Louisiana Transportation Research Center

Final Report 568

Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana—Phase 2

by

D. Max Sheppard, Ph.D.
Mark S. Gosselin, Ph.D., P.E.
Philip E. Dompe, P.E.
Hüseyin Demir, Ph.D., P.E.
INTERA Incorporated

4101 Gourrier Avenue | Baton Rouge, Louisiana 70808
(225) 767-9131 | (225) 767-9108 fax | www.ltrc.lsu.edu

TECHNICAL REPORT STANDARD PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/LA.16/568		

4. Title and Subtitle	5. Report Date
Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana – Phase 2	September 2016
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
D. Max Sheppard, Ph.D., Philip E. Dompe, P.E., Mark S. Gosselin, Ph.D., P.E., and Hüseyin Demir, Ph.D.	

9. Performing Organization Name and Address	10. Work Unit No.
INTERA Incorporated 2114 NW 40th Terrace, Suite A-1 Gainesville, FL 32605	11. Contract or Grant No. LRTC No. 15-1ST SIO No. 30000118

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Louisiana Department of Transportation and Development P.O. Box 94245 Baton Rouge, LA 70804-9245	Final Report March 2016
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report summarizes the work performed by INTERA Incorporated (INTERA), for the Louisiana Department of Transportation and Development (DOTD) on Phase 2 of LTRC project No. 10-4ST, "Development of Wave and Surge Atlas for the Design Protection of Coastal Bridges in South Louisiana." In Phase 1 (LTRC project No. 10-4ST, Final Report 528), a Level III storm surge/wave analysis provided the design water level and wave parameters needed to compute wave loads. This analysis entailed (1) hindcasting 50 of the most severe tropical storms and hurricanes that have affected Louisiana coastal waters over the past 160 years including hindcasting alternative paths for a select number of those storms resulting in a total of 124 hindcasts, and (2) performing extreme value analyses on water elevation and wave heights throughout the area covered by the model to obtain 100-year design meteorological /oceanographic (met/ocean) conditions. The results from the extreme value analyses provided the data for the Wave and Surge Atlas. The atlas is presented in a geographic information system (GIS) database for ease of access and use. Those data provided the input to determine the vulnerability of selected DOTD coastal bridges to design storm surge and wave loads. This phase includes (1) developing parameters for additional return periods (5-, 10-, 25-, and 50-year) from the results of the hindcasted storms in Phase 1; (2) develop a Surge/Wave Atlas for maximum values of the actual hurricane/tropical storm-induced water elevation, wave height and peak period and wind speed for the study area over the past 160 years; (3) developing a Surge/Wave Atlas for maximum values of the actual + path shifted hurricane/tropical storm-induced water elevation, wave height and peak period, and wind speed for the study area over the past 160-years; (4) Developing an AASHTO Wave Load Calculation Program (Visual Basic Program) based on the AASHTO Guide Specifications *[1]*; (5) providing a training session for DOTD employees so that DOTD will be able to update or modify the program as needed for future code changes; and (6) computing the forces and moments on the remaining spans on the bridges determined to be vulnerable and generate PDF files of the bridge information and the forces and moments along the entire bridge, and adding PDF pop-ups to the locations of all bridges determined to be vulnerable.

17. Key Words	18. Distribution Statement
Wave Forces, Storm Surge, Wave Atlas	**Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.**

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
		163	

Project Review Committee

Each research project will have an advisory committee appointed by the LTRC Director. The Project Review Committee is responsible for assisting the LTRC Administrator or Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings.

LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

LTRC Manager

Walid R. Alaywan, Ph.D., P.E.
Sr. Structures Research Manager

Members

Jenny Fu, P.E.
Stephanie Cavalier, P.E.
Ray Mumphrey, P.E.
Steve Lee, P.E.
Arturo Aguirre, P.E.

Directorate Implementation Sponsor

Janice P. Williams, P.E.
DOTD Chief Engineer

Development of Wave and Surge Atlas for the Design and Protection of Coastal Bridges in South Louisiana Phase 2

by

D. Max Sheppard, Ph.D.
Mark S. Gosselin, Ph.D., P.E.
Philip E. Dompe, P.E.
Hüseyin Demir, Ph.D., P.E.

INTERA Incorporated
2114 NW 40th Terrace, Suite A-1
Gainesville, FL 32605

LTRC Project No. 15-1ST
SIO No. 30000118

conducted for

Louisiana Department of Transportation and Development
Louisiana Transportation Research Center

September 2016

ABSTRACT

This report summarizes the work performed by INTERA Incorporated (INTERA), for the Louisiana Department of Transportation and Development (DOTD) on Phase 2 of LTRC project No. 10-4ST, "Development of Wave and Surge Atlas for the Design Protection of Coastal Bridges in South Louisiana." In Phase 1 (LTRC project No. 10-4ST, Final Report 528), a Level III storm surge/wave analysis provided the design water level and wave parameters needed to compute wave loads. This analysis entailed (1) hindcasting 50 of the most severe tropical storms and hurricanes that have affected Louisiana coastal waters over the past 160 years including hindcasting alternative paths for a select number of those storms resulting in a total of 124 hindcasts, and (2) performing extreme value analyses on water elevation and wave heights throughout the area covered by the model to obtain 100-year design meteorological /oceanographic (met/ocean) conditions. The results from the extreme value analyses provided the data for the Wave and Surge Atlas. The atlas is presented in a geographic information system (GIS) database for ease of access and use. Those data provided the input to determine the vulnerability of selected DOTD coastal bridges to design storm surge and wave loads. This phase includes (1) developing parameters for additional return periods (5-, 10-, 25-, and 50-year) from the results of the hindcasted storms in Phase 1; (2) develop a Surge/Wave Atlas for maximum values of the actual hurricane/tropical storm-induced water elevation, wave height and peak period and wind speed for the study area over the past 160 years; (3) developing a Surge/Wave Atlas for maximum values of the actual + path shifted hurricane/tropical storm- induced water elevation, wave height and peak period, and wind speed for the study area over the past 160- years; (4) Developing an AASHTO Wave Load Calculation Program (Visual Basic Program) based on the AASHTO Guide Specifications *[1]*; (5) providing a training session for DOTD employees so that DOTD will be able to update or modify the program as needed for future code changes; and (6) computing the forces and moments on the remaining spans on the bridges determined to be vulnerable and generate PDF files of the bridge information and the forces and moments along the entire bridge, and adding PDF pop-ups to the locations of all bridges determined to be vulnerable.

ACKNOWLEDGMENTS

This study was made possible by funding from the Louisiana Transportation Research Center (LTRC). In-kind services were provided by the Louisiana Department of Transportation Bridge Design Section.

IMPLEMENTATION STATEMENT

The hurricane-wave and storm-surge-induced damage experienced by a number of large and expensive bridges in the Gulf Coast states during the past decade led to the creation of the AASHTO document *Guide Specifications for Bridges Vulnerable to Coastal Storms*. This document provides guide specifications for calculating hurricane generated wave and storm surge loads on bridge superstructures for both design of new bridges and evaluation of existing bridges. Phase 1 of this study in LTRC project No. 10-4ST (Final Report 528) was conducted to apply the AASHTO specification to evaluate DOTD's existing coastal bridges to discern their current vulnerability to this type of loading. The study identified 18 bridges as potentially vulnerable. In addition to the vulnerability assessment, this study produced a Wave and Surge Atlas, transmitted to the Department, which contains 100-year wave and storm surge conditions at Louisiana's coastal bridges. The atlas provides a GIS interface to present and access the data. This tool allows DOTD to rapidly identify 100-year wave and storm surge conditions along Louisiana's coastal waterways enabling acquisition of design wave and surge parameters for evaluation of existing bridges or design of new bridges.

While the 100-year meteorological/oceanographic (met/ocean) conditions are appropriate for most designs, there are many issues encountered by DOTD engineers where other frequency met/ocean information (e.g., 5-, 10-, 25-, 50-year return interval values) are more appropriate. Phase 2, the subject of this report, developed a Wave and Storm Surge Atlas for the 5-, 10-, 25-, 50-year return intervals. Those data provide more appropriate conditions to design a temporary facility (a detour bridge) or to design retrofits for bridges, where the service life is approaching the design life.

To facilitate application of the Wave and Storm Surge Atlas, this phase also included development of a calculator that follows the AASHTO document *Guide Specifications for Bridges Vulnerable to Coastal Storms* to calculate the wave forces. The user inputs met/ocean data and structure dimensions and the calculator does the appropriate conversion of the wave data, calculates the forces, and presents the data in a formatted report.

TABLE OF CONTENTS

ABSTRACT iii
ACKNOWLEDGMENTS v
IMPLEMENTATION STATEMENT vii
TABLE OF CONTENTS ix
LIST OF FIGURES xi
INTRODUCTION 1
OBJECTIVE 3
SCOPE 5
METHODOLOGY 7
Additional Wave and Surge Atlases 7
Additional Return Periods 7
Maximum Values 7
Wave Force Calculator 9
Wave and Surge Atlas 21
Detailed Surge/Wave Forces 23
Design Conditions for the Detailed Wave Loading 23
Method of Analysis 24
DISCUSSION OF RESULTS 27
CONCLUSIONS 29
ACRONYMS, ABBREVIATIONS, AND SYMBOLS 31
REFERENCES 33
APPENDICES 35
APPENDIX A Storm surge and wave GIS database 37
Wave Force Calculator Example – Bridge Recall Number 003440 54
APPENDIX B 65
Detailed Wave Force calculations 65

LIST OF FIGURES

Figure 1 Wave force calculator flow chart 11
Figure 2 Wave force calculator interface data input 14
Figure 3 Wave force calculator superstructure information table 15
Figure 4 Wave force calculator sea state table 16
Figure 5 Wave force calculator control buttons 17
Figure 6 Wave force calculator results table project information 18
Figure 7 Wave force calculator results table data input 19
Figure 8 Wave force calculator results table data input 20
Figure 9 Wave force calculator results table intermediate steps 20
Figure 10 Screenshot of storm wave and surge atlas GIS geodatabase 22

INTRODUCTION

The infrastructure in low-lying coastal areas subject to tropical storms and hurricanes is potentially vulnerable to the elevated water levels, high velocity flows, and wave conditions that accompany these types of storms. It is imperative that those responsible for the design and maintenance of this infrastructure have the most accurate information as practical about these conditions. In particular, coastal roadways and bridges are potentially vulnerable to this type of loading. A number of large and expensive bridges in the Gulf Coast states were destroyed by storms during the past decade. Most of this destruction was attributed to hurricane storm surge and wave forces. In this document, environmental parameters associated with tropical storms and hurricanes are referred to as met/ocean, conditions.

In order for the met/ocean information to be useful, the frequency of occurrence must also be known. That is, estimates of its probability of occurrence each year must be known. With this information, the desired structure life, and the acceptable level of risk, design conditions can be established. Common design frequencies for coastal bridges are 1 and 2 percent chances of occurrence each year (referred to as 100-year and 50-year return intervals, respectively).

The first phase of this project (LTRC Project No. 10-4ST, Final Report 528) developed met/ocean data for the 100-year return period (1 percent chance) in South Louisiana and present the data in a GIS platform referred to as the Wave and Surge Atlas. The second phase, the subject of this report, develops met/ocean data for the 5-, 10-, 25-, and 50-year (20, 10, 4, and 2 percent chance) in South Louisiana, extracts the maximum met/ocean data occurring during all of the hindcasted storms (50 storms), extracts the maximum met/ocean data occurring during all of the hindcasted storms and shifted paths (124 storms), and presents those data in a GIS platform.

Phase 2 also develops a wave force calculator that solves the wave force equations in the AASHTO *Guide Specifications for Bridges Vulnerable to Coastal Storms.* The calculator converts the met/ocean data extracted from the Wave and Surge Atlas based on the methods presented on the AASHTO Specifications, solves the wave and surge parametric equations presented in the AASHTO Specifications, and tabulates the input data and results in an EXCEL spreadsheet.

This phase of the study also evaluates all the spans of the bridges identified as vulnerable during Phase 1. Those results both tabulated and plotted in PDF format are included in the Wave and Surge Atlas.

OBJECTIVE

This research intended to develop and extend the previously completed wave and surge atlases for the design and evaluation of coastal bridges in South Louisiana. Specifically to (1) establish met/ocean data for the 5-, 10-, 25-, and 50-year return interval events (20, 10, 4, and 2 percent chance of occurrence) in South Louisiana, extract the maximum met/ocean data for all the hindcasted storms, extract the maximum met/ocean data for all the hindcasted and shifted storms, and to present the results in a Surge/Wave GIS Database (Wave and Surge Atlas); (2) develop a wave force calculator to solve the parametric equations in the AASHTO *Guide Specifications for Bridges Vulnerable to Coastal Storms*; and (3) evaluate (for the 100-year met/ocean conditions) all of the spans on the DOTD bridges identified as vulnerable and include the results in both tabulated and plotted PDF format in the Wave and Surge Atlas.

SCOPE

This study included seven tasks intended to develop a set of GIS coverages generated from the results of all the events hindcasted in Phase 1, development of a wave force calculator, and a detailed analysis of the bridges identified as potentially vulnerable in Phase 1. The first task developed a Surge/Wave Atlas for return intervals of 5 years, 10 years, 25 years, and 50 years. To maintain consistency in the outcome, the analyses employed the same methodology and computer program(s) used in Phase 1 for the return interval of 100 year. The second task developed a Surge/Wave Atlas for maximum values of the actual hurricane/tropical storm-induced water elevation, wave heights and peak period, and wind speed for the study area over the past 160 years. The third task developed a Surge/Wave Atlas for maximum values of the actual and path shifted hurricane/tropical storm-induced water elevation, wave height and peak period, and wind speed for the study area over the past 160 years. The fourth task developed an AASHTO Wave Load Calculation Program (Visual Basic Program) based on the AASHTO Guide Specifications *[1]*. The program allows the designers to input metrological/oceanographic parameters from the Surge/Wave Atlas and the bridge superstructure information, and simply click a "compute button" to obtain all wave loads calculated in accordance with the equations in AASHTO's *Guide Specifications for Bridges Vulnerable to Coastal Storms.* The fifth task provided a training session for DOTD employees so that DOTD will be able to update or modify the program as needed for future code changes. Task six evaluated the forces and moments on the remaining spans on the bridges determined to be vulnerable and generated PDF files of the bridge information and the forces and moments along the entire bridge, added PDF pop-ups to the Wave/Surge Atlas at the locations of all bridges determined to be vulnerable. The PDF pop up at each bridge location displays PDF files of the bridge and loading information, and plots of bridge low chord elevation, maximum 100-year storm water elevation, and 100-year wave crest elevation. Finally, task seven prepared a final report documenting the entire research effort. The report includes guidelines regarding the application and/or limitations of the Surge/Wave Atlas. The following section details the methods employed to meet the target scope.

METHODOLOGY

Phase 1 developed a 100-year Wave and Surge Atlas for southern Louisiana based on a 100-year return period interval and employed that data to evaluate the potentially vulnerable bridges (LTRC Project No. 10-4ST, Final Report 528). This phase of the study extends Phase 1 by developing the met/ocean data for 5, 10, 25, and 50 years (20, 10, 4, and 2 percent chance), extracting the maximum met/ocean conditions for all of the hindcasted storms (50 storms) and the maximum conditions for all of the hindcasted storms and the shifted path storms (124 storms) in South Louisiana. The results are presented in a Wave and Surge Atlas for each event. Additionally, Phase 2 calculates the forces on the remainder of the spans on the bridges identified as vulnerable in Phase 1 including the results in the Wave Atlas and develops a wave force calculator to solve the AASHTO wave force equations.

Additional Wave and Surge Atlases

This section presents the analysis of the Phase 1 hindcast simulations to develop the 5-, 10-, 25-, and 50-year (20, 10, 4, and 2 percent chance) and the maximum met/ocean conditions for all of the hindcasted storms and the maximum conditions for all of the hindcasted storms and the shifted path storms.

Additional Return Periods

For consistency, development of the 5-, 10-, 25-, and 50-year (20, 10, 4, and 2 percent chance) return period conditions followed the methodology from the Phase 1 study (LTRC Project No. 10-4ST, Final Report 528). This involved extracting the (1) maximum water surface elevation (storm surge plus local wind setup) and associated wave heights and (2) maximum wave heights and associated water surface elevations at each node location within the model domain from each simulated storm during Phase 1. Then applying extreme value analyses to obtain the 5-, 10-, 25-, and 50-year values of the (1) maximum water surface elevation (storm surge plus local wind setup) and associated wave heights and (2) maximum wave heights and associated water surface elevations at each node location within the model domain. Contour maps of 5-, 10-, 25-, and 50-year (1) maximum water surface elevations and associated wave heights, and (2) maximum wave heights and associated water surface elevations, and (3) steepness/depth limited wave periods for maximum waves are developed and converted to shapefiles. Separate GIS geodatabases for each return period are developed from the shape files.

Maximum Values

The Wave and Surge Atlas developed during Phase 1 of the project incorporated 100-year surge and wave conditions. The 100-year conditions originated from extreme value analyses

on actual or synthetic data. Notably, accuracy of the different return interval values increases with larger data sets for extreme value analyses. The methodology applied in the development of the atlas started with hindcasting the actual major storms that affected the study area over the last 160 years. Shifting the paths of all of these storms to the right and left of the point of landfall and hindcasting these shifted path storms created two additional data sets. All three hindcasts (actual and two shifted paths) excluded astronomical tides so that they could be added later with up to 1,000 different phases with each storm. This step helped capture more of the natural variability (and further increased the sample size) and, therefore, the accuracy of the different return interval values. This procedure, however, prevents the computation of the precise storm of record properties (e.g., water surface elevations and wave heights). While the magnitude of the astronomical tide varies throughout the month, the peak values are relatively small along the Louisiana coast — the tide range is about 2 feet. One may obtain reasonably conservative estimates of the storm of record parameter values by applying the average root mean square (RMS) value of the astronomical tide for the month. A slightly more conservative approach would include applying the maximum tide value for the month.

Maximum Values Actual Hindcasted Storms. The process involves extracting the maximum water surface elevation (storm surge plus local wind setup) and associated wave heights and maximum wave heights and associated water surface elevations at each node location within the model domain from each actual storm hindcasted during Phase 1. Water surface elevations are adjusted by adding the average RMS tide elevation from the one-month, tide-only ADCIRC simulation performed during Phase I. The next step determines the maximum and associated parameters at each node location within the model boundary for each of the actual storms. Note that the storm that produced the value of one parameter is not necessarily the storm that produced the maximum value of another parameter. Those data are then used to construct contour maps of maximum water surface elevations (and associated wave heights and periods), and maximum wave heights (and associated periods), associated water surface elevations, and steepness/depth-limited wave periods for maximum waves. Finally, the GIS geodatabase is populated by converting the contour maps to shapefiles. This GIS geodatabase represents the actual hurricane/tropical storm Surge/Wave Atlas.

Maximum Values Actual Hindcasted and Shifted Storms. The maximum values for the actual hindcasted and shifted storms generally follow the methodology outlined for the actual hindcasted with the exception that the analysis will consider actual and path shifted hurricanes/tropical storms.

Wave Force Calculator

This section details the methodology employed to develop an AASHTO wave load calculation program (Visual Basic Program) based on the AASHTO Guide Specifications *[1]*. The program allows the designers to input metrological/oceanographic parameters from the Surge/Wave Atlas and the bridge superstructure information to obtain all wave loads calculated in accordance with the equations in AASHTO's *Guide Specifications for Bridges Vulnerable to Coastal Storms.*

Figure 1 presents the flow chart designed to guide the development of the code. As the flow chart illustrates, the logic starts by checking the input values (wave parameters) to ensure they do not violate the limits of the AASHTO equations. If so, the wave parameters are adjusted and noted. The logic continues checking to confirm the design wave parameters can physically exist, as required by the AASHTO code, noting any changes to the wave parameters. Once the design wave parameters are confirmed, the wave forces are calculated and the results are printed.

The code, developed in Visual Basic, includes three modules with 17 commented subroutines. Module1 contains the "Reset_Wave_Forces" subroutine, which resets all the inputs in the spreadsheet to the default values and clears the output table. Module2 contains the subroutine that creates reports for the selected spans. Module3 contains the main subroutine "Calc_Wave_Forces()" that sets the variable declarations, initiates the variables, reads the user specified variables, initiates the wave force subroutines, and writes the results to the EXCEL spreadsheet. There is a separate subroutine for each force component, the slamming force, and the trapped air factor. Table 1 lists each of the Module3 subroutines along with the description and reference (where applicable) to the AASHTO Specifications.

An EXCEL spreadsheet provides access to the Wave Force Calculator. Figure 2 presents an overview of the calculator, which includes the superstructure information, the sea state data, the control buttons, the project information, the definition figure, and the results table. The spreadsheet includes an "Instructions" sheet that details these components.

Figure 3 presents the superstructure information table and details the superstructure information required in the calculations. Information required for the superstructure are the span number, span length, span width, girder height, girder type, number of girders, deck thickness, railing height, percent of trapped air, and the clearance. The girder height is employed for all forces except the horizontal force associated with the maximum vertical force — for slab structures, the girder height is zero. Girder type is only employed in the horizontal force associated with the maximum vertical force equation and is limited to the

five girder types, a slab, and box girder available through the drop down menu. For slabs, the height of the slab (and deck) are input as the deck thickness. Trapped air accounts for the volume of air trapped between the girders and is estimated as a percentage of the height of the girders — typically 100%.

Figure 4 presents the sea state table and describes the information necessary to populate the table. These data are provided in the Wave and Surge Atlas. Figure 5 presents the control buttons and details the action each button initiates. Figure 6 presents the project information table, which provides the data to populate the reports generated by the calculator. Figure 7 through Figure 9 present the results table, which lists the results, input data, and intermediate and steps of the wave force parametric equations. Both INTERA and DOTD vetted the Wave Force Calculator by testing the program for a wide range of coastal conditions and bridge superstructure geometries.

