1	60	$ 227,373	$ 81,200	7	17.3	1	31	-1	2
44	044S_SH0306A	0	190	77	128	30	1	60	$ 280,016	$ 100,000	16	24.4	1	4	-1	0.5
44	044S_SH0307A	300	125	48	328	30	1	2	$ 78,404	$ 28,000	7	10.3	1	31	-1	0.5
44	044S_SH0309G	0	0	0	373	25	1	1	$ 67,204	$ 24,000	6	7.3	1	31	-1	0.5
44	044S_SH0309A	300	125	48	318	30	1	1	$ 68,324	$ 24,400	7	9.9	1	31	-1	0.5
44	044S_SH0310A	0	190	77	124	45	1	2	$ 115,367	$ 41,200	13	11	1	31	-1	0.5
44	044S_SH0311A	300	100	74	316	55	1	1	$ 100,806	$ 36,000	7	11	1	31	-1	0.5
44	044S_SH0312A	0	190	77	114	45	1	59	$ 201,611	$ 72,000	16	10.4	1	1	-1	0.5
44	044S_SH0313A	300	100	74	325	30	1	60	$ 267,695	$ 95,600	7	18.3	1	31	-1	2
44	044S_SH0401A	300	120	74	314	75	1	1	$ 103,046	$ 36,800	11.6	11.6	1	31	-1	0.5
44	044S_SH0402A	0	190	77	108	45	1	59	$ 179,210	$ 64,000	12.4	20.8	1	1	-1	0.5
44	044S_SH0404A	0	190	77	108	50	1	59	$ 212,812	$ 76,000	12.6	22.1	1	19	-1	0.5
44	044S_SH0403A	300	125	48	305	50	1	2	$ 84,005	$ 30,000	12.7	12.7	1	31	-1	0.5
44	044S_SH0405S	0	0	0	400	25	1	60	$ 224,013	$ 80,000	6	7.5	1	31	-1	2
44	044S_SH0406A	0	200	77	173	45	1	55	$ 113,001	$ 40,355	13	20.4	1	28	-1	0.5
44	044S_SH0408A	0	200	77	120	40	1	59	$ 134,408	$ 48,000	10.9	21	1	2	-1	2
44	044S_SH0405A	300	125	48	307	50	1	1	$ 224,013	$ 80,000	13.4	13.4	1	31	-1	0.5
44	044S_SH0410A	0	200	77	103	40	1	59	$ 134,408	$ 48,000	10.5	18.6	1	2	-1	2
44	044S_SH0412A	0	200	77	161	30	1	60	$ 262,095	$ 93,600	13	23.2	1	4	-1	0.5
44	044S_SH0413A	300	75	74	304	45	1	1	$ 69,444	$ 24,800	14.2	14.2	1	31	-1	0.5
44	044S_SH0501A	300	70	74	301	30	1	60	$ 246,414	$ 88,000	7	18.5	1	31	-1	2
44	044S_SH0503A	300	75	74	298	30	1	60	$ 209,452	$ 74,800	15.2	25.5	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
44	044S_SH0504A	0	200	77	89	30	1	59	$ 156,809	$ 56,000	19	28.5	1	19	-1	0.5
44	044S_SH0505A	300	200	48	294	40	1	1	$ 89,605	$ 32,000	16	16	1	31	-1	0.5
44	044S_SHFF01A	300	125	48	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
44	044S_SHFF03A	0	200	77	160	40	1	56	$ 315,125	$ 109,150	10	22	1	24	-1	2
44	044S_SHFF02A	290	75	74	300	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
44	044S_SHHWY	230	64	1000	245	34	1	64	$ 105,868	$ -	8.5	8.5	1	34	-1	0.5
-999																
45	045HIGH0106A	395	50	84	399	30	1	60	$ 113,001	$ 40,355	8	18.8	1	31	-1	2
45	045N_SH0102A	0	110	133	151	40	1	38	$ 422,264	$ 150,800	19	18.7	1	28	-1	0.5
45	045ROLA0204X	330	210	45	376	30	1	1	$ 113,001	$ 40,355	13	12.8	1	31	-1	0.5
45	045ROLA0204A	330	210	45	398	65	1	1	$ 113,001	$ 40,355	14	12.8	1	31	-1	0.5
45	045ROLA0205A	430	100	180	427	80	1	1	$ 113,001	$ 40,355	9	7.9	1	31	-1	0.5
45	045S_SH0101A	0	110	100	137	40	1	38	$ 113,001	$ 40,355	18	18.8	1	28	-1	2
45	045S_SH0103A	325	55	108	356	30	1	55	$ 67,204	$ 24,000	9	11.3	1	31	-1	2
45	045S_SH0110A	0	120	51	169	45	1	59	$ 201,611	$ 72,000	15	27.1	1	22	-1	2
45	045S_SH0112A	0	120	51	197	40	1	59	$ 113,001	$ 40,355	13	19	1	13	-1	2
45	045S_SH0116A	0	60	96	133	30	1	59	$ 112,006	$ 40,000	18	16.5	1	10	-1	2
45	045S_SH0116X	200	50	48	215	25	1	59	$ 112,006	$ 40,000	13	15.8	1	31	-1	2
45	045S_SH0116Y	200	50	48	207	30	1	59	$ 112,006	$ 40,000	12	15.8	1	31	-1	2
45	045S_SH0120A	0	120	52	151	25	1	60	$ 324,819	$ 116,000	15	24.8	1	4	-1	2
45	045S_SH0122X	0	125	52	156	12	1	25	$ 20,161	$ 7,200	15	14.2	1	4	-1	2
45	045S_SH0002P	0	110	70	137	20	1	1	$ 113,001	$ 40,355	17	18.9	1	4	-1	2
45	045S_SH0202A	0	180	52	153	25	1	60	$ 324,819	$ 116,000	17	14.7	1	4	-1	2
45	045S_SH0204A	0	180	52	151	30	1	60	$ 257,615	$ 92,000	17	14.7	1	4	-1	2
45	045S_SH0205A	313	100	49	336	35	1	1	$ 113,001	$ 40,355	7	9.2	1	31	-1	0.5
45	045S_SH0205X	380	100	49	396	30	1	1	$ 113,001	$ 40,355	7	10.1	1	31	-1	0.5
45	045S_SH0206A	0	180	52	169	40	1	60	$ 324,819	$ 116,000	12	22	1	22	-1	2
45	045S_SH0207A	313	100	51	317	40	1	60	$ 113,001	$ 40,355	7	20	1	31	-1	2
45	045S_SH0208A	0	45	52	159	45	1	60	$ 369,621	$ 132,000	14	22.6	1	4	-1	0.5
45	045S_SH0209A	313	100	54	334	30	1	1	$ 113,001	$ 40,355	7	10.4	1	31	-1	0.5
45	045S_SH0210A	0	180	52	153	35	1	60	$ 320,338	$ 114,400	15	23.6	1	22	-1	2
45	045S_SH0211A	305	100	42	317	35	1	60	$ 240,814	$ 86,000	7	19	1	31	-1	2
45	045S_SH0212A	0	180	52	157	40	1	60	$ 357,300	$ 127,600	13	24.9	1	22	-1	2
45	045S_SH0213A	305	90	42	311	40	1	60	$ 240,814	$ 86,000	7	18.9	1	31	-1	2
45	045S_SH0214A	0	180	52	165	35	1	60	$ 313,618	$ 112,000	14	22.5	1	4	-1	0.5
45	045S_TO0116A	430	100	180	438	40	1	35	$ 232,973	$ 83,200	8	9.7	1	31	-1	0.5
45	045S_TO0210A	420	125	54	429	30	1	1	$ 135,494	$ 48,388	7	8.7	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
45	045S_SHFF01A	325	60	108	340	40	1	56	$ 315,125	$ 109,150	12	24	1	31	-1	2
45	045S_SHFF02A	205	50	100	215	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_SHFF05A	325	100	108	340	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_TOFF01A	430	100	180	450	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_SHFF03A	0	125	51	200	40	1	56	$ 315,125	$ 109,150	9	24	1	24	-1	2
45	045S_SHFF06A	325	100	108	340	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_SHFF07A	325	100	108	330	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_SHFF08A	313	200	132	350	40	1	56	$ 315,125	$ 109,150	9	24	1	31	-1	2
45	045S_SHFF04A	0	125	51	190	40	1	56	$ 315,125	$ 109,150	9	24	1	24	-1	2
45	045S_SHHWY	250	64	1000	265	34	1	64	$ 105,868	$ -	8.2	8.2	1	34	-1	0.5
-999																
46	046GREE0203A	372	50	140	368	35	1	1	$ 113,001	$ 40,355	10	12	1	31	-1	0.5
46	046N_SH0107A	321	120	63	319	50	1	1	$ 201,611	$ 72,000	12	15.6	1	31	-1	0.5
46	046N_SH0107S	0	0	0	396	20	1	1	$ 113,001	$ 40,355	11	17	1	31	-1	0.5
46	046N_SH0108A	0	180	68	149	60	1	2	$ 784,045	$ 280,000	20	13.8	1	31	-1	0.5
46	046N_SH0111A	321	100	63	344	45	1	59	$ 333,779	$ 119,200	12	18.7	1	31	-1	2
46	046N_SH0114A	0	100	68	206	40	1	59	$ 160,169	$ 57,200	16	13.1	1	1	-1	2
46	046N_SH0121A	321	100	63	334	40	1	1	$ 92,965	$ 33,200	11	14.2	1	31	-1	0.5
46	046N_SH0123A	300	70	70	316	25	1	60	$ 257,615	$ 92,000	11	20.2	1	31	-1	2
46	046N_SH0124A	0	170	68	180	20	1	60	$ 134,408	$ 48,000	16	12.8	1	22	-1	2
46	046N_SH0202A	0	170	68	188	25	1	60	$ 280,016	$ 100,000	12	21.8	1	22	-1	2
46	046N_SH0204A	0	170	68	185	25	1	60	$ 280,016	$ 100,000	11	21.5	1	23	-1	2
46	046N_SH0206A	0	170	68	182	20	1	60	$ 280,016	$ 100,000	11	21.4	1	23	-1	2
46	046N_SH0207A	281	90	73	284	30	1	1	$ 72,804	$ 26,000	8	10.9	1	31	-1	0.5
46	046N_SH0208A	0	170	68	147	35	1	60	$ 287,856	$ 102,800	14	22.3	1	22	-1	2
46	046N_SH0209A	281	90	73	288	55	1	59	$ 226,253	$ 80,800	8	10	1	31	-1	2
46	046N_SH0211S	0	80	0	329	15	1	59	$ 226,253	$ 80,800	7	8.6	1	31	-1	2
46	046N_SH0211A	281	80	73	269	35	1	2	$ 336,019	$ 120,000	6	8.9	1	31	-1	0.5
46	046N_SH0212A	0	170	68	112	45	1	60	$ 252,014	$ 90,000	16	20.4	1	4	-1	2
46	046N_SH0213A	0	50	50	261	35	1	1	$ 179,210	$ 64,000	6	9.5	1	31	-1	0.5
46	046N_SH0213M	148	50	50	310	30	1	1	$ 179,210	$ 64,000	6	9.7	1	31	-1	0.5
46	046N_SH0214A	148	170	50	159	30	1	1	$ 82,885	$ 29,600	9	17.3	1	31	-1	0.5
46	046N_SH0214X	0	170	50	104	30	1	1	$ 113,001	$ 40,355	17	18.6	1	31	-1	0.5
46	046N_TO0106A	432	100	56	475	40	1	53	$ 156,809	$ 56,000	10	8.9	1	31	-1	0.5
46	046N_TO0114A	432	100	56	412	40	1	60	$ 148,968	$ 53,200	10	13.3	1	31	-1	2
46	046N_TO0118A	432	100	56	454	40	1	53	$ 67,204	$ 24,000	9	10.3	1	31	-1	2
46	046N_TO0206A	376	90	150	367	35	1	60	$ 113,001	$ 40,355	7	13.4	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
46	046N_TOFF04A	432	100	56	440	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046S_SHFF02A	281	90	73	300	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF07A	321	100	63	350	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF07A	432	100	56	460	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF02A	422	80	70	440	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF12A	321	110	63	360	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF05A	432	100	56	440	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF06A	432	100	56	450	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF05A	321	100	63	340	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046S_SHFF03A	300	70	70	310	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF09A	432	100	56	480	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF08A	432	100	56	480	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046S_SHFF01A	0	170	68	155	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046N_TOFF03A	422	80	70	450	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF09A	321	110	63	350	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF08A	0	180	68	180	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046N_SHFF13A	321	110	63	350	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHFF11A	0	180	68	180	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046N_SHFF04A	0	180	68	180	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046N_SHFF06A	0	180	68	180	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046N_SHFF10A	0	180	68	180	40	1	56	$ 315,125	$ 109,150	11	23	1	24	-1	2
46	046GOLDFF01A	401	50	70	410	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046GRENFF01A	380	50	140	390	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046GOLDFF02A	357	50	70	365	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_TOFF01A	447	50	140	430	40	1	56	$ 315,125	$ 109,150	11	23	1	31	-1	2
46	046N_SHHWY	230	64	1000	245	34	1	64	$ 105,868	$ -	10.8	10.8	1	34	-1	0.5
-999																
47	047N_SH0302A	0	190	59	105	45	1	59	$ 134,408	$ 48,000	16	19.4	1	1	-1	2
47	047N_SH0302F	200	190	59	166	20	1	59	$ 22,401	$ 8,000	11	22.2	1	31	-1	2
47	047N_SH0302A	0	190	200	282	170	1	59	$ 672,038	$ 240,000	7	10.6	1	3	-1	2
47	047N_SH0304A	0	190	59	126	40	1	59	$ 168,010	$ 60,000	13	25.1	1	19	-1	2
47	047N_SH0305S	300	90	62	345	20	1	2	$ 22,401	$ 8,000	7	8.5	1	31	-1	0.5
47	047N_SH0306G	0	190	0	163	45	1	55	$ 113,001	$ 40,355	10	19.5	1	30	-1	2
47	047N_SH0306A	0	190	59	110	30	1	55	$ 113,001	$ 40,355	17	14.3	1	30	-1	2
47	047N_SH0307A	300	90	62	277	45	1	1	$ 89,605	$ 32,000	7	12.6	1	31	-1	0.5
47	047N_SH0308A	0	190	59	108	40	1	55	$ 58,243	$ 20,800	16	18.6	1	28	-1	2
47	047N_SH0311A	300	90	62	301	40	1	1	$ 106,406	$ 38,000	8	12.5	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
47	047N_SH0312A	0	190	59	119	50	1	59	$ 201,611	$ 72,000	17	22.5	1	1	-1	2
47	047N_SH0313A	300	90	62	288	35	1	1	$ 94,085	$ 33,600	8	11.1	1	31	-1	0.5
47	047N_SH0314A	0	190	59	129	35	1	59	$ 112,006	$ 40,000	15	14.2	1	31	-1	2
47	047N_SH0315A	300	80	62	302	25	1	60	$ 235,213	$ 84,000	7	18.9	1	31	-1	2
47	047N_SH0316A	0	190	59	116	40	1	1	$ 113,001	$ 40,355	17	21.6	1	31	-1	0.5
47	047N_SH0316G	0	190	59	164	30	1	60	$ 113,001	$ 40,355	12	26.8	1	4	-1	2
47	047N_SH0317A	300	80	62	308	35	1	60	$ 218,412	$ 78,000	7	18	1	31	-1	2
47	047N_SH0318A	0	190	59	130	45	1	55	$ 280,016	$ 100,000	17	27.6	1	28	-1	2
47	047N_SH0320A	0	190	59	184	25	1	60	$ 344,980	$ 123,200	11	23.2	1	24	-1	2
47	047N_SH0322A	0	190	59	168	25	1	55	$ 96,325	$ 34,400	17	23.9	1	28	-1	2
47	047N_SH0324A	0	190	59	131	30	1	60	$ 190,411	$ 68,000	18	24.2	1	4	-1	2
47	047N_SH0326X	200	190	59	188	40	1	1	$ 113,001	$ 40,355	12	14.3	1	31	-1	0.5
47	047N_SH0326A	0	190	59	104	40	1	1	$ 113,001	$ 40,355	17	21	1	31	-1	0.5
47	047N_SH0327A	300	80	62	314	35	1	2	$ 147,848	$ 52,800	8	9.8	1	31	-1	0.5
47	047N_SH0328A	0	190	59	176	35	1	60	$ 392,022	$ 140,000	14	23.6	1	22	-1	2
47	047N_SH0330A	0	190	59	151	30	1	60	$ 280,016	$ 100,000	16	24.9	1	4	-1	2
47	047N_SH0331A	300	80	62	311	25	1	1	$ 71,684	$ 25,600	8	11	1	31	-1	0.5
47	047N_SH0332X	0	190	59	138	30	1	60	$ 280,016	$ 100,000	18	20.7	1	4	-1	2
47	047N_SH0332A	200	190	59	188	25	1	60	$ 96,325	$ 34,400	17	26.6	1	4	-1	2
47	047N_SH0333A	300	80	62	307	30	1	60	$ 134,408	$ 48,000	9	9.7	1	31	-1	2
47	047N_SH0334A	0	190	59	201	30	1	1	$ 313,618	$ 112,000	13	22.1	1	31	-1	0.5
47	047N_TO0306A	390	75	67	398	40	1	1	$ 113,001	$ 40,355	7	10.4	1	31	-1	0.5
47	047N_TO0312A	390	75	67	382	20	1	1	$ 48,163	$ 17,200	7	10	1	31	-1	0.5
47	047N_TO0314A	390	75	67	415	35	1	1	$ 112,006	$ 40,000	7	11	1	31	-1	0.5
47	047N_TO0316A	390	75	67	382	14	1	1	$ 113,001	$ 40,355	7	9.7	1	31	-1	0.5
47	047N_TO0322A	390	75	67	415	30	1	1	$ 134,408	$ 48,000	7	10.8	1	31	-1	0.5
47	047N_TO0324A	390	75	67	402	40	1	55	$ 118,727	$ 42,400	7	10.9	1	30	-1	2
47	047N_TO0326A	390	75	67	414	30	1	55	$ 78,404	$ 28,000	8	10.4	1	29	-1	2
47	047N_TO0328A	390	75	67	387	35	1	1	$ 144,488	$ 51,600	8	12.1	1	31	-1	0.5
47	047N_TO0330A	390	75	67	413	25	1	55	$ 67,204	$ 24,000	8	10.2	1	31	-1	2
47	047N_TO0334A	390	75	67	408	55	1	60	$ 162,409	$ 58,000	9	10.9	1	31	-1	2
47	047NEW_0201A	300	70	62	323	45	1	1	$ 113,001	$ 40,355	9	10.5	1	31	-1	0.5
47	047N_SHFF04A	300	80	62	320	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
47	047N_SHFF03A	0	180	59	155	40	1	56	$ 315,125	$ 109,150	8	20	1	21	-1	2
47	047N_SHFF01A	300	80	62	340	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
47	047N_SHFF02A	300	80	62	330	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
47	047N_TOFF01A	390	80	67	410	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
47	047N_TOFF02A	390	80	67	400	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
47	047N_SHHWY	220	64	1000	235	34	1	64	$ 105,868	$ -	9.7	9.7	1	34	-1	0.5
47	047N_TOHWY	450	64	1000	465	34	1	64	$ 105,868	$ -	9.7	9.7	1	34	-1	0.5
-999																
48	048N_SH0401A	320	80	56	326	35	1	1	$ 61,604	$ 22,000	8	9.9	1	31	-1	0.5
48	048N_SH0402A	0	200	62	162	30	1	60	$ 357,300	$ 127,600	16	24.9	1	1	-1	2
48	048N_SH0403A	320	80	56	329	30	1	1	$ 44,803	$ 16,000	8	8.7	1	31	-1	0.5
48	048N_SH0404A	0	200	62	153	30	1	60	$ 492,828	$ 176,000	17	20.3	1	4	-1	2
48	048N_SH0405A	320	80	56	331	35	1	1	$ 67,204	$ 24,000	8	10.4	1	31	-1	0.5
48	048N_SH0406A	0	200	62	154	35	1	60	$ 436,825	$ 156,000	17	14.3	1	4	-1	2
48	048N_SH0408A	0	200	62	132	45	1	59	$ 153,449	$ 54,800	18	14	1	1	-1	2
48	048N_SH0409A	320	80	56	328	25	1	2	$ 134,408	$ 48,000	8	9.3	1	31	-1	0.5
48	048N_SH0411A	320	80	56	323	45	1	59	$ 257,615	$ 92,000	8	10.8	1	31	-1	2
48	048N_SH0412A	0	200	62	109	40	1	59	$ 61,604	$ 22,000	18	20.8	1	1	-1	2
48	048N_SH0413A	320	80	56	317	30	1	1	$ 56,003	$ 20,000	9	9.7	1	31	-1	0.5
48	048N_SH0414G	0	200	62	177	12	1	55	$ 113,001	$ 40,355	15	15	1	31	-1	2
48	048N_SH0414A	0	200	62	115	30	1	55	$ 268,815	$ 96,000	18	21	1	28	-1	2
48	048N_SH0414X	170	80	62	206	30	1	55	$ 113,001	$ 40,355	13	12.7	1	31	-1	2
48	048N_SH0415A	320	80	56	309	35	1	55	$ 113,001	$ 40,355	9	18.5	1	31	-1	2
48	048N_SH0415X	355	80	56	352	30	1	1	$ 113,001	$ 40,355	7	9.5	1	31	-1	0.5
48	048N_SH0416A	0	200	62	114	35	1	55	$ 123,207	$ 44,000	18	20.6	1	28	-1	2
48	048N_SH0416G	0	200	62	220	20	1	1	$ 11,201	$ 4,000	12	13.6	1	31	-1	0.5
48	048N_SH0417A	320	80	56	317	30	1	1	$ 56,003	$ 20,000	9	11.2	1	31	-1	0.5
48	048N_SH0418A	0	200	62	105	35	1	2	$ 113,001	$ 40,355	17	19.8	1	31	-1	0.5
48	048N_SH0418G	0	80	62	219	25	1	2	$ 22,401	$ 8,000	12	17.7	1	31	-1	0.5
48	048N_SH0419P	0	80	62	327	55	1	11	$ 44,803	$ 16,000	9	10.2	1	31	-1	2
48	048N_SH0420A	0	200	62	158	35	1	60	$ 369,621	$ 132,000	16	26.3	1	4	-1	2
48	048N_SH0422A	0	200	62	121	40	1	59	$ 194,891	$ 69,600	18	24.9	1	1	-1	2
48	048N_SH0424A	0	200	62	167	30	1	60	$ 380,822	$ 136,000	16	25.7	1	4	-1	2
48	048N_SH0426A	0	200	62	178	30	1	60	$ 113,001	$ 40,355	16	26	1	25	-1	2
48	048N_SH0502A	0	200	62	100	35	1	55	$ 156,809	$ 56,000	16	21.7	1	28	-1	2
48	048N_SH0504A	0	200	62	172	45	1	55	$ 235,213	$ 84,000	13	23.4	1	28	-1	2
48	048N_SH0508A	0	200	62	113	45	1	59	$ 312,498	$ 111,600	17	23.3	1	1	-1	2
48	048N_SH0509A	320	80	50	331	20	1	60	$ 113,001	$ 40,355	10	20.4	1	31	-1	2
48	048N_TO0402A	390	65	62	412	30	1	1	$ 28,002	$ 10,000	8	9.7	1	31	-1	0.5
48	048N_TO0404A	390	65	62	413	50	1	1	$ 11,761	$ 4,200	7	10.7	1	31	-1	0.5
48	048N_TO0406A	390	65	62	394	40	1	2	$ 160,169	$ 57,200	7	9.5	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
48	048N_TO0408A	390	65	62	413	30	1	1	$ 109,766	$ 39,200	7	9.3	1	31	-1	0.5
48	048N_TO0410A	390	65	62	413	30	1	1	$ 81,765	$ 29,200	7	10.1	1	31	-1	0.5
48	048N_TO0412A	390	65	62	401	40	1	1	$ 62,724	$ 22,400	7	9.7	1	31	-1	0.5
48	048N_TO0414A	390	65	62	389	35	1	2	$ 134,408	$ 48,000	7	7.7	1	31	-1	0.5
48	048N_TO0418A	390	65	62	400	30	1	2	$ 168,010	$ 60,000	7	10.8	1	31	-1	0.5
48	048N_TO0420A	320	65	200	396	30	1	17	$ 168,010	$ 60,000	8	10.4	1	31	-1	2
48	048N_TO0420S	0	0	0	412	20	1	25	$ 22,401	$ 8,000	10	10.6	1	31	-1	2
48	048WILM0200A	320	125	200	341	80	1	24	$ 280,016	$ 100,000	11	13.2	1	31	-1	2
48	048N_SHFF01A	320	125	50	340	40	1	56	$ 315,125	$ 109,150	12	24	1	31	-1	2
48	048S_SHFF03A	320	200	56	325	40	1	56	$ 315,125	$ 109,150	12	24	1	31	-1	2
48	048N_SHFF02A	0	200	62	170	40	1	56	$ 315,125	$ 109,150	12	24	1	19	-1	2
48	048N_SHHWY	260	64	1000	275	34	1	64	$ 105,868	$ -	11.3	11.3	1	34	-1	0.5
-999																
49	049N_SH0511A	310	120	50	342	30	1	60	$ 252,014	$ 90,000	9	21.2	1	31	-1	2
49	049N_SH0512A	185	50	150	205	35	1	56	$ 449,020	$ 160,355	16	24.7	1	31	-1	2
49	049N_SH0513A	310	120	50	336	30	1	1	$ 33,602	$ 12,000	10	11.7	1	31	-1	0.5
49	049N_SH0514A	0	140	75	116	30	1	55	$ 133,064	$ 47,520	22	27.6	1	28	-1	2
49	049N_SH0516A	0	140	75	114	30	1	55	$ 460,221	$ 164,355	21	27.6	1	28	-1	2
49	049N_SH0518A	0	75	50	184	30	1	60	$ 113,001	$ 40,355	15	25.3	1	19	-1	2
49	049N_SH0519A	310	120	50	319	30	1	1	$ 69,444	$ 24,800	10	11.6	1	31	-1	0.5
49	049N_SH0519S	0	0	0	381	12	1	1	$ 22,401	$ 8,000	9	9.6	1	31	-1	0.5
49	049N_SH0520A	0	220	50	167	40	1	60	$ 851,249	$ 304,000	15	25.3	1	22	-1	2
49	049N_SH0521A	310	60	75	308	40	1	59	$ 113,001	$ 40,355	10	19.2	1	31	-1	2
49	049N_SH0522A	0	190	50	102	35	1	55	$ 78,404	$ 28,000	20	21.5	1	28	-1	2
49	049N_SH0602A	0	170	81	149	30	1	60	$ 280,016	$ 100,000	18	25.9	1	22	-1	2
49	049N_SH0605A	225	90	81	242	35	1	1	$ 58,243	$ 20,800	11	13.6	1	31	-1	0.5
49	049N_SH0606A	0	150	81	101	30	1	59	$ 168,010	$ 60,000	20	27.9	1	19	-1	2
49	049N_SH0607A	225	90	81	241	35	1	1	$ 70,564	$ 25,200	11	14.1	1	31	-1	0.5
49	049N_SH0608A	0	140	81	86	40	1	59	$ 162,409	$ 58,000	17	25.5	1	19	-1	2
49	049N_SH0610A	0	150	81	95	35	1	2	$ 162,409	$ 58,000	19	15.1	1	31	-1	0.5
49	049N_SH0611A	225	80	81	246	20	1	1	$ 44,803	$ 16,000	12	13.6	1	31	-1	0.5
49	049N_SH0611W	0	0	0	288	8	1	1	$ 44,803	$ 16,000	9	10.2	1	31	-1	0.5
49	049N_SH0614A	0	140	81	114	35	1	2	$ 179,210	$ 64,000	19	22.3	1	31	-1	0.5
49	049N_SH0616A	0	140	81	99	35	1	2	$ 168,010	$ 60,000	18	15	1	31	-1	0.5
49	049N_SH0617A	225	100	81	223	35	1	1	$ 67,204	$ 24,000	13	15.3	1	31	-1	0.5
49	049N_SH0618A	0	140	81	101	25	1	2	$ 291,217	$ 104,000	19	24.1	1	31	-1	0.5
49	049N_SH0620A	0	140	81	105	25	1	2	$ 252,014	$ 90,000	17	24.4	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
49	049N_SH0702A	0	220	50	119	40	1	60	$ 441,305	$ 157,600	12	22.6	1	22	-1	2
49	049N_TO0515A	310	120	50	326	70	1	1	$ 11,201	$ 4,000	11	11	1	31	-1	0.5
49	049N_TO0522A	370	60	75	382	35	1	1	$ 113,001	$ 40,355	9	9.6	1	31	-1	0.5
49	049N_TO0606A	310	100	81	327	40	1	1	$ 113,001	$ 40,355	8	9.6	1	31	-1	0.5
49	049N_TO0608A	310	100	81	321	40	1	1	$ 113,001	$ 40,355	8	9.6	1	31	-1	0.5
49	049N_TO0610A	310	100	81	302	45	1	1	$ 113,001	$ 40,355	9	10.3	1	31	-1	0.5
49	049N_TO0612A	310	100	81	320	40	1	59	$ 113,001	$ 40,355	8	16.8	1	31	-1	2
49	049N_TO0618A	310	180	81	329	30	1	2	$ 113,001	$ 40,355	8	15.3	1	31	-1	0.5
49	049N_TO0620A	210	100	110	284	35	1	59	$ 304,657	$ 108,800	10	10.8	1	31	-1	2
49	049N_TO0710A	250	140	50	292	40	1	60	$ 441,305	$ 157,600	10	20.8	1	31	-1	2
49	049N_TOFF03A	310	80	81	350	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_SHFF01A	225	90	81	240	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_TOFF01A	310	100	81	320	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_TOFF02A	310	100	81	325	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_SHFF03A	225	85	81	250	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_TOFF04A	310	110	50	350	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_SHFF04A	225	100	81	270	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_SHFF02A	225	80	81	240	40	1	56	$ 315,125	$ 109,150	10	22	1	31	-1	2
49	049N_SHHWY1	250	64	200	265	34	1	64	$ 21,169	$ -	12	12	1	34	-1	0.5
49	049N_SHHWY2	200	64	150	215	34	1	64	$ 15,883	$ -	12	12	1	34	-1	0.5
49	049N_SHHWY3	150	64	650	165	34	1	64	$ 68,817	$ -	12	12	1	34	-1	0.5
49	049N_TOHWY	380	64	1000	395	34	1	64	$ 105,868	$ -	12	12	1	34	-1	0.5
-999																