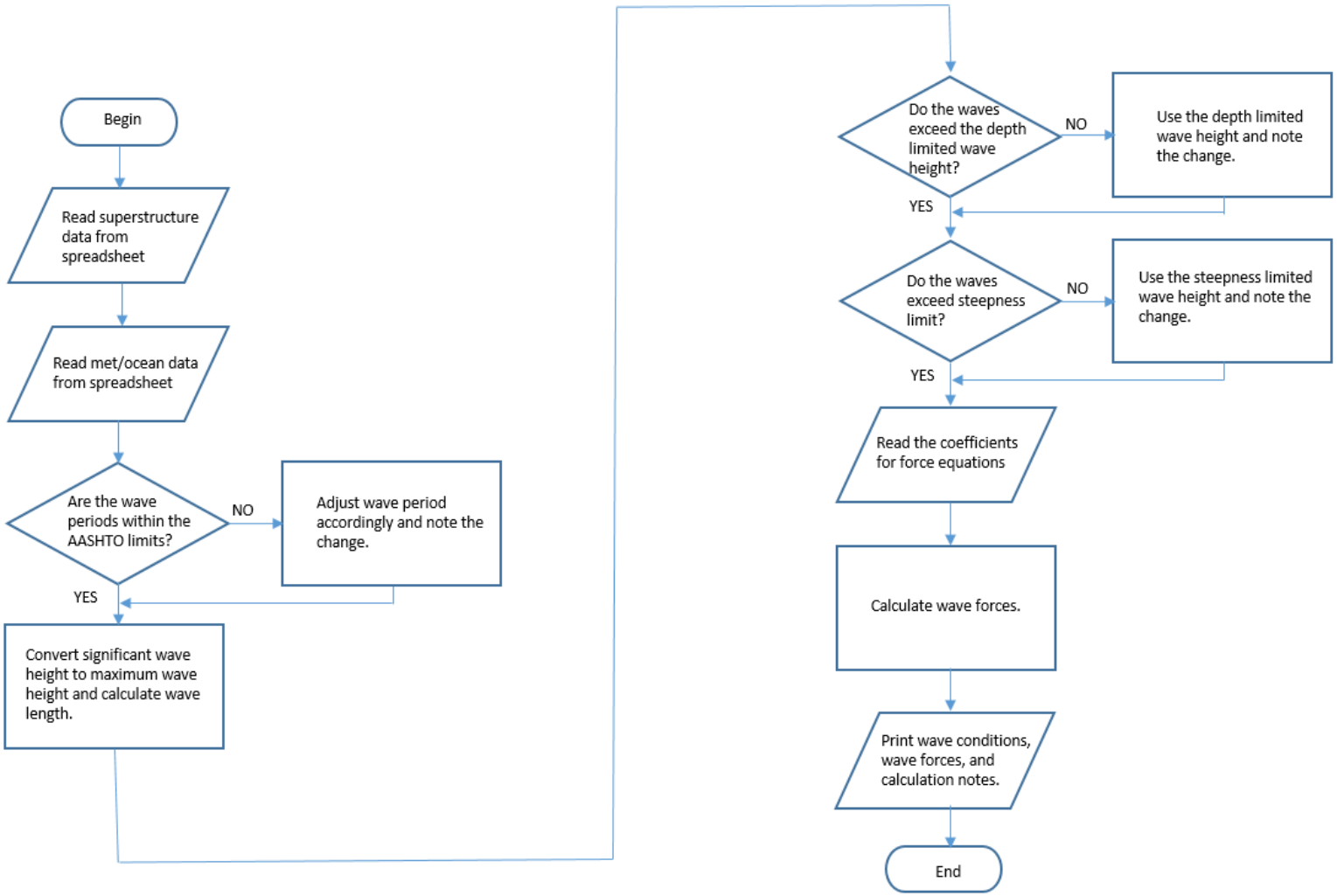


Figure 1
Wave force calculator flow chart

Table 1
Wave calculator subroutines

Subroutine	Purpose
Calc_Wave_Forces	Initialize Variables, reads in user specified variables, calls the wave force calculation subroutines, and writes the results to the results table
Calculate_Sea_State	The Calculate_Sea_State subroutine employs equations 6.2.2.4-7 through 6.2.2.4-10 to calculate the design wave parameters based on the input information. The routine also checks for depth and steepness limiting criteria. It also checks at the period is within the range of applicability for the equations.
Check_Input_Errors	The Check_Input_Errors subroutine ensures that the input variables have all been entered. The routine displays a message box if the cells have been left blank.
Create_Calculation_Notes	The Create_Calculation_Notes subroutine creates notes to be included in the output tables that indicate if any of the limits have been exceeding regarding wave height or peak period.
Determine_Fhav	The Determine_Fhav subroutine employs equations 6.1.2.2.3-1 through 6.1.2.2.3-3 to calculate the quasi-static horizontal force, Fhav, associated with the maximum vertical force.
Determine_Fhav_Coefficients	The Determine_Fhav_Coefficients subroutine assigns the coefficients employed in the calculation of the associated horizontal force at time of maximum vertical force.
Determine_FHmax	The Determine_FHmax subroutine employs equations 6.1.2.3.1-1 through 6.1.2.3.1-4 to calculate the maximum horizontal force, FHmax.
Determine_Fslam	The Determine_Fslam subroutine employs equations 6.1.2.2.2-1 through 6.1.2.2.2-4 to calculate the slamming force, Fslam.

Subroutine	Purpose
Determine_Fvah	The Determine_Fvah subroutine employs equations 6.1.2.3.2-1 through 6.1.2.3.2-4 to calculate the vertical force, Fvah, associated with the maximum horizontal force.
Determine_FVmax	The Determine_FVmax subroutine employs equations 6.1.2.2.1-1 through 6.1.2.2.1-8 to calculate the maximum vertical force, FVmax.
Determine_Mtah	The Determine_Mtah subroutine employs equations 6.1.2.3.4-1 through 6.1.2.3.4-2 to calculate the moment, Mtah, associated with the maximum horizontal force.
Determine_Mtav	The Determine_Mtav subroutine employs equations 6.1.2.2.4-1 through 6.1.2.2.4-9 to calculate the moment, Mtav, associated with the maximum vertical force.
Determine_TAF	The Determine_TAF subroutine employs equations 6.1.2.2.1a-8 through 6.1.2.2.1a-10 to calculate the trapped air factor TAF. It also checks the range of percent trapped air via equations 6.1.2.2.1a-11&12.
Format_rows	The Format_rows subroutine formats the output table on the 'Calculator' spreadsheet.

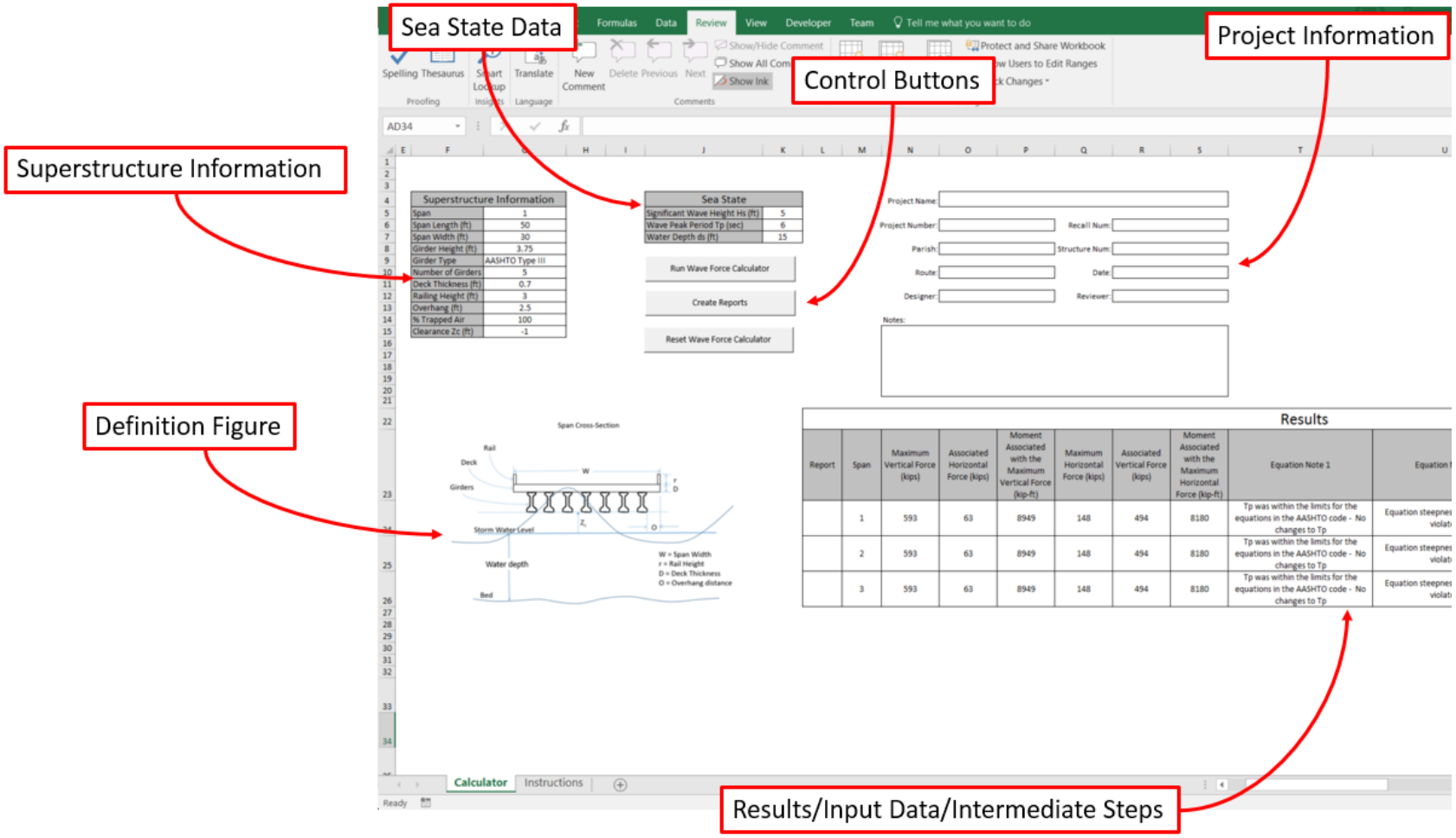
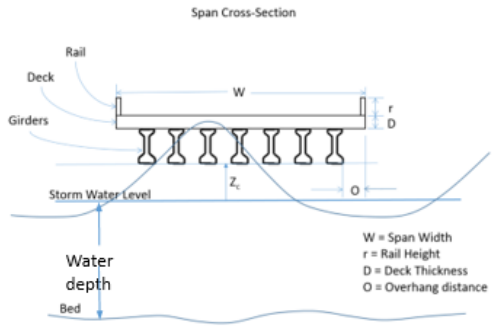


Figure 2
Wave force calculator interface data input

Superstructure Information

- Span – Enter the span number.
- Span Length – Enter the length of the span in feet.
- Span Width – Enter the span width (W) in feet.
- Girder Height – This field is employed for all forces except the horizontal force associated with the maximum vertical force. Enter the girder height in feet.
- Girder Type – This field is only employed in the horizontal force associated with the maximum vertical force equation. Select a girder type from the drop down menu only. Selecting a slab structure changes the inputs. For slab structures, girder height, number of girders, overhang, and % trapped air are not used, so they are removed from the input table.
- Number of Girders – Enter the number of girders.
- Deck Thickness – Enter the deck thickness (D) in feet. For slab structures, enter the combined slab and deck thickness.
- Railing Height – Enter the height of the railing in feet.
- % Trapped Air – Enter the percentage of air trapped between the girders - in most cases, this is 100%. The % trapped air is less than 100% when the diaphragm does not extend to the bottom of the girder. For that case, determine the % trapped air by dividing the height of the diaphragm by the height of the girder and multiply by 100.
- Clearance – Enter the distance between the low chord (bottom of the girders or slab) and the storm water level. If the storm water level is below the low chord elevation the value is positive, if the storm water level is above the low chord elevation the value is negative.
- Overhang – the distance from the edge of the deck to the edge of the girder.



Superstructure Information	
Span	1
Span Length (ft)	50
Span Width (ft)	30
Girder Height (ft)	3.75
Girder Type	AASHTO Type III
Number of Girders	5
Deck Thickness (ft)	0.7
Railing Height (ft)	3
Overhang (ft)	2.5
% Trapped Air	100
Clearance Zc (ft)	-1

Superstructure Information	
Span	1
Span Length (ft)	50
Span Width (ft)	30
	3.75
Girder Type	21-inch Voided Slab
	5
Slab Thickness (ft)	0.7
Railing Height (ft)	3
	2.5
	100
Clearance Zc (ft)	-1

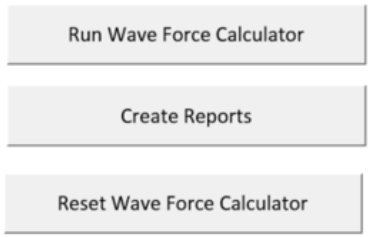
Note - for slab bridges, the following fields are not used: Number of Girders, Overhang, % Trapped Air.

Figure 3
Wave force calculator superstructure information table

Sea State	
Significant Wave Height Hs (ft)	5
Wave Peak Period Tp (sec)	6
Water Depth ds (ft)	15

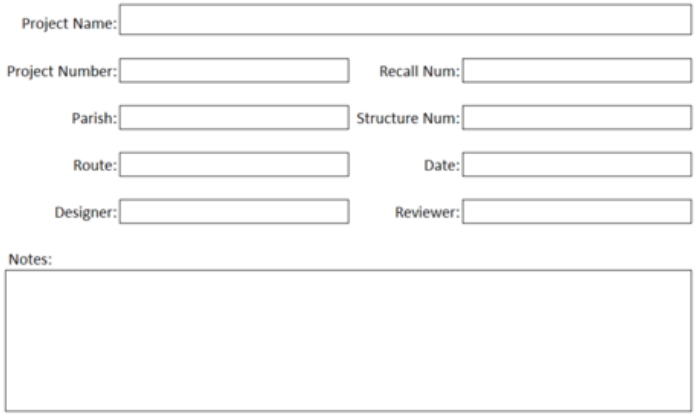
- Significant Wave Height – Enter the significant wave height (ft) from the "Wave and Surge Atlas" (or from another reliable source).
- Wave Peak Period – Enter the significant peak wave period (sec) from the "Wave and Surge Atlas" (or from another reliable source).
- Water Depth – Enter the water depth in feet. The water depth is the distance from the Storm Water Level to the bed.

Figure 4
Wave force calculator sea state table



- Run Wave Force Calculator – Once all the input tables are populated, clicking the "Run Wave Force Calculator" button calculates the wave forces and writes the results to the results table.
- Create Reports – Clicking this button creates reports for each span with a "1" in the first column of the results table. Note that the span identifier (number) must be unique for each span checked.
- Reset Wave Force Calculator – Clicking this button resets the Calculator sheet, clearing the table and resetting the input to the default values.

Figure 5
Wave force calculator control buttons



- Enter the project information into the fields in this section.
- These fields are the same for all spans and are retained in the span reports created for the project.
- Fields contained in this section include:
  - Project Name
  - Project Number
  - Recall Number
  - Parish
  - Structure Number
  - Route
  - Date
  - Designer
  - Reviewer
- The section also contains a field for notes (a maximum of 6 lines). The notes will be reproduced the non-printable area within each span report.

Figure 6
Wave force calculator results table project information

Results											
Report	Span	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)	Equation Note 1	Equation Note 2	Steepness Limit Notes	Depth Limit Notes
1	1	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
1	2	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
1	3	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	4	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	4	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	4	593	63	8949	148	494	8180	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated

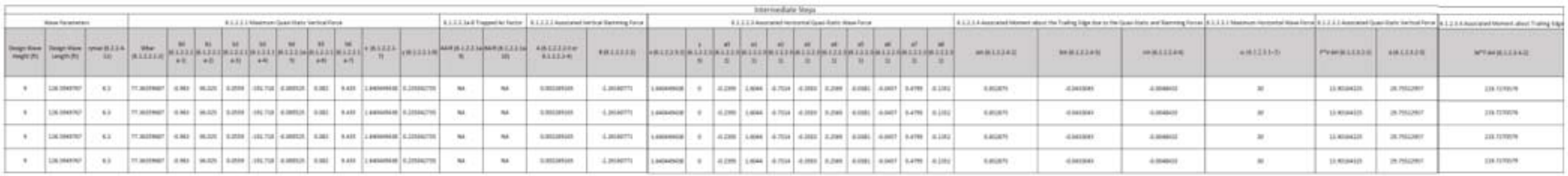
- Report – This column tells the program to generate a report for the span. When the “Create Reports” button is pressed, the program will create a new Excel book with a separate report for each span that has a “1” in this column. Note that span numbers can not be the same for selected spans.
- Span – The number to identify the span. When generating reports, each report selected must have a unique number.
- Maximum Vertical Force – The maximum vertical force produced on the span by the conditions using equation 6.1.2.2.1 from the AASHTO specifications.
- Associated Horizontal Force – The horizontal force associated with the maximum vertical force using equation 6.1.2.2.3 from the AASHTO specifications.
- Moment Associated with the Maximum Vertical Force – The moment associated with the maximum vertical force using equation 6.1.2.2.4 from the AASHTO specifications.
- Maximum Horizontal Force – The maximum horizontal force produced on the span by the conditions using equation 6.1.2.3.1 from the AASHTO specifications.
- Associated Vertical Force – The vertical force associated with the maximum horizontal force using equation 6.1.2.2.2 from the AASHTO specifications.
- Moment Associated with the Maximum Horizontal Force – The moment associated with the maximum horizontal force using equation 6.1.2.3.4 from the AASHTO specifications.
- Equation Note 1 – Notes whether the peak period (Tp) is within the limits for the equations in the AASHTO code and if the program adjusted Tp.
- Equation Note 2 – Notes whether the wave steepness is within the limits for the equations in the AASHTO code and if the program adjusted either the wave length or the maximum wave height (Hmax).
- Steepness Limit Note – Notes whether the physical limitations to the wave steepness were violated and if the program adjusted the maximum wave height (Hmax).
- Depth Limit Note – Notes whether the physical limitations to the wave height imposed by water depth were violated and if the program adjusted the maximum wave height (Hmax).

Figure 7
Wave force calculator results table data input

Input Data												
Span Length (ft)	Span Width (ft)	Girder Height (ft)	Girder Type	Number of Girders	Deck Thickness (ft)	Railing Height (ft)	Overhang (ft)	% Trapped Air	Clearance Zc (ft)	Significant Wave Height Hs (ft)	Peak Period Tp (sec)	Water Depth ds (ft)
50	30	3.75	FL Bulb-T 78	5	0.7	3	2.5	100	-1	5	6	15
50	30	3.75	FL Bulb-T 78	5	0.7	3	2.5	100	-1	5	6	15
50	30	3.75	FL Bulb-T 78	5	0.7	3	2.5	100	-1	5	6	15
50	30	3.75	FL Bulb-T 78	5	0.7	3	2.5	100	-1	5	6	15

- This portion of the table re-tabulates the user input data from the "Superstructure Input" and "Sea State Data" tables for each calculation.

Figure 8
Wave force calculator results table data input



- This portion of the table provides the intermediate steps in the wave force calculations as a tool to perform independent checks.

Figure 9
Wave force calculator results table intermediate steps

Wave and Surge Atlas

The magnitude of the met/ocean information produced by this study is extremely large; therefore, its presentation does not lend itself to the usual tables and graphs. For this reason, this information, which has applications beyond the computation of wave loads on bridge superstructures, is presented in a GIS database. The database, constructed with ESRI ArcInfo and ArcReader GIS mapping software, provides greater flexibility in graphical representation of large datasets with seamless flow between various types of information.

The Wave and Surge GIS Database presents the user with an interactive map that contains 5-, 10-, 25-, 50-, and 100-year hydraulic design data for Louisiana's coastal waters. Hydraulic data contained within the database include the following: 5-, 10-, 25-, 50-, and 100-year maximum storm surge level (and associated significant wave height and peak wave period) and the 5-, 10-, 25-, 50-, and 100-year maximum significant wave height (and associated peak wave period and storm water level). Thematic groups include roadways, county boundaries, and city and town locations. Base maps in the database include land boundaries, aerial imagery, and topographic maps.

Accessibility of the hydraulic information is by mouse click at the desired point on the map. This information can also be obtained by typing in the x-y coordinates (lat-long, state-plane, etc.) or bridge recall number. The search results are presented in tabular format with the coordinates and hydraulic values displayed in a window on the map.

The information in the Storm Surge and Wave GIS Database will have numerous applications for both existing and future water related projects. Figure 10 displays a screen shot of the Storm Surge and Wave GIS base map. In the figure, the locations of the 65 bridges evaluated in the study are represented by the yellow dots. A detailed description of the database and its application is presented in Appendix A.

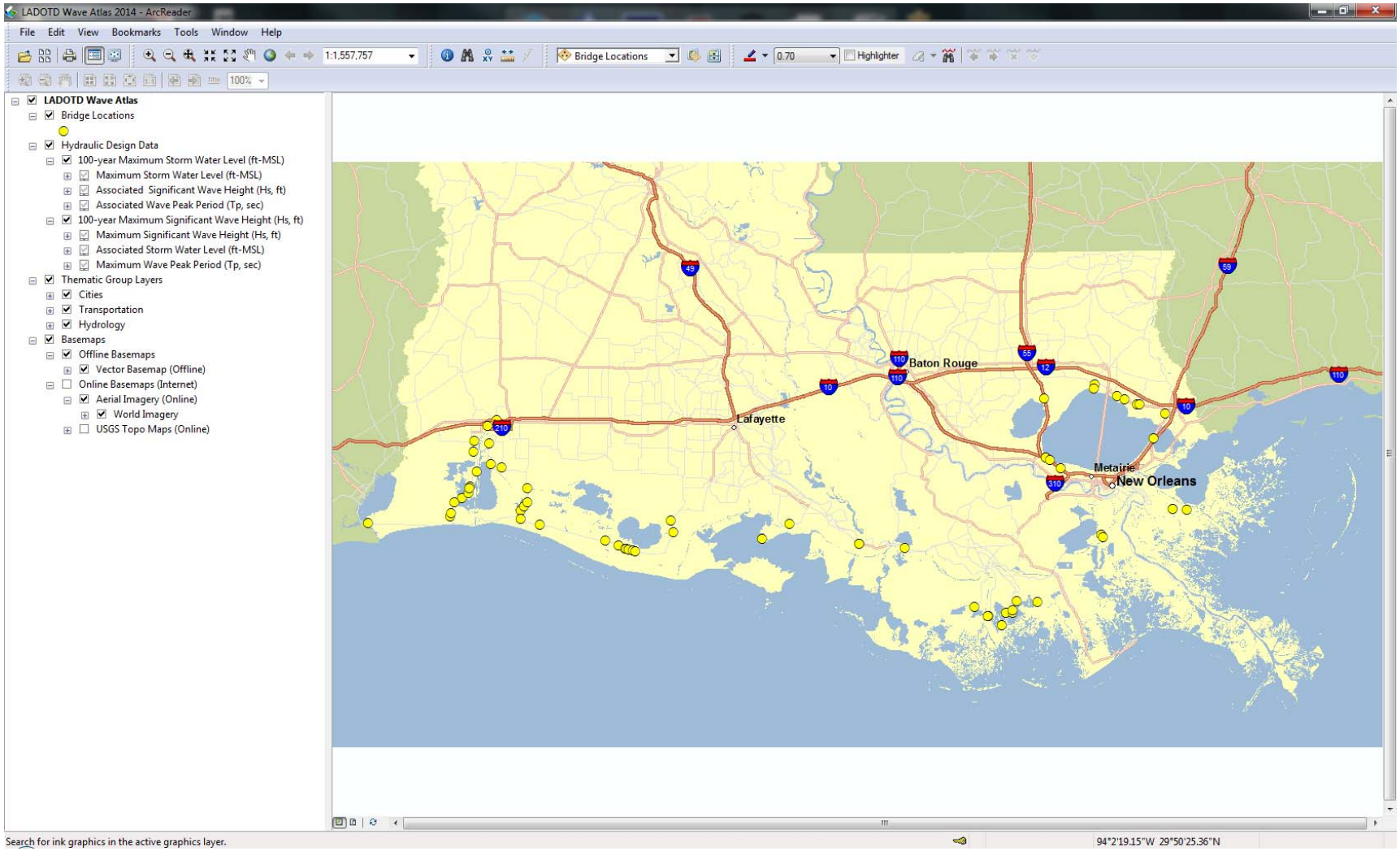


Figure 10
Screenshot of storm wave and surge atlas GIS geodatabase

Detailed Surge/Wave Forces

Phase 1 evaluated 65 bridges for vulnerability to storm surge and wave loading. The analysis took a conservative approach evaluating the most vulnerable span (typically near the begin or end bridge) while applying the largest met/ocean conditions (wave height and surge elevation) along the alignment. By design, this conservative approach leads to false positives. Based on that approach, Phase 1 identified 18 vulnerable bridges in coastal Louisiana. This phase, Phase 2, employs a more detailed approach that evaluates all the spans and the met/ocean conditions at that location. Table 2 lists the bridges identified as vulnerable in Phase 1 that are further evaluated for detailed wave loading in this phase as described in the following sections.

Table 2
Bridges evaluated

Bridge Recall No.
002631
002632
002650
002892
002894
003432
003440
003450
003480
003510
003520
003690
009030
031755
033698
033700
059482
060360

Design Conditions for the Detailed Wave Loading

Since these forces and moments depend on the combination of water elevation and wave parameters (height and length), two sets of conditions require examination at each bridge; (1) the maximum 100-year water elevation and associated wave height and (2) the maximum wave height and associated water elevation. This is necessary since the maximum wave

height does not necessarily occur at the same time as the maximum water elevation during the storm. The extreme value analyses applied to the hindcasted storms (in Phase 1) produced these two sets of data for 100-year return interval met/ocean conditions.

For bridges crossing large bodies of water, the 100-year storm water level and wave heights can vary along the bridge. For these cases, the extreme value analysis was performed at multiple locations along the bridge alignment and the results from the location provided the met/ocean input for the adjacent spans. Appendix B lists the two 100-year met/ocean cases evaluated.

Method of Analysis

The procedure for identifying the vulnerability of the selected bridges began by obtaining the dimensions for each span on each bridge. The structural parameters (span type, dimensions, low chord elevation, superstructure dead weight, etc.) for that span were provided by DOTD. Next, the design forces and moments were computed along with a conservative estimate (i.e., a lower estimate) of the resistive forces and moments. As discussed in detail below, the design forces include a load factor, the magnitude of which depends on the criticality of the bridge. The resistive forces are conservative in that only the dead weight of the superstructure is considered. If there are tie-downs or other means of increasing the resistance, then the actual resistive forces and moments will be greater. The vulnerability index is the ratio of the design force or moment divided by the maximum resistive force or moment. If the vulnerability index is greater than or equal to 1 for either force or moment, the bridge span is considered to be potentially vulnerable. The computer model used to compute the forces and moments is discussed below.

Physics Based Model. Until recently, the methods for predicting wave forces on horizontal structures such as bridge spans were not well developed. Kaplan and Kaplan et al. published an analytical approach for computing forces on the decks of offshore platforms using an approach similar to that used in the development of Morison's Equation for horizontal wave forces on vertical piles *[2], [3], [4]*. There are, however, differences between offshore platform decks and bridge spans as well as differences in the range of wave frequencies (and thus wave lengths) encountered by most coastal bridges. Starting with Kaplan's Equations, Dr. Sheppard and his graduate students at the University of Florida developed predictive equations for wave-induced horizontal and vertical forces and the resulting moments on bridge superstructures *[5]*. INTERA developed a proprietary computer program (Physics Based Model or PBM) that evaluates these equations for a wide variety of bridge superstructure designs and met/ocean conditions. The PBM generated the data that formed the basis of the parametric force and moment equations in the AASHTO's *Guide*

Specifications for Bridges Vulnerable to Coastal Storms. This involved calculating wave forces and moments using the PBM for a large number of met/ocean conditions for many of the more common beam types. Curve fitting that data provided the equations in the AASHTO code. These equations envelope the majority of the data, which, in general, results in conservative predictions. Additionally, the equations in the code are limited by the conditions used in their development. Specifically, waves were limited to wave periods between 3 and 10 seconds with steepness limited to values between 0.035 and 0.15 and heights were limited to no greater than 65 percent of the water depth. The PBM computed the surge/wave loads in this study.

Surge/Wave Forces and Moments. The forces and moments were computed for two sets of conditions, the 100-year storm water level and the associated wave height and the 100-year wave height and the associated storm water level and a range of wave periods. For bridges crossing large water bodies, where the 100-year storm water level and wave heights vary along the bridge, the combination of wave heights and storm water levels closest to the span of interest were used in the calculations. Once calculated, the larger of the forces and moments provided the inputs to compute the bridge vulnerability. Appendix B details the results of the wave force calculations.

Bridge Vulnerability. In this study, bridge spans where the design surge/wave forces and/or moments (with the proper load factors) exceed the maximum resistive forces and/or moments are classified as vulnerable. The AASHTO code recommends a strength limit state wave force load factor of 1.75 for bridges classified by the owner as "critical/essential." For bridges designated as "typical," the extreme event limit state wave force load factor is specified as 1.00. DOTD provided the criticality classification for the bridges examined in this study. Bridges classified with a criticality of 3 or greater are considered "critical/essential" and are evaluated with a load factor of 1.75. Conversely, bridges classified with a criticality of 2 or less are considered "typical" and are evaluated with a load factor of 1.00.

The resistive forces consist of superstructure dead weight, tie-downs or other constraints (if present), and frictional forces between the super- and substructure. Due to the effort required to obtain information on the existence and condition of tie-downs and estimating frictional forces, only superstructure dead weight is considered in this analysis. Bridges found to be vulnerable, from this conservative approach, should be further examined to discern accurate tie-down information prior to making decisions regarding corrective action. The vulnerability index for both vertical force and moment were computed. These indices, along with the resistive forces and moments, are presented in Appendix B. Table 3 summarizes the results

of the detailed wave force analysis. From the table, this analysis identified 15 of the 18 bridges as vulnerable to the 100-year surge/wave loading. Notably, the bridges that were reclassified as “Not Vulnerable” are longer bridges. For those cases, the conservative approach in Phase 1 resulted in false positive results. This results from selecting the most vulnerable span — the span with the lowest low chord (i.e. near the banks of the body of water) — while applying the largest met/ocean conditions (near the center of the body of water), which, as this analysis demonstrates, can result in conservative results for long crossings.

Table 3
100-year surge/wave forces and moments calculated using the PBM

Bridge Recall No.	Vulnerability
2631	Vulnerable
2632	Vulnerable
2650	Vulnerable
2892	Not vulnerable
2894	Vulnerable
3432	Vulnerable
3440	Vulnerable
3450	Vulnerable
3480	Vulnerable
3510	Not vulnerable
3520	Vulnerable
3690	Vulnerable
9030	Vulnerable
31755	Vulnerable
33698	Vulnerable
33700	Not vulnerable
59482	Vulnerable
60360	Vulnerable

DISCUSSION OF RESULTS

The objectives of this study included (1) creating a Wave and Surge Atlas for the 5-, 10-, 25-, and 50 year return period events (20, 10, 4, and 2 percent chance), the maximum met/ocean data occurring during all of the hindcasted storms, and the maximum met/ocean data occurring during all of the hindcasted storms and shifted paths; (2) developing a wave and surge calculator that solves the equations in the AASHTO code; (3) applying the 100-year met/ocean data to compute the storm surge and wave loads on the spans of the DOTD coastal bridges identified as vulnerable in Phase 1; and (4), assessing the analyzed bridges' vulnerability based on these computed loads. The Wave and Surge Atlas includes the 5-, 10-, 25-, and 50-year (20, 10, 4, and 2 percent chance) maximum water elevations with associated wave heights, and maximum wave heights with associated water elevations throughout the modeled area. The results are presented in GIS databases with a public domain GIS reader. The met/ocean information has many potential uses beyond that for computing surge/wave loading on bridge superstructures.

Eighteen coastal bridges were examined in this study. The 100-year surge/wave forces and moments were computed for each span on these bridges. The resistive forces and moments (based on the superstructure dead weight) were also computed. The vulnerability index, which is the calculated forces/moments with the appropriate load factors divided by the resistive forces/moments, provides the means for determining a bridge's vulnerability. Bridges with vulnerability indices equal to or greater than one were classified as vulnerable. Of the 18 bridges analyzed, 15 had at least one span that was determined vulnerable to these types of loads.

CONCLUSIONS

While the 100-year met/ocean conditions are appropriate for most designs, there are many issues encountered by DOTD engineers where other frequency met/ocean information (e.g., 5-, 10-, 25-, 50-year return interval values) are more appropriate. For instance, engineers may design a temporary facility (a detour bridge) based on a 5-year return interval (20 percent chance of occurrence each year). Bridges, where the service life is approaching the design life, may undergo retrofitting based on a return interval different from the 100-year return interval. The information needed to produce these values exists in the Level III analysis solution files developed in the recently completed Phase 1 of the project. Results of this study provide the DOTD with higher frequency (e.g., 5-, 10-, 25-, 50-year return interval values) design surge/wave data throughout southern Louisiana.

These data were developed using the best bathymetry/topography available at the time of the study. Future conditions may differ depending on the location. For example, along barrier islands, island breaching during hurricanes may expose the bridge to elevated wave conditions. Another example could include areas where significant subsidence is an issue. For cases where historical evidence shows unstable bathymetry/topography, the designer is encouraged to use a project-specific modeling effort to account for future conditions. Additionally, design of more valuable bridge assets may warrant a detailed modeling effort commensurate with the risk. When applying the Wave and Surge Atlas results for design, good engineering practice dictates performing a sensitivity analysis to evaluate the effects of variations in storm surge level and wave heights.

The detailed vulnerability analysis identified 15 bridges as vulnerable. If any of the vulnerable bridges have constraints (tie-downs, etc.), then a more accurate assessment of the resistive forces and moments contributed by those constraints should be evaluated. For some bridges, the amount the design surge/wave load exceeds the resistive forces (span dead weight) is minimal. In those cases, the additional dead weight resistance contributed by the railings, barriers, and parapets could offset the amount of resistance exceeded by the surge/wave load. For those bridges that remain vulnerable, possible retrofit options include adding constraints or providing venting to reduce the volume of trapped air between girders. In many cases, particularly for older bridges, a more appropriate plan of action may be monitoring and eventual replacement. Implementation of countermeasures or retrofit options are at the discretion of DOTD and beyond the scope of this study.

For future bridges, the AASHTO *Guide Specifications for Bridges Vulnerable to Coastal Storms* recommends raising the low chord 1 ft. above the design (1 percent) wave crest

elevation. The wave crest elevation is the sum of the storm water level and 70 percent of the maximum wave height (1.8 * significant wave height), which are readily accessible using the Wave and Surge Atlas. For cases where raising the bridge above the design wave crest elevation is impractical, AASHTO recommends that bridges designed for the strength limit state include a load factor of 1.75. For bridges designed for the extreme event limit state, AASHTO recommends the wave load factor of unity. The wave force calculator provides DOTD and their consultants a tool to develop wave loads via the equations and procedures detailed in the AASHTO's *Guide Specifications for Bridges Vulnerable to Coastal Storms*.

ACRONYMS, ABBREVIATIONS, AND SYMBOLS

AASHTO	American Association of State Highway and Transportation Officials
ADCIRC	Advanced Circulation Model for Coastal Ocean Hydrodynamics
DOTD	Department of Transportation and Development
ft.	foot (feet)
ft/sec	feet per second
GIS	Geographic Information System
LTRC	Louisiana Transportation Research Center
Min.	minute(s)
Met/Ocean	Metrological and oceanographic
MSL	mean sea level
INTERA	INTERA Incorporated
PBM	Physics Based Model
RMS	Root Mean Square
sec.	second
US	United States

REFERENCES

1. American Association of State Highway and Transportation Officials. *Guide Specifications for Bridges Vulnerable to Coastal Storms*. 2008.

2. Kaplan, P. “Wave Impact Forces on Offshore Structures: Re-Examination and New Interpretations.” Proceedings of the 24th Annual Conference on Offshore Technology, OTC 6814, Houston, TX, 1992, pp. 79-86.

3. Kaplan, P., Murray, J.J., and Yu, W.C. 1995. “Theoretical Analysis of Wave Impact Forces on Platform Deck Structures.” Proceedings of the 14th International Conference on Offshore Mechanics and Arctic Engineering, Copenhagen. American Society of Mechanical Engineers, NY, 1995, pp. 189-198.

4. Morison, J.R., O’Brien, M.P., Johnson, J.W., and Schaaf, S.A. “The Forces Exerted by Surface Waves on Piles.” Petroleum Trans., AIME, Vol. 189, 1950, pp. 149-157.

5. Marin, J. and Sheppard, D.M. “Storm Surge and Wave Loading on Bridge Superstructures.” Don't Mess with Structural Engineers: Expanding Our Role, Proceedings of the 2009 ASCE Structures Congress, April 30–May 2, 2009, Austin, TX, pp. 1-10.

APPENDICES

Appendix A: STORM SURGE AND WAVE GIS DATABASE

Appendix B: DETAILED WAVE FORCE CALCULATIONS

APPENDIX A

Storm Surge and Wave GIS Database

A public domain ArcReader 10.1 GIS Reader is provided with the Storm Surge and Wave Database. The ArcReader10 program requires installation on the computer(s) that will access the database. To open the database, simply click on the desired Wave Atlas PMF file (5-, 10-, 25-, 50-, and 100-year return periods) after the ArcReader 10.1 application has been installed.

Workspace Layout

One of the key features in using a geo-referenced GIS map is the ease of navigation. At startup the image shown in Figure A. 1 is displayed. Notably, the screen is divided into three regions or frames, a Data Toolbar Frame, Table of Contents Frame, and a Map Display Frame as displayed in Figure A. 2.

The Data Toolbar Frame contains several common features plus several that are unique to this application. The Table of Contents Frame lists all of the graphical data that can be displayed in the Map Display Frame. Selecting or deselecting (by turning on or off the check box) a dataset or dataset group in the Table of Contents will display or turn off the set or group in the Map Display. The Map Display Frame displays the map of the coverage area at various scales and the graphical information turned on within the Table of Contents. Also, items selected using the specific tools in Data Toolbar will be displayed in tabular form in a pop-up window in or around the Data Map.

The ArcReader 10.1 software also displays information in two different views, Data View and Layout View. The Data View is the initial display mode shown when the software loads the GIS database. This view allows the user to navigate and display information in digital and tabular form. The Layout View within the ArcReader 10.1 software can be accessed by going to Edit-Layout View within the top toolbar. Layout View allows the user to see a print preview of the map with a North Arrow and Scale. Layout View does not show tabular data that is identified from the map. An example of Layout View is shown in Figure A. 3.

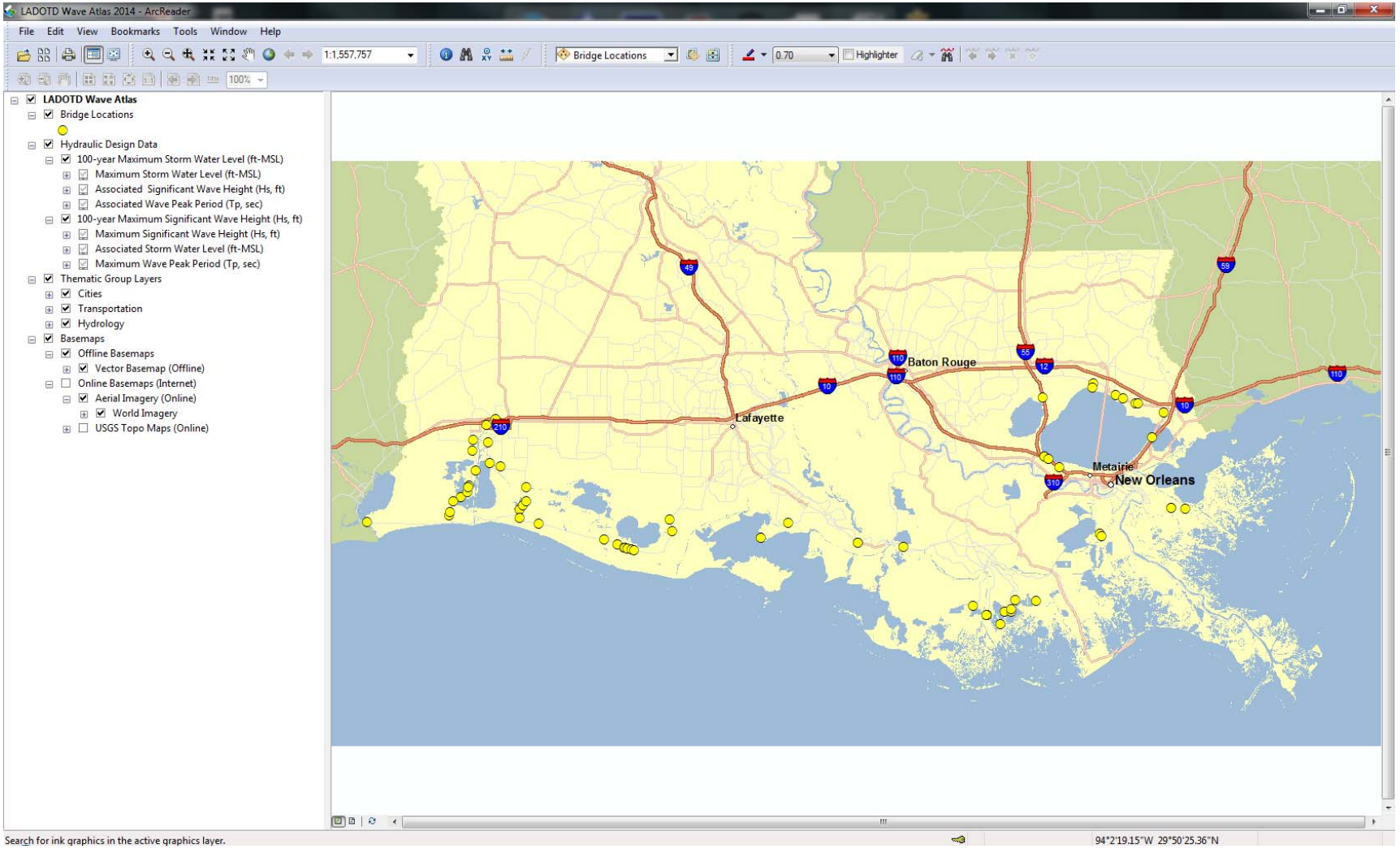


Figure A. 1
ArcGIS default opening screen

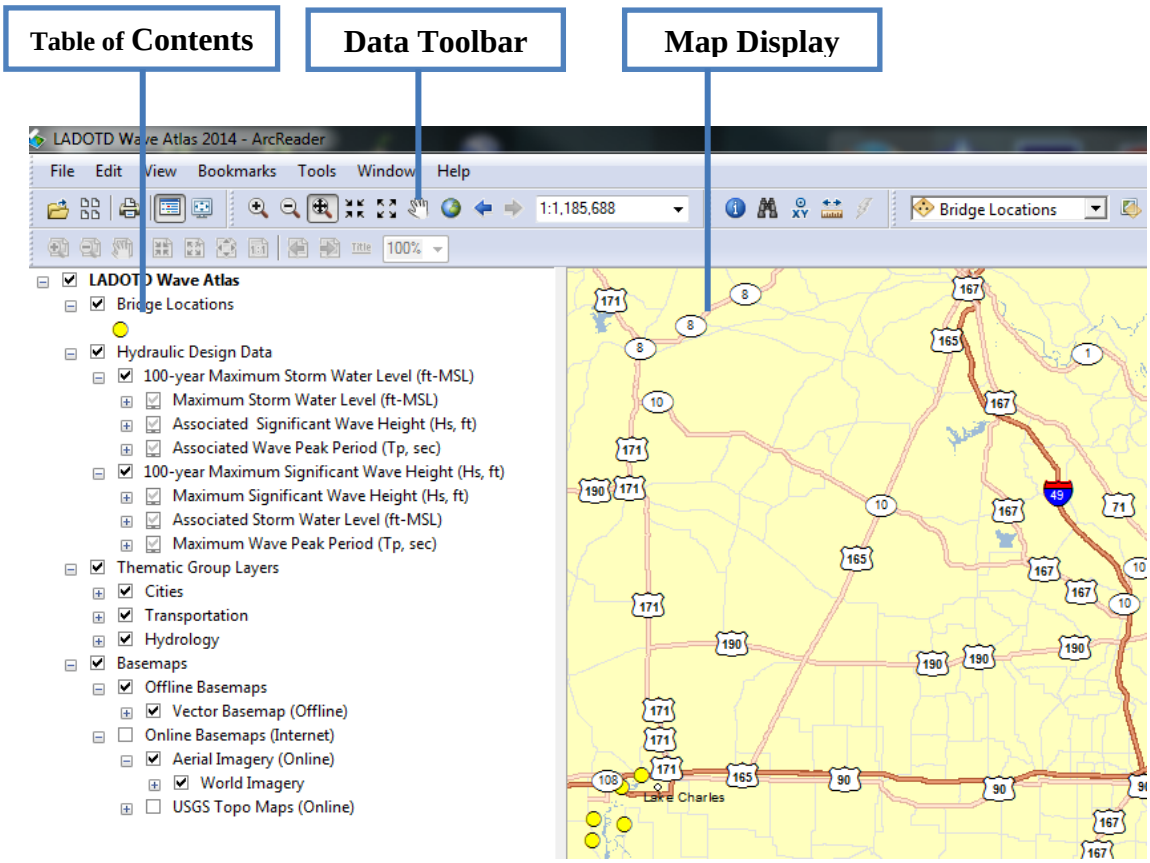


Figure A. 2
ArcGIS navigation frame layout

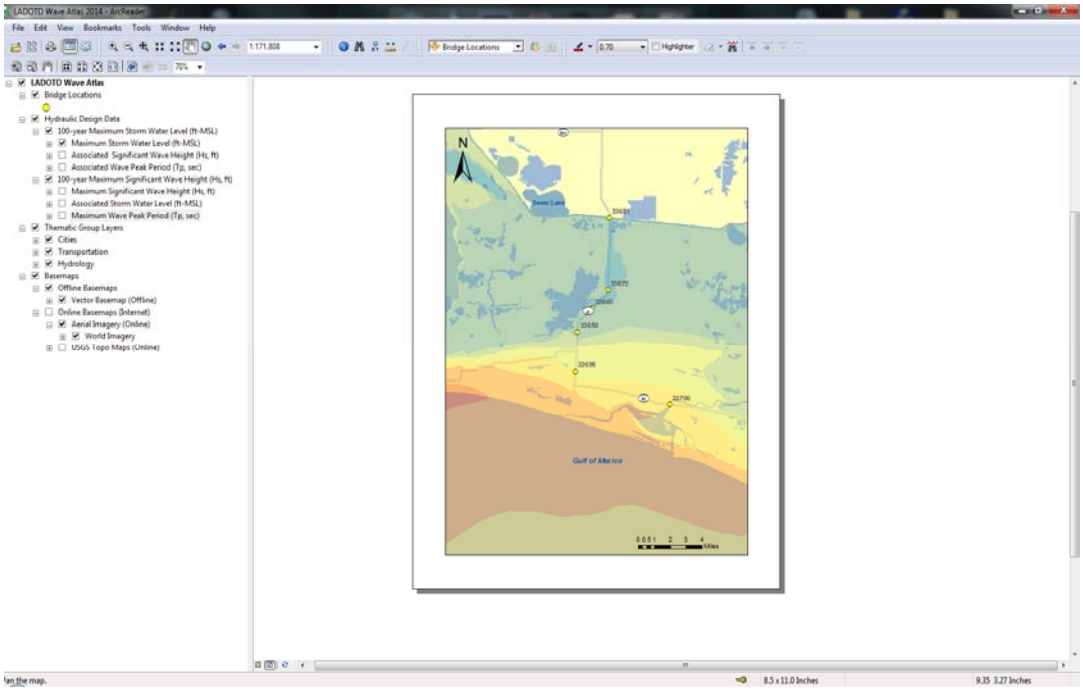


Figure A. 3
ArcGIS layout view

Data Toolbar Frame

Figure A. 4 displays the ArcReader 10.1 Toolbar. Features of this toolbar include printing, zooming, and panning the map as well as selecting various display scales and performing data searches. The data search option includes four tools for accessing and finding data within the map.