50	050N_SH0706A	0	230	54	123	35	1	60	$ 441,305	$ 157,600	13	22.7	1	19	-1	0.5
50	050N_SH0710A	0	230	54	117	40	1	60	$ 441,305	$ 157,600	13	22.7	1	22	-1	0.5
50	050N_SH0714A	0	270	54	134	30	1	60	$ 113,001	$ 40,355	13	22.9	1	22	-1	0.5
50	050N_SH0716A	0	210	54	137	30	1	60	$ 364,021	$ 130,000	13	23.3	1	22	-1	0.5
50	050N_SH0718A	0	250	54	131	35	1	60	$ 113,001	$ 40,355	13	23.3	1	22	-1	0.5
50	050N_SH0720A	0	250	54	132	30	1	60	$ 268,815	$ 96,000	13	22.9	1	22	-1	0.5
50	050N_SH0726A	0	250	54	149	30	1	60	$ 322,578	$ 115,200	13	22.8	1	22	-1	0.5
50	050N_SH0728A	0	250	54	151	25	1	60	$ 504,029	$ 180,000	13	22.5	1	22	-1	0.5
50	050N_TO0017A	320	50	150	327	12	1	62	$ 12,195	$ 4,355	9	11.7	1	33	-1	2
50	050N_TO0018A	275	50	150	287	14	1	62	$ 12,195	$ 4,355	9	12.1	1	33	-1	2
50	050N_TO0019A	230	50	150	244	12	1	62	$ 12,195	$ 4,355	10	12.4	1	33	-1	2
50	050N_TO0020A	180	50	150	205	14	1	62	$ 12,195	$ 4,355	10	12.7	1	33	-1	2
50	050N_TO0022A	0	50	75	104	12	1	62	$ 12,195	$ 4,355	11	13.2	1	33	-1	2
50	050N_TO0023A	285	50	150	300	40	1	62	$ 12,195	$ 4,355	8	12.1	1	33	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
50	050N_TO0024A	240	50	150	264	14	1	62	$ 12,195	$ 4,355	9	12.6	1	33	-1	2
50	050N_TO0025A	200	50	150	207	16	1	62	$ 12,195	$ 4,355	10	16.7	1	33	-1	2
50	050N_TO0026A	180	50	150	187	14	1	62	$ 12,195	$ 4,355	10	13.2	1	33	-1	2
50	050N_TO0027A	0	50	75	138	16	1	62	$ 12,195	$ 4,355	11	15.8	1	33	-1	2
50	050N_TO0028A	285	50	150	301	45	1	62	$ 12,195	$ 4,355	9	12	1	33	-1	2
50	050N_TO0029A	240	50	150	255	50	1	62	$ 12,195	$ 4,355	9	12	1	33	-1	2
50	050N_TO0030A	0	50	75	139	45	1	62	$ 12,195	$ 4,355	11	13.7	1	33	-1	2
50	050N_TO0031A	0	50	75	127	45	1	62	$ 12,195	$ 4,355	13	14.4	1	33	-1	0.5
50	050N_TO0702A	240	150	60	292	40	1	60	$ 441,305	$ 157,600	10	20.9	1	31	-1	2
50	050N_TO0706A	240	150	60	296	40	1	60	$ 504,029	$ 180,000	10	20.9	1	31	-1	2
50	050N_TO0804A	0	250	100	170	75	1	60	$ 337,014	$ 120,355	9	19.6	1	24	-1	2
50	050N_SHFF02A	0	250	54	290	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
50	050N_SHFF01A	0	200	54	140	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
50	050N_TOFF07A	240	110	60	300	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_SHFF03A	0	250	54	150	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
50	050N_TOFF02A	240	110	60	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF05A	240	110	60	270	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF08A	240	110	60	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF09A	240	110	60	300	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF06A	240	110	60	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF04A	240	110	60	280	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF03A	240	110	60	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_TOFF01A	240	110	100	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
50	050N_SHHWY2	250	64	350	265	34	1	64	$ 37,052	$ -	8	8	1	34	-1	0.5
50	050N_SHHWY1	210	64	200	225	34	1	64	$ 21,169	$ -	8	8	1	34	-1	0.5
50	050N_TOHWY	350	64	1000	365	34	1	64	$ 105,868	$ -	8	8	1	34	-1	0.5
-999																
51	051N_NE0918A	0	130	225	100	60	1	5	$ 113,001	$ 40,355	13	18.3	1	25	-1	0.5
51	051N_NE0918Z	200	250	225	194	200	1	5	$ 113,001	$ 40,355	10	17.7	1	31	-1	2
51	051N_NE0918T	0	130	225	102	60	1	5	$ 113,001	$ 40,355	15	18.8	1	25	-1	0.5
51	051N_NE0918Y	375	250	225	425	200	1	5	$ 113,001	$ 40,355	8	16.3	1	31	-1	2
51	051N_NE0918U	200	250	225	183	150	1	5	$ 113,001	$ 40,355	10	18.5	1	31	-1	2
51	051N_NE0918A	0	120	100	110	70	1	5	$ 113,001	$ 40,355	8	13.6	1	26	-1	2
51	051N_NE0918V	375	250	225	357	200	1	5	$ 113,001	$ 40,355	8	17.4	1	31	-1	2
51	051N_NE0918X	580	120	225	603	80	1	5	$ 113,001	$ 40,355	8	16.3	1	31	-1	2
51	051N_NE0918W	580	120	225	581	80	1	5	$ 113,001	$ 40,355	8	16.4	1	31	-1	2
51	051N_SH1003A	260	150	50	288	40	1	60	$ 113,001	$ 40,355	9	19.1	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
51	051N_SH1004A	0	220	75	168	40	1	60	$ 144,488	$ 51,600	12	21.4	1	22	-1	2
51	051N_SH1005A	260	140	50	286	65	1	60	$ 224,013	$ 80,000	8	17.5	1	31	-1	2
51	051N_SH1006A	0	180	75	128	40	1	60	$ 255,375	$ 91,200	16	25.6	1	7	-1	2
51	051N_SH1007A	260	140	50	282	40	1	60	$ 169,130	$ 60,400	9	8.1	1	31	-1	2
51	051N_TO1004A	400	100	50	409	50	1	60	$ 246,414	$ 88,000	6	18.3	1	31	-1	2
51	051N_TO1006A	400	100	50	405	60	1	2	$ 156,809	$ 56,000	7	5.9	1	31	-1	0.5
51	051N_TO1008A	400	100	50	413	40	1	60	$ 162,409	$ 58,000	6	16.1	1	31	-1	2
51	051N_TO0808A	0	240	67	171	35	1	60	$ 113,001	$ 40,355	11	23.2	1	24	-1	2
51	051N_TO0810A	0	230	67	189	40	1	60	$ 113,001	$ 40,355	11	22.3	1	24	-1	2
51	051N_TO0812A	270	100	80	291	40	1	60	$ 113,001	$ 40,355	10	20.9	1	31	-1	2
51	051N_TO0814A	270	120	80	275	30	1	60	$ 113,001	$ 40,355	10	20.6	1	31	-1	2
51	051N_TO0818A	270	90	80	300	30	1	60	$ 113,001	$ 40,355	10	21	1	31	-1	2
51	051N_TO0820A	0	230	67	176	30	1	60	$ 113,001	$ 40,355	12	22.6	1	22	-1	2
51	051N_TO0822A	270	100	80	298	35	1	60	$ 113,001	$ 40,355	9	21.9	1	31	-1	2
51	051N_TO0824A	0	220	67	171	35	1	60	$ 113,001	$ 40,355	13	18.8	1	22	-1	0.5
51	051N_TO0826A	0	210	67	180	25	1	60	$ 113,001	$ 40,355	11	18.3	1	24	-1	2
51	051N_TO0828A	270	100	80	295	30	1	60	$ 113,001	$ 40,355	12	21.3	1	31	-1	2
51	051N_TOFF01A	0	220	67	220	40	1	56	$ 315,125	$ 109,150	8	0	1	24	-1	2
51	051N_SHHWY	370	64	100	390	34	1	64	$ 10,585	$ -	6.8	6.8	1	34	-1	0.5
51	051N_TOHWY	370	64	350	390	34	1	64	$ 37,052	$ -	6.8	6.8	1	34	-1	0.5
-999																
52	052N_SH1008A	0	150	77	131	35	1	59	$ 145,160	$ 51,840	14	18.1	1	19	-1	0.5
52	052N_SH1009A	260	130	56	286	50	1	59	$ 217,292	$ 77,600	9	17	1	31	-1	2
52	052N_SH1010A	0	150	77	138	30	1	60	$ 263,215	$ 94,000	14	19.3	1	4	-1	2
52	052N_SH1011A	260	130	56	298	40	1	60	$ 168,010	$ 60,000	8	16.8	1	31	-1	2
52	052N_SH1013A	260	130	56	291	40	1	59	$ 166,890	$ 59,600	8	16.6	1	31	-1	2
52	052N_SH1014A	0	150	77	129	40	1	1	$ 156,809	$ 56,000	16	20.3	1	31	-1	0.5
52	052N_SH1101A	260	130	56	297	45	1	59	$ 96,325	$ 34,400	9	16.5	1	31	-1	2
52	052N_SH1102A	0	150	77	128	40	1	59	$ 144,488	$ 51,600	18	20.8	1	19	-1	2
52	052N_SH1103A	260	130	56	296	60	1	59	$ 134,408	$ 48,000	9	16.6	1	31	-1	2
52	052N_SH1104A	0	150	77	120	30	1	55	$ 100,806	$ 36,000	17	18.7	1	28	-1	2
52	052N_SH1105A	260	130	56	299	40	1	60	$ 145,608	$ 52,000	9	19.5	1	31	-1	2
52	052N_SH1106A	0	150	77	130	30	1	60	$ 221,773	$ 79,200	13	19.4	1	19	-1	2
52	052N_SH1108A	0	150	77	138	40	1	59	$ 92,965	$ 33,200	14	18.7	1	19	-1	2
52	052N_SH1109A	260	130	56	299	30	1	2	$ 190,411	$ 68,000	9	17	1	31	-1	0.5
52	052N_SH1111A	260	130	56	292	45	1	59	$ 156,809	$ 56,000	9	16.9	1	31	-1	2
52	052N_SH1112A	0	150	77	140	40	1	55	$ 106,406	$ 38,000	15	19.6	1	28	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
52	052N_SH1114A	0	150	77	130	35	1	55	$ 224,013	$ 80,000	16	19.7	1	28	-1	2
52	052N_SH1115A	260	130	56	288	50	1	60	$ 324,819	$ 116,000	9	16.6	1	6	-1	2
52	052N_SH1116A	0	150	77	138	30	1	55	$ 62,724	$ 22,400	13	18.2	1	28	-1	2
52	052N_SH1117A	260	130	56	288	45	1	59	$ 96,325	$ 34,400	9	16.6	1	31	-1	2
52	052N_SH1118A	0	150	77	168	30	1	60	$ 168,010	$ 60,000	15	17.7	1	22	-1	2
52	052N_SH1119A	260	130	56	287	45	1	55	$ 96,325	$ 34,400	9	16.3	1	31	-1	2
52	052N_SH1120A	0	150	77	126	40	1	56	$ 250,000	$ 75,000	16	28	1	28	-1	0.5
52	052N_SH1121A	260	130	56	286	45	1	55	$ 96,325	$ 34,400	9	16.4	1	31	-1	2
52	052N_SH1203A	260	100	56	284	30	1	60	$ 284,496	$ 101,600	10	20.3	1	31	-1	2
52	052N_SH1205A	260	100	56	278	30	1	59	$ 179,210	$ 64,000	9	15	1	31	-1	2
52	052N_SH1206A	0	150	77	139	45	1	55	$ 106,406	$ 38,000	18	18.2	1	28	-1	2
52	052N_SH1207A	260	100	56	271	35	1	59	$ 72,804	$ 26,000	9	14.4	1	31	-1	2
52	052N_TO1010A	390	100	56	420	40	1	59	$ 162,409	$ 58,000	6	16	1	31	-1	2
52	052N_TO1012A	390	100	56	431	40	1	2	$ 125,447	$ 44,800	6	14.4	1	31	-1	0.5
52	052N_TO1014A	390	100	56	417	45	1	55	$ 134,408	$ 48,000	7	14.6	1	31	-1	2
52	052N_TO1104A	390	110	56	415	50	1	2	$ 168,010	$ 60,000	8	14.7	1	31	-1	0.5
52	052N_TO1114A	390	110	56	407	45	1	59	$ 96,325	$ 34,400	8	15.7	1	31	-1	2
52	052N_TO1116A	390	110	56	431	40	1	56	$ 179,210	$ 64,000	8	18.2	1	31	-1	2
52	052N_TO1118A	390	110	56	411	45	1	59	$ 235,213	$ 84,000	8	19.1	1	31	-1	2
52	052N_TO1120A	390	120	56	413	30	1	60	$ 166,890	$ 59,600	8	16	1	31	-1	2
52	052N_TO1122A	390	120	56	422	35	1	60	$ 190,411	$ 68,000	8	16	1	31	-1	2
52	052N_TO1204A	390	110	56	400	50	1	59	$ 156,809	$ 56,000	11	15.4	1	31	-1	2
52	052N_TO1208A	390	110	56	392	40	1	55	$ 101,590	$ 36,280	9	14.7	1	31	-1	2
52	052N_SHFF02A	260	120	56	300	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF03A	390	115	56	420	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF07A	390	110	56	440	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF04A	390	110	56	415	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SHFF01A	260	100	56	310	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF02A	390	110	56	410	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF06A	390	110	56	420	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF01A	390	110	56	410	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SHFF03A	260	125	56	300	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_TOFF05A	390	110	56	420	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SH1202A	0	150	50	115	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SH1204A	0	150	50	115	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SH1122A	0	150	50	115	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
52	052N_SH1110A	0	150	50	115	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
52	052MISCHWY	350	40	200	36	34	1	64	$ 21,169	$ -	9.2	9.2	1	34	-1	0.5
52	052N_SHHWY	200	64	1000	215	34	1	64	$ 105,868	$ -	9.2	9.2	1	34	-1	0.5
52	052N_TOHWY	480	64	1000	500	34	1	64	$ 105,868	$ -	9.2	9.2	1	34	-1	0.5
-999																
53	053JONE0104A	320	100	56	359	30	1	55	$ 75,044	$ 26,800	6	13.9	1	31	-1	2
53	053N_SH1209A	200	100	59	264	45	1	59	$ 112,006	$ 40,000	9	15.7	1	31	-1	2
53	053N_SH1211A	200	100	59	258	40	1	55	$ 84,005	$ 30,000	9	15.6	1	31	-1	2
53	053N_SH1212A	0	140	111	106	30	1	55	$ 62,724	$ 22,400	14	16.1	1	28	-1	2
53	053N_SH1213A	200	100	59	253	45	1	55	$ 107,526	$ 38,400	9	16.1	1	31	-1	2
53	053N_SH1214A	0	140	111	106	30	1	55	$ 90,277	$ 32,240	16	17.4	1	28	-1	2
53	053N_SH1215A	200	100	59	239	55	1	55	$ 203,852	$ 72,800	9	15.9	1	31	-1	2
53	053N_SH1216A	0	110	111	96	55	1	59	$ 302,417	$ 108,000	16	15.6	1	1	-1	2
53	053N_SH1217A	200	100	59	234	40	1	59	$ 134,408	$ 48,000	9	16.1	1	31	-1	2
53	053N_SH1218A	0	110	111	97	35	1	59	$ 156,809	$ 56,000	14	16.8	1	19	-1	2
53	053N_SH1219A	200	100	59	227	40	1	60	$ 77,284	$ 27,600	9	14.9	1	31	-1	2
53	053N_SH1222A	0	140	111	120	30	1	60	$ 166,890	$ 59,600	12	18.1	1	22	-1	2
53	053N_SH1223A	200	100	59	219	45	1	2	$ 140,008	$ 50,000	9	14.5	1	31	-1	0.5
53	053N_SH1225A	200	100	59	214	55	1	59	$ 190,411	$ 68,000	9	16.8	1	31	-1	2
53	053N_SH1226A	0	140	111	103	30	1	55	$ 156,809	$ 56,000	14	16.1	1	28	-1	2
53	053N_SH1301A	200	100	59	225	35	1	59	$ 84,005	$ 30,000	8	15.9	1	31	-1	2
53	053N_SH1303A	200	100	59	207	35	1	59	$ 126,567	$ 45,200	7	16	1	31	-1	2
53	053N_SH1304A	0	140	111	61	30	1	55	$ 78,404	$ 28,000	6	18.1	1	29	-1	2
53	053N_SH1305A	200	100	59	204	35	1	60	$ 145,608	$ 52,000	7	17.1	1	31	-1	2
53	053N_SH1307A	200	100	59	199	40	1	59	$ 100,806	$ 36,000	7	16.5	1	31	-1	2
53	053N_SH1309A	200	100	59	193	40	1	59	$ 95,205	$ 34,000	7	17	1	31	-1	2
53	053N_SH1310A	0	130	111	50	35	1	55	$ 156,809	$ 56,000	6	17.1	1	29	-1	2
53	053N_SH1311A	200	100	59	188	45	1	55	$ 95,205	$ 34,000	7	14.7	1	31	-1	2
53	053N_SH1313A	200	100	59	182	40	1	59	$ 145,608	$ 52,000	7	16.9	1	31	-1	2
53	053N_SH1314A	0	130	111	46	40	1	55	$ 201,611	$ 72,000	6	15.7	1	29	-1	2
53	053N_SH1317A	200	100	59	169	40	1	59	$ 112,006	$ 40,000	7	16.8	1	31	-1	2
53	053N_SH1318P	0	130	0	77	20	1	1	$ 11,201	$ 4,000	11	17.2	1	31	-1	0.5
53	053N_TO1210A	320	110	56	392	45	1	2	$ 208,332	$ 74,400	9	14.7	1	31	-1	0.5
53	053N_TO1212A	320	110	56	383	45	1	2	$ 179,210	$ 64,000	9	14.9	1	31	-1	0.5
53	053N_TO1216A	320	110	56	363	55	1	59	$ 146,728	$ 52,400	9	14.8	1	31	-1	2
53	053N_TO1218A	320	110	56	370	40	1	2	$ 168,010	$ 60,000	9	6.6	1	31	-1	0.5
53	053N_TO1222A	320	110	56	354	45	1	60	$ 302,417	$ 108,000	8	18.5	1	31	-1	2
53	053N_TO1224A	320	110	56	351	30	1	60	$ 302,417	$ 108,000	8	17.1	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
53	053N_TO1226A	320	110	56	337	30	1	60	$ 246,414	$ 88,000	8	16.5	1	31	-1	2
53	053N_TO1306A	320	100	56	326	40	1	60	$ 257,615	$ 92,000	6	17	1	31	-1	2
53	053N_TO1308A	320	100	56	320	40	1	2	$ 324,819	$ 116,000	6	15.1	1	31	-1	0.5
53	053N_TO1310A	320	100	56	302	40	1	59	$ 134,408	$ 48,000	6	16.1	1	31	-1	2
53	053N_TO1312A	320	100	56	303	30	1	59	$ 77,284	$ 27,600	7	16.2	1	31	-1	2
53	053N_TO1314A	320	100	56	297	40	1	59	$ 145,608	$ 52,000	7	16.7	1	31	-1	2
53	053N_TO1316A	320	100	56	300	50	1	55	$ 106,406	$ 38,000	6	15.7	1	31	-1	2
53	053N_TO1320A	320	100	56	280	35	1	59	$ 81,765	$ 29,200	7	16	1	31	-1	2
53	053N_TOFF01A	320	100	56	300	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
53	053N_TOFF03A	320	100	56	360	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
53	053N_SHFF01A	200	90	59	190	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
53	053N_TOFF02A	320	100	56	335	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
53	053N_TOHWY	460	64	1000	475	34	1	64	$ 105,868	$ -	6.9	6.9	1	34	-1	0.5
53	053N_SHHWY	180	64	1000	195	34	1	64	$ 105,868	$ -	6.9	6.9	1	34	-1	0.5
-999																
54	054EASY1506A	300	90	59	336	30	1	60	$ 212,812	$ 76,000	8	15.8	1	31	-1	2
54	054LENO0103A	300	100	59	273	40	1	59	$ 113,001	$ 40,355	7	16	1	31	-1	2
54	054N_SH1319A	190	90	71	169	40	1	59	$ 201,611	$ 72,000	7	16.7	1	31	-1	2
54	054N_SH1401A	190	90	71	201	30	1	59	$ 100,806	$ 36,000	9	17.3	1	31	-1	2
54	054N_SH1409A	190	90	71	198	45	1	55	$ 88,485	$ 31,600	10	18.7	1	31	-1	2
54	054N_SH1411A	190	90	71	208	25	1	60	$ 257,615	$ 92,000	9	21.1	1	31	-1	2
54	054N_SH1413A	190	90	71	204	40	1	59	$ 77,284	$ 27,600	9	19.3	1	31	-1	2
54	054N_SH1417A	190	90	71	205	35	1	59	$ 84,005	$ 30,000	8	18.5	1	31	-1	2
54	054N_SH1419A	190	90	71	197	50	1	59	$ 132,168	$ 47,200	8	16.4	1	31	-1	2
54	054N_SH1420A	0	125	500	82	35	1	59	$ 119,847	$ 42,800	11	17.5	1	20	-1	2
54	054N_SH1421A	190	90	71	205	40	1	60	$ 209,452	$ 74,800	8	18.9	1	31	-1	2
54	054N_SH1422A	0	125	500	77	35	1	55	$ 150,089	$ 53,600	12	17.1	1	28	-1	0.5
54	054N_SH1501A	190	90	71	213	35	1	59	$ 77,284	$ 27,600	8	17.7	1	31	-1	2
54	054N_SH1503A	190	90	71	212	40	1	60	$ 380,822	$ 136,000	9	17.9	1	31	-1	2
54	054N_TO1402A	300	85	59	302	35	1	2	$ 100,806	$ 36,000	7	16.1	1	31	-1	0.5
54	054N_TO1404A	300	85	59	309	30	1	60	$ 197,131	$ 70,400	8	19.4	1	31	-1	2
54	054N_TO1406A	300	85	59	311	30	1	60	$ 89,605	$ 32,000	8	16.7	1	31	-1	2
54	054N_TO1408A	300	85	59	309	35	1	2	$ 100,806	$ 36,000	7	8.7	1	31	-1	0.5
54	054N_TO1410A	300	85	59	312	40	1	2	$ 179,210	$ 64,000	8	8.7	1	31	-1	0.5
54	054N_TO1412A	300	85	59	302	35	1	55	$ 212,812	$ 76,000	9	20.6	1	31	-1	2
54	054N_TO1416A	300	85	59	292	40	1	55	$ 89,605	$ 32,000	9	17.1	1	31	-1	2
54	054N_TO1418A	300	85	59	305	35	1	59	$ 112,006	$ 40,000	9	18.3	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
54	054N_TO1420A	300	85	59	305	25	1	60	$ 222,893	$ 79,600	8	19.3	1	31	-1	2
54	054PEND0201A	300	80	59	297	45	1	2	$ 113,001	$ 40,355	8	16.2	1	31	-1	0.5
54	054N_SHFF04A	0	90	71	210	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
54	054N_TOFF04A	300	80	59	320	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
54	054N_SHFF01A	0	80	71	210	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
54	054N_TOFF03A	300	80	59	320	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
54	054N_SHFF02A	0	80	71	210	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
54	054N_SHFF03A	0	90	71	210	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
54	054N_TOFF05A	300	80	59	310	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
54	054EASYFF01A	300	90	59	330	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
54	054EASYFF02A	300	90	59	340	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
54	054N_TOHWY	380	64	1000	375	34	1	64	$ 105,868	$ -	8.3	8.3	1	34	-1	0.5
54	054N_SHHWY	120	64	1000	135	34	1	64	$ 105,868	$ -	8.3	8.3	1	34	-1	0.5
-999																
55	055EASY1512A	315	90	78	324	50	1	49	$ 179,210	$ 64,000	8	16.3	1	31	-1	2
55	055EASY1514A	315	90	78	329	35	1	59	$ 134,408	$ 48,000	9	16.2	1	31	-1	2
55	055EASY1516A	315	90	78	328	35	1	59	$ 134,408	$ 48,000	9	15.9	1	31	-1	2
55	055EASY1518A	315	90	56	314	50	1	2	$ 207,212	$ 74,000	9	16	1	31	-1	0.5
55	055N_NE1702A	375	100	76	446	60	1	38	$ 113,001	$ 167,474	9	10	1	31	-1	0.5
55	055N_NE1702S	375	140	76	467	30	1	38	$ 113,001	$ 40,355	9	8.4	1	31	-1	0.5
55	055N_NE1708S	0	0	0	397	40	1	59	$ 113,001	$ 40,355	10	8.5	1	31	-1	2
55	055N_NE1708A	375	140	76	444	40	1	1	$ 113,001	$ 40,355	9	7.4	1	31	-1	0.5
55	055N_NE1712A	375	140	76	434	40	1	59	$ 113,001	$ 40,355	9	14.7	1	31	-1	2
55	055N_NE1710A	375	140	76	439	45	1	59	$ 113,001	$ 40,355	9	15.2	1	31	-1	2
55	055N_SH1701A	0	125	70	135	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055N_SH1703A	0	125	70	135	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055N_SH1705A	0	125	70	135	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055N_SH1505A	0	100	78	220	35	1	60	$ 204,972	$ 73,200	9	21.8	1	31	-1	2
55	055N_SH1507A	0	100	78	232	45	1	59	$ 100,806	$ 36,000	9	17.3	1	31	-1	2
55	055N_SH1511A	0	100	78	222	45	1	59	$ 190,411	$ 68,000	9	16.8	1	31	-1	2
55	055N_SH1513A	0	100	78	219	25	1	59	$ 134,408	$ 48,000	9	16.9	1	31	-1	2
55	055N_SH1515A	0	100	78	224	40	1	59	$ 336,019	$ 120,000	9	18	1	31	-1	2
55	055N_SH1601A	0	60	78	219	30	1	60	$ 145,608	$ 52,000	9	19.1	1	31	-1	2
55	055N_SH1603A	0	100	78	202	40	1	55	$ 89,605	$ 32,000	9	16.7	1	31	-1	2
55	055N_SH1707A	0	140	63	276	30	1	55	$ 67,204	$ 24,000	10	15.9	1	31	-1	2
55	055N_SH1709A	0	140	63	272	40	1	59	$ 113,001	$ 40,355	10	19.7	1	31	-1	2
55	055N_SH1711A	0	140	63	265	45	1	59	$ 113,001	$ 40,355	9	19.1	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
55	055NEPT0106A	315	45	100	314	25	1	59	$ 190,411	$ 68,000	9	18.9	1	31	-1	2
55	055NEPTFF01A	365	50	100	360	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055EASYFF01A	315	90	78	330	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055EASYFF02A	315	90	78	340	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055BROAFF01A	315	100	78	330	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
55	055N_SHFF04A	0	100	78	225	40	1	56	$ 315,125	$ 109,150	9	21	1	29	-1	2
55	055N_SH1701A	0	190	63	300	40	1	56	$ 244,300	$ 73,200	9	21	1	29	-1	2
55	055N_SH1703A	0	190	63	280	40	1	56	$ 244,300	$ 73,200	9	21	1	29	-1	2
55	055N_SH1705A	0	190	63	320	40	1	56	$ 244,300	$ 73,200	9	21	1	29	-1	2
55	055N_SH1707A	0	190	63	320	40	1	56	$ 244,300	$ 73,200	9	21	1	29	-1	2
55	055N_SHHWY	130	64	1000	145	34	1	64	$ 105,868	$ -	8.7	8.7	1	34	-1	0.5
-999																
56	056N_NE1714A	380	130	59	446	40	1	59	$ 113,001	$ 40,355	9	15.7	1	31	-1	2
56	056N_NE1718A	380	130	59	439	40	1	59	$ 113,001	$ 40,355	9	16.4	1	31	-1	2
56	056N_NE1720A	380	130	59	421	45	1	2	$ 113,001	$ 40,355	8	7	1	31	-1	0.5
56	056N_NE1802A	380	130	59	438	30	1	55	$ 113,001	$ 40,355	9	14.9	1	31	-1	2
56	056N_NE1804A	380	130	59	417	30	1	55	$ 113,001	$ 40,355	8	17.9	1	31	-1	2
56	056N_NE1806A	380	130	59	423	40	1	59	$ 113,001	$ 40,355	9	18.6	1	31	-1	2
56	056N_NE1810A	380	130	59	412	40	1	59	$ 113,001	$ 40,355	9	16.3	1	31	-1	2
56	056N_NE1812A	380	130	59	413	50	1	59	$ 113,001	$ 40,355	9	17.3	1	31	-1	2
56	056N_NE1814A	380	130	59	413	45	1	2	$ 113,001	$ 40,355	9	15.3	1	31	-1	0.5
56	056N_NE1816A	380	130	59	430	35	1	60	$ 113,001	$ 40,355	9	17.7	1	31	-1	2
56	056N_NE1818A	380	130	59	421	40	1	59	$ 113,001	$ 40,355	9	14.9	1	31	-1	2
56	056N_NE1820A	380	130	59	411	45	1	59	$ 113,001	$ 40,355	8	14.8	1	31	-1	2
56	056N_NE1822A	380	130	59	404	40	1	60	$ 113,001	$ 40,355	8	15.4	1	31	-1	2
56	056N_NE1824A	380	150	59	394	55	1	55	$ 113,001	$ 40,355	9	15.8	1	31	-1	2
56	056N_SH1713A	245	130	59	260	60	1	59	$ 113,001	$ 40,355	9	17	1	31	-1	2
56	056N_SH1714A	0	130	500	96	40	1	55	$ 113,001	$ 40,355	11	17.6	1	30	-1	2
56	056N_SH1717A	245	130	59	269	35	1	59	$ 113,001	$ 40,355	9	17.1	1	31	-1	2
56	056N_SH1719A	245	130	59	268	45	1	59	$ 113,001	$ 40,355	9	16.5	1	31	-1	2