The Identify Tool, a blue circle with "i" in the center, identifies database information. The Search Tool, binoculars symbol, searches on bridge names (for bridges that have been analyzed), parishes, roadways, or features. The Hyperlinks Tool provides access to hyperlinks within the Atlas. The Coordinate Search Tool, XY symbol, searches a specific geographic position via various coordinate systems (Lat. - Long., state plane, etc.) and orients the user to bridge locations that were not part of this study. The Distance Measure Tool, ruler symbol, measures distance between any two points on the map.

The search tools in the toolbar display the desired information at a particular location on the map in a window in tabular form in the Map Frame.

Figure A. 4
ArcGIS Reader 10.1 toolbar

Table of Contents Frame

Figure A. 5 shows the ArcReader 10.1 Navigation Frame. This frame lists the layers of graphical data contained in the Map Frame. Selecting a data set or data group causes the graphical information to be displayed in the Map Display Frame. For example, selecting 100-year Maximum Significant Wave Height displays a color coded contour map of 100-year Maximum Significant Wave Height. The color legend for the contours will be displayed in the Table of Contents Frame. To avoid confusing images, only select one contour item at a time.

Each data set is contained within a specific category or folder. There are four main groups of data within the DOTD Wave Atlas map. The four groups are Bridge Locations and Recall Numbers, Hydraulic Design Data, Thematic Group Layers, and the Basemap group. Each group can either be turned on or off on the Map Display by selecting or deselecting the checkbox to the left of the group. Each main group except for the Bridge Location and Recall Group contain subgroups. For example, the Hydraulic Design Data main group contains two subgroups, the 100-year Maximum Storm Water Level and the 100-year Maximum Significant Wave Height.

The subgroups contain data layers relating to their main group. If the subgroups are not shown, use the plus sign to expand or compress the subgroups. This Group/Subgroup methodology applies to all groups within the Table of Contents such as the Hydraulic Design Data, Thematic Group Layers, and Basemaps.

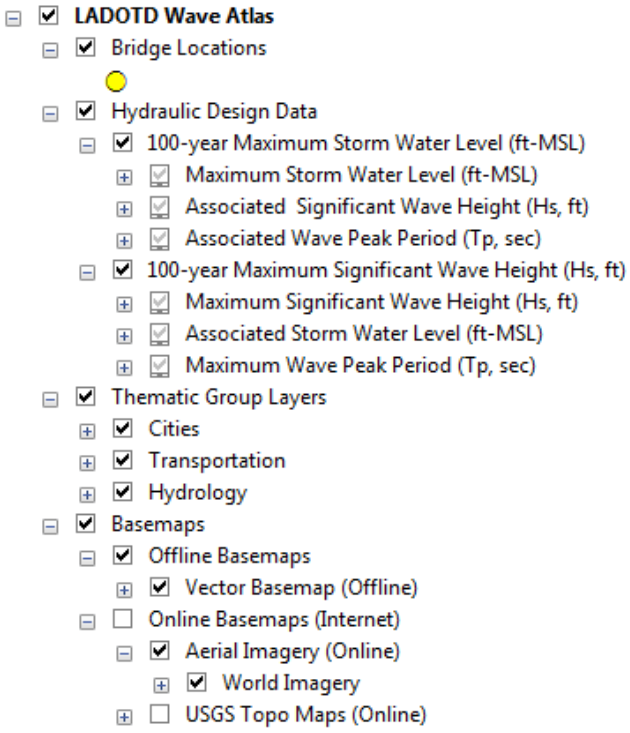


Figure A. 5
ArcGIS Reader table of contents

Map Display Frame

The ArcReader 10.1 Map Display contains, or has links to, all of the data in the database. Graphical data can be displayed in this frame by selecting it in the Table of Contents. Information at a specific location in the map can be displayed in tabular form in a superimposed window in the Map Display by specifying the location with the coordinate (XY) or search (binocular) tools and identifying the desired quantity with the identify tool. The location can also be specified by the cursor and a left click of the mouse.

Figure A. 6 displays the default map for the DOTD Storm Surge and Wave Database. The map can be panned and zoomed with the tools in the Data Toolbar. Zooming to a specific area can also occur by selecting a rectangular area with the mouse. Zooming in and out in this frame changes the information that can be displayed, i.e., some information will only be displayed when the map is zoomed in to a certain point. For example, the bridge numbers can only be

displayed when the map is zoomed in to a 1:500,000 scale. As an example, the zoomed-in image of Lake Pontchartrain shown in Figure A. 7 displays the I-10 Bridge numbers. The bridge recall numbers were not displayed prior to the magnification.

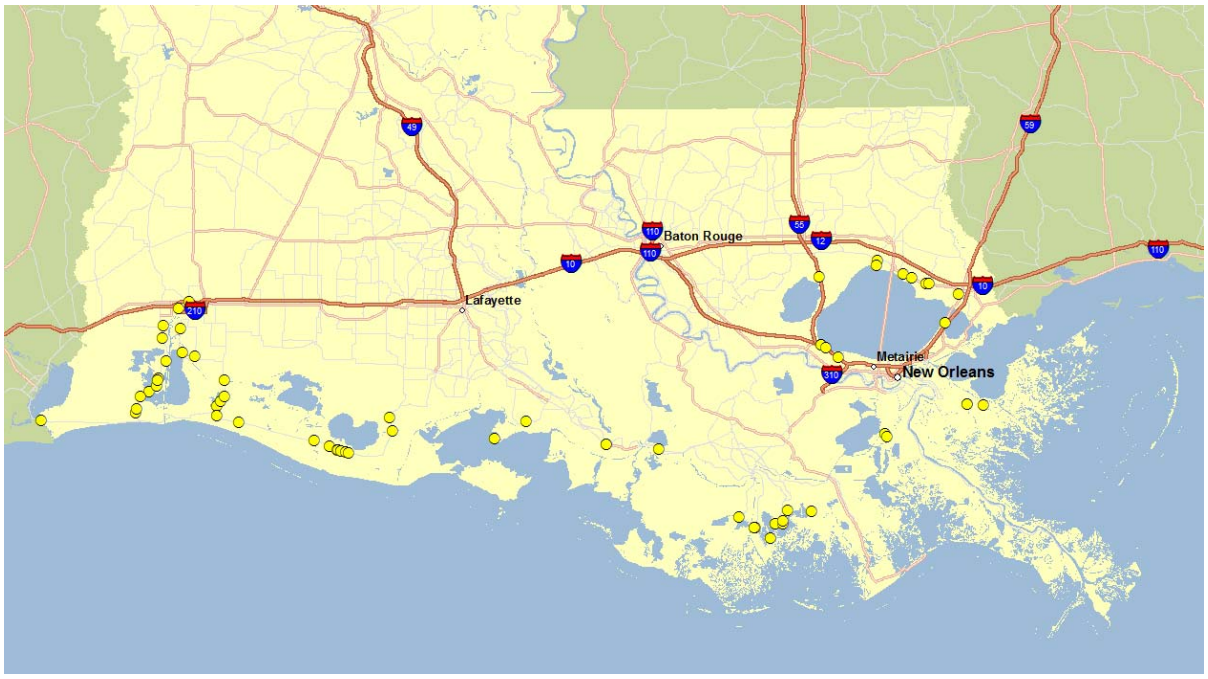


Figure A. 6
ArcGIS Reader 10.1 default map frame map

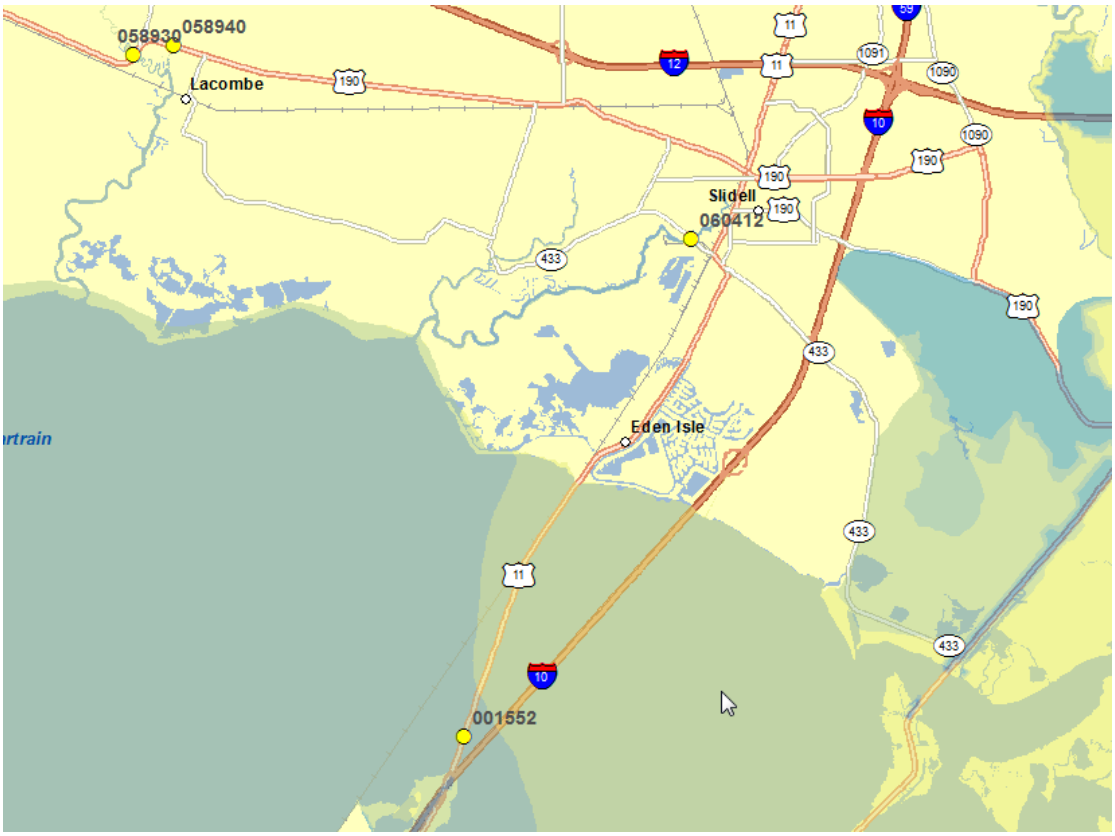


Figure A. 7
Magnified ArcGIS reader map of Lake Pontchartrain

Navigation Example – Bridge Recall Number 003440

The example below demonstrates how to obtain Hydraulic Values from the DOTD Wave Atlas GIS Database from start to finish. This example will be used further in the following section to demonstrate the Wave Force Calculator. This step-by-step example investigates Bridge Recall Number 003440.

STEP 1: OPENING THE DOTD WAVE ATLAS GIS Database

The ArcReader 10.1 software was designed only for Microsoft Windows operating systems. Initially opening the software requires navigating to the Start Menu Shortcut as displayed in FIGURE A.8. The software will be loaded but will not display any data. Accessing the data occurs by opening the software as shown in Figure A. 8 or by double clicking the DOTD Wave Atlas 100 year.pmf file within the windows operating system. ArcReader can only open published map files (.pmf) that have been created and saved within the ArcMap software. The map will now be displayed as shown in Figure A. 9.

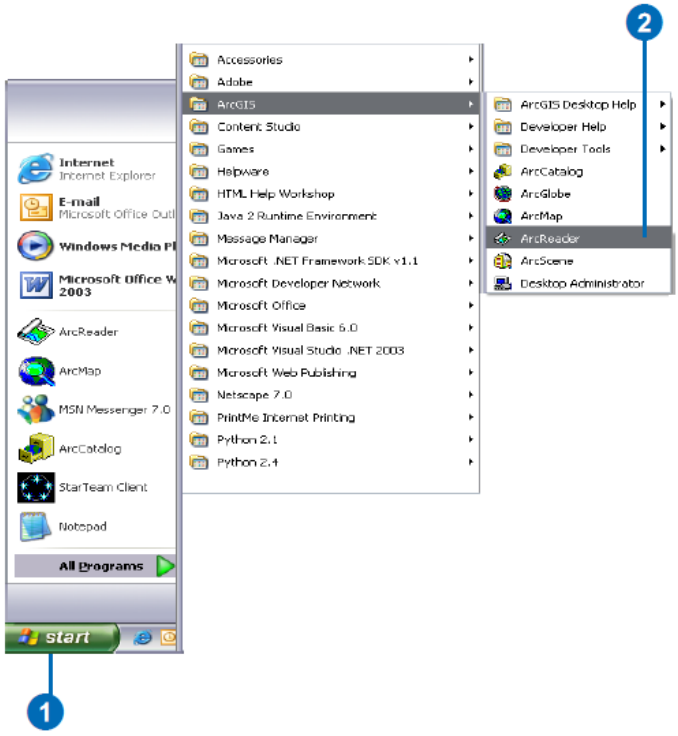


Figure A. 8
Using the windows start menu to open the ArcReader 10.1 software

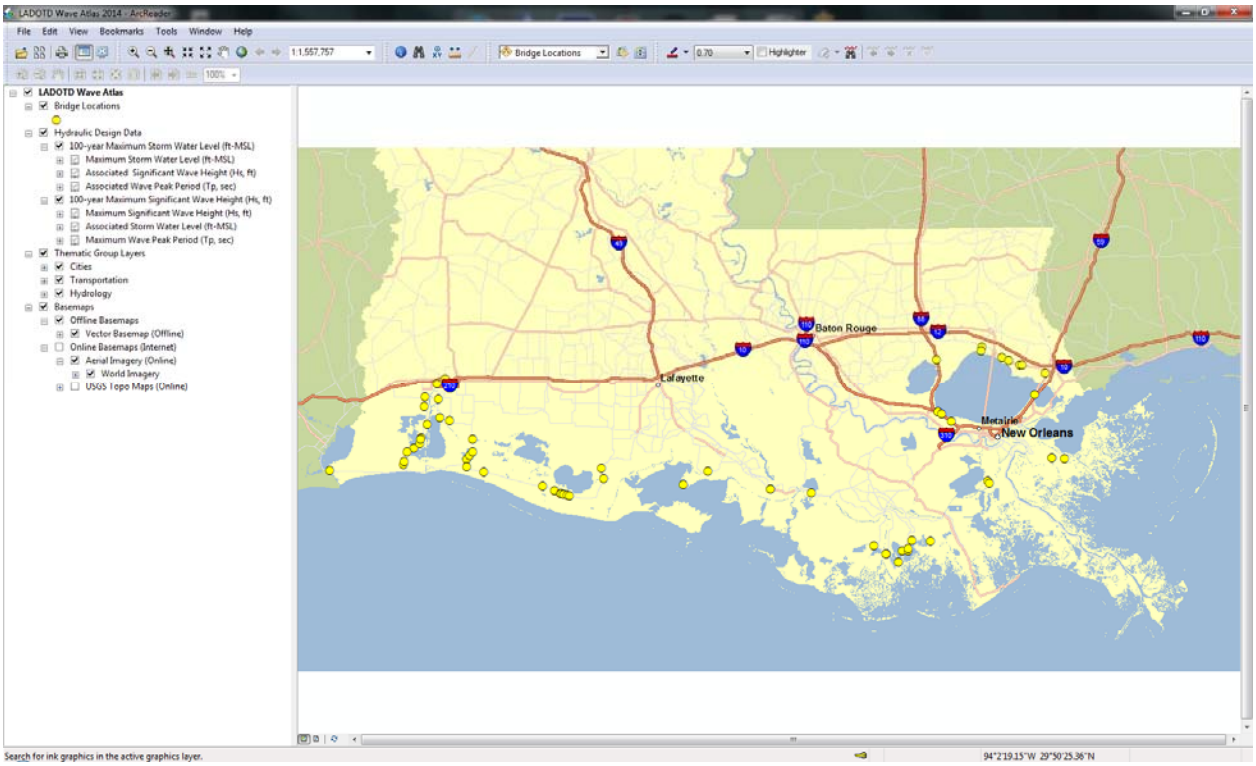


Figure A. 9

STEP 2: SELECTING DISPLAYED DATA

Selecting layers to display on the Display Map Frame is performed within the Table of Contents Frame. Turning on and off layers within the Table of Contents Frame occurs by checking or unchecking the selection box to the left of the dataset. This example will identify the hydraulic data values associated with the 100-year Maximum Storm Water Level. Therefore, the second subgroup under the main Hydraulic Design Data Group, the 100-year Maximum Significant Wave Height, is turned off. Turning this subgroup off occurs in one of two ways. The first way is to turn off the entire subgroup in the Table of Contents. This is performed by unchecking the box next to the subgroup heading as displayed in Figure A. 10. The second method is to turn off the subgroups data sets individually as displayed in Figure A. 11. Note, the Hydraulic Design Data Group only displays on the map at a scale of 1:500,000. If the map is at a smaller scale, there will not be any change in the Map Display Frame. Regardless, the data sets will remain turned off if the check box next to the group, subgroup or data set layer is turned off.

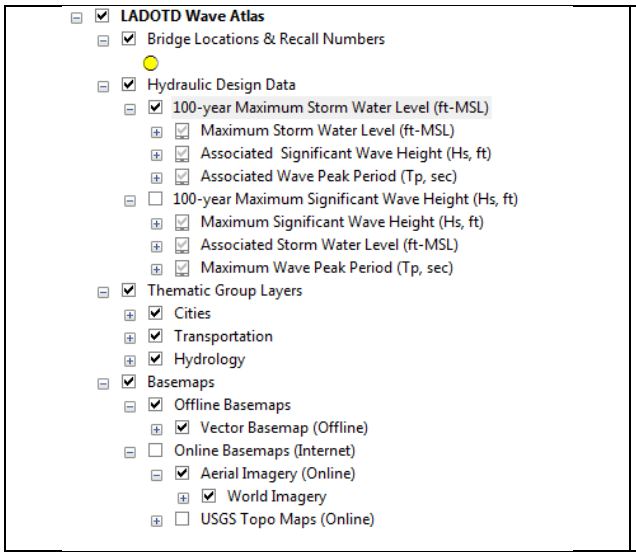


Figure A. 10
Method 1 of turning off subgroup data

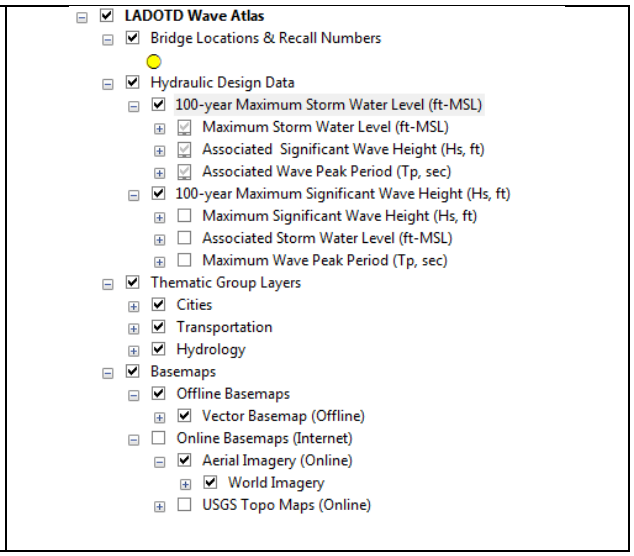


Figure A. 11
Method 2 of turning off subgroup data

STEP 3: INDENTIFYING HYDRAULIC DESIGN DATA FOR A LOCATION

A. Locating via the Find Tool

First, select the Find Tool located in the Data Toolbar Frame. This tool looks like a pair of binoculars as displayed in Figure A. 12.

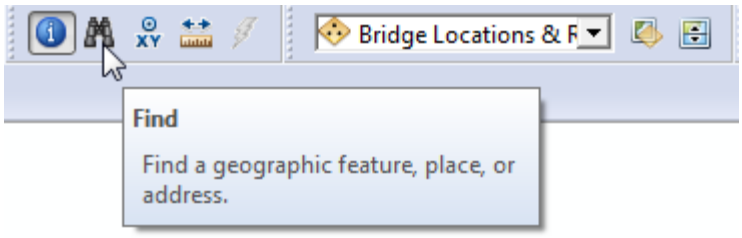


Figure A. 12
Selecting the find tool

Once this tool is selected, an information window will appear on the screen with the heading "Find." There are two tabs labeled Features and Locations. The Features Tab locates information found within the database. The Locations Tab locates information through street addresses (internet connection required). For this example, use the Features Tab.

For this example, Bridge Recall Number 003440 is located within the Bridge Locations and Recall Numbers layer. To select this layer, use the layers dropdown menu and select the appropriate layer as shown in Figure A. 13.

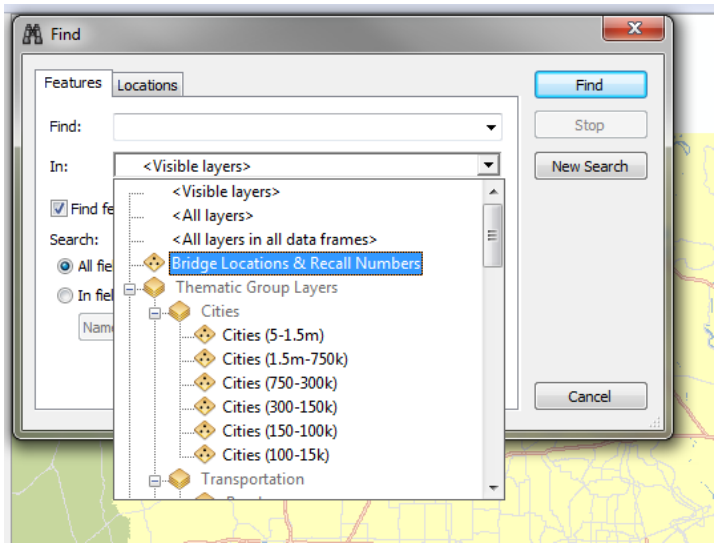


Figure A. 13
Selecting the bridge locations & recall numbers layer

Next, enter the Recall Number in the "Find" box. The box next to "Find Features that are similar to or contain the search string" remains checked. Search the recall number In field: Name as shown in Figure A.14. The Bridge Recall Number will now be displayed in the menu at the bottom after hitting the Find Button as displayed in Figure A. 15.

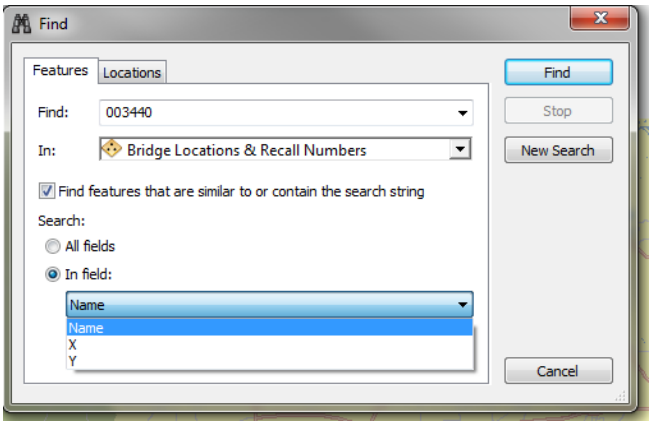


Figure A. 14
Locating bridge recall number 003440 using the find tool

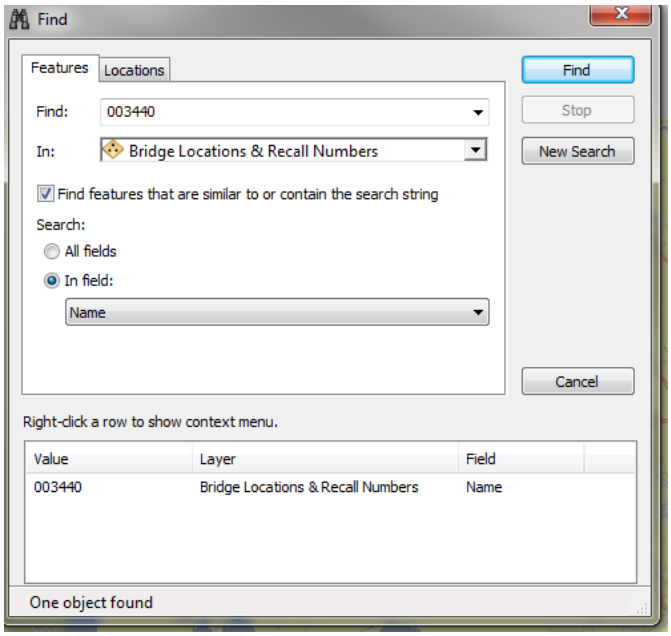


Figure A. 15
Bridge recall number displayed in find tool menu

Right-click the row containing the recall number to display the context menu (Figure A. 16). Within the context menu, “Zoom To” the feature. This will center the location relating to the Recall Number in the center of the screen as displayed in Figure A. 17.

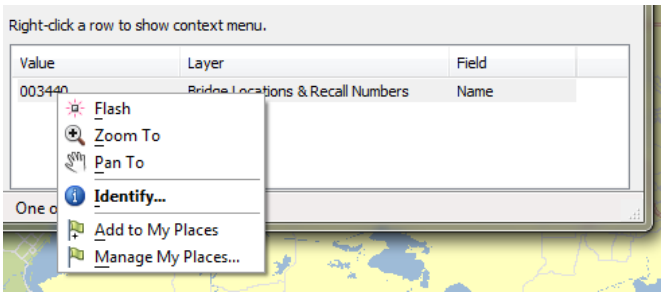


Figure A. 16
Opening the context menu

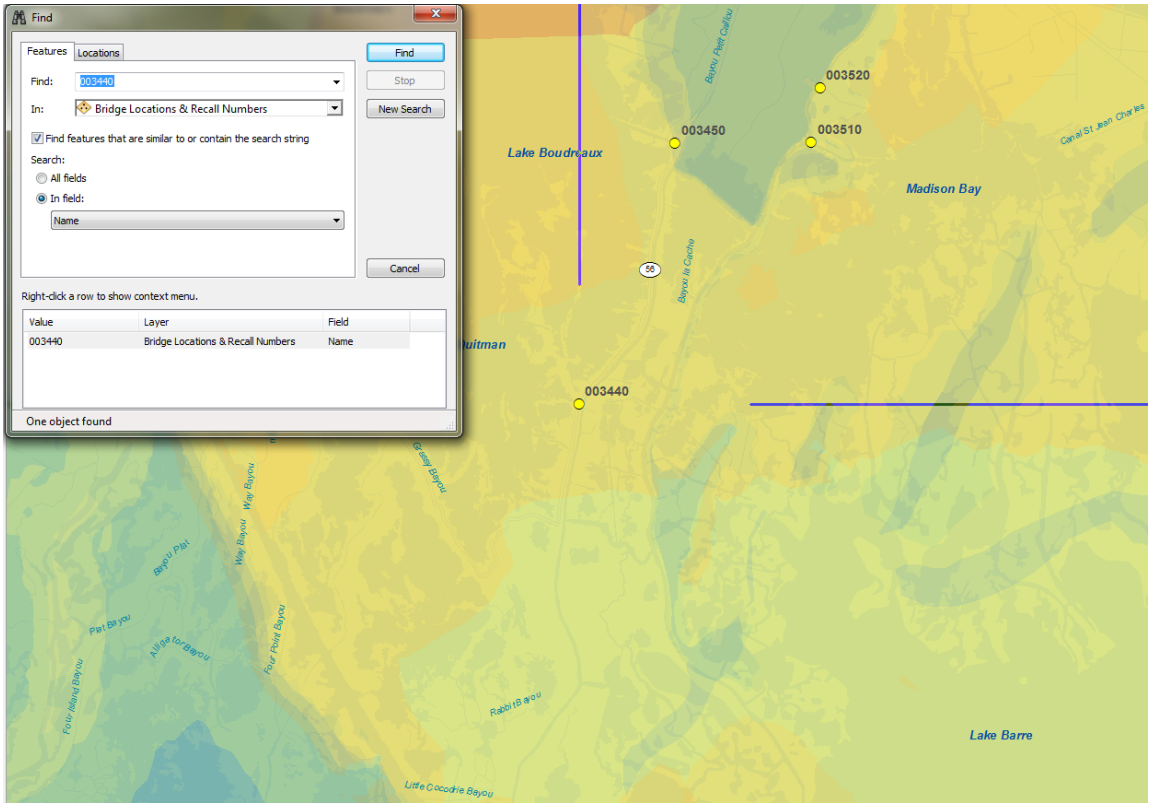


Figure A. 17
"Zooming To" the bridge recall number

Acquiring data from a location requires a scale of 1:10,000 or below. This is accomplished using the Scale Dropdown Menu located in the Data Toolbar. Figure A. 18 presents selecting 1:10,000 scale using the dropdown menu.

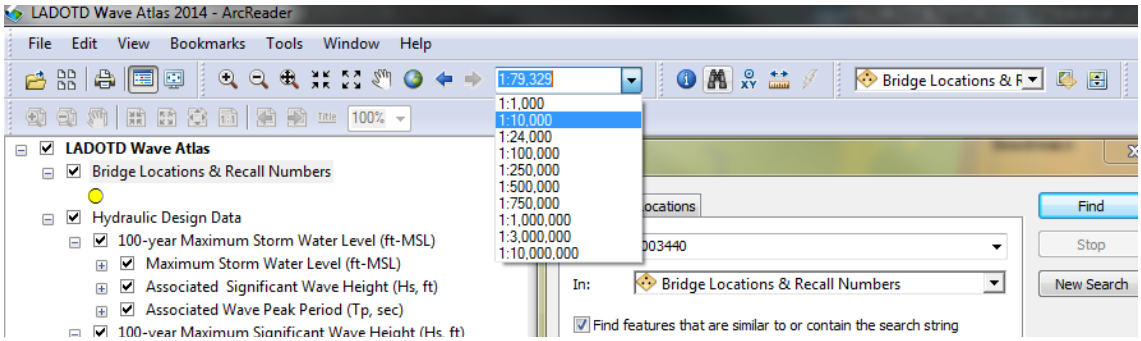


Figure A. 18
Selecting the 1:10,000 scale using the scale dropdown menu

B. Locating using the Go To XY Tool

The second method to locate hydraulic values is to use the "Go To XY" Tool. First, select the Go To XY located in the Data Toolbar Frame. This tool appears as a blue dot with XY underneath as displayed in Figure A. 19.

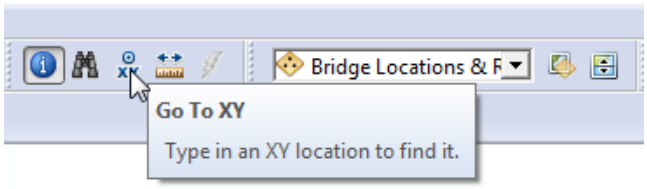


Figure A. 19
Selecting the "Go To XY" tool

The "Go To XY" Tool opens a small input window within the Map Display. The user can choose the search units by using the arrow drop down menu as displayed in Figure A. 20 and Figure A. 21. If the input is in Degrees Minutes Seconds, use a space to differentiate between degrees, minutes and seconds (i.e., 90 45 33.25W, 24 52 46.2N).

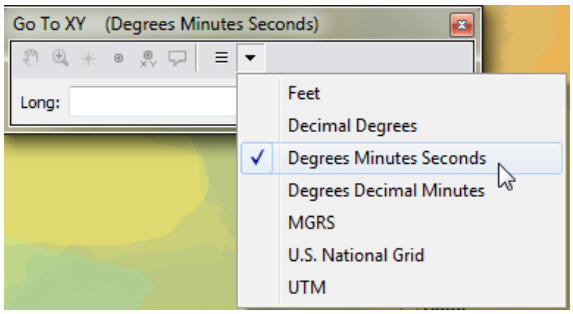


Figure A. 20
Selecting degrees minutes seconds

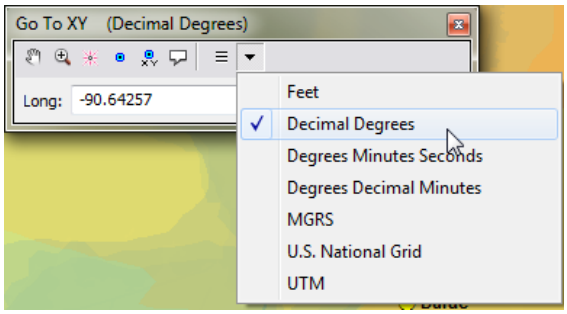


Figure A. 21
Selecting the decimal degrees

STEP 4: IDENTIFYING HYDRAULIC DATA

Identifying data is accomplished via the Identify Tool located in the Data Toolbar. This tool is located next to the Find Tool and has an icon which is a blue circle with a lowercase "i." Selecting the tool opens up the Identify Tool window. In this example, the data will be identified from the Hydraulic Design Data group. This group is selected using the layer dropdown menu as displayed in Figure A. 22. The data being identified should be turned on within the table of contents.

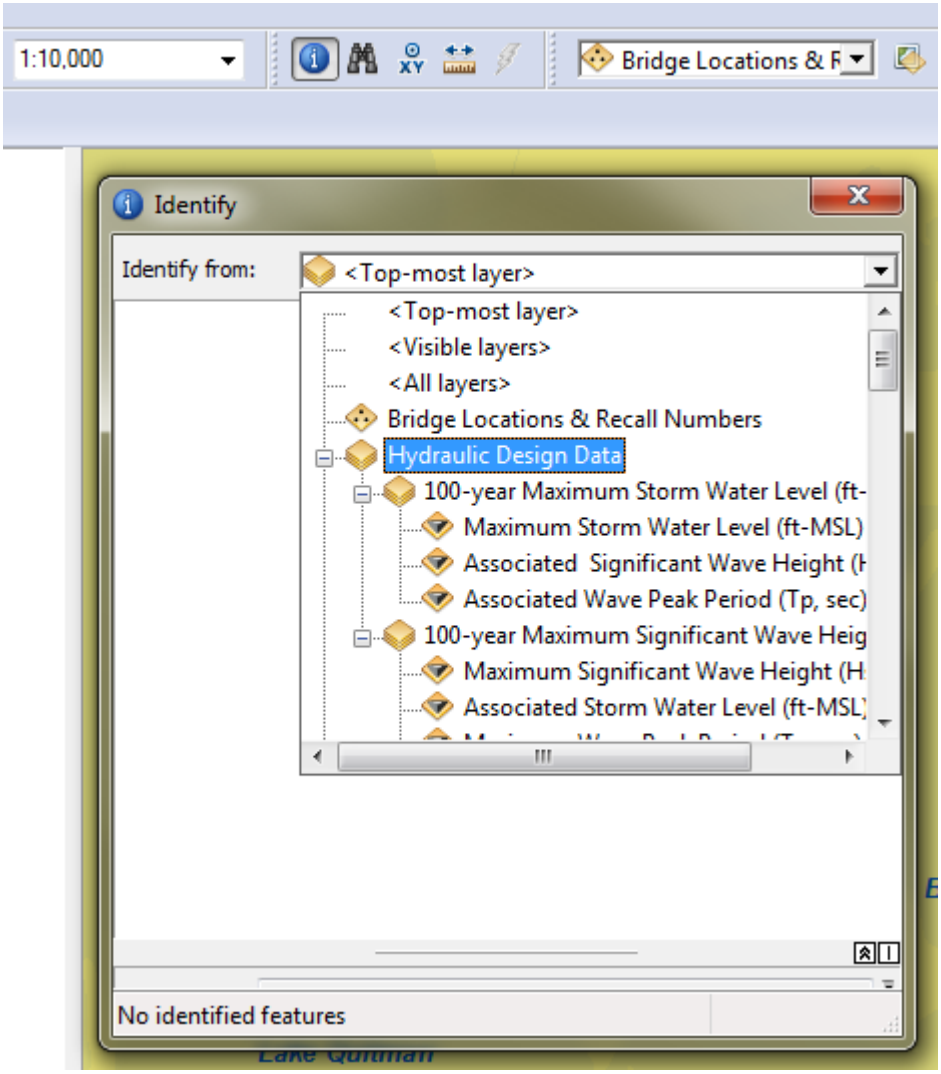


Figure A. 22
Selecting hydraulic design data group

The cursor is used to identify the hydraulic data by clicking the location of the bridge. This will now display the hydraulic design values within the Identify window. Figure A. 23 displays the screen showing the identified hydraulic values, Table on Contents, and the Map Display frame.

The identified hydraulic values associated with the two sea conditions for Bridge Recall Number 003440 are displayed in Table A. 1 and Table A. 2.

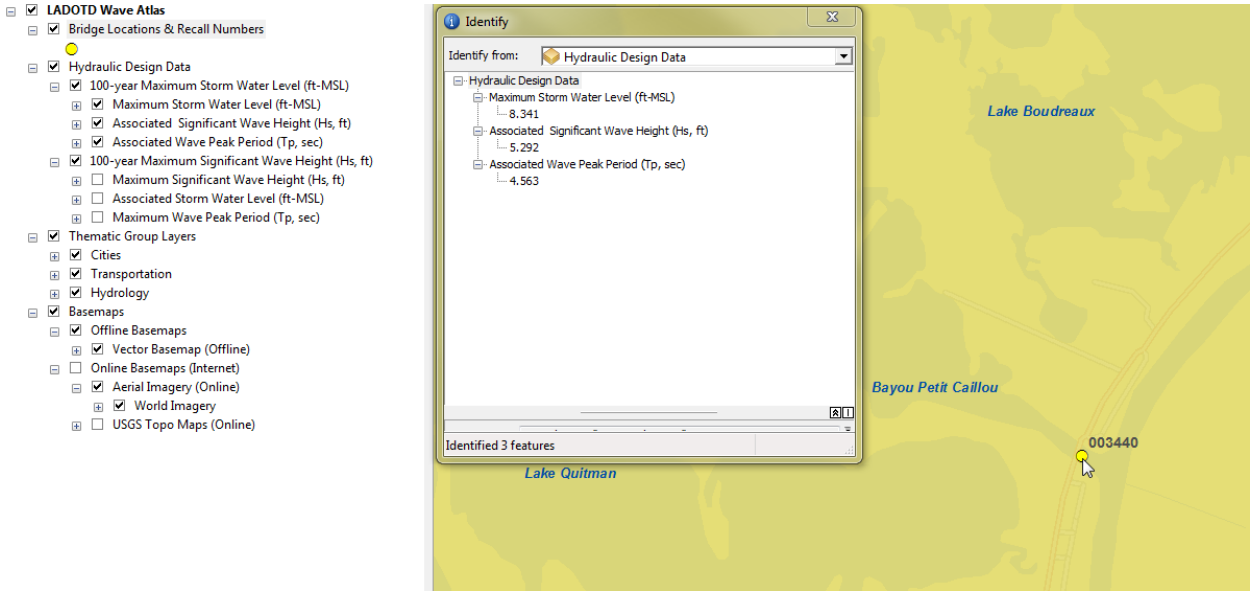


Figure A. 23
Hydraulic design data displayed for bridge recall number 003440

Table A. 1
100-year met/ocean parameters at the time of maximum storm water elevation (from 100-year wave and surge atlas)

Maximum Storm Water Level (ft.)	Associated Significant Wave Height (ft.)	Associated Peak Wave Period (sec)
8.3	5.3	4.6

Table A. 2
100-year met/ocean parameters at the time of maximum significant wave height (from 100-year wave and surge atlas)

Associated Storm Water Level (ft.)	Maximum Significant Wave Height (ft.)	Associated Peak Wave Period (sec)
8.1	5.7	4.4

Both the 100-year Maximum Significant Wave Height and Maximum Storm Water Level hydraulic design values and associated values can be displayed in the same Identify Window.

Both subgroups must be turned on (checked) in the Table of Contents. Figure A. 24 displays the Table of Contents, Identify Window, and Map Display for this scenario.

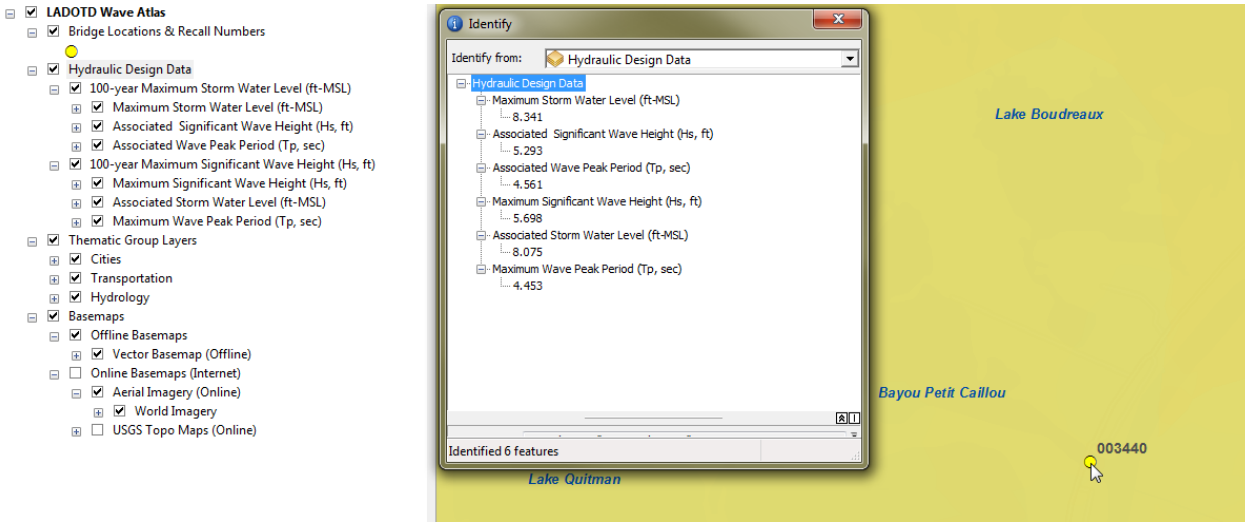


Figure A. 24
All hydraulic design data subgroups selected and identified for bridge recall number 003440

The 100-year Wave and Surge Atlas includes PDF files that detail the wave force calculations for the bridges identified as vulnerable during Phase 1. To access those data, select the Hyperlinks Tool. Once the Hyperlinks Tool cursor is selected, the bridges with hyperlinks turn blue. Selecting the desired bridge will display the PDF containing a table and plot that details the wave force information for the bridge. Figure A. 25 displays the PDF file for Bridge Recall Number 003440. To use this function, your computer must have Adobe Acrobat Reader (https://acrobat.adobe.com/us/en/products/pdf-reader.html) installed.