56	056N_SH1801A	245	130	59	266	35	1	59	$ 113,001	$ 40,355	9	15.5	1	31	-1	2
56	056N_SH1804A	0	130	500	128	40	1	55	$ 113,001	$ 40,355	12	19.1	1	30	-1	0.5
56	056N_SH1805A	245	130	59	275	35	1	60	$ 113,001	$ 40,355	9	18.7	1	31	-1	2
56	056N_SH1807A	245	130	59	315	35	1	60	$ 113,001	$ 40,355	9	16.7	1	31	-1	2
56	056N_SH1809A	245	130	59	281	30	1	59	$ 113,001	$ 40,355	9	16.7	1	31	-1	2
56	056N_SH1811A	245	130	59	268	45	1	59	$ 113,001	$ 40,355	9	16.6	1	31	-1	2
56	056N_SH1813A	245	130	59	269	40	1	59	$ 113,001	$ 40,355	9	15.3	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
56	056N_SH1815A	245	130	59	267	40	1	60	$ 113,001	$ 40,355	9	17.3	1	31	-1	2
56	056N_SH1817A	245	130	59	263	45	1	60	$ 113,001	$ 40,355	9	17.4	1	31	-1	2
56	056N_SH1819A	245	130	59	284	50	1	55	$ 113,001	$ 40,355	10	20.9	1	31	-1	2
56	056N_SH1821A	245	130	59	277	40	1	60	$ 113,001	$ 40,355	11	22	1	31	-1	2
56	056N_SH1825A	245	130	59	267	40	1	59	$ 113,001	$ 40,355	9	16.4	1	31	-1	2
56	056N_SHFF03A	0	140	59	290	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
56	056N_NEFF03A	380	135	59	430	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
56	056N_NEFF02A	380	130	59	415	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
56	056N_SHFF02A	245	130	59	280	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
56	056N_NEFF01A	0	100	59	270	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
56	056N_SHFF01A	245	120	59	415	40	1	60	$ 315,125	$ 109,150	9	21	1	31	-1	2
56	056N_SHHWY	180	64	1000	195	34	1	64	$ 105,868	$ -	7.5	7.5	1	34	-1	0.5
-999																
57	057N_NE1902A	360	120	59	399	40	1	59	$ 113,001	$ 40,355	9	16	1	31	-1	2
57	057N_NE1904A	360	120	59	397	40	1	55	$ 113,001	$ 40,355	9	16.6	1	31	-1	2
57	057N_NE1906A	360	120	59	403	45	1	59	$ 113,001	$ 40,355	9	16.4	1	31	-1	2
57	057N_NE1908A	360	120	59	404	45	1	59	$ 113,001	$ 40,355	9	15.9	1	31	-1	2
57	057N_NE1914A	360	120	59	388	45	1	59	$ 113,001	$ 40,355	9	15.9	1	31	-1	2
57	057N_NE1916A	360	120	59	377	55	1	59	$ 113,001	$ 40,355	9	15.7	1	31	-1	2
57	057N_NE1918A	360	120	59	382	50	1	59	$ 113,001	$ 40,355	9	16.1	1	31	-1	2
57	057N_NE1920A	360	120	59	375	50	1	59	$ 113,001	$ 40,355	9	16.1	1	31	-1	2
57	057N_NE1922A	360	120	59	389	40	1	59	$ 113,001	$ 40,355	9	15.5	1	31	-1	2
57	057N_NE2002A	360	110	59	389	40	1	2	$ 113,001	$ 40,355	9	7.9	1	31	-1	0.5
57	057N_NE2008A	360	110	59	382	40	1	2	$ 113,001	$ 40,355	9	15.5	1	31	-1	0.5
57	057N_NE2010A	360	110	59	386	40	1	59	$ 113,001	$ 40,355	9	7.8	1	31	-1	2
57	057N_NE2012A	360	110	59	381	40	1	2	$ 113,001	$ 40,355	9	17	1	31	-1	0.5
57	057N_SH1901A	0	120	59	275	45	1	59	$ 113,001	$ 40,355	9	16.4	1	31	-1	2
57	057N_SH1903A	0	120	59	271	30	1	59	$ 113,001	$ 40,355	9	17.8	1	31	-1	2
57	057N_SH1905A	0	120	59	263	50	1	59	$ 113,001	$ 40,355	9	15.4	1	31	-1	2
57	057N_SH1907A	0	120	59	269	45	1	59	$ 113,001	$ 40,355	9	18.9	1	31	-1	2
57	057N_SH1909A	0	120	59	264	45	1	59	$ 113,001	$ 40,355	9	16	1	31	-1	2
57	057N_SH1911A	0	120	59	264	55	1	59	$ 113,001	$ 40,355	9	15.7	1	31	-1	2
57	057N_SH1913A	0	120	59	266	45	1	55	$ 113,001	$ 40,355	9	15.5	1	31	-1	2
57	057N_SH1915A	0	120	59	266	45	1	59	$ 113,001	$ 40,355	9	15.7	1	31	-1	2
57	057N_SH1917A	0	120	59	269	40	1	59	$ 113,001	$ 40,355	9	15.9	1	31	-1	2
57	057N_SH1919A	0	120	59	271	40	1	59	$ 113,001	$ 40,355	9	16.6	1	31	-1	2
57	057N_SH2001A	245	120	59	266	35	1	55	$ 113,001	$ 40,355	9	16.7	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
57	057N_SH2003A	245	110	59	276	30	1	55	$ 113,001	$ 40,355	9	16.5	1	31	-1	2
57	057N_SH2004A	0	135	200	117	30	1	56	$ 113,001	$ 40,355	13	17.9	1	28	-1	0.5
57	057N_SH2005A	245	110	59	277	30	1	59	$ 113,001	$ 40,355	9	18.9	1	31	-1	2
57	057N_SH2006A	0	135	200	123	30	1	60	$ 113,001	$ 40,355	13	17.5	1	22	-1	0.5
57	057N_SH2007A	245	110	59	274	25	1	60	$ 113,001	$ 40,355	10	18.8	1	31	-1	2
57	057N_SH2008A	0	135	200	123	30	1	60	$ 113,001	$ 40,355	13	17.7	1	22	-1	0.5
57	057N_SH2009A	245	110	59	267	25	1	60	$ 113,001	$ 40,355	9	16.5	1	31	-1	2
57	057N_SH2010A	0	135	200	120	25	1	55	$ 113,001	$ 40,355	16	17	1	28	-1	0.5
57	057N_SH2011A	245	110	59	271	35	1	59	$ 113,001	$ 40,355	9	16.8	1	31	-1	2
57	057N_SH2012A	0	135	200	117	30	1	56	$ 113,001	$ 40,355	16	19.2	1	28	-1	0.5
58	058N_SH2014A	0	135	200	120	25	1	56	$ 315,125	$ 40,355	9	21	1	30	-1	2
57	057N_SHFF01A	0	110	59	270	40	1	56	$ 315,125	$ 109,150	9	21	1	24	-1	2
57	057N_NEFF03A	360	110	59	400	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
57	057N_NEFF02A	360	110	59	390	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
57	057N_NEFF04A	360	110	59	400	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
57	057N_NEFF01A	360	110	59	390	40	1	56	$ 315,125	$ 109,150	9	21	1	31	-1	2
57	057N_SHHWY	180	64	1000	180	34	1	64	$ 113,001	$ -	6.6	6.6	1	34	-1	0.5
-999																
58	058E_NI9001A	375	50	140	390	30	1	60	$ 113,001	$ 40,355	9	16.6	1	31	-1	2
58	058E_NI9002A	330	125	95	307	185	1	38	$ 168,010	$ 60,000	8	9.5	1	31	-1	2
58	058E_NI9005A	300	50	140	304	40	1	60	$ 113,001	$ 40,355	9	17.1	1	31	-1	2
58	058N_NE2016A	350	100	54	380	35	1	60	$ 113,001	$ 40,355	8	16.1	1	31	-1	2
58	058N_NE2018A	350	110	54	382	35	1	59	$ 113,001	$ 40,355	9	18.2	1	31	-1	2
58	058N_NE2108A	0	120	225	322	30	1	33	$ 280,016	$ 100,000	8	9.4	1	31	-1	2
58	058N_NE2112A	330	120	42	352	55	1	38	$ 168,010	$ 60,000	8	8.2	1	31	-1	2
58	058N_SH2013A	230	110	50	261	35	1	60	$ 113,001	$ 40,355	9	16.8	1	31	-1	2
58	058N_SH2014A	0	120	530	123	30	1	56	$ 113,001	$ 40,355	15	19.9	1	28	-1	0.5
58	058N_SH2015A	230	130	50	250	40	1	59	$ 113,001	$ 40,355	9	18.1	1	31	-1	2
58	058N_SH2017A	200	150	80	233	35	1	59	$ 113,001	$ 40,355	10	15.9	1	31	-1	2
58	058N_SH2020A	0	120	140	73	45	1	59	$ 113,001	$ 40,355	10	18.4	1	21	-1	2
58	058N_SH2021A	230	100	125	211	40	1	35	$ 113,001	$ 40,355	10	10.9	1	31	-1	2
58	058N_SH2111A	0	120	73	223	55	1	35	$ 113,001	$ 40,355	9	7.6	1	31	-1	2
58	058N_SHFF04A	200	120	73	230	40	1	56	$ 315,125	$ 109,150	8	20	1	24	-1	2
58	058N_SHFF03A	200	120	73	230	40	1	56	$ 315,125	$ 109,150	8	20	1	24	-1	2
58	058N_SHFF02A	200	120	73	225	40	1	56	$ 315,125	$ 109,150	8	20	1	24	-1	2
58	058N_NEFF01A	350	120	54	380	40	1	56	$ 315,125	$ 109,150	8	20	1	31	-1	2
58	058N_SHFF01A	200	120	73	240	40	1	56	$ 315,125	$ 109,150	8	20	1	24	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
58	058N_SHHWY1	170	64	150	185	34	1	64	$ 15,883	$ -	10.1	10.1	1	34	-1	0.5
58	058N_SHHWY2	120	64	500	135	34	1	64	$ 52,934	$ -	10.1	10.1	1	34	-1	0.5
58	058ISLAFF01A	0	412	60	110	40	1	56	$ 315,125	$ 94,537	11	23	1	31	-1	2
58	058ISLAFF02A	0	412	60	110	40	1	56	$ 315,125	$ 94,537	11	23	1	31	-1	2
58	058ISLAFF03A	0	412	60	200	40	1	56	$ 315,125	$ 94,537	11	23	1	31	-1	2
58	058ISLAFF04A	0	412	60	205	40	1	56	$ 315,125	$ 94,537	11	23	1	31	-1	2
58	058ISLAFF05A	0	412	60	200	40	1	56	$ 315,125	$ 94,537	11	23	1	31	-1	2
58	058S_SHHWY	137	64	827	152	34	1	64	$ 87,555	$ -	10.12	10.12	1	34	-1	0.5
-999																
59	059ISLAFF01A	0	420	88	195	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF02A	0	420	88	200	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF03A	0	420	88	190	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF04A	0	420	88	185	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF06A	216	115	130	240	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF07A	332	106	108	370	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF08A	216	115	130	235	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF09A	332	106	108	375	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF10A	216	115	130	235	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF11A	332	106	108	370	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF12A	216	115	130	240	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF13A	332	106	108	375	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059ISLAFF14A	332	106	108	375	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
59	059SEA_0196A	0	181	108	105	36	1	56	$ 134,679	$ 36,073	8.1	20.6	1	30	-1	2
59	059SEA_0198A	0	181	108	105	36	1	56	$ 134,679	$ 36,073	8.4	20.4	1	31	-1	2
59	059SEA_0200A	0	181	108	108	36	1	56	$ 134,679	$ 36,073	8.5	20.8	1	30	-1	2
59	059SEA_0202A	0	181	108	110	36	1	56	$ 134,679	$ 36,073	8.1	20.6	1	30	-1	2
59	059SEA_0206A	0	181	108	96	40	1	59	$ 65,229	$ 17,471	7.8	20.7	1	21	-1	2
59	059SEA_0209A	216	115	130	266	31	1	60	$ 213,668	$ 57,229	6.1	13.2	1	31	-1	2
59	059SEA_0210A	0	181	108	99	44	1	59	$ 80,711	$ 21,618	0	17.8	1	12	-1	2
59	059SEA_FF0215	A 332	106	108	280	40	1	60	$ 315,125	$ 94,537	7.6	19.2	1	31	-1	2
59	059S_SHHWY	182	64	535	197	34	1	64	$ 56,642	$ -	4.21	4.21	1	34	-1	0.5
-999																
60	060ISLA2372A	353	95	73	368	32	1	59	$ 49,340	$ 13,215	6.5	18.5	1	31	-1	2
60	060ISLA2376A	353	95	73	403	32	1	60	$ 93,353	$ 25,004	6.5	16	1	31	-1	2
60	060ISLAFF01A	353	95	73	395	40	1	56	$ 315,125	$ 94,537	6.5	18.5	1	31	-1	2
60	060SEA_0219A	244	186	87	289	40	1	59	$ 71,162	$ 19,060	7.4	17	1	31	-1	2
60	060SEA_0220A	0	179	83	115	40	1	2	$ 98,912	$ 26,493	10.4	19.5	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
60	060SEA_0224A	0	179	83	110	46	1	60	$ 127,001	$ 34,016	7.4	16	1	6	-1	2
60	060SEA_0225A	244	186	87	316	61	1	2	$ 90,808	$ 24,322	7.6	16.2	1	31	-1	0.5
60	060SEA_0231A	244	186	87	286	43	1	60	$ 213,831	$ 57,273	7	17.5	1	31	-1	2
60	060SEA_0231G	0	0	0	406	43	1	60	$ 213,831	$ 57,273	6.5	18.5	1	31	-1	2
60	060SEA_0232A	0	179	83	136	30	1	59	$ 100,949	$ 27,039	7.3	17.3	1	2	-1	2
60	060SEA_0236A	0	179	83	107	40	1	59	$ 69,977	$ 18,743	7.8	17.4	1	12	-1	2
60	060SEA_0237A	244	186	87	288	33	1	2	$ 251,047	$ 67,241	7.2	15.8	1	31	-1	0.5
60	060SEA_0242A	0	179	83	107	40	1	59	$ 70,842	$ 18,975	9	18	1	21	-1	2
60	060SEA_0243A	244	186	87	287	33	1	60	$ 434,701	$ 116,431	7.2	16.2	1	31	-1	2
60	060SEA_0248A	0	179	83	105	40	1	59	$ 58,053	$ 15,549	8.5	17.8	1	20	-1	2
60	060SEA_0252A	0	179	83	107	40	1	59	$ 97,105	$ 26,009	7.4	16.9	1	3	-1	2
60	060SEA_0253A	244	186	87	284	34	1	60	$ 277,398	$ 74,299	7.8	21.3	1	31	-1	2
60	060SEA_0256A	0	179	83	107	46	1	59	$ 128,056	$ 34,299	8.5	17.8	1	3	-1	2
60	060SEA_0266A	0	179	83	121	32	1	60	$ 201,678	$ 54,018	6.5	18.5	1	6	-1	2
60	060SEA_0274A	0	179	83	106	46	1	59	$ 40,778	$ 10,922	11.7	17.7	1	20	-1	2
60	060SEA_0283A	260	93	73	277	32	1	59	$ 135,946	$ 36,412	8	17.1	1	31	-1	2
60	060SEA_0284A	0	179	83	45	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
60	060SEA_0292A	0	179	83	45	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
60	060SEA_0288A	0	179	83	123	24	1	60	$ 125,464	$ 33,605	11.2	12.2	1	15	-1	2
60	060SEA_0296A	0	179	83	110	52	1	59	$ 101,059	$ 27,068	6.7	17.7	1	3	-1	2
60	060SEA_FF02A	260	93	73	285	40	1	56	$ 315,125	$ 94,537	6.5	18.5	1	31	-1	2
60	060SEA_FF03A	260	93	73	285	40	1	56	$ 315,125	$ 94,537	6.5	18.5	1	31	-1	2
60	060WICK2006A	244	186	87	268	50	1	60	$ 212,775	$ 56,990	6.5	18.5	1	31	-1	2
60	060WICK2006X	244	186	87	352	50	1	60	$ 226,728	$ 60,727	6.5	18.5	1	31	-1	2
60	060WICK2006Y	244	186	87	281	45	1	60	$ 221,765	$ 59,398	6.5	18.5	1	31	-1	2
60	060S_SHHWY	200	64	1000	215	34	1	64	$ 105,868	$ -	6.95	6.95	1	34	-1	0.5
-999																
61	061ISLA2398A	338	113	78	391	40	1	1	$ 48,848	$ 13,083	7	19	1	31	-1	0.5
61	061ISLA2414A	338	113	78	399	26	1	59	$ 44,616	$ 11,950	7	19	1	31	-1	2
61	061ISLA2416A	338	113	78	388	26	1	60	$ 169,400	$ 45,372	7.2	18.2	1	31	-1	2
61	061ISLA2422A	248	113	78	385	40	1	60	$ 230,235	$ 61,667	9	15	1	15	-1	2
61	061ISLA2426A	338	113	78	363	42	1	55	$ 91,672	$ 24,553	7	19	1	31	-1	2
61	061ISLA2430A	248	214	220	279	60	1	62	$ 45,085	$ 12,075	7	19	1	31	-1	2
61	061ISLAFF01A	248	113	78	385	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
61	061ISLAFF02A	248	113	78	385	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
61	061ISLAFF03A	248	113	78	385	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
61	061ISLAFF04A	248	113	78	390	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
61	061ISLAFF05A	248	113	78	390	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
61	061SEA_0299A	248	90	78	273	32	1	59	$ 46,053	$ 12,335	8.4	16.3	1	31	-1	2
61	061SEA_0300A	0	188	100	96	40	1	59	$ 87,842	$ 23,528	7	15.5	1	11	-1	2
61	061SEA_0303A	248	90	78	284	20	1	59	$ 50,417	$ 13,504	8.7	14.2	1	31	-1	2
61	061SEA_0304A	0	188	100	99	42	1	59	$ 70,062	$ 18,766	6.9	15.4	1	20	-1	2
61	061SEA_0307A	248	90	78	259	28	1	60	$ 86,756	$ 23,237	8.5	17.2	1	31	-1	2
61	061SEA_0310A	0	188	100	110	51	1	60	$ 171,878	$ 46,036	8.6	17.4	1	6	-1	2
61	061SEA_0311A	248	90	78	265	30	1	60	$ 113,001	$ 30,266	9.3	18.6	1	31	-1	2
61	061SEA_0315A	248	90	78	265	25	1	59	$ 47,465	$ 12,713	7	19	1	31	-1	2
61	061SEA_0316A	0	188	100	118	28	1	60	$ 229,593	$ 61,494	8.6	17.2	1	24	-1	2
61	061SEA_0319A	248	90	78	276	38	1	60	$ 130,142	$ 34,858	8.7	19.2	1	31	-1	2
61	061SEA_0326A	0	188	100	119	30	1	59	$ 66,608	$ 17,841	7	16.8	1	2	-1	2
61	061SEA_0330A	0	75	100	60	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
61	061SEA_0331A	248	90	78	268	54	1	59	$ 122,365	$ 32,774	7.5	17.3	1	31	-1	2
61	061SEA_0333A	248	90	78	269	45	1	59	$ 182,371	$ 48,847	7.7	19	1	31	-1	2
61	061SEA_0335A	248	90	78	260	36	1	59	$ 53,727	$ 14,390	6.4	7.5	1	31	-1	2
61	061SEA_0338A	0	188	100	125	34	1	60	$ 188,609	$ 50,517	8.9	21.4	1	14	-1	2
61	061SEA_0339A	248	90	78	278	56	1	59	$ 162,515	$ 43,528	6.6	13.8	1	31	-1	2
61	061SEA_0342A	0	188	100	137	26	1	60	$ 100,909	$ 27,028	6.8	19.3	1	24	-1	2
61	061SEA_0346A	0	188	100	123	34	1	60	$ 202,169	$ 54,149	6.8	19.8	1	6	-1	2
61	061SEA_0350A	0	188	100	124	21	1	56	$ 103,748	$ 27,788	6.9	19.9	1	29	-1	2
61	061SEA_0354A	0	188	100	125	24	1	56	$ 117,487	$ 31,468	6.7	19.7	1	29	-1	2
61	061S_SHHWY	193	64	655	208	34	1	64	$ 69,343	$ -	6.57	6.57	1	34	-1	0.5
-999																
62	062S_PE0100A	350	138	67	399	36	1	2	$ 241,885	$ 64,787	8.4	16.1	1	31	-1	0.5
62	062S_PE0101A	0	155	143	159	60	1	25	$ 113,001	$ 30,266	10	22	1	31	-1	2
62	062S_PE0102A	350	138	67	388	26	1	60	$ 200,663	$ 53,746	8.3	18.3	1	31	-1	2
62	062S_PE0103A	0	155	143	154	38	1	60	$ 378,255	$ 101,312	9.8	18.6	1	5	-1	2
62	062S_PE0104A	350	138	67	387	34	1	60	$ 195,295	$ 52,308	8.5	17.5	1	31	-1	2
62	062S_PE0106A	350	138	67	414	24	1	60	$ 151,900	$ 40,685	10	22	1	31	-1	2
62	062S_PE0107A	0	155	143	151	32	1	60	$ 238,399	$ 63,853	10.6	20.5	1	6	-1	2
62	062S_PE0108A	350	138	67	401	28	1	60	$ 160,221	$ 42,914	10	22	1	31	-1	2
62	062S_PE0109A	157	76	91	265	25	1	60	$ 1,044	$ 280	11	20.1	1	31	-1	2
62	062S_PE0112A	350	138	67	380	35	1	60	$ 202,416	$ 54,215	10.1	19.4	1	31	-1	2
62	062S_PE0113A	157	76	91	240	42	1	60	$ 380,769	$ 101,986	9.8	18.9	1	31	-1	2
62	062S_PE0114A	350	138	67	374	45	1	60	$ 258,394	$ 69,209	10.3	19.8	1	31	-1	2
62	062S_PE0115A	0	155	143	158	36	1	60	$ 188,065	$ 50,372	11.6	20	1	15	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
62	062S_PE0116A	350	138	67	373	42	1	60	$ 309,049	$ 82,776	11.1	20.3	1	31	-1	2
62	062S_PE0117A	157	76	91	249	28	1	60	$ 154,689	$ 41,432	10.2	20.7	1	31	-1	2
62	062S_PE0118A	350	138	67	365	33	1	59	$ 167,312	$ 44,813	15.7	26.4	1	31	-1	0.5
62	062S_PE0120A	350	138	67	369	26	1	60	$ 153,822	$ 41,200	14.9	22	1	31	-1	0.5
62	062S_PE0122A	350	138	67	380	30	1	60	$ 376,341	$ 100,800	14.8	25.6	1	31	-1	0.5
62	062S_PE0125A	157	76	91	226	26	1	60	$ 248,226	$ 66,486	11.8	21.7	1	31	-1	2
62	062S_PE0126A	350	138	67	386	29	1	56	$ 143,192	$ 38,353	9.6	20	1	31	-1	2
62	062S_PE0127A	0	155	143	158	30	1	60	$ 251,338	$ 67,319	12.3	23.6	1	6	-1	0.5
62	062S_PE0128A	350	138	67	402	43	1	56	$ 216,778	$ 58,062	9.8	19.1	1	31	-1	2
62	062S_PE0129A	157	76	91	238	28	1	60	$ 184,015	$ 49,287	14.7	24.2	1	31	-1	0.5
62	062S_PE0133A	157	76	91	250	30	1	60	$ 1,044	$ 280	15	23.5	1	31	-1	0.5
62	062S_PE0135A	0	155	143	177	28	1	60	$ 224,190	$ 60,047	17.1	23.2	1	16	-1	0.5
62	062S_PE0137A	157	76	91	234	30	1	60	$ 203,794	$ 54,585	13	22.6	1	31	-1	0.5
62	062S_PEFF01A	0	76	91	235	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF02A	0	76	91	245	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF03A	350	138	67	375	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF05A	0	155	143	185	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF06A	157	76	91	260	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF07A	350	138	67	390	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF08A	0	155	143	280	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEFF09A	157	76	91	255	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PE0137A	0	50	50	55	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PE0131A	0	50	50	55	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PE0117A	0	50	50	55	40	1	56	$ 315,125	$ 94,537	10	22	1	31	-1	2
62	062S_PEHWY	318	64	905	333	34	1	64	$ 95,810	$ -	6.6	6.6	1	34	-1	0.5
-999																
63	063ISLAFF01A	373	150	60	400	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063ISLAFF02A	373	150	60	400	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063ISLAFF03A	373	150	60	400	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063ISLAFF04A	373	150	60	400	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063ISLAFF05A	373	150	60	400	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PE0102A	0	237	67	170	40	1	60	$ 113,001	$ 30,266	10	18.8	1	14	-1	2
63	063N_PE0103A	385	134	70	399	36	1	60	$ 189,211	$ 50,679	7.2	18.4	1	31	-1	2
63	063N_PE0104A	240	113	85	255	28	1	60	$ 184,015	$ 49,287	7.7	18.1	1	31	-1	2
63	063N_PE0105A	385	134	70	396	30	1	60	$ 180,592	$ 48,370	7.8	19.4	1	31	-1	2
63	063N_PE0106A	0	237	67	139	34	1	2	$ 303,319	$ 81,242	9.2	19.1	1	8	-1	0.5
63	063N_PE0107A	385	134	70	400	30	1	2	$ 113,001	$ 30,266	8	18.4	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
63	063N_PE0108A	240	113	85	240	30	1	60	$ 113,001	$ 30,266	10.1	21.2	1	5	-1	2
63	063N_PE0109A	385	134	70	400	32	1	60	$ 232,372	$ 62,239	8	20	1	31	-1	2
63	063N_PE0110A	0	237	67	150	24	1	60	$ 216,337	$ 57,944	10	19	1	5	-1	2
63	063N_PE0111A	385	134	70	388	24	1	60	$ 204,918	$ 54,886	5.7	16.5	1	31	-1	2
63	063N_PE0112A	240	113	85	247	30	1	60	$ 191,217	$ 51,216	8.8	18.2	1	31	-1	2
63	063N_PE0113A	385	134	70	443	435	1	60	$ 113,001	$ 30,266	8	20	1	31	-1	2
63	063N_PE0114A	0	237	67	145	26	1	60	$ 214,830	$ 57,541	8.8	16	1	15	-1	2
63	063N_PE0115A	385	134	70	447	34	1	60	$ 257,927	$ 69,084	16.1	18.1	1	31	-1	0.5
63	063N_PE0116A	240	113	85	240	30	1	60	$ 1,194	$ 320	9.8	16.4	1	31	-1	2
63	063N_PE0117A	385	134	70	453	34	1	60	$ 142,110	$ 38,063	5.2	14.1	1	31	-1	2
63	063N_PEFF0119	A 385	134	70	385	40	1	56	$ 315,125	$ 94,537	6.5	18.3	1	31	-1	2
63	063N_PE0120A	240	113	85	250	41	1	60	$ 229,313	$ 61,420	7.4	17.5	1	31	-1	2
63	063N_PE0122A	0	237	67	156	45	1	60	$ 181,752	$ 48,681	10.1	19.5	1	15	-1	2
63	063N_PE0124A	240	113	85	253	28	1	60	$ 162,137	$ 43,427	8	20	1	31	-1	2
63	063N_PE0126A	0	237	67	172	30	1	60	$ 272,536	$ 72,996	8.6	18.6	1	23	-1	2
63	063N_PE0128A	0	220	100	166	24	1	60	$ 192,444	$ 51,544	8.8	18.6	1	23	-1	2
63	063N_PEFF01A	240	113	85	260	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PEFF02A	385	134	70	405	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PEFF04A	0	237	67	185	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PEFF05A	223	70	100	245	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PEFF06A	293	80	100	310	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063OCEA0408A	0	210	200	66	58	1	56	$ 9,596	$ 2,570	6.9	14.5	1	31	-1	2
63	063OCEAFF01A	213	160	60	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063OCEAFF02A	213	160	60	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063OCEAFF03A	213	160	60	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063OCEAFF04A	0	160	60	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063OCEAFF05A	0	160	60	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
63	063N_PEHWY	339	64	821	354	34	1	64	$ 86,917	$ -	5.21	5.21	1	34	-1	0.5
-999																
64	064GREE3003A	380	99	59	423	28	1	59	$ 28,212	$ 7,556	5.3	6.3	1	31	-1	2
64	064GREE3003X	0	0	0	381	35	1	60	$ 11,201	$ 3,000	8	18	1	31	-1	2
64	064ISLA2656A	380	99	59	420	28	1	60	$ 81,612	$ 21,859	8	18	1	31	-1	2
64	064ISLA2660A	380	99	59	408	40	1	55	$ 63,036	$ 16,884	8	18	1	31	-1	2
64	064ISLA2672A	380	99	59	404	48	1	1	$ 40,943	$ 10,966	8	18	1	31	-1	0.5
64	064ISLA2676A	380	99	59	401	32	1	59	$ 83,468	$ 22,356	8.1	8.1	1	31	-1	2
64	064ISLA2684A	380	99	59	401	30	1	2	$ 75,828	$ 20,310	7.4	14	1	31	-1	0.5
64	064ISLA2688A	380	99	59	430	25	1	1	$ 50,226	$ 13,452	6.9	9.1	1	31	-1	0.5

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
64	064ISLA2692A	380	99	59	385	36	1	59	$ 99,197	$ 26,569	8	18	1	31	-1	2
64	064ISLA2704A	380	99	59	377	37	1	59	$ 50,106	$ 13,420	8	18	1	31	-1	2
64	064ISLAFF01A	380	99	59	390	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF02A	380	99	59	395	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF03A	380	99	59	395	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF04A	380	99	59	395	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF05A	380	99	59	395	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF06A	380	99	59	405	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF07A	380	99	59	410	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064ISLAFF08A	380	99	59	400	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEA0442A	0	207	91	113	26	1	55	$ 35,665	$ 9,553	9.1	16.1	1	30	-1	2
64	064OCEA0448A	0	207	91	111	35	1	60	$ 129,155	$ 34,593	9.7	17.9	1	14	-1	2
64	064OCEA0454A	0	207	91	109	32	1	2	$ 102,538	$ 27,464	8.4	16	1	31	-1	0.5
64	064OCEA0457A	271	109	63	282	38	1	59	$ 69,355	$ 18,576	8.3	8.3	1	31	-1	2
64	064OCEA0460A	0	207	91	101	30	1	2	$ 58,688	$ 15,719	8.7	16	1	31	-1	0.5
64	064OCEA0462A	0	207	91	106	24	1	2	$ 63,741	$ 17,072	10	16.4	1	31	-1	0.5
64	064OCEA0464A	0	207	91	111	38	1	55	$ 60,765	$ 16,275	8.5	18.3	1	29	-1	2
64	064OCEA0465A	271	109	63	283	24	1	2	$ 52,538	$ 14,072	8.1	15.6	1	31	-1	0.5
64	064OCEA0469A	271	109	63	285	42	1	59	$ 77,548	$ 20,771	8.2	16.7	1	31	-1	2
64	064OCEA0470A	0	207	91	109	26	1	55	$ 52,837	$ 14,152	8.3	16.4	1	30	-1	2
64	064OCEA0473A	271	109	63	285	24	1	59	$ 67,474	$ 18,072	8.4	12	1	31	-1	2
64	064OCEA0476A	0	207	91	107	28	1	59	$ 95,307	$ 25,527	8.5	16.7	1	12	-1	2
64	064OCEA0477A	271	109	63	289	36	1	59	$ 43,877	$ 11,752	7.9	19.7	1	31	-1	2
64	064OCEA0481A	271	109	63	295	36	1	2	$ 89,353	$ 23,932	7.7	12	1	31	-1	0.5
64	064OCEA0485A	271	109	63	285	28	1	2	$ 47,036	$ 12,598	7.9	14.8	1	31	-1	0.5
64	064OCEA0486A	0	207	91	96	34	1	59	$ 55,221	$ 14,791	8.6	16.4	1	20	-1	2
64	064OCEA0489A	271	109	63	291	40	1	59	$ 88,498	$ 23,703	8.5	16.5	1	31	-1	2
64	064OCEA0492A	0	207	91	99	30	1	59	$ 98,532	$ 26,391	8.4	16	1	20	-1	2
64	064OCEA0493A	271	109	63	294	30	1	1	$ 25,189	$ 6,747	8.2	10.2	1	31	-1	0.5
64	064OCEAFF01A	0	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF02A	0	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF03A	0	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF04A	271	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF05A	271	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF06A	271	109	63	285	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF07A	0	207	91	145	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2
64	064OCEAFF08A	271	109	63	310	40	1	56	$ 315,125	$ 94,537	8	18	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
64	064OCEAHWY	205	64	1000	220	34	1	64	$ 105,868	$ -	7.36	7.36	1	34	-1	0.5
-999																
65	065GREY3200A	326	82	56	349	32	1	1	$ 35,855	$ 9,604	8.1	15.7	1	31	-1	0.5
65	065ISLA2708A	326	82	56	399	32	1	55	$ 47,124	$ 12,622	8	20	1	31	-1	2
65	065ISLA2712A	326	82	56	390	24	1	2	$ 56,518	$ 15,138	8	20	1	31	-1	0.5
65	065ISLA2716A	326	82	56	389	22	1	56	$ 117,102	$ 31,365	7.3	0	1	31	-1	2
65	065ISLA2720A	326	82	56	376	28	1	60	$ 104,071	$ 27,874	8	20	1	31	-1	2
65	065ISLA2728A	326	82	56	360	28	1	60	$ 79,814	$ 21,378	8	20	1	31	-1	2
65	065ISLA2734A	326	82	56	369	44	1	2	$ 78,689	$ 21,076	8	20	1	31	-1	0.5
65	065ISLA2752A	326	82	56	330	24	1	59	$ 64,192	$ 17,193	8	20	1	31	-1	2
65	065ISLA2768A	326	82	56	289	38	1	59	$ 50,999	$ 13,659	8.3	16	1	31	-1	2
65	065ISLA2772A	326	82	56	278	38	1	2	$ 67,475	$ 18,073	8.1	8.1	1	31	-1	0.5
65	065ISLA2776A	326	82	56	270	40	1	2	$ 101,552	$ 27,200	8	8	1	31	-1	0.5
65	065ISLA2780A	326	82	56	273	28	1	60	$ 133,965	$ 35,882	8	20	1	31	-1	2
65	065ISLA2784A	326	82	56	290	30	1	60	$ 113,001	$ 30,266	8	20	1	31	-1	2
65	065ISLAFF01A	326	82	56	390	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065ISLAFF02A	326	82	56	350	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065ISLAFF03A	326	82	56	325	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065ISLAFF04A	326	82	56	315	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065ISLAFF05A	326	82	56	315	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEA0508A	0	171	333	155	40	1	59	$ 80,451	$ 21,548	8.1	18.1	1	11	-1	2
65	065OCEA0509A	235	91	59	306	35	1	59	$ 39,532	$ 10,588	7.7	12	1	31	-1	2
65	065OCEA0512A	0	82	56	85	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEA0516A	0	171	333	105	32	1	55	$ 67,647	$ 18,119	8	20	1	29	-1	2
65	065OCEA0521A	235	91	59	288	36	1	59	$ 54,576	$ 14,618	7.8	16.1	1	31	-1	2
65	065OCEA0533A	235	91	59	255	38	1	59	$ 65,798	$ 17,623	9.1	17.4	1	31	-1	2
65	065OCEA0538A	0	171	333	126	44	1	59	$ 74,876	$ 20,055	7	15.8	1	12	-1	2
65	065OCEA0539A	235	91	59	229	35	1	59	$ 113,001	$ 30,266	8	20	1	31	-1	2
65	065OCEA0549A	235	91	59	237	36	1	59	$ 67,212	$ 18,002	7.7	17	1	31	-1	2
65	065OCEA0553A	235	91	59	240	25	1	55	$ 113,291	$ 30,344	9.7	17.9	1	31	-1	2
65	065OCEA0559A	235	91	59	211	37	1	60	$ 141,633	$ 37,935	8.3	16.7	1	31	-1	2
65	065OCEA0563A	235	91	59	186	40	1	59	$ 64,972	$ 17,402	7.6	8.6	1	31	-1	2
65	065OCEA0569A	235	91	59	182	47	1	2	$ 45,066	$ 12,070	8.7	8.7	1	31	-1	0.5
65	065OCEA0569S	235	93	56	220	10	1	60	$ 12,195	$ 3,266	8	20	1	31	-1	2
65	065OCEA0575A	235	91	59	182	28	1	59	$ 93,407	$ 25,018	8.8	8.8	1	31	-1	2
65	065OCEAFF01A	235	91	59	315	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAFF02A	235	91	59	310	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
65	065OCEAFF03A	235	91	59	295	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAFF04A	235	91	59	298	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAFF05A	235	91	59	290	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAFF06A	235	91	59	190	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAFF07A	235	91	59	190	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
65	065OCEAHWY	201	64	1006	216	34	1	64	$ 106,507	$ -	7.06	7.06	1	34	-1	0.5
-999																
66	066ISLA0627A	205	102	58	211	38	1	59	$ 66,653	$ 17,852	11.3	11.3	1	31	-1	2
66	066ISLA0631A	205	102	58	221	30	1	60	$ 111,260	$ 29,800	11.5	11.9	1	31	-1	2
66	066ISLA0641A	205	102	58	230	32	1	55	$ 39,125	$ 10,479	9.4	18.4	1	31	-1	2
66	066ISLA0645A	205	102	58	234	32	1	59	$ 36,618	$ 9,808	9.3	17.7	1	31	-1	2
66	066ISLA0649A	205	102	58	233	33	1	55	$ 45,513	$ 12,190	9.1	18.8	1	31	-1	2
66	066ISLA0653A	205	102	58	230	38	1	55	$ 53,353	$ 14,290	9.9	19.1	1	31	-1	2
66	066ISLA0657A	205	102	58	237	32	1	56	$ 73,966	$ 19,811	9.4	17.5	1	31	-1	2
66	066ISLA0665A	205	102	58	232	25	1	59	$ 72,124	$ 19,318	8.8	17.9	1	31	-1	2
66	066ISLA2794A	257	72	95	267	32	1	60	$ 65,439	$ 17,527	9	17.2	1	31	-1	2
66	066ISLA2798A	257	72	95	264	24	1	2	$ 53,940	$ 14,448	9	21	1	31	-1	0.5
66	066ISLA2806A	257	72	95	265	38	1	59	$ 82,249	$ 22,029	9	21	1	31	-1	2
66	066ISLA2810A	257	72	95	269	30	1	2	$ 39,470	$ 10,572	9	21	1	31	-1	0.5
66	066ISLA2865A	427	114	125	476	18	1	60	$ 15,838	$ 4,242	9	21	1	31	-1	2
66	066ISLAFF01A	257	72	95	280	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF02A	427	114	125	450	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF03A	427	114	125	440	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF04A	427	114	125	440	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF05A	427	114	125	425	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF06A	427	114	125	420	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF07A	427	114	125	415	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF08A	427	114	125	425	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066ISLAFF09A	0	102	59	235	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066OCEA0597A	205	52	59	189	37	1	59	$ 61,168	$ 16,383	9.3	16.6	1	31	-1	2
66	066OCEA0603A	205	52	59	189	36	1	2	$ 72,561	$ 19,435	9.4	9.4	1	31	-1	0.5
66	066OCEA0607A	205	52	59	196	26	1	59	$ 55,123	$ 14,764	11	17.3	1	31	-1	2
66	066OCEA0611A	205	52	59	193	28	1	59	$ 47,608	$ 12,752	10.2	17.6	1	31	-1	2
66	066OCEA0615A	205	52	59	212	34	1	59	$ 56,149	$ 15,039	9	21	1	31	-1	2
66	066OCEA0623A	205	52	59	207	30	1	59	$ 69,191	$ 18,532	10.7	18.7	1	31	-1	2
66	066OCEAFF01A	0	168	1000	100	40	1	56	$ 10	$ 3	9	21	1	31	-1	2
66	066OCEAFF02A	205	52	59	195	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
66	066OCEAFF03A	205	52	59	200	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
66	066OCEAHWY	137	64	1000	152	34	1	64	$ 105,868	$ -	9.96	9.96	1	34	-1	0.5
66	066ISLAHWY	316	64	1003	331	34	1	64	$ 106,182	$ -	9.96	9.96	1	34	-1	0.5
-999																
67	067ISLA0671A	0	285	167	227	44	1	2	$ 82,618	$ 22,128	9.6	10.5	1	31	-1	0.5
67	067ISLA2928A	0	285	167	156	20	1	56	$ 128,743	$ 34,483	11.1	21.4	1	30	-1	2
67	067ISLAFF01A	0	285	167	225	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067ISLAFF02A	368	128	193	405	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067LATE0301A	368	128	193	403	30	1	60	$ 113,001	$ 30,266	9	21	1	31	-1	2
67	067LATE0309A	438	70	250	457	30	1	60	$ 113,001	$ 30,266	9	16.3	1	31	-1	2
67	067LATEFF01A	368	70	250	0	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067OCEA0210A	0	285	167	187	24	1	60	$ 118,256	$ 31,674	9	21	1	23	-1	2
67	067OCEA0224A	0	285	167	146	34	1	60	$ 232,539	$ 62,284	8.8	19.4	1	23	-1	2
67	067OCEA0236A	0	285	167	166	35	1	60	$ 232,899	$ 62,380	9.4	19.4	1	23	-1	2
67	067OCEA0202A	0	100	50	90	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067OCEA0206A	0	100	50	90	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067OCEA0212A	0	100	50	90	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067OCEA0216A	0	100	50	90	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067OCEA0230A	0	100	50	90	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
67	067PORT0200A	368	128	193	399	40	1	60	$ 113,001	$ 30,266	9	21	1	31	-1	2
67	067ISLAHWY1	240	64	568	255	34	1	64	$ 60,136	$ -	5.77	5.77	1	34	-1	0.5
67	067ISLAHWY2	296	64	1000	311	34	1	64	$ 105,868	$ -	5.77	5.77	1	34	-1	0.5
-999																
68	06824TH4503A	365	189	62	424	42	1	59	$ 86,229	$ 23,096	6	18	1	31	-1	2
68	068ERNE0200A	0	283	83	133	34	1	56	$ 94,860	$ 25,408	6.1	17.8	1	30	-1	2
68	068ERNE0202A	0	283	83	127	30	1	55	$ 181,019	$ 48,484	6.5	18.3	1	30	-1	2
68	068ERNE0204A	0	283	83	144	34	1	56	$ 49,695	$ 13,310	2.7	5.7	1	30	-1	2
68	068ISLA2950A	0	283	83	149	35	1	53	$ 113,001	$ 168,483	5.4	18.1	1	30	-1	2
68	068ISLA2978A	0	283	83	153	40	1	60	$ 106,366	$ 28,489	9.8	14.8	1	5	-1	2
68	068ISLA2998A	0	283	83	145	24	1	55	$ 52,642	$ 14,100	6	18	1	31	-1	2
68	068ISLA2999A	365	189	62	166	30	1	60	$ 49,173	$ 13,171	6.9	13.7	1	31	-1	2
68	068ISLA3000A	0	283	83	164	20	1	60	$ 169,857	$ 45,495	10.1	21.4	1	5	-1	2
68	068ISLA3004A	0	283	83	146	30	1	60	$ 114,705	$ 30,723	7.2	19	1	5	-1	2
68	068ISLA3010A	0	283	83	205	32	1	60	$ 141,932	$ 38,015	6	18	1	23	-1	2
68	068ISLA3017A	365	189	62	437	28	1	1	$ 67,419	$ 18,058	4.8	7.2	1	31	-1	0.5
68	068ISLA3021A	365	189	62	430	154	1	59	$ 101,409	$ 27,162	5.5	13.3	1	31	-1	2
68	068ISLA3028A	0	283	83	205	32	1	60	$ 120,925	$ 32,389	6	18	1	5	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
68	068ISLAFF01A	365	189	62	390	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF02A	365	189	62	390	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF03A	365	189	62	395	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF04A	365	189	62	395	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF05A	365	189	62	405	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF06A	0	283	83	205	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAFF07A	0	283	83	215	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068SUMM0101A	365	86	220	375	25	1	56	$ 132,542	$ 35,500	5.2	14.2	1	31	-1	2
68	068SUMM0102A	365	86	220	370	32	1	60	$ 110,255	$ 29,531	4.7	14.4	1	31	-1	2
68	068SUMM0111A	451	103	220	459	32	1	2	$ 118,357	$ 31,701	6	18	1	31	-1	0.5
68	068SUMMFF01A	451	103	220	470	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
68	068ISLAHWY	280	64	1000	295	34	1	64	$ 105,868	$ -	5.91	5.91	1	34	-1	0.5
-999																
69	06922ND4903A	362	172	111	509	14	1	62	$ 23,657	$ 6,336	5	8	1	31	-1	2
69	06923RD4701A	362	172	111	441	40	1	59	$ 55,900	$ 14,972	5	13.6	1	31	-1	2
69	06923RD4706A	362	172	111	509	26	1	59	$ 66,250	$ 17,744	5.5	14	1	31	-1	2
69	06924TH4502A	362	172	111	417	31	1	59	$ 57,860	$ 15,497	4.5	12.8	1	31	-1	2
69	069ISLA3032A	0	279	67	198	30	1	56	$ 126,155	$ 33,790	0	0	1	30	-1	2
69	069ISLA3041A	362	172	111	425	30	1	59	$ 53,016	$ 14,200	4.9	13.4	1	31	-1	2
69	069ISLA3044A	0	279	67	201	20	1	56	$ 199,389	$ 53,405	4.9	13.1	1	30	-1	2
69	069ISLA3045A	362	172	111	432	30	1	59	$ 52,655	$ 14,103	4.9	13.1	1	31	-1	2
69	069ISLA3060A	0	279	67	206	32	1	60	$ 256,931	$ 68,817	12.4	20.8	1	13	-1	0.5
69	069ISLA3064A	0	279	67	208	32	1	60	$ 254,622	$ 68,198	7.6	20.6	1	5	-1	2
69	069ISLA3068A	0	279	67	187	64	1	59	$ 125,632	$ 33,650	8.8	18.4	1	12	-1	2
69	069ISLAFF01A	0	279	67	210	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069ISLAFF02A	0	279	67	205	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069ISLAFF03A	0	279	67	210	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069ISLAFF04A	0	279	67	215	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069TOPS0110A	0	279	67	139	32	1	60	$ 137,501	$ 36,829	7.1	18.9	1	15	-1	2
69	069TOPS0114A	0	279	67	209	24	1	60	$ 131,358	$ 35,183	11	23	1	23	-1	2
69	069TOPS0115A	362	172	111	361	30	1	59	$ 87,627	$ 23,470	8.3	17.2	1	21	-1	2
69	069TOPS0122A	0	279	67	211	34	1	60	$ 166,065	$ 44,479	9.5	21.6	1	5	-1	2
69	069TOPS0128A	0	279	67	169	30	1	60	$ 114,375	$ 30,635	8.1	20.1	1	5	-1	2
69	069TOPSFF01A	0	279	67	210	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069TOPSFF02A	0	279	67	215	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069TOPSFF03A	362	172	111	365	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2
69	069TOPSFF04A	362	172	111	375	40	1	56	$ 315,125	$ 94,537	5	17	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
69	069ISLAHWY	325	64	627	340	34	1	64	$ 66,375	$ -	6.86	6.86	1	34	-1	0.5
69	069TOPSHWY	287	64	341	302	34	1	64	$ 36,100	$ -	6.86	6.86	1	34	-1	0.5
-999																
70	07018TH5605A	398	72	82	390	10	1	62	$ 6,958	$ 1,864	7	19	1	31	-1	2
70	07018TH5611A	291	107	57	315	32	1	1	$ 127,557	$ 34,165	7	19	1	31	-1	0.5
70	070ISLA3184A	398	72	82	386	66	1	62	$ 20,828	$ 5,579	7	19	1	31	-1	2
70	070ISLA3188A	398	72	82	386	10	1	62	$ 16,306	$ 4,368	7	19	1	31	-1	2
70	070ISLAFF01A	398	72	82	430	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070ISLAFF02A	398	72	82	430	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070ISLAFF03A	398	72	82	425	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070ISLAFF04A	398	72	82	420	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070ISLAFF05A	398	72	82	420	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070ISLAFF06A	398	72	82	415	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
70	070TOPS0142A	0	249	125	193	28	1	60	$ 124,069	$ 33,231	7	19	1	15	-1	2
70	070TOPS0151A	328	141	65	346	31	1	60	$ 235,199	$ 62,996	9.7	20.1	1	31	-1	2
70	070TOPS0153A	328	141	65	330	30	1	60	$ 188,412	$ 50,464	8.6	19.3	1	31	-1	2
70	070TOPS0154A	0	249	125	190	41	1	60	$ 155,201	$ 41,569	11.3	23.1	1	23	-1	2
70	070TOPS0155A	291	107	57	326	36	1	59	$ 87,932	$ 23,552	7.6	16.7	1	31	-1	2
70	070TOPS0159A	291	107	57	325	40	1	60	$ 277,270	$ 74,264	3.8	15.6	1	31	-1	2
70	070TOPS0160A	0	249	125	187	28	1	60	$ 138,701	$ 37,150	7	19	1	23	-1	2
70	070TOPS0163A	291	107	57	336	34	1	2	$ 257,625	$ 69,003	6.5	15.1	1	31	-1	0.5
70	070TOPS0167A	291	107	57	336	36	1	2	$ 287,946	$ 77,124	6	15.3	1	31	-1	0.5
70	070TOPS0168A	0	249	125	151	32	1	60	$ 83,345	$ 22,323	7.7	19.2	1	15	-1	2
70	070TOPS0171A	291	107	57	326	34	1	2	$ 257,187	$ 68,885	6.2	15.5	1	31	-1	0.5
70	070TOPS0174A	0	249	125	162	28	1	56	$ 94,715	$ 25,368	7.5	19.7	1	30	-1	2
70	070TOPS0180A	0	249	125	160	22	1	60	$ 183,586	$ 49,172	8.1	21	1	23	-1	2
70	070TOPS0183A	291	107	57	340	25	1	59	$ 64,554	$ 17,290	5.6	13.7	1	31	-1	2
70	070TOPS0191A	291	107	57	320	30	1	60	$ 113,001	$ 30,266	10.2	0	1	31	-1	2
70	070TOPS0193A	291	107	57	289	28	1	60	$ 144,722	$ 38,763	7	19	1	31	-1	2
70	070TOPS0194A	0	249	125	162	28	1	56	$ 87,317	$ 23,387	8.3	22.1	1	30	-1	2
70	070TOPS0204A	0	249	125	150	30	1	56	$ 67,426	$ 18,059	7.1	19	1	30	-1	2
70	070TOPS0205A	291	107	57	294	12	1	62	$ 8,887	$ 2,380	7.1	9	1	31	-1	2
70	070TOPS0213A	291	107	57	272	78	1	1	$ 64,941	$ 17,394	7.1	9	1	31	-1	0.5
70	070TOPSFF01A	328	141	65	370	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
70	070TOPSFF02A	328	141	65	365	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
70	070TOPSFF03A	291	107	57	320	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
70	070TOPSFF04A	291	107	57	325	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
70	070TOPSFF05A	0	100	57	190	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
70	070TOPSFF06A	0	100	57	190	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
70	070TOPSHWY	248	64	1000	263	34	1	64	$ 105,868	$ -	10.27	10.27	1	34	-1	0.5
-999																
71	07113TH6602A	345	51	100	330	40	1	59	$ 82,413	$ 22,074	8.1	10.3	1	31	-1	2
71	07113TH6604A	297	48	100	293	12	1	62	$ 4,758	$ 1,274	8.2	10.8	1	31	-1	2
71	07114TH6400A	345	51	100	358	14	1	62	$ 12,195	$ 3,266	7.7	11.4	1	31	-1	2
71	07114TH6404A	297	48	100	296	40	1	59	$ 59,005	$ 15,804	8.3	16.1	1	31	-1	2
71	07114TH6411A	226	105	63	205	12	1	62	$ 6,780	$ 1,816	10.1	11.5	1	31	-1	2
71	07114TH6412A	226	105	63	188	33	1	55	$ 52,936	$ 14,179	9.8	17.1	1	31	-1	2
71	07114TH6503A	345	51	100	343	14	1	62	$ 12,195	$ 3,266	8.4	10.3	1	31	-1	2
71	07114TH6504A	297	48	100	293	22	1	1	$ 32,782	$ 8,780	8.4	10.3	1	31	-1	0.5
71	07115TH6200A	331	92	60	336	44	1	59	$ 112,842	$ 30,224	7.7	9.9	1	31	-1	2
71	07115TH6201A	345	51	100	363	14	1	62	$ 32,398	$ 8,677	7.7	11	1	31	-1	2
71	07115TH6205A	297	48	100	320	46	1	62	$ 10,510	$ 2,815	8.4	10.3	1	31	-1	2
71	07115TH6210A	226	105	63	239	38	1	60	$ 109,584	$ 29,351	8	20	1	31	-1	2
71	07115TH6211A	226	105	63	221	22	1	55	$ 25,563	$ 6,847	9.4	16.5	1	31	-1	2
71	071ISLA3192A	331	92	60	394	14	1	62	$ 13,607	$ 3,644	8	10	1	31	-1	2
71	071ISLA3200A	331	92	60	385	30	1	60	$ 164,803	$ 44,141	7	19.1	1	31	-1	2
71	071ISLA3210A	331	92	60	358	60	1	59	$ 12,195	$ 3,266	8	20	1	31	-1	2
71	071ISLA3212A	0	0	0	363	38	1	59	$ 124,171	$ 33,258	7.7	15	1	31	-1	2
71	071ISLA3222A	331	92	60	338	42	1	59	$ 99,072	$ 26,536	7.2	17.6	1	31	-1	2
71	071ISLAFF01A	331	92	60	385	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
71	071ISLAFF02A	331	92	60	365	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
71	071ISLAFF03A	331	92	60	345	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
71	071TOPS0213S	226	105	63	300	40	1	60	$ 5,600	$ 1,500	8	20	1	31	-1	2
71	071TOPS0220A	0	174	250	158	24	1	56	$ 113,001	$ 30,266	6.9	20.8	1	30	-1	2
71	071TOPS0221A	226	105	63	269	62	1	59	$ 32,829	$ 8,793	6.6	9.1	1	31	-1	2
71	071TOPS0229A	226	105	63	273	24	1	60	$ 161,409	$ 43,232	9	18.4	1	31	-1	2
71	071TOPS0230A	0	174	250	144	26	1	55	$ 88,628	$ 23,738	6.6	19.7	1	30	-1	2
71	071TOPS0233A	226	105	63	268	32	1	60	$ 216,130	$ 57,889	9.3	19.4	1	31	-1	2
71	071TOPS0237A	226	105	63	281	26	1	60	$ 134,400	$ 35,998	9.1	16.4	1	31	-1	2
71	071TOPS0238A	0	174	250	141	20	1	55	$ 90,145	$ 24,144	6.4	18	1	30	-1	2
71	071TOPS0241A	226	105	63	277	26	1	60	$ 116,431	$ 31,185	8.9	18	1	31	-1	2
71	071TOPS0247A	226	105	63	248	32	1	59	$ 51,126	$ 13,694	8.8	17.7	1	31	-1	2
71	071TOPS0265A	226	105	63	220	28	1	59	$ 59,128	$ 15,837	9.3	18.6	1	31	-1	2
71	071TOPS0269A	226	105	63	200	28	1	59	$ 36,584	$ 9,798	9.3	17	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
71	071TOPS0285A	226	105	63	197	14	1	59	$ 17,919	$ 4,800	8	20	1	31	-1	2
71	071TOPS0290A	0	174	250	72	26	1	59	$ 46,413	$ 12,432	7.5	21	1	12	-1	2
71	071TOPSFF01A	226	105	63	330	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
71	071TOPSFF02A	226	105	63	285	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
71	071TOPSHWY	173	64	998	188	34	1	64	$ 105,656	$ -	7.15	7.15	1	34	-1	0.5
-999																
72	07210TH7202A	319	49	125	321	12	1	1	$ 9,228	$ 2,472	8	20	1	31	-1	0.5
72	07210TH7204A	268	51	125	262	46	1	59	$ 99,975	$ 26,778	8.2	17.4	1	31	-1	2
72	07210TH7211A	169	99	59	154	24	1	59	$ 48,781	$ 13,065	8.8	16.4	1	31	-1	2
72	07210THFF01A	268	51	125	270	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	07211TH01A	268	51	125	270	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	07211TH7002A	319	49	125	322	40	1	60	$ 113,704	$ 30,455	8	20	1	31	-1	2
72	07211TH7003A	319	49	125	325	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	07211TH7003P	319	100	111	323	40	1	1	$ 4,480	$ -	8	20	1	31	-1	0.5
72	07211TH7007A	268	51	125	266	40	1	2	$ 65,408	$ 17,519	7.6	15.2	1	31	-1	0.5
72	07212TH6803A	319	49	125	335	35	1	56	$ 113,001	$ 30,266	8	20	1	31	-1	2
72	07212TH6804A	268	51	125	284	25	1	1	$ 13,441	$ 3,600	8	20	1	31	-1	0.5
72	07212TH6805A	268	51	125	285	35	1	59	$ 113,001	$ 30,266	8	20	1	31	-1	2
72	07213TH6603A	319	49	125	331	14	1	62	$ 5,600	$ 1,500	8	20	1	31	-1	2
72	07213TH6605A	268	51	125	290	16	1	62	$ 5,600	$ 1,500	8	20	1	31	-1	2
72	0729TH_7400A	319	49	125	314	28	1	59	$ 25,714	$ 6,888	7.8	14.9	1	31	-1	2
72	0729TH_7402A	268	51	125	264	24	1	59	$ 28,339	$ 7,590	7.9	14.9	1	31	-1	2
72	0729TH_7414A	169	99	59	149	24	1	59	$ 34,507	$ 9,242	9.6	16.3	1	31	-1	2
72	072ISLAFF01A	319	49	125	335	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	072ISLAFF02A	319	49	125	320	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	072TOPS0303A	169	99	59	180	40	1	62	$ 28,871	$ 7,733	10.9	11.9	1	31	-1	2
72	072TOPS0306A	0	117	333	68	24	1	2	$ 45,351	$ 12,147	8	19.3	1	31	-1	0.5
72	072TOPS0307A	169	99	59	177	40	1	56	$ 224,013	$ 60,000	8	20	1	31	-1	2
72	072TOPS0311A	169	99	59	196	32	1	56	$ 174,120	$ 46,637	10	18.6	1	31	-1	2
72	072TOPS0315A	169	99	59	175	35	1	62	$ 15,613	$ 4,182	7.6	11	1	31	-1	2
72	072TOPS0321A	169	99	59	187	30	1	60	$ 168,038	$ 45,008	8	20	1	31	-1	2
72	072TOPS0325A	169	99	59	161	31	1	59	$ 85,907	$ 23,009	8.7	16.2	1	31	-1	2
72	072TOPS0329A	169	99	59	204	38	1	59	$ 117,743	$ 31,537	8.9	18.1	1	31	-1	2
72	072TOPS0333A	169	99	59	185	39	1	56	$ 106,303	$ 28,472	7.8	16.9	1	31	-1	2
72	072TOPS0340A	0	117	333	46	24	1	59	$ 67,205	$ 18,000	6.6	16.6	1	12	-1	2
72	072TOPS0341A	169	99	59	180	50	1	59	$ 108,841	$ 29,152	8.9	18.2	1	31	-1	2
72	072TOPS0345A	169	99	59	163	36	1	56	$ 80,055	$ 21,442	8	20	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
72	072TOPS0349A	169	99	59	155	37	1	59	$ 88,655	$ 23,746	8.6	16.3	1	31	-1	2
72	072TOPS0353A	169	99	59	175	44	1	60	$ 109,168	$ 29,240	9.4	17.4	1	31	-1	2
72	072TOPS0364A	0	117	333	46	24	1	59	$ 73,170	$ 19,598	6.3	16.8	1	12	-1	2
72	072TOPSFF01A	169	99	59	175	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	072TOPSFF01A	169	99	59	220	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	072TOPSFF02A	169	99	59	180	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
72	072TOPSHWY	119	64	999	134	34	1	64	$ 105,756	$ -	7.8	7.8	1	34	-1	0.5
-999																
73	0735TH_8202A	308	54	125	335	35	1	56	$ 113,001	$ 30,266	9	21	1	31	-1	2
73	0735TH_8210A	163	98	62	204	26	1	2	$ 70,156	$ 18,791	8.5	12.8	1	31	-1	0.5
73	0735TH_FF01A	261	47	125	275	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	0736TH_8000A	308	54	125	314	14	1	1	$ 24,189	$ 6,479	8.8	11.8	1	31	-1	0.5
73	0736TH_8003A	308	54	125	330	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	0736TH_8003S	0	0	0	323	8	1	60	$ 504	$ 135	9	21	1	31	-1	2
73	0736TH_8004A	261	47	125	269	50	1	1	$ 39,462	$ 10,570	9.3	11.8	1	31	-1	0.5
73	0736TH_8004S	0	0	0	265	12	1	60	$ 1,344	$ 360	9	21	1	31	-1	2
73	0736TH_8005A	261	47	125	261	53	1	55	$ 76,509	$ 20,492	12.9	15.2	1	31	-1	0.5
73	0736TH_8011A	163	98	62	169	32	1	60	$ 54,639	$ 14,635	9.7	19.2	1	31	-1	2
73	0737TH_7800A	308	54	125	326	32	1	59	$ 70,395	$ 18,855	8.7	10.7	1	31	-1	2
73	0737TH_7800S	334	0	111	325	12	1	60	$ 952	$ 255	9	21	1	31	-1	2
73	0737TH_7803A	308	54	125	308	34	1	59	$ 96,221	$ 25,772	9.1	20.4	1	31	-1	2
73	0737TH_7806A	261	47	125	262	34	1	59	$ 67,465	$ 18,070	8.9	16.6	1	31	-1	2
73	0737TH_7807A	261	47	125	261	30	1	59	$ 69,415	$ 18,592	9.8	11.7	1	31	-1	2
73	0737TH_7812A	163	98	62	157	41	1	59	$ 78,904	$ 21,134	8.5	16.2	1	31	-1	2
73	0738TH_7605A	261	47	125	268	30	1	59	$ 76,990	$ 20,621	9	21	1	31	-1	2
73	0738TH_7605S	308	54	125	328	12	1	60	$ 1,680	$ 450	9	21	1	31	-1	2
73	0738TH_7612A	163	98	62	163	40	1	60	$ 96,554	$ 25,861	9.3	17.3	1	31	-1	2
73	0738TH_FF01A	261	47	125	275	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	0739TH_7401A	308	54	125	313	42	1	60	$ 107,468	$ 28,785	5.2	7.4	1	31	-1	2
73	0739TH_7405A	261	47	125	266	24	1	59	$ 47,997	$ 12,856	9	21	1	31	-1	2
73	0739TH_7415A	163	98	62	164	48	1	60	$ 100,908	$ 27,027	9.3	16.4	1	31	-1	2
73	073ISLAFF01A	308	54	125	330	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPS0383A	163	98	62	162	57	1	1	$ 19,597	$ 5,249	8.8	11.8	1	31	-1	0.5
73	073TOPS0387A	163	98	62	180	30	1	59	$ 54,026	$ 14,471	9.4	16.7	1	31	-1	2
73	073TOPS0403A	163	98	62	191	24	1	60	$ 158,061	$ 42,335	9.1	17.1	1	31	-1	2
73	073TOPS0419A	163	98	62	175	36	1	59	$ 55,637	$ 14,902	9.7	19.2	1	31	-1	2
73	073TOPS0423A	163	98	62	181	40	1	59	$ 59,171	$ 15,848	11.2	18.7	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
73	073TOPS0425A	163	98	62	181	26	1	59	$ 44,579	$ 11,940	11	19.5	1	31	-1	2
73	073TOPSFF01A	0	116	1000	62	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSFF02A	163	98	62	185	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSFF03A	163	98	62	165	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSFF04A	163	98	62	180	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSFF05A	163	98	62	180	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSFF06A	163	98	62	185	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
73	073TOPSHWY	115	64	1000	130	34	1	64	$ 105,868	$ -	8.93	8.93	1	34	-1	0.5
-999																
74	0742ND_8800A	296	53	143	298	34	1	1	$ 26,382	$ 7,066	9	21	1	31	-1	0.5
74	0742ND_8800G	0	0	0	317	12	1	1	$ 1,344	$ 360	9	21	1	31	-1	2
74	0742ND_8801A	296	53	143	291	40	1	59	$ 88,832	$ 23,793	9	21	1	31	-1	2
74	0742ND_8804A	245	51	143	247	40	1	1	$ 113,001	$ 30,266	9	21	1	31	-1	0.5
74	0742ND_8804G	0	0	0	247	25	1	1	$ 5,600	$ 1,500	9	21	1	31	-1	2
74	0742ND_8805A	245	51	143	244	24	1	55	$ 17,388	$ 4,657	9	21	1	31	-1	2
74	0742ND_8805S	0	0	0	265	30	1	1	$ 2,240	$ 600	9	21	1	31	-1	2
74	0742ND_8806A	146	99	59	166	30	1	55	$ 113,001	$ 30,266	9	21	1	31	-1	2
74	0742ND_8811A	146	99	59	151	32	1	55	$ 43,849	$ 11,745	9	21	1	30	-1	2
74	0742ND_8904A	437	92	125	460	28	1	55	$ 89,029	$ 23,846	9	21	1	31	-1	2
74	0743RD_8603A	245	51	143	310	30	1	60	$ 113,001	$ 30,266	9	21	1	23	-1	2
74	0743RD_8607A	245	51	143	241	36	1	59	$ 87,675	$ 23,483	9	21	1	31	-1	2
74	0743RD_8610A	146	99	59	185	30	1	60	$ 113,001	$ 30,266	9	21	1	15	-1	2
74	0744TH_8404A	245	51	143	275	32	1	56	$ 113,001	$ 30,266	9	21	1	31	-1	2
74	0744TH_8409A	245	51	143	264	46	1	1	$ 42,817	$ 11,468	9	21	1	31	-1	0.5
74	0744TH_8411A	146	99	59	177	32	1	59	$ 113,252	$ 30,334	9	21	1	31	-1	2
74	0745TH_8203A	296	53	143	304	38	1	59	$ 66,993	$ 17,943	9	21	1	31	-1	2
74	0745TH_8205A	245	51	143	253	42	1	59	$ 105,488	$ 28,254	7.2	16.3	1	31	-1	2
74	0745TH_8211A	146	99	59	173	40	1	59	$ 51,404	$ 13,768	8.3	15.8	1	31	-1	2
74	0746TH_8803A	296	53	143	315	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074ISLA3504A	146	99	59	157	32	1	60	$ 252,987	$ 67,760	8.6	18.7	1	23	-1	2
74	074ISLA3507A	437	92	125	434	32	1	60	$ 195,931	$ 52,478	4	14.2	1	31	-1	2
74	074ISLAFF01A	296	53	143	320	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074ISLAFF02A	296	53	143	315	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074ISLAFF03A	296	53	143	318	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074TOPS0464A	0	100	500	64	18	1	55	$ 63,515	$ 17,012	6	20.9	1	30	-1	2
74	074TOPS0465A	146	99	59	171	32	1	60	$ 41,268	$ 11,053	7.1	15.6	1	31	-1	2
74	074TOPS0469A	146	99	59	205	28	1	60	$ 132,579	$ 35,510	8.4	9.2	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
74	074TOPS0479A	146	99	59	185	30	1	59	$ 1,044	$ 280	9.9	17.1	1	31	-1	2
74	074TOPS0486A	0	100	500	39	24	1	59	$ 42,608	$ 11,412	7.2	18.2	1	2	-1	2
74	074TOPS0499A	146	99	59	185	35	1	55	$ 224,013	$ 60,000	9.1	21.1	1	31	-1	2
74	074TOPS0503A	146	99	59	178	40	1	55	$ 77,702	$ 20,812	9.9	18	1	30	-1	2
74	074TOPS0517A	146	99	59	151	30	1	55	$ 37,075	$ 9,930	11.1	17.8	1	31	-1	2
74	074TOPS0523A	146	99	59	152	66	1	60	$ 99,322	$ 26,603	10.4	14.9	1	31	-1	2
74	074TOPS0527A	146	99	59	149	34	1	59	$ 113,704	$ 30,455	9.8	18.2	1	31	-1	2
74	074TOPS0527G	0	0	0	200	40	1	60	$ 12,195	$ 3,266	9	21	1	31	-1	2
74	074TOPSFF01A	146	99	59	175	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074TOPSFF02A	146	99	59	180	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074TOPSFF03A	146	99	59	175	40	1	56	$ 315,125	$ 94,537	9	21	1	31	-1	2
74	074TOPSHWY	102	64	892	117	34	1	64	$ 94,433	$ -	8.06	8.06	1	34	-1	0.5
-999																
75	075CALI0101A	440	119	111	471	30	1	60	$ 392,497	$ 105,127	6.6	17	1	31	-1	2
75	075CALI0105A	440	119	111	486	30	1	60	$ 392,659	$ 105,170	6	18	1	31	-1	2
75	075HERO0101A	440	119	111	466	30	1	60	$ 100,689	$ 26,969	6.2	16.3	1	31	-1	2
75	075HERO0105A	440	119	111	466	30	1	60	$ 100,689	$ 26,969	6	18	1	31	-1	2
75	075ISLA3512A	0	353	67	159	28	1	60	$ 155,643	$ 41,688	7.8	18.1	1	5	-1	2
75	075ISLA3518A	0	353	67	165	34	1	60	$ 257,807	$ 69,052	8.9	21.4	1	5	-1	2
75	075ISLA3522A	0	353	67	182	25	1	60	$ 228,462	$ 61,192	7.9	19.7	1	5	-1	2
75	075ISLA3530A	0	353	67	163	32	1	60	$ 207,752	$ 55,644	16.1	16.3	1	5	-1	0.5
75	075ISLA3536A	0	353	67	215	30	1	55	$ 164,033	$ 43,935	6	18	1	30	-1	2
75	075ISLA3541A	440	119	111	484	30	1	60	$ 113,738	$ 30,464	5.4	14	1	31	-1	2
75	075ISLA3542A	0	353	67	135	40	1	60	$ 71,398	$ 19,124	6.9	19	1	15	-1	2
75	075ISLA3546A	0	353	67	198	28	1	60	$ 97,027	$ 25,988	11.2	24.4	1	23	-1	2
75	075ISLA3560A	0	353	67	264	26	1	60	$ 126,875	$ 33,983	6	18	1	23	-1	2
75	075ISLA3562A	0	353	67	133	47	1	60	$ 213,694	$ 57,236	6.6	21.1	1	5	-1	2
75	075ISLA3575A	440	119	111	530	24	1	59	$ 49,265	$ 13,195	6.1	14.2	1	31	-1	2
75	075ISLA3584A	0	353	67	227	32	1	60	$ 223,159	$ 59,772	6	18	1	23	-1	2
75	075ISLA3585A	440	119	111	528	32	1	55	$ 48,554	$ 13,005	6.1	13.9	1	31	-1	2
75	075ISLA3586A	0	353	67	239	33	1	59	$ 177,097	$ 47,434	9.8	0	1	12	-1	2
75	075ISLA3588A	0	353	67	227	52	1	60	$ 317,694	$ 85,092	7.1	22.4	1	5	-1	2
75	075ISLA3588G	0	0	0	264	30	1	60	$ 12,195	$ 3,266	6	18	1	31	-1	2
75	075ISLAFF01A	440	119	111	450	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
75	075ISLAFF02A	0	353	67	260	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
75	075ISLAFF03A	0	353	67	260	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
75	075ISLAFF04A	440	119	111	450	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2