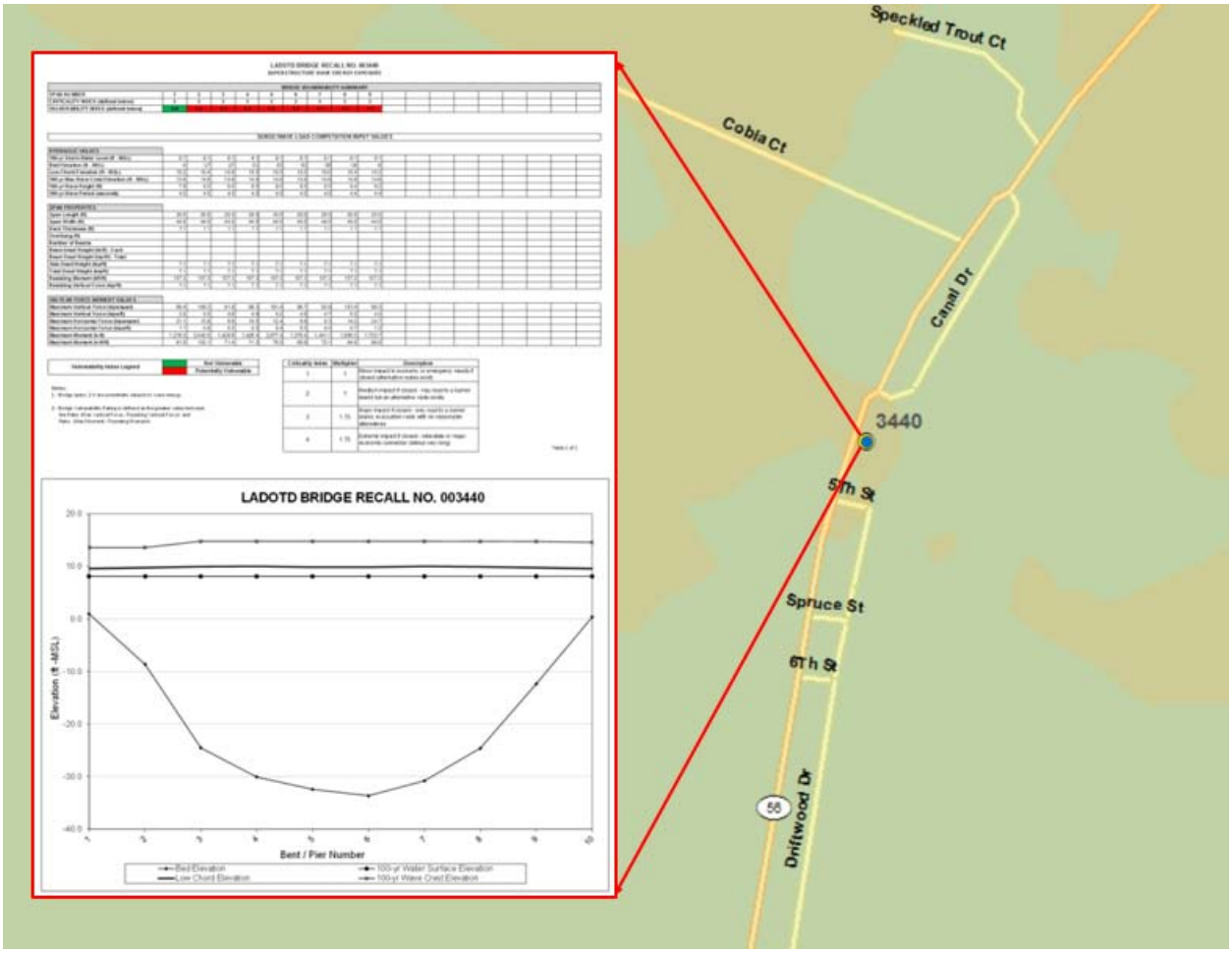


Figure A. 25
Wave force data displayed for bridge recall number 003440

Wave Force Calculator Example – Bridge Recall Number 003440

The example below demonstrates how to use the data obtained from the DOTD Wave Atlas GIS Database to calculate wave forces with the Wave Force Calculator. Each span should be evaluated for two sets of data from the DOTD Wave Atlas GIS Database — the Maximum Storm Water Level and Associated Significant Wave Height and Associated Wave Peak Period and the Maximum Significant Wave Height and Associated Storm Water Level and Associated Wave Peak Period. This step by step example calculates wave forces for Bridge Recall Number 003440.

STEP 1: Obtain the Required Bridge Superstructure Information

In order to calculate the wave forces, specific superstructure information is required. Those data include the span lengths, span widths, deck thickness, beam type, number of beams, overhang, rail height, low chord elevation, and bed elevation at each span. Ideally, these data are obtained from the as-built plans. Most of these data are found on the plan and elevation sheets. Low chord elevations are typically tabulated on a detail sheet. Table A.3 presents the superstructure information, provided by DOTD staff, for this example problem. The remainder of the data are obtained from the DOTD Wave Atlas GIS Database. Those data, presented in Table A.4 and Table A.5, include two calculated values — the clearance and the water depth. The clearance is the distance between the storm water level (Table A.4 and Table A.5) and the low chord elevation (Table A.3). For the case where the storm water level is below the low chord elevation, the clearance is positive. Conversely, for the case where the storm water level is above the low chord elevation, the clearance is negative. For this example, all of the clearance values are positive. Water depth is the distance between the storm water level and the bed elevation.

Table A. 3
Superstructure information (provided by DOTD)

Span Number	Span Length (ft.)	Span Width (ft.)	Deck Thickness (ft.)	Beam Type	Rail Height (ft.)	Low Chord at the Bent (ft-MSL)	Bed Elevation at the Bent (ft.)
1	20.000	44.000	1.083	Slab	2.7	10.2	-4.0
2	20.000	44.000	1.083	Slab	2.7	10.4	-17.0
3	20.000	44.000	1.083	Slab	2.7	10.6	-27.0
4	20.000	44.000	1.083	Slab	2.7	10.5	-31.0
5	35.000	44.000	1.083	Slab	2.7	10.5	-33.0
6	20.000	44.000	1.083	Slab	2.7	10.5	-32.0
7	20.000	44.000	1.083	Slab	2.7	10.6	-28.0
8	20.000	44.000	1.083	Slab	2.7	10.4	-18.0
9	20.000	44.000	1.083	Slab	2.7	10.2	-6.0

Table A. 4
100-year met/ocean parameters at the time of maximum storm water elevation (from 100-year wave and surge atlas)

Span Number	Case 1 Maximum Storm Water Level and Associated Waves				
	Max Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Wave Peak Period (sec)	Clearance (ft.)	Depth (ft-MSL)
1	8.3	5.3	4.6	1.9	12.3
2	8.3	5.3	4.6	2.1	25.3
3	8.3	5.3	4.6	2.3	35.3
4	8.3	5.3	4.6	2.2	39.3
5	8.3	5.3	4.6	2.2	41.3
6	8.3	5.3	4.6	2.2	40.3
7	8.3	5.3	4.6	2.3	36.3
8	8.3	5.3	4.6	2.1	26.3
9	8.3	5.3	4.6	1.9	14.3

Table A. 5
100-year met/ocean parameters at the time of maximum wave height (from 100-year Wave and Surge Atlas)

Span Number	Case 2 Maximum Waves and Associated Storm Water Level				
	Associated Storm Water Level (ft-MSL)	Maximum Significant Wave Height (ft.)	Maximum Wave Peak Period (sec)	Clearance (ft.)	Depth (ft-MSL)
1	8.1	5.7	4.4	2.1	12.1
2	8.1	5.7	4.4	2.3	25.1
3	8.1	5.7	4.4	2.5	35.1
4	8.1	5.7	4.4	2.4	39.1
5	8.1	5.7	4.4	2.4	41.1
6	8.1	5.7	4.4	2.4	40.1
7	8.1	5.7	4.4	2.5	36.1
8	8.1	5.7	4.4	2.3	26.1
9	8.1	5.7	4.4	2.1	14.1

STEP 2: Running the Wave Calculator

Once all of the data is collected, the forces are calculated using the Wave Force Calculator. Begin by opening the Wave Force Calculator — Wave_Force_Calculator_Version 1.8 — and agreeing to the terms. The first step is to enter the data into the calculator. As the Methodology Section detailed, running the Wave Calculator requires inputting two sets of data —superstructure information and the sea state. This example evaluates the two cases provided in the DOTD Wave Atlas GIS Database — Case 1; the Maximum Storm Water Level and Associated Significant Wave Height and Associated Wave Peak Period and Case 2; the Maximum Significant Wave Height and Associated Storm Water Level and Associated Wave Peak Period. Comparing the wave forces produced by the two sea state conditions will determine the design conditions.

Most of the superstructure information is provided in Table A.3. Figure A.26 illustrates the superstructure input for span 1. Span length, span width, deck thickness (in this case the slab thickness), and the railing height are the values from Table A.3. The parametric wave force equations in the AASHTO specifications evaluate the vertical and horizontal forces using different inputs for the girder/slab. The equations for the vertical force employ the girder height, while the equations for the horizontal force are limited to five types of girders and

two types of slabs (see Figure A.27). For this case, a 1.083-ft. (13-in.) slab supported structure, the closest available girder type is the 21-in. Voided Slab. Since the modeled slab is 8 in. thicker than the actual slab, the horizontal force will be conservative. As Figure A.28 demonstrates, selecting one of the slab superstructures blanks the "Girder Height," "Number of Girders," "Overhang," and "% Trapped Air" in the "Superstructure Information" table and inserts a note below the table that provides guidance for filling the table. For slab supported superstructures, the program sets the "Girder Height," "Number of Girders," and "Overhang" to zero and uses the deck thickness as the thickness of the slab in the vertical force calculations. Additionally, unlike a girder supported superstructure, a slab supported superstructure does not trap air, so the program does not use "% Trapped Air." Finally, for span 1 of this case, the Clearance (Zc) is obtained from Table A.4. Notably, for this example, the only value in the Superstructure Information table that changes for the different spans and the two cases, is the clearance, which is dependent on the storm water level and the low chord of that span.

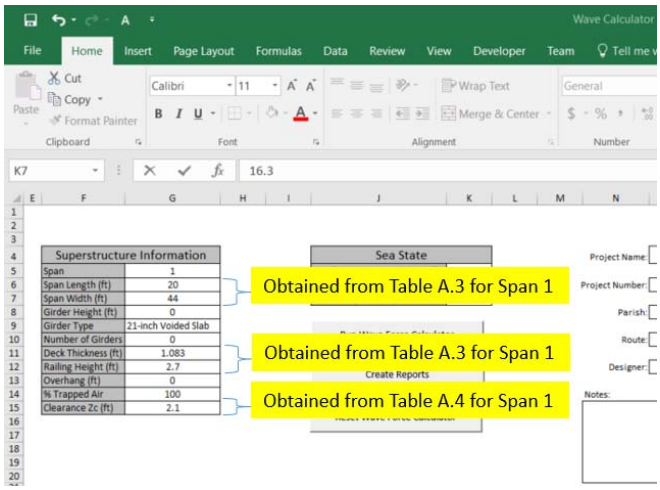


Figure A. 26
Entering superstructure data

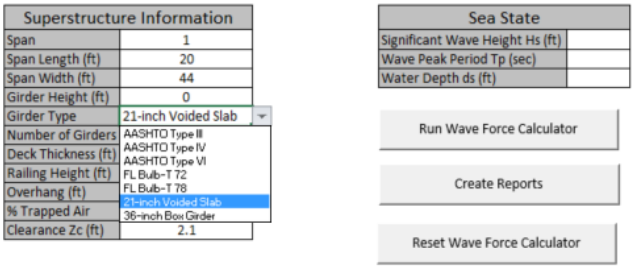


Figure A. 27
Wave calculator drop down box for the five girder types and two slab type structures in the AASHTO horizontal force equations

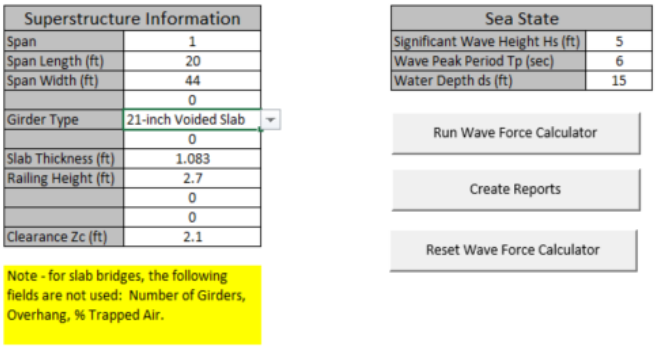


Figure A. 28
Wave calculator drop down box with the 21-inch voided slab type structure selected

The sea state data include the significant wave height, wave peak period, and water depth. As noted above, for this example those data are derived from the DOTD Wave Atlas GIS Database and summarized in Table A.4 and Table A.5 at each span for the two cases. The program converts the wave height to the appropriate design wave based on the AASHTO Guide Specifications *[1]*. The program provides notes in the results table documenting any changes to the wave height and period. Figure A.29 shows the completed Sea State table filled with the conditions for span 1 case 1.

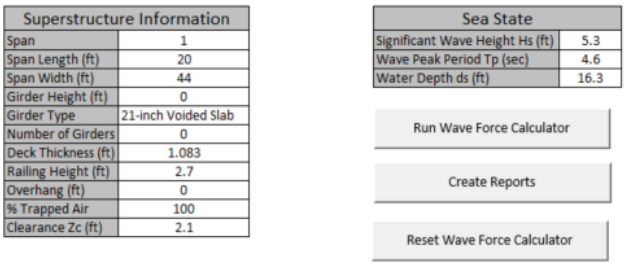


Figure A. 29
Completed sea state table for span 1 case 1 of the example

The program provides the user with the ability to generate a report for the calculations of each span evaluated. The report can include details on the bridge including the location, project name and number, designer, and the date. Figure A.30 presents the available detailed information included in the report.

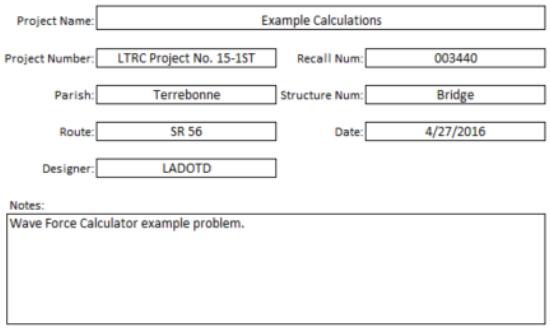


Figure A. 30
Wave force report information

The next step is to run the program and generate reports. As Figure A.31 illustrates, there are three control buttons. The “Run Wave Force Calculator” button runs the portion of the program that calculates the forces and populates Results/Input Data/Intermediate Steps table. The “Create Reports” button generates a report for each span with the numeral 1 in the first column of the Results/Input Data/Intermediate Steps Table — note when printing reports for multiple results, each span must have a unique span number. The “Reset Wave Force Calculator” resets the input data in the Superstructure Information table and the Sea State table to the default values and the clears the Results/Input Data/Intermediate Steps table.

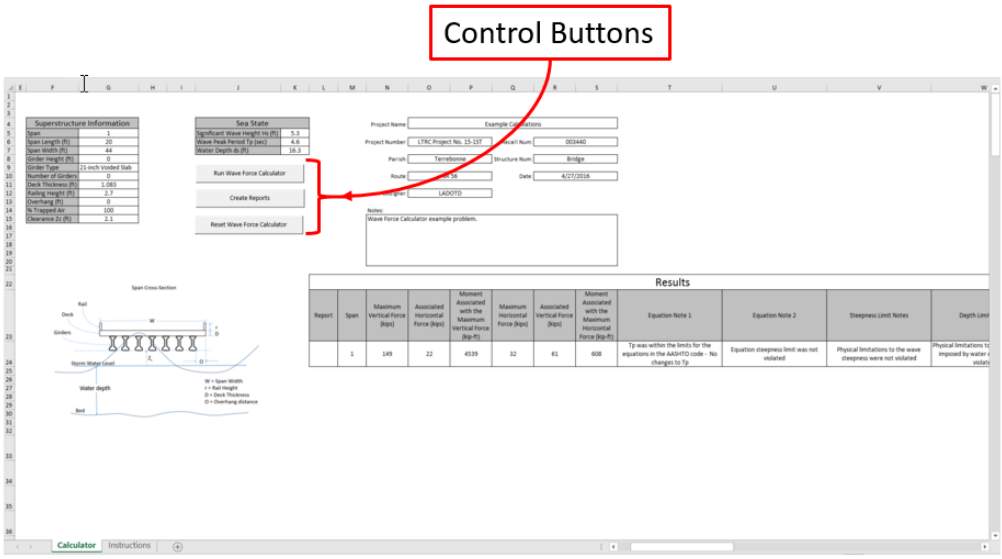
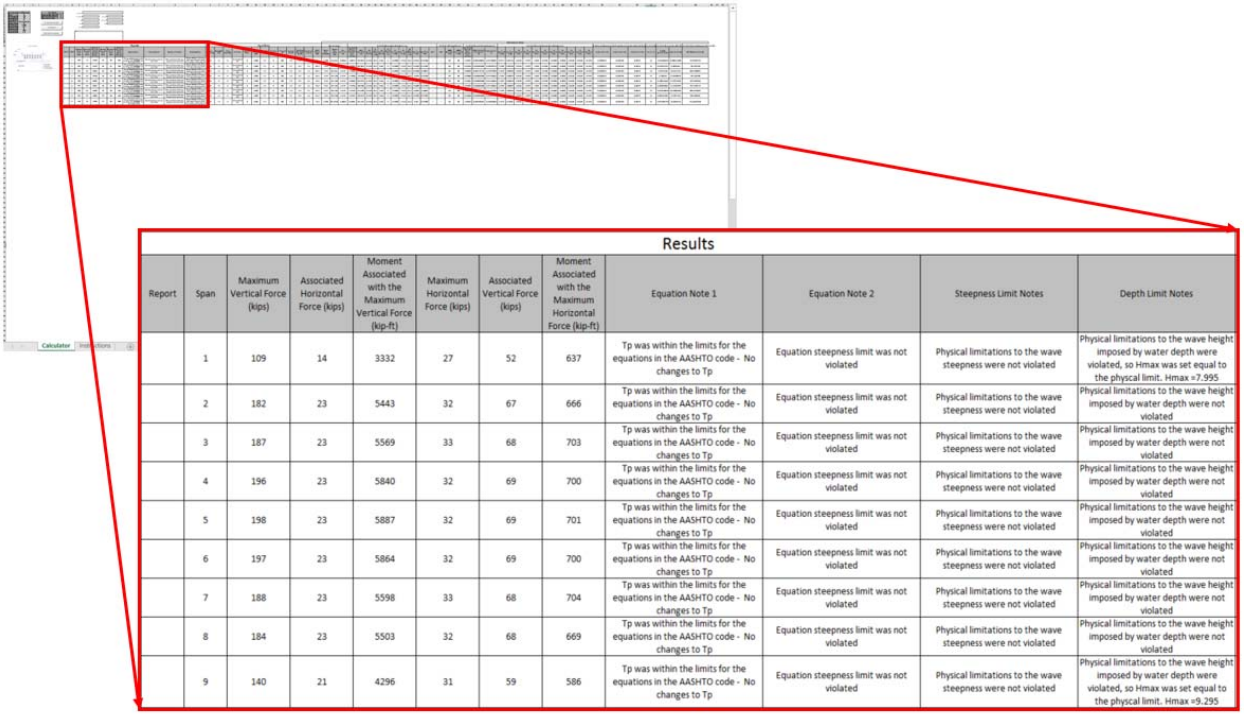


Figure A. 31
Wave force calculator control buttons

Figure A.32 through Figure A.34 presents the Results/Input Data/Intermediate Steps table from the Wave Force Calculator for all nine spans under Case 1 sea state conditions. Figure A.32 presents the results section of the combined table from the Wave Force Calculator, which provide the forces and moments and notes regarding any changes to the sea state to avoid violating the equation limits and physical limits. Figure A.33 presents the input data section of the combined table, which provides a quality control to check that the input is the data intended for the input. Figure A.34 presents the intermediate steps section of the combined table, which provides all the final wave parameters (AASHTO Guide Specifications, and the intermediate steps in the wave force calculations *[1]*. This provides a method to check hand calculations.

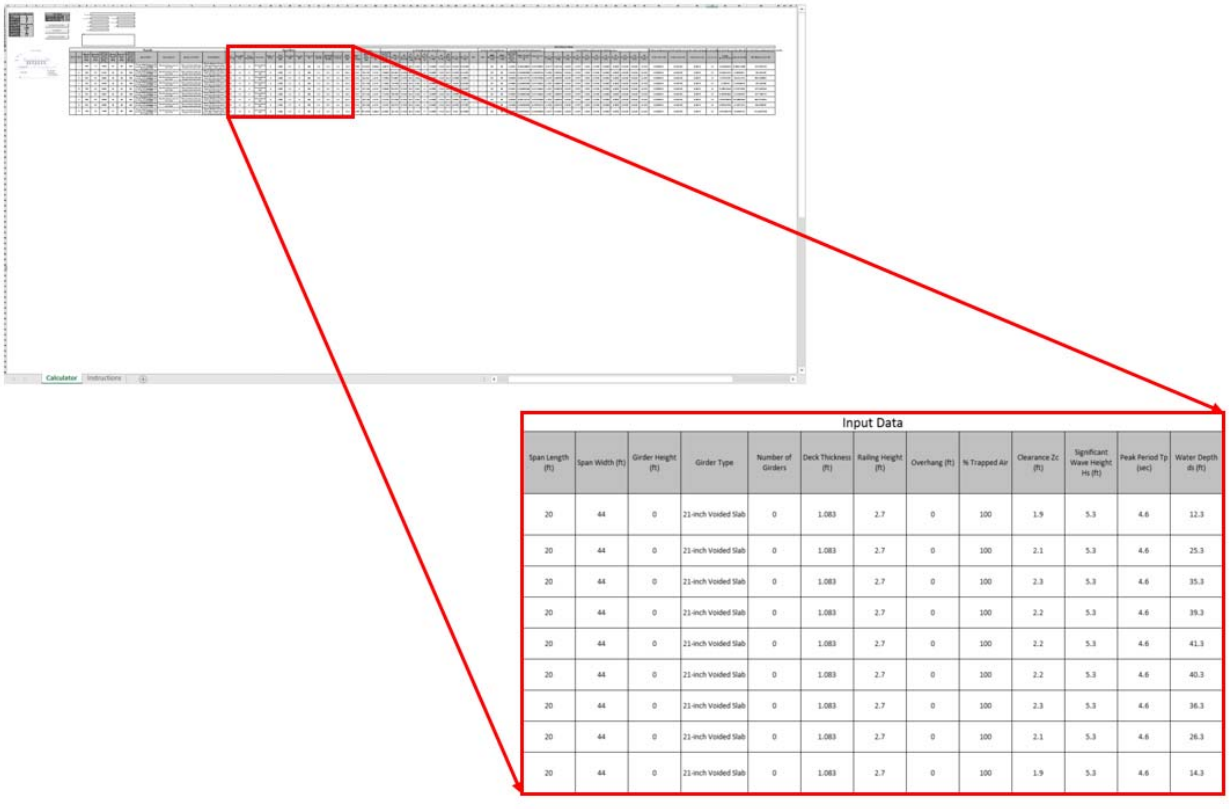
To create reports from the Wave Force Calculator, insert a “1” in the Report column of the Results/Input Data/Intermediate Steps next to each of the desired spans as demonstrated in Figure A.35. Running the Create Reports program (by clicking the Create Reports button), creates a new spreadsheet with separate tabs containing reports for each span with a “1” in the Report column.