Reach ID	USACE_ID	REF lot front	Lot length	Lot width	REF struc front	Struc length	AA Ratio	Flood Curve	Replacement Value of Structure in Dollars	Value of Contents in Dollars	G_elev	FF_elev	Active	Erosion Curve	Armor	Erosion Indicator
75	075ISLAFF05A	0	353	67	400	40	1	56	$ 315,125	$ 94,537	6	18	1	31	-1	2
75	075_210HWY	353	64	1000	368	34	1	64	$ 105,868	$ -	6.87	6.87	1	34	-1	0.5
-999																
76	076ISLA3592A	0	360	71	233	65	1	60	$ 267,991	$ 71,779	6.9	11.6	1	23	-1	2
76	076ISLA3600A	0	360	71	278	28	1	2	$ 77,984	$ 20,888	8	20	1	31	-1	0.5
76	076ISLA3605A	449	145	167	509	38	1	59	$ 65,724	$ 17,604	5.7	13.3	1	31	-1	2
76	076ISLA3606A	0	360	71	226	40	1	59	$ 283,726	$ 75,993	14.3	24.1	1	10	-1	0.5
76	076ISLA3612A	0	360	71	171	26	1	60	$ 172,622	$ 46,236	9.2	12.2	1	5	-1	2
76	076ISLA3618A	0	360	71	172	32	1	60	$ 134,143	$ 35,929	7.6	19.2	1	15	-1	2
76	076ISLA3622A	0	360	71	177	30	1	60	$ 106,771	$ 28,598	8.1	18.9	1	5	-1	2
76	076ISLA3632A	0	360	71	255	24	1	60	$ 174,913	$ 46,849	8.4	18	1	23	-1	2
76	076ISLA3634A	0	360	71	258	24	1	56	$ 177,843	$ 47,634	8.4	17.9	1	30	-1	2
76	076ISLA3638A	0	360	71	261	28	1	56	$ 285,638	$ 76,506	8	20	1	30	-1	2
76	076ISLA3644A	0	360	71	162	32	1	60	$ 220,343	$ 59,017	8.7	15.2	1	5	-1	2
76	076ISLA3648A	0	360	71	248	24	1	60	$ 179,403	$ 48,052	17	21.1	1	13	-1	0.5
76	076ISLA3655A	449	145	167	482	27	1	2	$ 106,235	$ 28,454	8	20	1	31	-1	0.5
76	076ISLA3655G	0	0	0	500	40	1	1	$ 113,704	$ 30,455	8	20	1	31	-1	2
76	076ISLA3658A	0	360	71	181	32	1	60	$ 104,859	$ 28,086	8.1	10.2	1	17	-1	2
76	076ISLAFF01A	465	145	167	510	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
76	076ISLAFF02A	449	145	167	510	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
76	076ISLAFF03A	449	145	167	495	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
76	076ISLAFF04A	449	145	167	480	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
76	076ISLAFF05A	0	360	71	220	40	1	56	$ 315,125	$ 94,537	8	20	1	31	-1	2
76	076_210HWY	362	64	1000	377	34	1	64	$ 105,868	$ -	6.43	6.43	1	34	-1	0.5
-999																
77	077ISLA3674A	0	318	71	192	42	1	56	$ 131,103	$ 35,115	11.4	12.1	1	30	-1	2
77	077ISLA3720A	0	318	71	201	34	1	59	$ 314,031	$ 84,111	7	19	1	12	-1	2
77	077ISLA3730A	0	318	71	202	36	1	60	$ 155,075	$ 41,536	7	18.5	1	15	-1	2
77	077ISLA3734A	0	318	71	475	40	1	60	$ 163,722	$ 43,852	7	19	1	27	-1	2
77	077ISLA3735A	421	162	111	199	35	1	56	$ 113,001	$ 30,266	7	19	1	31	-1	2
77	077ISLA3740A	0	318	71	124	25	1	60	$ 164,795	$ 44,139	5.4	18.9	1	15	-1	2
77	077ISLA3744A	0	318	71	119	28	1	60	$ 210,300	$ 56,327	8.3	16.4	1	5	-1	2
77	077ISLA3748A	0	318	71	187	50	1	60	$ 137,118	$ 36,726	7	19	1	15	-1	2
77	077ISLAFF01A	0	318	71	200	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF02A	405	162	111	480	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF03A	0	318	71	215	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF04A	405	162	111	485	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2