Results

Report	Span	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)	Equation Note 1	Equation Note 2	Steepness Limit Notes	Depth Limit Notes
	1	109	14	3332	27	52	637	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were violated, so Hmax was set equal to the physcal limit. Hmax =7.995
	2	182	23	5443	32	67	666	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	3	187	23	5569	33	68	703	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	4	196	23	5840	32	69	700	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	5	198	23	5887	32	69	701	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	6	197	23	5864	32	69	700	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	7	188	23	5598	33	68	704	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	8	184	23	5503	32	68	669	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	9	140	21	4296	31	59	586	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were violated, so Hmax was set equal to the physcal limit. Hmax =9.295

Figure A. 32
Case 1 results from the wave force calculator

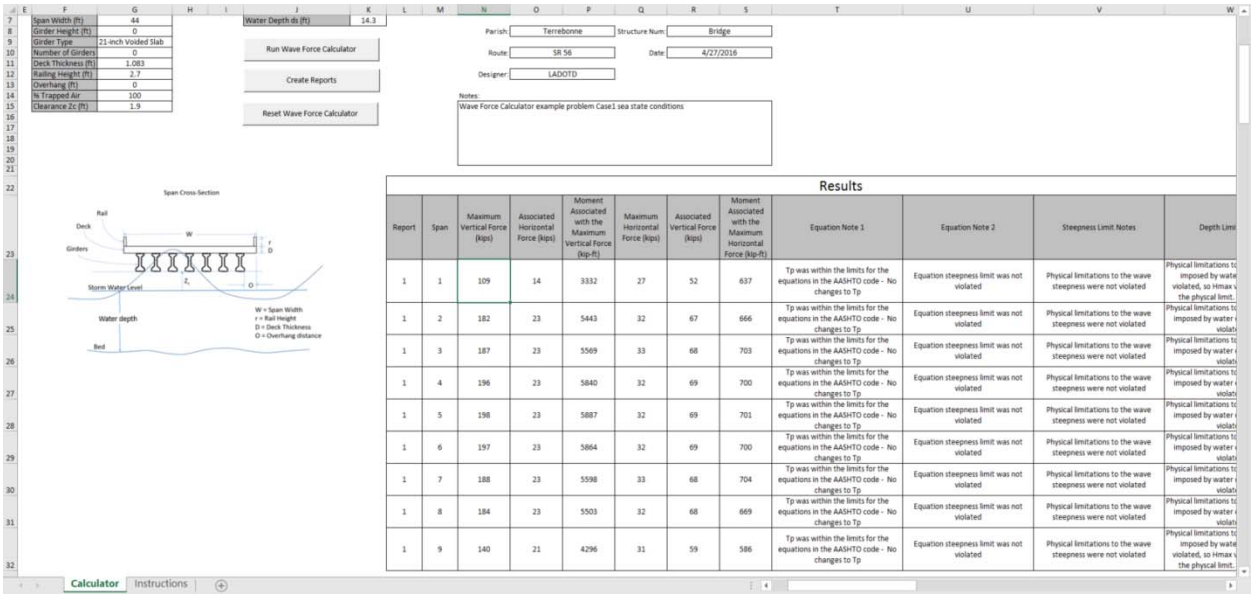


Input Data

Span Length (ft)	Span Width (ft)	Girder Height (ft)	Girder Type	Number of Girders	Deck Thickness (ft)	Railing Height (ft)	Overhang (ft)	% Trapped Air	Clearance Zc (ft)	Significant Wave Height Hs (ft)	Peak Period Tp (sec)	Water Depth ds (ft)
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	1.9	5.3	4.6	12.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.1	5.3	4.6	25.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.3	5.3	4.6	35.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.2	5.3	4.6	39.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.2	5.3	4.6	41.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.2	5.3	4.6	40.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.3	5.3	4.6	36.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	2.1	5.3	4.6	26.3
20	44	0	21-inch Voided Slab	0	1.083	2.7	0	100	1.9	5.3	4.6	14.3

Figure A. 33
Case 1 input data from the wave force calculator

Figure A. 34
Case 1 intermediate steps from the wave force calculator



Span Width (ft)	44
Girder Height (ft)	0
Girder Type	21-inch Voided Slab
Number of Girders	0
Deck Thickness (ft)	1.083
Railing Height (ft)	2.7
Overhang (ft)	0
% Trapped Air	100
Clearance 2c (ft)	1.9

Water Depth ds (ft): 14.3

Run Wave Force Calculator

Create Reports

Reset Wave Force Calculator

Parish: Terrebonne Structure Num: Bridge

Route: SR 56 Date: 4/27/2016

Designer: LADOTD

Notes: Wave Force Calculator example problem Case1 sea state conditions

Span Cross-Section

Results

Report	Span	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)	Equation Note 1	Equation Note 2	Steepness Limit Notes	Depth Limi
1	1	109	14	3332	27	52	637	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by wate violated, so Hmax the physcal limit.
1	2	182	23	5443	32	67	666	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	3	187	23	5569	33	68	703	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	4	196	23	5840	32	69	700	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	5	198	23	5887	32	69	701	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	6	197	23	5864	32	69	700	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	7	188	23	5598	33	68	704	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	8	184	23	5503	32	68	669	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by water violati
1	9	140	21	4296	31	59	586	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to imposed by wate violated, so Hmax the physcal limit.

Calculator | Instructions

Figure A. 35
Creating reports with the wave force calculator

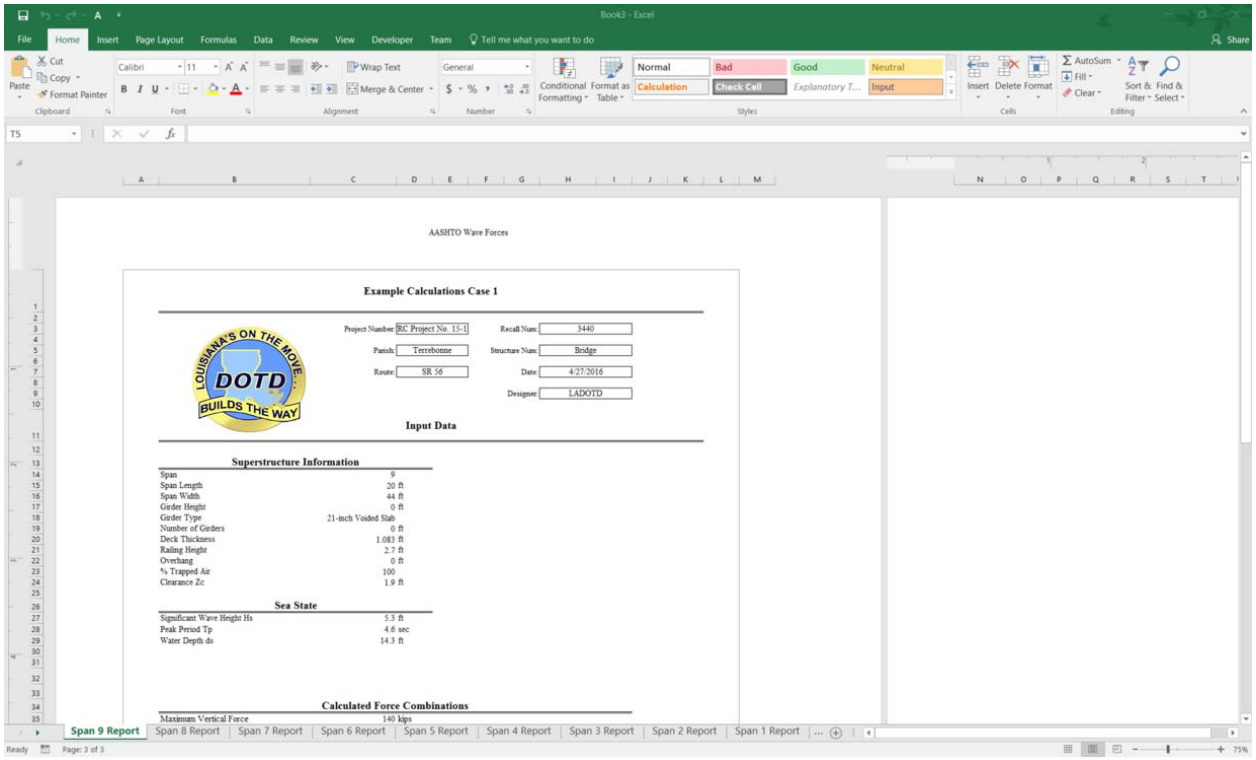
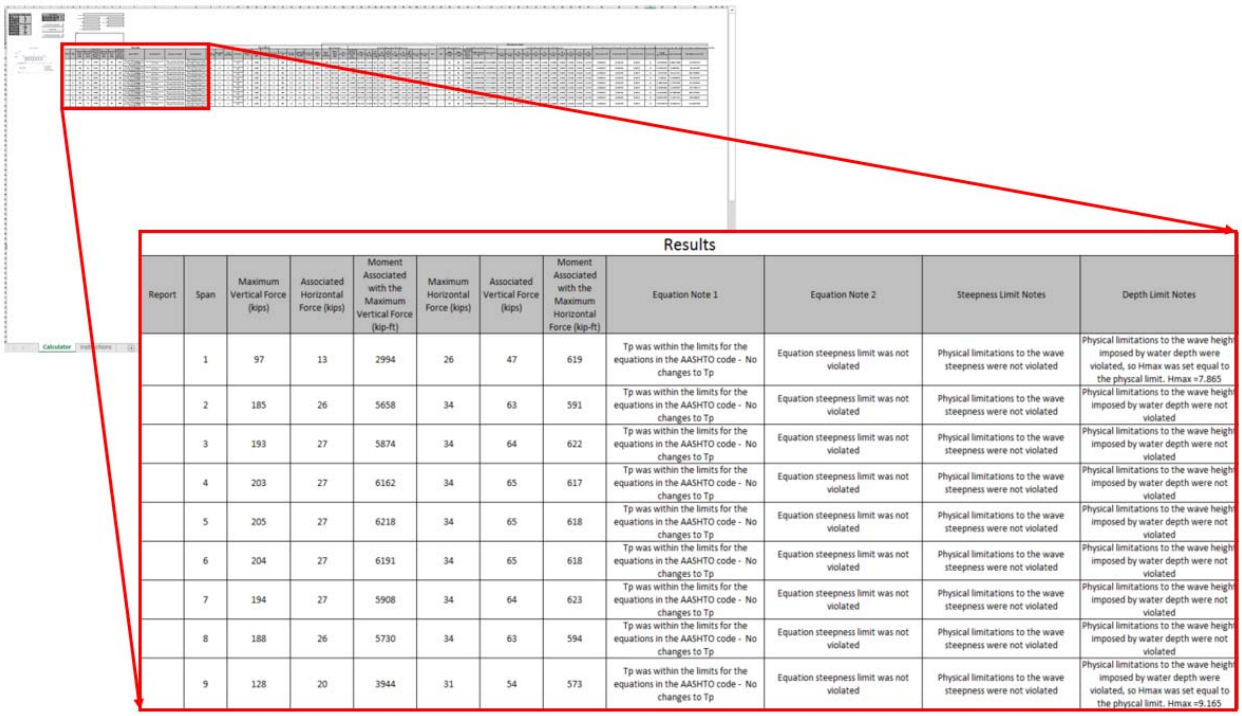


Figure A. 36
Reports from the wave force calculator

The next step involves calculating the wave forces using Case 2 sea state conditions. Figure A.37 presents the wave forces for the nine spans under Case 2 sea state conditions. The design condition is based on the case that produces the largest wave forces for each span. Figure A.38 presents a comparison of the wave forces for the two cases. As the figure demonstrates, neither case controls the forces at all the spans. For example, for Span 1 the forces produced by Case 1 sea state exceed those produced by Case 2. However, this is reversed for Span 2, where the forces produced by Case 2 sea state exceed those produced by Case 1.



Results

Report	Span	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)	Equation Note 1	Equation Note 2	Steepness Limit Notes	Depth Limit Notes
	1	97	13	2994	26	47	619	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were violated, so Hmax was set equal to the physcal limit. Hmax =7.865
	2	185	26	5658	34	63	591	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	3	193	27	5874	34	64	622	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	4	203	27	6162	34	65	617	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	5	205	27	6218	34	65	618	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	6	204	27	6191	34	65	618	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	7	194	27	5908	34	64	623	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	8	188	26	5730	34	63	594	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were not violated
	9	128	20	3944	31	54	573	Tp was within the limits for the equations in the AASHTO code - No changes to Tp	Equation steepness limit was not violated	Physical limitations to the wave steepness were not violated	Physical limitations to the wave height imposed by water depth were violated, so Hmax was set equal to the physcal limit. Hmax =9.165

Figure A. 37
Case 2 results from the wave force calculator

Span	Case 1						Case 2					
	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)	Maximum Vertical Force (kips)	Associated Horizontal Force (kips)	Moment Associated with the Maximum Vertical Force (kip-ft)	Maximum Horizontal Force (kips)	Associated Vertical Force (kips)	Moment Associated with the Maximum Horizontal Force (kip-ft)
1	109	14	3332	27	52	637	97	13	2994	26	47	619
2	182	23	5443	32	67	666	185	26	5658	34	63	591
3	187	23	5569	33	68	703	193	27	5874	34	64	622
4	196	23	5840	32	69	700	203	27	6162	34	65	617
5	198	23	5887	32	69	701	205	27	6218	34	65	618
6	197	23	5864	32	69	700	204	27	6191	34	65	618
7	188	23	5598	33	68	704	194	27	5908	34	64	623
8	184	23	5503	32	68	669	188	26	5730	34	63	594
9	140	21	4296	31	59	586	128	20	3944	31	54	573

Figure A. 38
Case 1 and Case 2 wave force comparison

APPENDIX B

Detailed Wave Force calculations

Met/Ocean Data

Table B. 1
Maximum Storm Water Level and Associated Waves

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002631	1	8.6	2.9	4.1
002631	2	8.6	2.9	4.1
002631	3	8.6	2.9	4.1
002632	1	8.6	2.9	4.1
002632	2	8.6	2.9	4.1
002632	3	8.6	2.9	4.1
002650	1	8.0	2.9	4.0
002650	2	8.0	2.9	4.0
002650	3	8.0	2.9	4.0
002650	4	8.0	2.9	4.0
002650	5	8.0	2.9	4.0
002892	5	9.1	3.8	6.1
002892	6	9.1	3.8	6.0
002892	7	9.1	3.8	6.0
002892	8	9.1	3.8	6.0
002892	9	9.1	3.8	6.0
002892	10	9.1	3.8	6.0
002892	11	9.1	3.9	6.0
002892	12	9.1	3.9	6.0
002892	13	9.0	3.8	6.1
002892	14	9.1	3.9	6.0
002892	15	9.1	3.9	6.0
002892	16	9.1	3.9	6.0
002892	17	9.1	3.9	6.0
002892	18	9.1	4.0	6.0
002892	19	9.1	4.0	6.0
002892	20	9.1	4.0	6.0
002892	21	9.1	4.0	6.0

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	22	9.1	4.0	6.0
002892	23	9.2	4.0	6.0
002892	24	9.2	4.1	6.1
002892	25	9.2	4.1	6.1
002892	26	9.2	4.1	6.1
002892	27	9.2	4.1	6.1
002892	28	9.2	4.1	6.1
002892	29	9.1	4.0	6.0
002892	30	9.2	4.1	6.1
002892	31	9.2	4.1	6.1
002892	32	9.2	4.1	6.1
002892	33	9.2	4.1	6.1
002892	34	9.2	4.2	6.1
002892	35	9.2	4.1	6.1
002892	36	9.2	4.2	6.1
002892	37	9.2	4.2	6.1
002892	38	9.2	4.2	6.1
002892	39	9.2	4.2	6.1
002892	40	9.2	4.3	6.1
002892	41	9.2	4.3	6.1
002892	42	9.2	4.3	6.1
002892	43	9.2	4.3	6.1
002892	44	9.2	4.3	6.1
002892	45	9.2	4.2	6.1
002892	46	9.3	4.3	6.1
002892	47	9.3	4.3	6.1
002892	48	9.3	4.3	6.1
002892	49	9.3	4.4	6.1
002892	50	9.3	4.4	6.1
002892	51	9.3	4.4	6.1
002892	52	9.3	4.4	6.1
002892	53	9.3	4.4	6.1
002892	54	9.3	4.5	6.1
002892	55	9.3	4.3	6.1
002892	56	9.3	4.5	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	57	9.3	4.6	6.1
002892	58	9.3	4.6	6.1
002892	59	9.3	4.6	6.1
002892	60	9.3	4.6	6.1
002892	61	9.3	4.6	6.1
002892	62	9.3	4.7	6.1
002892	63	9.3	4.7	6.1
002892	64	9.3	4.7	6.1
002892	65	9.3	4.5	6.1
002892	66	9.3	4.7	6.1
002892	67	9.3	4.7	6.1
002892	68	9.4	4.7	6.1
002892	69	9.4	4.7	6.1
002892	70	9.4	4.8	6.1
002892	71	9.4	4.8	6.1
002892	72	9.4	4.8	6.1
002892	73	9.4	4.8	6.1
002892	74	9.4	4.8	6.1
002892	75	9.3	4.7	6.1
002892	76	9.4	4.8	6.1
002892	77	9.4	4.8	6.1
002892	78	9.4	4.8	6.1
002892	79	9.4	4.8	6.1
002892	80	9.4	4.8	6.1
002892	81	9.4	4.8	6.1
002892	82	9.4	4.8	6.1
002892	83	9.4	4.8	6.1
002892	84	9.4	4.8	6.1
002892	85	9.4	4.8	6.1
002892	86	9.4	4.8	6.1
002892	87	9.4	4.9	6.1
002892	88	9.4	4.9	6.1
002892	89	9.4	4.9	6.1
002892	90	9.4	4.9	6.1
002892	91	9.4	4.9	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	92	9.4	4.9	6.1
002892	93	9.4	4.9	6.1
002892	94	9.4	4.9	6.1
002892	95	9.4	4.9	6.1
002892	96	9.4	4.9	6.1
002892	97	9.4	4.9	6.1
002892	98	9.4	4.9	6.1
002892	99	9.4	4.9	6.0
002892	100	9.5	4.9	6.0
002892	101	9.5	5.0	6.0
002892	102	9.5	5.0	6.0
002892	103	9.5	5.0	6.0
002892	104	9.5	5.0	6.0
002892	105	9.4	4.9	6.1
002892	106	9.5	5.0	6.0
002892	107	9.5	5.0	6.1
002892	108	9.5	5.1	6.1
002892	109	9.5	5.1	6.1
002892	110	9.5	5.1	6.1
002892	111	9.5	5.1	6.1
002892	112	9.5	5.1	6.1
002892	113	9.5	5.2	6.1
002892	114	9.5	5.1	6.1
002892	115	9.5	5.0	6.1
002892	116	9.5	5.1	6.1
002892	117	9.5	5.1	6.2
002892	118	9.5	5.1	6.2
002892	119	9.5	5.1	6.2
002892	120	9.5	5.1	6.2
002892	121	9.5	5.1	6.2
002892	122	9.5	5.1	6.2
002892	123	9.6	5.1	6.1
002892	124	9.5	5.1	6.1
002892	125	9.6	5.1	6.1
002892	126	9.6	5.1	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	127	9.6	5.2	6.1
002892	128	9.6	5.2	6.1
002892	129	9.6	5.2	6.1
002892	130	9.6	5.2	6.1
002892	131	9.6	5.2	6.1
002892	132	9.6	5.2	6.1
002892	133	9.6	5.3	6.1
002892	134	9.6	5.1	6.1
002892	135	9.6	5.3	6.1
002892	136	9.6	5.4	6.1
002892	137	9.6	5.4	6.0
002892	138	9.6	5.4	6.0
002892	139	9.6	5.4	6.0
002892	140	9.6	5.4	6.0
002892	141	9.6	5.4	6.1
002892	142	9.6	5.4	6.1
002892	143	9.6	5.4	6.1
002892	144	9.6	5.3	6.1
002892	145	9.6	5.4	6.1
002892	146	9.6	5.5	6.1
002892	147	9.6	5.5	6.1
002892	148	9.6	5.5	6.0
002892	149	9.6	5.5	6.0
002892	150	9.6	5.5	6.0
002892	151	9.6	5.5	6.0
002892	152	9.6	5.5	6.0
002892	153	9.7	5.5	6.0
002892	154	9.6	5.4	6.1
002892	155	9.7	5.5	6.0
002892	156	9.7	5.5	6.1
002892	157	9.7	5.5	6.1
002892	158	9.7	5.5	6.1
002892	159	9.7	5.5	6.1
002892	160	9.7	5.5	6.1
002892	161	9.7	5.5	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	162	9.7	5.4	6.1
002892	163	9.7	5.5	6.1
002892	164	9.7	5.5	6.1
002892	165	9.7	5.5	6.1
002892	166	9.7	5.5	6.1
002892	167	9.7	5.5	6.0
002892	168	9.7	5.5	6.0
002892	169	9.7	5.5	6.0
002892	170	9.7	5.5	6.0
002892	171	9.7	5.5	6.0
002892	172	9.7	5.5	6.0
002892	173	9.7	5.5	6.0
002892	174	9.7	5.5	6.1
002892	175	9.7	5.5	6.0
002892	176	9.7	5.5	6.0
002892	177	9.7	5.5	6.0
002892	178	9.8	5.5	6.0
002892	179	9.8	5.5	6.0
002892	180	9.8	5.4	6.0
002892	181	9.8	5.4	6.1
002892	182	9.8	5.5	6.0
002892	183	9.8	5.5	6.0
002892	184	9.7	5.5	6.0
002892	185	9.8	5.5	6.0
002892	186	9.8	5.5	6.0
002892	187	9.8	5.5	6.0
002892	188	9.8	5.5	6.0
002892	189	9.8	5.5	6.0
002892	190	9.8	5.5	6.0
002892	191	9.8	5.5	6.0
002892	192	9.8	5.5	6.0
002892	193	9.8	5.5	6.0
002892	194	9.8	5.5	6.0
002892	195	9.8	5.5	6.0
002892	196	9.8	5.5	6.0