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77	077ISLAFF05A	0	318	71	220	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF06A	405	162	111	475	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF07A	0	318	71	215	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF08A	405	162	111	470	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF09A	0	318	71	475	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF10A	405	162	111	425	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF11A	0	318	71	205	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF12A	405	162	111	465	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF13A	0	318	71	195	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF14A	405	162	111	440	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077ISLAFF15A	405	162	111	440	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
77	077_210HWY	318	64	1000	333	34	1	64	$ 105,868	$ -	4.89	4.89	1	34	-1	0.5
-999																
78	078ISLA3752A	0	322	56	183	24	1	56	$ 113,722	$ 30,460	7	19	1	30	-1	2
78	078ISLA3756A	0	322	56	187	26	1	60	$ 120,166	$ 32,185	7	19	1	23	-1	2
78	078ISLA3759A	408	183	100	450	35	1	60	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078ISLA3760A	0	322	56	185	40	1	59	$ 104,715	$ 28,047	7	19	1	12	-1	2
78	078ISLA3764A	0	322	56	200	30	1	60	$ 1,044	$ 280	7	19	1	15	-1	2
78	078ISLA3767A	408	183	100	450	30	1	60	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078ISLA3768A	0	322	56	200	30	1	60	$ 1,044	$ 280	7	19	1	15	-1	2
78	078ISLA3775A	408	183	100	450	35	1	60	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078ISLA3776A	0	322	56	195	32	1	56	$ 94,689	$ 25,362	7.4	15.9	1	31	-1	2
78	078ISLA3801A	408	183	100	450	35	1	60	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078ISLA3802A	0	322	56	227	33	1	56	$ 84,302	$ 22,580	7	19	1	30	-1	2
78	078ISLA3803A	408	183	100	450	35	1	60	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078ISLA3804A	0	322	56	203	48	1	56	$ 172,820	$ 46,288	8	17.5	1	30	-1	2
78	078ISLA3805A	408	183	100	429	34	1	60	$ 83,304	$ 22,312	5.9	14.6	1	31	-1	2
78	078ISLA3808A	0	322	56	119	40	1	59	$ 83,703	$ 22,419	6.6	11.4	1	12	-1	2
78	078ISLA3814A	0	322	56	197	40	1	56	$ 126,815	$ 33,966	7	19	1	30	-1	2
78	078ISLA3824A	0	322	56	138	32	1	60	$ 193,948	$ 51,947	7.3	13.7	1	5	-1	2
78	078ISLA3825A	408	183	100	488	40	1	55	$ 58,126	$ 15,569	7	19	1	31	-1	2
78	078ISLA3828A	0	322	56	148	32	1	55	$ 60,259	$ 16,140	8.4	19.3	1	30	-1	2
78	078ISLAFF01A	408	183	100	450	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
78	078ISLAFF02A	408	183	100	455	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
78	078ISLAFF03A	0	322	56	200	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
78	078ISLAFF04A	0	322	56	225	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
78	078ISLAFF05A	0	322	56	240	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2

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78	078ISLAFF08A	0	80	50	175	40	1	56	$ 315,125	$ 94,537	7	19	1	31	-1	2
78	078MYRT0209A	0	322	56	188	40	1	55	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078MYRT0211A	0	322	56	191	35	1	59	$ 113,001	$ 30,266	7	19	1	31	-1	2
78	078MYRTFF01A	0	322	56	220	40	1	56	$ 113,704	$ 30,455	7	19	1	31	-1	2
78	078SEA_0100A	408	90	100	433	33	1	60	$ 80,180	$ 21,475	7	19	1	31	-1	2
78	078SEA_0110A	498	93	100	534	35	1	60	$ 80,180	$ 21,475	7	19	1	31	-1	2
78	078_210HWY	322	64	998	337	34	1	64	$ 105,656	$ -	4.69	4.69	1	34	-1	0.5
-999																

April 21, 2002

Erosion Damage Thresholds in North Carolina

by Spencer M. Rogers Jr.
North Carolina Sea Grant

INTRODUCTION

As the coast of North Carolina developed over the last century, coastal construction has experienced significant damage from hurricanes and other coastal storms, as well as long-term erosion. Construction practices have evolved due to changes in public perception of storm risk and several construction regulation programs. Several important changes in practice did not occur as a gradual process but instead in a series of identifiable steps in time. Significant events affecting construction practice include: a series of severe hurricanes and coastal storms in the 1950s; the mid-1960s adoption and later revision of the North Carolina State Building Code, the second oldest hurricane-resistant building code in the U.S.; and the 1978 implementation and later revisions of the NC Coastal Area Management Act. The evolution of coastal construction practice and general thresholds for damage has been described by Rogers (2001). This report applies to those observed changes to develop methods to estimate damage to coastal structures due to storm-induced erosion in North Carolina. A comprehensive inventory of building construction details and other structures can be combined with commonly unmeasurable construction details that can be inferred from the construction date and the known evolution of general construction practices.

The effect of construction regulations is always limited by the effectiveness of local enforcement and the speed of adoption as general construction practice. Experience from severe storms and long-term erosion in North Carolina has shown that the building code and regulatory enforcement has been generally good; regulatory compliance in coastal communities has been consistently high; and the adoption of new standards by local contractors timely. The use of construction dates to estimate hidden construction parameters affecting erosion resistance is therefore a reasonable assumption and an improvement over previous methods to estimate erosion damage.

North Carolina's buildings and other development have evolved due to a unique storm and regulatory history. The recommendations in this report will not directly apply to other coastal areas. However, locally-customized construction factors can be developed for any shoreline that could be used to significantly improve erosion damage predictions over previously used methods.

The most accurate method to predict future damage is to perform a building by building damage evaluation of historical severe storms on shorelines with similar development and construction standards. At this time detailed studies do not exist. Therefore, the damage thresholds suggested for North Carolina and the erosion damage curves in Appendix A are based on the opinion of the author, formed over 27 years of building damage evaluations, following most of the worst storms on the East and Gulf coasts, and for most of that time, observations of the North Carolina coast on a daily basis. A resume is included as Appendix B.

GENERAL APPROACH

To improve erosion damage estimates, buildings can be separated into two general classes: small buildings (primarily single family houses) and larger commercial buildings. Each class is further separated by construction details determined by a local building inventory and assumed local construction practice based on construction date. The erosion resistance of a building can seldom be determined by construction details alone. The local ground elevation significantly affects the effectiveness of the construction standards. Local topographical data can be used to separate shorelines into two general types with high or low elevation building sites.

SHORELINE TYPES

On ocean shorelines, zones of storm damage have been observed that can separated by ground elevation into two types (Rogers, 1990) shown in **Figure 1**. The high elevation type is defined as sufficiently elevated to prevent wave effects unless subject to erosion (**Figure 1-A**). The seaward of two damage zones is defined by the area subject to erosion. Buildings in the erosion zone are subject to combined damage from erosion, wave impacts and flooding. The high elevation of the more landward zone protects the buildings from erosion, waves and flooding. Both zones are subject to storm winds.

Low elevation shorelines with overtopped dunes have four building damage zones (**Figure 1B**). The seaward zone is defined as the area experiencing erosion but also subject to waves, and flooding. The next landward zone is defined as the area subject to breaking waves capable of destroying solid building walls and foundations. It includes the area subject to overwash deposition. The National Flood Insurance Program has traditionally identified the threshold for destructive wave heights as 3 feet (Corps of Engineers, 1975). More recent research indicates that a breaking wave of 1.5 feet will destroy common solid walls and foundations (Tung et al, 1999) . The next landward zone is defined by flooding but no significant wave damage. The landward-most zone has sufficient elevation to avoid erosion, waves and flooding but like the more seaward zones, may be subject to high winds.

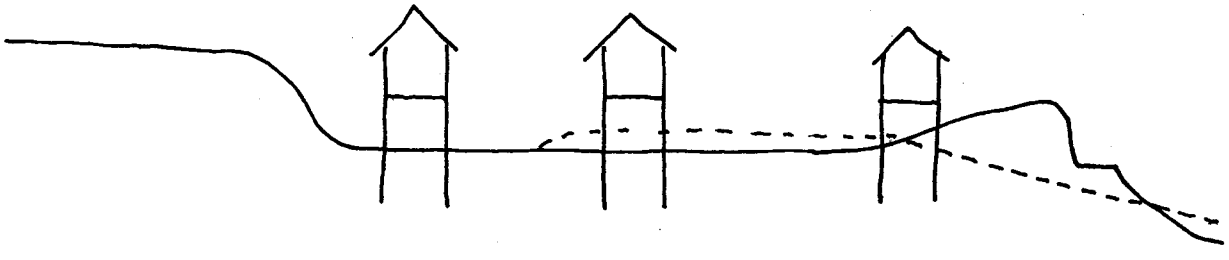
Figure 1: SHORELINE TYPES

A. High dune, no overtopping
1. Erosion zone with waves and flooding
2. High ground (no erosion, waves or flooding)

HIGH GROUND **EROSION, WAVES & FLOODING**

B. Small overtopped dune
1. Erosion zone with waves and flooding
2. Waves zone with overwash deposition and flooding
3. Stable ground elevation with flooding
4. High ground: (no erosion, waves or flooding)

HIGH GROUND **FLOODING** **WAVES** **EROSION**



CLASSES OF STRUCTURES

To predict erosion damage within the described zones, it is useful to separate structures into several different classes as shown in **Figure 2.** Buildings are separated by general size, typically single-family houses and larger commercial buildings. Both classes of buildings commonly use breakaway walls and enclosures under piling supported, elevated buildings. The behavior of the enclosures is sufficiently different and often independent of the elevated buildings therefore justifying a separate class and damage calculations for the enclosures. A broad class of structures including mobile homes, swimming pools and other expendable structures, including decks seaward of oceanfront houses, are grouped as highly erosion sensitive structures. Dune walkways, roads and erosion control actions are listed as separate classes. It is useful to separate the buildings and several other classes into subclasses, based on similar construction characteristics. Suggested erosion damage tables for Classes 1-5 are included as an appendix.

Class 1: Single-Family Houses

Single-family houses are by far the most common class of buildings along the North Carolina coast. They are used as primary residences, second homes and rental property. The class includes similarly designed small buildings such as duplexes, small condos and some small commercial buildings. The class can be further divided by foundation type, determined by a detailed building inventory and the date of initial construction. Class 1a includes erosion-sensitive foundations including concrete slabs, shallow spread footings and most others not on pilings. Class 1b buildings are constructed on relatively shallow pilings. Building code requirements beginning in the mid-1960s led to the common use of pilings installed to a depth of 8 feet below grade. It includes most non-oceanfront houses up to present and oceanfront houses constructed through 1985. Class 1c consists of oceanfront houses constructed from 1986 to present, following an increase in the piling foundation standard to -5 feet NGVD or 16 feet below grade, whichever is shallower.

The shallow foundations in Class 1a are equally erosion damage prone in both shoreline elevation types. The shallow pilings in Class 1b are ineffective on high elevation, Type A shorelines, and perform like Class 1a (**Figure 3**). At lower ground elevations of Type B a moderate level of erosion resistance is provided (**Figure 4**). For short pilings, +12' NGVD is suggested as an effective ground elevation separation for shoreline type. Shallow piling foundations in Type A shorelines have a piling tip penetration above +4' or slightly above the mean high water elevation, too little embedment to improve the erosion-resistance over Class 1a. Significant damage to deeper imbedded pilings is likely to begin when the erosion depth exceeds 4', half the embedment depth of 8'.

On high elevation Type A shorelines the deeper pilings of Class 1c are limited in effectiveness by the 16' feet below grade requirement. The shoreline types can be separated by a ground elevation of +16' NGVD. On A shorelines, the piling embedment will be no deeper than 0.0' NGVD and can be expected to perform similar to the other grossly eroded foundations in 1a and 1b(A) (**Figure 5**). When piling embedment approaches or exceeds the -5' NGVD piling standard on lower ground elevations (Type B) the erosion resistance of 1986 piling standards proved very effective during Hurricane Fran (FEMA, 1997 and Woodward-Clyde, 1997.) See **Figure 6.** An erosion threshold of 4 feet is suggested.

Figure 2: CLASSES OF COASTAL BUILDINGS AND OTHER STRUCTURES

1. Single-family house (includes duplexes & small condos)
   a. Slab foundation or shallow perimeter footing and interior piers
   b. Shallow piling foundation (~ 8' below grade: oceanfront, 1965 thru 1985 and farther inland, all dates.)
   c. Deeper piling foundation (piling penetration to -5' NGVD or 16' below grade, whichever is shallower, 1986 and later, oceanfront only)

2. Commercial or large multi-family buildings
   a. Slab or other on-grade foundation
   b. Second floor and above piling supported, lowest floor on grade (common in hotel and condos)
   c. Fully piling supported, deep pilings, [some wood-frame, pre-1985 oceanfront condos may have shallow pilings as in 1b above]
   d. Building specific evaluation (fishing piers, etc.)

3. Underhouse enclosures: may be unfinished or finished interior
   Unfinished enclosures have fixed cost per either SF or linear wall footage
   Finished enclosure valued as ratio of total finished floor area
   a. None (parking slab?)
   b. Small (<300 SF)
   c. Partial (>300 SF, < full)
   d. Full enclosure

4. Mobile homes, utility buildings, detached garages, decks seaward of oceanfront houses, gazebos, pools etc

5. Dune walkways
   a. Houses
   b. Public/commercial

6. Paved roads and parking lots
   a. Damage
   b. Overwash excavation
   c. Sand sifting operations

7. Erosion control structures and actions
   a. Beach scraping
   b. Emergency sandbags

Figure 3: Short piling foundation failures (Class 1b) on high-elevation shoreline (Type A). Location: Kure Beach NC after Hurricane Fran.

Figure 4: Short piling foundation (Class 1b) near failure on low-elevation shoreline (Type B). Location: Surf City NC after Hurricane Fran.

Figure 5: House under construction with piling 16 feet below grade (Class 1c) on high-elevation dune (Type A). Dune elevation above +16 feet NGVD makes erosion failure more likely. Location: Emerald Isle NC.

Figure 6: Houses on 1996 pilings (Class 1c) on low-elevation shoreline (Type B). Location: Topsail Island after Hurricane Fran.

Figure 7: Slab foundation failure (Class 1a & 2a) beside commercial/deep-piling structure (Class 2c) on high-elevation shoreline (Type A). Location: Surf City NC after Hurricane Fran.

Figure 8: Piling-supported hotel with lower floor on unsupported slab (Class 2b) on low-elevation shoreline (Type B). Location: Wrightsville Beach NC after Hurricane Fran.

Class 2: Large Commercial Buildings

The class of large buildings includes hotels, large condos, restaurants, and most other commercial buildings. These generally larger buildings are constructed to a separate performance building code that does not include the specific piling depth requirements found in Class 1. The large mass of the buildings typically dictates, that where used, piling embedment depths are significantly greater than for small buildings. Class 2a buildings are constructed on shallow, erosion-sensitive foundations, typical of older commercial buildings (**Figure 7**). Class 2c is fully supported on a piling foundation and has an erosion tolerance as good or better than the best small buildings (**Figure 7.)** Class 2b is a hybrid foundation common in hotel construction. All of the building walls and all floors above the first floor are supported on pilings and buried grade beams that are relatively erosion tolerant (**Figure 8**). The lowest finished floor is supported on a slab foundation supported on grade between the foundation pilings **(Figure 9**). The lowest floor is therefore highly erosion sensitive. Wave and erosion damage occurs to the lowest floor where much of the value of the building is concentrated, but higher floors are relatively undamaged. It is suggested that total erosion damage be estimated by treating the lowest floor as a slab (Class 1a and 2a)but weighted for twice the average square-foot value for the building, and added to damage in higher floors as applied in Class 1c and 2c.

Figure 9: Piling-supported hotel after failure of unsupported, first-floor slab (Class 2b) on low-elevation shoreline (Type B). Location: Horry County after Hurricane Hugo.

Class 3: Under-building Enclosures

Many buildings of all ages enclose part or all of the area under piling-supported elevated buildings. Present regulations allow lower level enclosures for the purposes of parking, storage or access to the elevated building. Any enclosure must be unfinished and include no equipment such as a heat pump, water heater, washer or dryer. In some communities it is common for piling-supported houses constructed prior to adoption of minimum floor elevation requirements, to have fully finished underhouse enclosures supported on a slab foundation. Although prohibited in more recent construction, small finished enclosures and unauthorized equipment are not uncommon. Erosion or waves frequently destroy the lower level and equipment, leaving the elevated floors in place.

Some near-ocean buildings are required to use specific designs for breakaway enclosure walls. More recent research has shown that standard wood framing adequately functions to breakaway from the piling foundation and elevated building, negating the need for a specific

breakaway design (Tung et al, 1999). Whether it was designed to breakaway is a moot issue. Waves and/or erosion will predictably cause all enclosure walls to breakaway.

Enclosures are common in both Class 1 and Class 2 buildings. Enclosures are supported on slab foundations that behave quite differently in erosion than the rest of a piling-supported building. Recent building inventory collections have included separate descriptions of the size and finish of the enclosures. Therefore overall damage calculations can be simplified and improved by considering enclosures as Class 4 structures, separate from the rest of the elevated buildings. The National Flood Insurance premium rating system serves to encourage enclosure sizes into four groups as outlined in **Figure 2**. Open buildings with no enclosures may still have parking slabs that are subject to erosion damage. In NFIP V-zones, enclosures smaller than 300 SF can be rated by local flood insurance agents. Larger enclosures must submit information to Washington for rating. Full enclosures are common near some shorelines particularly in A-zones where flood insurance rates are not affected by the size or presence of the enclosures.

The value of the enclosure will vary depending on whether it is finished or unfinished. Finished areas can be reasonably valued at the SF rate of the elevated building. Unfinished enclosures are obviously lower in value.

Class 4: Mobile Homes and Other Expendable Structures

Mobile homes and a group of other expendable structures are highly erosion sensitive, failing quickly after only partial undermining. Mobile homes in this class use shallow, mortarless concrete block piers, tied down with screw anchors. A small number of mobile homes have recently been installed on traditional piling foundations and should be evaluated as Class 1 structures. North Carolina has historically considered expendable structures to include small utility buildings, parking surfaces, gazebos, swimming pools and tennis courts. Also included are the open decks seaward of most oceanfront houses. Building setback lines generally apply to the roofed building, but expendable decks of limited size are allowed to be constructed contiguous to the building, seaward of the setback line. The building code allows the common practice of using short pilings on the decks compared to required depth for the building (FEMA, 1997.) Oceanfront decks are therefore far more erosion-sensitive than the adjacent buildings and are more accurately grouped with Class 4. Detached garages are more common in older development and are affected similarly by erosion.

Class 5: Dune walkways

Dune walkways are permitted as expendable structures and restricted in piling depth to require erosion damage rather than interfering with access along the beach. Walkway damage differs from Class 4 only in the rate that erosion damage progresses. The relatively long, shore perpendicular structures can be assumed to experience a linear increase in damage with the percentage of erosion rather than a quick total loss as in Class 4. Houses and commercial/public walkways differ primarily in value per linear foot of walkway . Commercial/public walkways tend to be a few feet wider and use heavier materials, therefore have a higher value per unit length.

Class 6: Paved Roads and Parking Areas

On-grade paving is destroyed by shallow erosion, requiring replacement and/or relocation. In contrast overwash deposits bury the paving without significant damage. Damage values result from the effort required to excavate the surface, returning it to its intended function. Road repair and replacement costs should be available from the NC Department of Transportation. Overwash excavation costs may also be available from the same source for Highway 12 or from local governments. Most near-ocean overwash deposits that are excavated from roads or developed areas are required to be replaced on or near the beach. In our recent hurricanes, the abundance of construction debris excavated with overwash sand has led to major sand sifting projects before being returned to the beach. The cost of handling has been estimated in some communities to have exceed $15/CY of excavated sand. The cost of past efforts should be available from local governments or NC Emergency Management since they are included in FEMA Public Assistance reimbursements.

Class 7: Erosion control structures and responses

Most erosion control structures on the oceanfront are prohibited by NC regulations. However emergency sandbag revetments and several other practices are pre-authorized by general permits and are in common use. Most permanent structures, including buildings, are eligible for an emergency sand bag permit if erosion moves the vegetation line closer than 20 feet from the building. Roads and septic tanks are included. Mobile homes and detached garages would also qualify but most other expendable structures in Class 4, including oceanfront decks, would not be eligible. The emergency sandbag revetments are limited in time (two to five years, depending on building size, longer if beach nourishment is under study) and in size. The size limit is approximately 6 feet high and 20 feet wide. Typical practice uses bags filled to roughly 2 feet high by four feet wide in a sloping revetment three bags high and three wide for a total of 6 rows of bags. A property owner on Topsail Island recently received three bids of approximately $20 per linear foot of row of bags or $120 per linear foot for a typical 6-bag cross section. Cooperating adjacent owners pay for their oceanfront lot width. Isolated owners must pay for extra bags to protect the one or both sides of their structures.

Beach scraping, excavating sand from the berm or foreshore and pushing it to just landward of the vegetation line or erosion scarp is the most common erosion control response in use on the NC coast. Funding and permitting varies by community. Work is contracted by individual property owners, or in some cases by local government or homeowners associations for longer shorelines under their management. Several research projects have concluded that beach scraping within the limits of the state permit conditions has no significant positive or negative impact on the local erosion rate. Although proven to be of little benefit, beach scraping is a common and real cost, directly by the property owner or indirectly through government or homeowner association assessments. The frequency and cost of beach scraping can usually be determined by contacting the local government or building inspector.

USING SBEACH TO PREDICT BUILDING DAMAGE

SBEACH erosion model was developed to predict two-dimensional beach profile changes with varying storm surge, wave and sediment size conditions. It is intended to predict bar movement, overwash and shoreline recovery better than previously available models. It was not developed to predict erosion damage to buildings and has limitations if directly used for that purpose. Most of the model calibration came from large scale wave tank data and field studies following storms with moderate surge elevations. Calibration for design level storms (50 to 100-year events) appears to have been minimal.

Since SBEACH was designed to better model dune overtopping and overwash deposition it should better represent low elevation shorelines where dunes are flattened and overwash is deposited farther landward. The predicted overwash terrace should provide a better profile for predicting depth limited wave heights around buildings on the second row and farther inland. For predicting erosion threats to typical oceanfront buildings it is suspected that the model underestimates erosion depth. It may not be a significant issue on shallow foundations, such as slabs, but becomes a particular problem when predicting the erosion failure threshold for shallow pilings. Reasonable results are likely to be obtained by using a modeled erosion depth threshold that is shallower (2' maybe?) than observed in the field (on the order of 4' for 8' pilings in severe storms.) Several sections of Topsail Island that lost 150+ similar buildings on short pilings in Fran would be useful area to calibrate SBEACH for the erosion failure threshold for low elevation shorelines with overtopped dunes.

During extreme storms, those most likely to cause erosion damage to buildings, high dunes or unconsolidated bluffs are observed to retreat with near vertical erosion scarps. Slopes steeper than 75 degrees appear common. There is sufficient soil moisture in the dune sands to allow the steep slope to remain stable for a period of days to weeks. Eventually the bluff face will dry and avalanche to a slope flatter than the angle of repose for the sand. The severe erosion depth caused by the retreat of the bluff during the storm places extreme conditions on both shallow and deep piling foundations. However, after the storm there is usually sufficient time to stabilize the top of the bluff, avoiding the additional horizontal erosion that would otherwise occur by avalanching.

In contrast, SBEACH adjusts the erosion scarp by continuously avalanching the eroded scarp (SBEACH Report #1 VI, page 171.) When the slope exceeds 28 degrees the model retreats the top of the erosion scarp and redistributes the sand volume to a slope of 10 degrees at each time step. The assumptions appear to be coded into the software and are not variable parameters. The theoretical slope may approach 28 degrees, much flatter than observed following severe storms. However, a few sample runs in dunes higher than the wave runup limit, consistently resulted in slopes of only 8 to 9 degrees, far flatter than the roughly 75 degrees observed in the field. The model profile output gives the appearance of a steep eroded dune face but is misleading due to the horizontal to vertical distortions in the default profile scales. The affect is not unique to SBEACH. Report #1 VII p. 217-9 indicates the Kriebel model predicts even flatter slopes.

There is no obvious method to adjust SBEACH to generate a more realistic erosion scarp or to adjust the observed erosion threshold depths of the different foundation types to fit the model. Selection of an erosion threshold in the model is necessary to determine the

percentage of structure erosion in **Figure 2** before the percentage of damage can be estimated. Calibration tests in SBEACH Report #4 appear to indicate the model underestimates the horizontal dune retreat more often than overestimates. The best vertical erosion depth for the model is likely to be lower than observed for actual damage. For shallow foundation classes an erosion threshold of 0.5' to 1' appears reasonable. For the piling foundation classes, an erosion threshold of 4' is realistic in the field but 2' or less in SBEACH may generate more realistic damage estimates. It may be feasible to calibrate the damage estimates using the high ground elevations of Kure Beach during Hurricane Fran when 15 to 20 building were destroyed. The choice of an erosion threshold depth on the flat eroded dune slope from SBEACH is likely to result in extreme variations in the percentage of damage for each class of structure. It is likely additional calibration will be necessary to select an arbitrary erosion threshold depth for reasonable damage estimates. The selected threshold for piling supported buildings is likely to be considerably different than observed in the field, a necessary correction due to limitations in the model.

SUGGESTED HURRICANE FRAN CALIBRATION AREAS FOR SBEACH

Kure Beach, NC in the vicinity of Avenue E — Figure 3

1226 N. Shore Drive & Jones Avenue, Surf City, NC — Figure 4
Area includes: Severely leaning house on short pilings
Post-1986 house on long piles, undamaged
Multiple pre-1986 houses destroyed.

341 Topsail Road & 11th Avenue, North Topsail Beach, NC — Figure10
Second-row house has been protected by overwash deposit left in place after Hurricane Fran.

Figure 10: Second-row dune left after Hurricane Fran provided protection during Hurricanes Bonnie, Dennis and Floyd. Location North Topsail Beach after Hurricane Floyd.

References

Corps of Engineers, 1975. "Guidelines for Identifying Coastal High Hazard Zones." US Army Corps of Engineers, Galveston District.

Federal Emergency Management Agency, 1997. "Building Performance Assessment: Hurricane Fran in North Carolina." FEMA 290.

Rogers, Spencer, 2001. "Evaluating Potential Hurricane and Erosion Damage to Buildings in Coastal North Carolina," North Carolina Sea Grant, UNC-SG-01-04.

Rogers, Spencer M. Jr., 1990. "Designing for Storm Surge and Wave Damage in Coastal Buildings." Coastal Engineering Conference, Delft, The Netherlands. ASCE. pp. 2908-2921.

Tung, C.C., B. Kasal, Spencer M. Rogers, Jr., and S.C. Yeh, 1999. "Behavior of Breakaway Wall Subjected to Wave Forces: Analytical and Experimental Studies." NC Sea Grant (UNC-SG-99-03).

Woodward-Clyde Federal Services, 1997. "Pile Damage Assessment: Topsail Island, North Carolina." Federal Emergency Management Agency, Region IV, EMW-95-C-4678, Task Order # 111.

APPENDIX A: Erosion-Damage Curves

Contents damage assumed to be the same curve as structural damage

Class 1 Structures: Single-family residential buildings, duplexes and small condos

Structure Class	1a. Slab	1b. Short Pilings		1c. Long Pilings	
Shoreline Type	A & B All ground elevations	A: High Dune ground el >12' piling tip > el +4'	B: Low Elevation ground el <12' piling tip < el +4	A: High Dune ground el >16' piling tip > el 0	B: Low Elevation ground el <16' piling tip < el 0'
Erosion depth threshold	0.5 feet	4 feet		4 feet	
% Erosion	% Damage				
0	0.05	0.05	0.05	0.05	0
0.1	0.2	0.1	0.1	0.1	0.01
0.2	0.4	0.2	0.2	0.2	0.02
0.3	0.6	0.4	0.3	0.4	0.03
0.4	0.8	0.8	0.4	0.8	0.04
0.5	1	1	0.5	1	0.05
0.6	1	1	0.6	1	0.06
0.7	1	1	0.7	1	0.07
0.8	1	1	0.8	1	0.08
0.9	1	1	0.9	1	0.09
1	1	1	1	1	0.1

Class 2 Structures: Commercial buildings, hotels, large condos

Structure Class	2a non-piling foundation	2b piling foundation lowest floor slab	2c full piling foundation
	Same as 1a	f(# floors) * below	Same as Type B-1c
Erosion depth threshold	0.5 feet	0.5 feet	4 feet
% erosion	% Damage		
0	0.05	*	0
0.1	0.2	*	0.01
0.2	0.4	*	0.02
0.3	0.8	*	0.03
0.4	1	*	0.04
0.5	1	*	0.05
0.6	1	*	0.06
0.7	1	*	0.07
0.8	1	*	0.08
0.9	1	*	0.09
1	1	*	0.1

* Class 2b: % damage = [2 x (% erosion) / (# floors)] + (% damage Class 2c)

Class 3 Structures: Underhouse enclosures below piling supported buildings, equipment, utilities, etc.

Non-piling foundation	Same as 1a
% erosion	% Damage
0	0.05
0.1	0.2
0.2	0.4
0.3	0.8
0.4	1
0.5	1
0.6	1
0.7	1
0.8	1
0.9	1
1	1

Erosion depth threshold = 0.5 feet

Class 4 Structures: Mobile homes, utility buildings, oceanfront residential decks, detached decks, gazebos, pools, detached garages, buried public utilities

	Shallow foundations
% erosion	% Damage
0	0
0.1	0.5
0.2	1
0.3	1
0.4	1
0.5	1
0.6	1
0.7	1
0.8	1
0.9	1
1	1

Erosion depth threshold = 0.5 feet

Class 5 Structures: Dune walkways

	Shallow foundations
% erosion	% Damage
0	0
0.1	0.1
0.2	0.2
0.3	0.3
0.4	0.4
0.5	0.5
0.6	0.6
0.7	0.7
0.8	0.8
0.9	0.9
1	1

Erosion depth threshold = 2 feet

APPENDIX B: BUILDING DAMAGE ASSESSMENT EXPERIENCE

Spencer McMath Rogers, Jr.

ADDRESS: North Carolina Sea Grant & Coastal Services
5001 Masonboro Loop Road & 233 Marsh Hen Drive
Wilmington, NC 28409 Wilmington, NC 28409
910-962-2491 910-799-6654

EDUCATION: M.S. Coastal & Oceanographic Engineering, 1975, University of Florida, Gainesville, FL
B.S. Engineering, 1973, University of Virginia, Charlottesville, Virginia

EMPLOYMENT:

1978 to Present: Job title: Coastal Engineering Specialist, NC Sea Grant. Work through the NC Sea Grant Marine Advisory Service to advise private property owners, builders, designers, and governmental agencies on hurricane-resistant construction methods, shoreline erosion alternatives and marine construction techniques. Faculty: University of North Carolina - Wilmington, Center for Marine Science. Adjunct faculty: North Carolina State University, Department of Civil Engineering in Raleigh NC.

1975-78: Coastal Engineer for the Bureau of Beaches and Shores, Florida Department of Natural Resources, Tallahassee. Conducted evaluations of proposed Atlantic and Gulf front development for variances of the coastal construction setback line. Evaluated erosion control alternatives and impacts.

AFFILIATIONS: National Association of Coastal Engineers
American Society of Civil Engineers
National Society of Professional Engineers
Professional Engineers of North Carolina
Association of State Floodplain Managers

REGISTRATIONS: Registered Geologist, State of North Carolina, # 684

APPOINTMENTS:

North Carolina Coastal Resources Advisory Council, 1992 to present.
Representing marine science and technology. The Council advises the NC Coastal Resources Commission on coastal management regulations in North Carolina.

NC Science Panel on Coastal Hazards, 1997 to present.
NC university coastal engineers and geologists advising the NC Coastal Resources Commission on technical issues related to coastal processes.

PERTINENT PUBLICATIONS: 35 selected from 47

Rogers, Spencer M. Jr. and Chris Jones, 2002. “Selecting Erosion Setbacks For Balanced Multi-hazard Risk.” Solutions to Coastal Disasters Conference, San Diego CA, ASCE.

Jones, Chris and Spencer Rogers, 2002. “Establishing Standards for Building Setbacks: Incorporation of Erosion Rate Variability.” Solutions to Coastal Disasters Conference, San Diego CA, ASCE.

Rogers, Spencer, 2001. “Evaluating Potential Hurricane and Erosion Damage to Buildings in Coastal North Carolina.” North Carolina Sea Grant, UNC-SG-01-04.

Rogers, Spencer M. Jr., 2000. "Beach Nourishment For Hurricane Protection: North Carolina: Project Performance in Hurricanes Dennis and Floyd." National Beach Preservation Conference. August 2000.

Kriebel, David, Larry Buss and Spencer Rogers, 2000. "Impact Loads from Flood-bourne Debris" ASCE report for FEMA. Other research on floating debris is in progress.

Rogers, Spencer M. Jr., 1999. "Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings in accordance with the National Flood Insurance Program." FEMA Technical Bulletin, FIA-TB 9-99.

Yeh, S. C., Spencer M. Rogers, Jr., C. C. Tung, and B. Kasal, 1999. " Behavior of Breakaway Walls Under Wave Action." Journal of Structural Engineering. ASCE. October 1999. pp. 1162-1169.

Tung, C. C., B. Kasal, S. C.Yeh, and Spencer M. Rogers, Jr., 1999. "Ultimate Capacity of Nailed Connections for Design of Breakaway Walls." Forest Products Journal. Vol. 49. No. 10. October 1999. pp. 76-81.

Tung, C.C., B. Kasal, Spencer M. Rogers, Jr., and S.C. Yeh, 1999. "Behavior of Breakaway Wall Subjected to Wave Forces: Analytical and Experimental Studies." NC Sea Grant (UNC-SG-99-03). February 2.

Work, Paul A., Spencer M. Rogers, Jr., and Robert Osborne, 1999. "Flood Retrofit of Coastal Residential Structures: Outer Banks, North Carolina." Journal of Water Resources Planning and Management. March/April 1999.

Pratt, Anthony P., Christopher P. Jones, Spencer M. Rogers, Jr., and Darryl J. Hatheway, 1998. "Delaware Coastal Vulnerability and Construction Standards Study." Association of State Floodplain Managers Conference Proceedings.

Rogers, Spencer M., Jr. and Sam Houston, 1997. "Hurricane Surge and Wave Conditions: Research Needs." Waves '97 Conference Proceedings, ASCE.

Jones, Christopher P., Spencer M. Rogers, Jr., and Darryl Hatheway, 1997. "Coastal Vulnerability and Construction Standards Study." Delaware Department of Natural Resources and Environmental Control. Dewberry & Davis. September 17, 1997.

Clark, Walter, and Spencer M. Rogers, Jr., 1996. "Questions and Answers on Purchasing Coastal Real Estate in North Carolina." NC Sea Grant & NC Real Estate Commission. (UNC-SG-96-10).

Rogers, Spencer M., Jr., 1996. "Corrosion Protection for Metal Connectors in Coastal Areas," Technical Bulletin TB 8-96, FEMA.

Rogers, Spencer M., Jr., 1995. "The Effects of Corrosion on Sheet-Metal Connectors in Coastal Buildings: A Summary of Present Knowledge," FEMA.

Rogers, Spencer M., Jr. 1995. "Getting the Most from Oceanfront Setback Lines" Coastal Zone '95, Tampa, FL, ASCE.

Rogers, Spencer, M. 1995. "Preliminary Summary of Conditions and Damages: Hurricane Emily". *Shore & Beach*, Journal of the American Shore and Beach Preservation Association, Berkeley, CA. January 1995.

Rogers, Spencer M. Jr., 1995. "Coastal Hazard Analysis for North Carolina Aquarium/Fort Fisher." NC Sea Grant.

Rogers, Spencer M. Jr., 1994. "Hurricane Andrew & the South Florida Building Code: Relevance to the North Carolina Building Code." NC Sea Grant.

Rogers, Spencer, M. Jr. 1993. "Relocating Erosion-Threatened Buildings: A Study of NC Housemoving". Coastal Zone '93, New Orleans, LA, ASCE.

Rogers, Spencer M. Jr., 1991. "Foundations and Breakaway Walls of Small Coastal Buildings in Hurricane Hugo." Coastal Zone '91, Long Beach, CA, ASCE. Also published in National Hazard Center Quick Response Report, #37.

Rogers, Spencer, M., Jr. 1991. "Flood Insurance Construction Standards: Can They Work on the Coast?". Coastal Zone '91, Long Beach, CA, ASCE, and Natural Hazards Research Center, U. of Colorado, 1990.

Rogers, Spencer M. Jr. 1990. "Designing for Storm Surge and Wave Damage in Coastal Buildings." Coastal Engineering Conference, Delft, The Netherlands, ASCE.

Rogers, Spencer M., Jr., 1990. "Performance of Building Resistance to Water, Waves and Erosion." Proceedings from "Hugo: One Year After." Charleston, SC, ASCE.

Rogers, Spencer M., and Peter R. Sparks, 1991. "Damage to Buildings: Hurricane Hugo". *Shore & Beach*, Journal of the American Shore and Beach Preservation Association, Berkeley, CA. Oct. 1990.

Rogers, Spencer M. Jr., 1990. "The Cost of Oceanfront Erosion in North Carolina: An Analysis of Flood Insurance Claim Payments 1977-1989." NC Sea Grant.

Rogers, Spencer M., Jr., 1986. "Coastal Erosion Issues in Flood Hazard Mapping,". Report to the Coastal Committee, Association of State Floodplain Managers.

Rogers, Spencer M., Jr., Sparks, Peter R. and Sparks, Katharine M., 1985. "A Study of the Effectiveness of Building Legislation in Improving the Wind Resistance of Residential Construction", National Conference on Wind Engineering, Lubbock, TX, Wind Engineering Council.

Rogers, Spencer M., Jr., 1985. "Hurricane Diana: Impact on Coastal Development." Coastal Zone '85, Baltimore, MD, ASCE.

Stutts, Alan T., Chrystos D. Siderelis, and Spencer M. Rogers. 1985. "Effect of Ocean Setback Standards on the Location of Permanent Structures in Coastal North Carolina." Coastal Zone '85, Baltimore, ASCE.

Cox, John W., with Spencer M. Rogers, Jr., 1984. "Performance of Offshore and Coastal Structures During Alicia", Alicia: One Year Later, Galveston, TX, ASCE.

Rogers, Spencer M. Jr., 1982. "Coastal Environment and Site Characteristics." Coastal Residential Construction Workshop. FEMA, Emmitsburg, MD.

Rogers, Spencer M. Jr., 1982. "Coastal Flood Forces", Proceedings from Intergovernmental Seminar on Flood-Loss Reduction Through Improved Building Practices, FEMA, Emmitsburg, MD.

Tayfun, M. Aziz, Spencer M. Rogers, Jr. and Jay Langfelder, 1979. "Delineation of an Ocean Hazard Zone for North Carolina Department of Marine Science and Engineering", NC State University.

POST-STORM BUILDING DAMAGE ASSESSMENTS
(not including northeasters or other storms)

Named Storm	Year	Location	Support
Hurricane Floyd	1999	NC	NC Sea Grant
Hurricane Dennis	1999	NC	NC Sea Grant
Hurricane Bonnie	1997	NC	NC Sea Grant
Hurricane Fran	1996	NC	FEMA Building Performance Assessment Team
Hurricane Bertha	1996	NC	NC Sea Grant
Hurricane Opal	1995	FL	Florida State Emergency Response Team
Hurricane Emily	1993	NC	FEMA Damage Assessment Team
Hurricane Andrew	1992	FL	NC Sea Grant
Hurricane Hugo	1989	SC/NC	Natural Hazards Research Center
Hurricane Gloria	1985	NC	NC Sea Grant
Hurricane Diana	1984	NC	NC Sea Grant
Hurricane Alicia	1983	TX	NC Sea Grant
Hurricane Fredric	1979	AL/MS	NC Sea Grant
Hurricane David	1978	NC	NC Sea Grant
Hurricane Eloise	1975	FL	Florida Bureau of Beach and Coastal Systems

OTHER WORK

Project member for FEMA's 2001 revisions of the Coastal Construction Manual.

Flood Hazard Committee, HAZUS Flood Loss Estimation Model, National Institute of Building Sciences. Committee is guiding development of a flood damage assessment model to estimate economic losses from future floods.

Member, ASCE Standards Committee: Flood Damage Resistant Design and Construction, 1995 to 1999.

Project committee member, "Compatibility of Flood Loss Reduction Standards of the National Flood Insurance Program with the National Model Building Codes and Standards," National Institute of Building Sciences, Washington, D.C., 1992.

Congressional Testimony, on "Issues Relating to Erosion, Erosion Management and Erosion Insurance H.R. 3456, H.R. 4461 and Managing Coastal Erosion by the National Research Council". Before the Committee on Banking, Finance and Urban Affairs, Subcommittee on Policy Research and Insurance. Rehoboth, DE, July 1990.

Technical Consultant, "Property Eligibility Requirements for Wind Storm Coverage" Property Insurance Underwriting Association, State of New York, 1988. NY now requires existing buildings to be retrofitted to minimum storm resistance standards for coverage through the state-sponsored wind insurance pool for high risk coastal buildings.

Technical Editor, America's Vanishing Coastlines: A New Concern For The Voluntary And Residual Property Insurance Markets, National Committee on Property Insurance, 1988.

Co-author, "Coastal and Flood Plain Construction Standards," NC State Building Code, NC Dept. of Insurance, 1986.