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	197	9.8	5.4	6.0
002892	198	9.8	5.4	6.0
002892	199	9.8	5.4	6.0
002892	200	9.8	5.4	6.0
002892	201	9.9	5.3	6.0
002892	202	9.9	5.3	6.0
002892	203	9.9	5.3	6.0
002892	204	9.9	5.2	6.1
002892	205	9.9	5.2	6.1
002892	206	9.9	5.2	6.1
002892	207	9.9	5.2	6.1
002892	208	9.9	5.2	6.1
002892	209	9.9	5.2	6.1
002892	210	9.9	5.2	6.0
002892	211	9.9	5.2	6.0
002892	212	9.9	5.2	6.0
002892	213	9.9	5.2	6.0
002892	214	9.9	5.2	6.0
002892	215	9.9	5.2	6.0
002892	216	9.9	5.2	6.0
002892	217	9.9	5.2	6.0
002892	218	9.8	5.4	6.0
002892	219	9.9	5.2	6.0
002892	220	9.9	5.2	6.0
002892	221	10.0	5.1	6.0
002892	222	10.0	5.1	6.0
002892	223	10.0	5.1	6.0
002892	224	10.0	5.0	6.0
002892	225	10.0	5.0	6.0
002892	226	10.0	4.9	6.0
002892	227	10.0	4.9	6.0
002892	228	10.0	4.9	6.0
002892	229	10.0	4.8	6.0
002892	230	10.0	4.8	6.1
002892	231	10.0	4.7	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002892	232	10.0	4.7	6.1
002892	233	10.0	4.6	6.1
002892	234	10.1	4.6	6.1
002892	235	10.1	4.6	6.1
002892	236	10.1	4.6	6.1
002892	237	10.1	4.6	6.1
002892	238	10.1	4.5	6.1
002892	239	10.1	4.5	6.1
002892	240	10.1	4.5	6.1
002892	241	10.0	5.1	6.0
002892	242	10.1	4.5	6.1
002894	5	9.7	5.6	6.1
002894	6	9.7	5.6	6.1
002894	7	9.0	3.8	6.1
002894	8	9.0	3.9	6.1
002894	9	9.0	3.9	6.1
002894	10	9.1	3.9	6.1
002894	11	9.1	3.9	6.1
002894	12	9.1	3.9	6.1
002894	13	9.1	3.9	6.1
002894	14	9.1	3.9	6.1
002894	15	9.0	3.8	6.1
002894	16	9.1	4.0	6.1
002894	17	9.1	4.0	6.1
002894	18	9.1	4.0	6.1
002894	19	9.1	4.0	6.1
002894	20	9.1	4.1	6.1
002894	21	9.1	4.1	6.1
002894	22	9.1	4.1	6.1
002894	23	9.1	4.1	6.1
002894	24	9.1	4.0	6.1
002894	25	9.1	4.1	6.1
002894	26	9.1	4.1	6.1
002894	27	9.1	4.1	6.1
002894	28	9.1	4.1	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	29	9.2	4.1	6.1
002894	30	9.2	4.1	6.1
002894	31	9.2	4.2	6.1
002894	32	9.2	4.2	6.1
002894	33	9.2	4.2	6.1
002894	34	9.2	4.2	6.1
002894	35	9.2	4.2	6.1
002894	36	9.2	4.3	6.1
002894	37	9.2	4.2	6.1
002894	38	9.2	4.3	6.1
002894	39	9.2	4.3	6.1
002894	40	9.2	4.4	6.1
002894	41	9.2	4.4	6.1
002894	42	9.2	4.4	6.1
002894	43	9.2	4.4	6.1
002894	44	9.2	4.4	6.1
002894	45	9.2	4.4	6.1
002894	46	9.2	4.5	6.1
002894	47	9.2	4.3	6.1
002894	48	9.2	4.5	6.1
002894	49	9.2	4.6	6.1
002894	50	9.2	4.6	6.1
002894	51	9.3	4.6	6.1
002894	52	9.3	4.6	6.1
002894	53	9.3	4.6	6.1
002894	54	9.3	4.7	6.0
002894	55	9.3	4.7	6.1
002894	56	9.3	4.7	6.1
002894	57	9.2	4.5	6.1
002894	58	9.3	4.7	6.1
002894	59	9.3	4.7	6.1
002894	60	9.3	4.7	6.1
002894	61	9.3	4.8	6.1
002894	62	9.3	4.8	6.1
002894	63	9.3	4.8	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	64	9.3	4.8	6.1
002894	65	9.3	4.8	6.1
002894	66	9.3	4.8	6.1
002894	67	9.3	4.7	6.1
002894	68	9.3	4.9	6.1
002894	69	9.3	4.9	6.1
002894	70	9.3	4.9	6.1
002894	71	9.3	4.9	6.1
002894	72	9.3	5.0	6.1
002894	73	9.3	5.0	6.1
002894	74	9.3	5.0	6.1
002894	75	9.3	5.0	6.1
002894	76	9.3	5.0	6.1
002894	77	9.3	4.9	6.1
002894	78	9.4	5.0	6.1
002894	79	9.4	4.9	6.1
002894	80	9.4	4.9	6.1
002894	81	9.4	5.0	6.1
002894	82	9.4	5.0	6.1
002894	83	9.4	5.0	6.1
002894	84	9.4	5.0	6.0
002894	85	9.4	5.0	6.1
002894	86	9.4	5.0	6.1
002894	87	9.4	4.9	6.1
002894	88	9.4	5.0	6.1
002894	89	9.4	5.0	6.1
002894	90	9.4	5.0	6.1
002894	91	9.4	5.0	6.1
002894	92	9.4	5.0	6.1
002894	93	9.4	5.0	6.1
002894	94	9.4	5.0	6.1
002894	95	9.4	5.0	6.1
002894	96	9.4	5.0	6.1
002894	97	9.4	5.0	6.1
002894	98	9.4	5.0	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	99	9.4	5.0	6.1
002894	100	9.4	5.0	6.1
002894	101	9.4	5.0	6.1
002894	102	9.4	5.1	6.1
002894	103	9.4	5.1	6.1
002894	104	9.4	5.1	6.1
002894	105	9.5	5.1	6.1
002894	106	9.5	5.1	6.1
002894	107	9.4	5.0	6.1
002894	108	9.5	5.2	6.1
002894	109	9.5	5.2	6.1
002894	110	9.5	5.2	6.1
002894	111	9.5	5.2	6.1
002894	112	9.5	5.2	6.1
002894	113	9.5	5.3	6.1
002894	114	9.5	5.3	6.1
002894	115	9.5	5.3	6.1
002894	116	9.5	5.3	6.1
002894	117	9.5	5.2	6.1
002894	118	9.5	5.3	6.2
002894	119	9.5	5.2	6.2
002894	120	9.5	5.2	6.2
002894	121	9.5	5.2	6.2
002894	122	9.5	5.3	6.2
002894	123	9.5	5.3	6.2
002894	124	9.5	5.3	6.2
002894	125	9.5	5.3	6.1
002894	126	9.5	5.3	6.2
002894	127	9.5	5.3	6.1
002894	128	9.5	5.3	6.1
002894	129	9.5	5.3	6.1
002894	130	9.5	5.4	6.1
002894	131	9.5	5.4	6.1
002894	132	9.6	5.4	6.1
002894	133	9.6	5.4	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	134	9.6	5.4	6.1
002894	135	9.6	5.4	6.1
002894	136	9.5	5.3	6.1
002894	137	9.6	5.4	6.1
002894	138	9.6	5.5	6.1
002894	139	9.6	5.5	6.1
002894	140	9.6	5.5	6.1
002894	141	9.6	5.5	6.1
002894	142	9.6	5.5	6.1
002894	143	9.6	5.5	6.1
002894	144	9.6	5.5	6.1
002894	145	9.6	5.5	6.1
002894	146	9.6	5.5	6.1
002894	147	9.6	5.6	6.1
002894	148	9.6	5.6	6.1
002894	149	9.6	5.6	6.1
002894	150	9.6	5.6	6.1
002894	151	9.6	5.6	6.1
002894	152	9.6	5.6	6.1
002894	153	9.6	5.6	6.1
002894	154	9.6	5.6	6.1
002894	155	9.6	5.7	6.1
002894	156	9.6	5.6	6.1
002894	157	9.6	5.7	6.1
002894	158	9.7	5.7	6.1
002894	159	9.7	5.7	6.1
002894	160	9.7	5.7	6.1
002894	161	9.7	5.6	6.1
002894	162	9.7	5.6	6.1
002894	163	9.7	5.6	6.1
002894	164	9.7	5.6	6.1
002894	165	9.7	5.6	6.1
002894	166	9.6	5.7	6.1
002894	167	9.7	5.6	6.1
002894	168	9.7	5.6	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	169	9.7	5.6	6.1
002894	170	9.7	5.6	6.1
002894	171	9.7	5.6	6.1
002894	172	9.7	5.6	6.1
002894	173	9.7	5.6	6.1
002894	174	9.7	5.6	6.1
002894	175	9.7	5.6	6.1
002894	176	9.7	5.6	6.1
002894	177	9.7	5.6	6.1
002894	178	9.7	5.6	6.1
002894	179	9.7	5.6	6.1
002894	180	9.7	5.6	6.1
002894	181	9.7	5.6	6.1
002894	182	9.8	5.6	6.1
002894	183	9.8	5.6	6.1
002894	184	9.8	5.6	6.1
002894	185	9.8	5.6	6.1
002894	186	9.8	5.6	6.1
002894	187	9.8	5.6	6.1
002894	188	9.8	5.6	6.1
002894	189	9.8	5.6	6.0
002894	190	9.8	5.6	6.0
002894	191	9.8	5.6	6.0
002894	192	9.8	5.6	6.0
002894	193	9.8	5.6	6.0
002894	194	9.8	5.6	6.0
002894	195	9.8	5.6	6.0
002894	196	9.8	5.5	6.0
002894	197	9.8	5.5	6.0
002894	198	9.8	5.5	6.0
002894	199	9.8	5.5	6.0
002894	200	9.8	5.5	6.0
002894	201	9.8	5.5	6.0
002894	202	9.8	5.4	6.0
002894	203	9.8	5.4	6.0

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	204	9.8	5.5	6.0
002894	205	9.9	5.4	6.0
002894	206	9.9	5.4	6.1
002894	207	9.9	5.3	6.1
002894	208	9.9	5.3	6.1
002894	209	9.9	5.3	6.1
002894	210	9.9	5.3	6.1
002894	211	9.9	5.3	6.1
002894	212	9.9	5.3	6.1
002894	213	9.9	5.3	6.1
002894	214	9.9	5.3	6.1
002894	215	9.9	5.3	6.1
002894	216	9.9	5.3	6.0
002894	217	9.9	5.3	6.1
002894	218	9.9	5.3	6.1
002894	219	9.9	5.2	6.1
002894	220	9.9	5.2	6.1
002894	221	9.9	5.2	6.0
002894	222	9.9	5.2	6.0
002894	223	9.9	5.2	6.0
002894	224	10.0	5.2	6.0
002894	225	10.0	5.2	6.0
002894	226	10.0	5.2	6.0
002894	227	10.0	5.1	6.0
002894	228	10.0	5.0	6.0
002894	229	10.0	5.0	6.0
002894	230	10.0	4.9	6.0
002894	231	10.0	4.9	6.0
002894	232	10.0	4.8	6.1
002894	233	10.0	4.8	6.1
002894	234	10.0	4.7	6.1
002894	235	10.0	4.7	6.1
002894	236	10.1	4.7	6.1
002894	237	10.1	4.6	6.1
002894	238	10.1	4.6	6.1

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
002894	239	10.1	4.6	6.1
002894	240	10.1	4.6	6.1
002894	241	10.1	4.6	6.1
002894	242	10.1	4.5	6.1
002894	243	10.1	4.5	6.1
002894	244	10.1	4.5	6.1
002894	245	10.1	4.5	6.1
002894	246	10.0	5.1	6.0
002894	247	10.1	4.4	6.1
003432	1	9.5	6.5	4.7
003432	2	9.5	6.5	4.7
003432	3	9.5	6.5	4.7
003432	4	9.5	6.5	4.7
003432	5	9.5	6.5	4.7
003432	6	9.5	6.6	4.7
003432	7	9.5	6.6	4.7
003432	8	9.5	6.6	4.7
003432	9	9.5	6.6	4.7
003432	10	9.5	6.6	4.7
003432	11	9.5	6.6	4.7
003432	12	9.5	6.6	4.7
003432	13	9.5	6.6	4.7
003432	14	9.5	6.6	4.7
003432	15	9.5	6.6	4.7
003432	16	9.5	6.6	4.7
003432	17	9.5	6.6	4.7
003440	1	8.1	5.3	4.5
003440	2	8.1	5.3	4.5
003440	3	8.1	5.3	4.6
003440	4	8.1	5.3	4.6
003440	5	8.1	5.3	4.6
003440	6	8.1	5.3	4.6
003440	7	8.1	5.3	4.6
003440	8	8.1	5.2	4.6
003440	9	8.1	5.2	4.5

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
003450	1	9.3	3.8	3.7
003450	2	9.3	3.8	3.7
003450	3	9.3	3.8	3.7
003450	4	9.3	3.8	3.7
003450	5	9.3	3.8	3.8
003450	6	9.3	3.8	3.8
003480	1	8.1	1.3	2.0
003480	2	8.1	1.3	2.0
003480	3	8.1	1.4	2.0
003480	4	8.1	1.4	2.0
003480	5	8.1	1.4	2.0
003510	1	8.9	4.5	4.4
003510	2	8.9	4.6	4.4
003510	3	8.9	4.6	4.4
003510	4	8.9	4.6	4.4
003510	5	8.9	4.6	4.4
003510	6	8.9	4.6	4.4
003510	7	8.9	4.6	4.4
003510	8	8.9	4.7	4.4
003510	9	8.9	4.6	4.4
003520	1	9.2	4.3	4.5
003520	2	9.2	4.3	4.5
003520	3	9.2	4.3	4.5
003690	1	9.5	6.5	4.7
003690	2	9.5	6.5	4.7
003690	3	9.5	6.5	4.7
003690	4	9.5	6.5	4.7
003690	5	9.5	6.5	4.7
009030	1	6.6	1.6	4.4
009030	2	6.6	1.6	4.4
009030	3	6.6	1.6	4.4
009030	4	6.6	1.6	4.4
009030	5	6.6	1.6	4.4
009030	6	6.6	1.6	4.4
009030	7	6.6	1.6	4.2

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
009030	8	6.6	1.6	4.1
031755	1	5.8	1.4	4.1
031755	2	5.8	1.4	4.8
031755	3	5.8	1.4	5.5
031755	4	5.8	1.5	6.4
031755	5	5.8	1.5	7.4
031755	6	5.8	1.5	8.5
031755	7	5.8	1.5	9.2
031755	8	5.8	1.6	9.4
031755	9	5.8	1.6	9.5
031755	10	5.8	1.7	9.4
031755	11	5.8	1.7	9.4
031755	12	5.8	1.7	9.4
031755	13	5.8	1.8	9.4
031755	14	5.8	1.8	9.4
031755	15	5.8	1.8	9.4
031755	16	5.8	1.8	9.4
031755	17	5.8	1.8	9.4
031755	18	5.8	1.9	9.4
031755	19	5.8	1.9	9.4
031755	20	5.8	1.9	9.4
031755	21	5.8	1.9	9.4
031755	22	5.8	1.9	9.4
031755	23	5.8	1.9	9.3
031755	24	5.8	1.9	8.7
031755	25	5.8	1.8	8.4
031755	26	5.8	1.7	8.1
031755	27	5.8	1.6	7.8
033698	1	8.3	2.2	2.7
033698	2	8.3	2.3	2.7
033700	1	9.7	4.1	3.8
033700	2	9.7	4.1	3.8
033700	3	9.7	4.1	3.8
033700	4	9.7	4.0	3.8
033700	5	9.7	4.0	3.8

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
033700	6	9.7	4.0	3.8
033700	7	9.7	3.9	3.8
033700	8	9.6	3.9	3.8
033700	9	9.6	3.8	3.8
033700	10	9.6	3.8	3.8
033700	11	9.6	3.7	3.8
033700	12	9.6	3.6	3.8
033700	13	9.6	3.5	3.8
033700	14	9.6	3.5	3.7
033700	15	9.6	3.6	3.7
033700	16	9.6	3.6	3.6
033700	17	9.6	3.6	3.6
033700	18	9.6	3.6	3.6
033700	19	9.6	3.6	3.5
033700	20	9.6	3.6	3.5
033700	21	9.6	3.6	3.5
033700	22	9.6	3.6	3.5
033700	23	9.6	3.6	3.5
033700	24	9.6	3.6	3.5
033700	25	9.6	3.6	3.5
033700	26	9.6	3.6	3.5
033700	27	9.6	3.6	3.5
033700	28	9.6	3.6	3.5
033700	29	9.6	3.6	3.5
033700	30	9.6	3.6	3.5
033700	31	9.6	3.6	3.5
033700	32	9.6	3.6	3.5
033700	33	9.6	3.5	3.5
033700	34	9.6	3.5	3.5
033700	35	9.6	3.5	3.5
059482	1	6.7	1.4	2.1
059482	2	6.7	1.4	2.1
059482	3	6.7	1.4	2.2
059482	4	6.7	1.3	2.3
059482	5	6.7	1.1	2.2

Bridge Recall Number	Span	Maximum Storm Water Level (ft-MSL)	Associated Significant Wave Height (ft.)	Associated Peak Period (sec)
059482	6	6.7	1.0	2.1
060360	1	6.5	2.2	4.8
060360	2	6.5	2.2	4.8
060360	3	6.5	2.2	4.8
060360	4	6.5	2.2	4.8
060360	5	6.5	2.2	4.8

Table B.2
Maximum Significant Wave Height and Associated Storm Water Level

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002631	1	2.9	8.0	3.9
002631	2	2.9	8.0	3.9
002631	3	2.9	8.0	3.9
002632	1	2.9	8.0	3.9
002632	2	2.9	8.0	3.9
002632	3	2.9	8.0	3.9
002650	1	3.1	7.8	3.6
002650	2	3.1	7.8	3.6
002650	3	3.1	7.8	3.6
002650	4	3.1	7.8	3.6
002650	5	3.1	7.8	3.6
002892	5	3.8	9.1	6.0
002892	6	3.8	9.1	6.0
002892	7	3.8	9.1	6.0
002892	8	3.8	9.1	6.0
002892	9	3.8	9.1	6.0
002892	10	3.9	9.1	6.0
002892	11	3.9	9.1	6.0
002892	12	3.9	9.1	6.0
002892	13	3.8	9.0	6.1
002892	14	3.9	9.1	6.0
002892	15	3.9	9.1	6.1
002892	16	3.9	9.1	6.1
002892	17	4.0	9.1	6.1
002892	18	4.0	9.1	6.1
002892	19	4.0	9.1	6.0
002892	20	4.0	9.1	6.0
002892	21	4.0	9.1	6.1
002892	22	4.0	9.1	6.0
002892	23	4.0	9.2	6.1
002892	24	4.1	9.2	6.1
002892	25	4.1	9.2	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	26	4.1	9.2	6.1
002892	27	4.1	9.2	6.1
002892	28	4.1	9.2	6.1
002892	29	4.0	9.1	6.1
002892	30	4.1	9.2	6.1
002892	31	4.1	9.2	6.1
002892	32	4.1	9.2	6.1
002892	33	4.1	9.2	6.1
002892	34	4.2	9.2	6.1
002892	35	4.1	9.2	6.1
002892	36	4.2	9.2	6.1
002892	37	4.2	9.2	6.1
002892	38	4.3	9.2	6.1
002892	39	4.3	9.2	6.1
002892	40	4.3	9.2	6.1
002892	41	4.3	9.2	6.1
002892	42	4.3	9.2	6.2
002892	43	4.3	9.2	6.2
002892	44	4.3	9.2	6.2
002892	45	4.2	9.2	6.1
002892	46	4.4	9.3	6.2
002892	47	4.4	9.3	6.1
002892	48	4.4	9.3	6.1
002892	49	4.4	9.3	6.1
002892	50	4.4	9.3	6.1
002892	51	4.4	9.3	6.1
002892	52	4.5	9.3	6.1
002892	53	4.5	9.3	6.1
002892	54	4.5	9.3	6.1
002892	55	4.4	9.3	6.1
002892	56	4.5	9.3	6.1
002892	57	4.6	9.3	6.1
002892	58	4.6	9.3	6.1
002892	59	4.6	9.3	6.1
002892	60	4.6	9.3	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	61	4.7	9.3	6.1
002892	62	4.7	9.3	6.1
002892	63	4.7	9.3	6.1
002892	64	4.7	9.3	6.1
002892	65	4.6	9.3	6.1
002892	66	4.7	9.3	6.1
002892	67	4.7	9.3	6.1
002892	68	4.8	9.4	6.1
002892	69	4.8	9.4	6.1
002892	70	4.8	9.4	6.1
002892	71	4.8	9.4	6.1
002892	72	4.9	9.4	6.1
002892	73	4.9	9.4	6.0
002892	74	4.9	9.4	6.0
002892	75	4.7	9.3	6.1
002892	76	4.9	9.4	6.0
002892	77	4.9	9.4	6.0
002892	78	4.9	9.4	6.0
002892	79	4.9	9.4	6.0
002892	80	4.9	9.4	6.0
002892	81	4.9	9.4	6.0
002892	82	4.9	9.4	6.0
002892	83	4.9	9.4	6.0
002892	84	4.9	9.4	6.0
002892	85	4.9	9.4	6.1
002892	86	4.9	9.4	6.0
002892	87	4.9	9.4	6.0
002892	88	4.9	9.4	6.0
002892	89	4.9	9.4	6.0
002892	90	4.9	9.4	6.0
002892	91	4.9	9.4	6.0
002892	92	4.9	9.4	6.0
002892	93	4.9	9.4	6.0
002892	94	4.9	9.4	6.0
002892	95	4.9	9.4	6.0

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	96	4.9	9.4	6.0
002892	97	5.0	9.4	6.0
002892	98	5.0	9.4	6.0
002892	99	5.0	9.4	6.0
002892	100	5.0	9.5	6.0
002892	101	5.0	9.5	6.0
002892	102	5.0	9.5	6.0
002892	103	5.1	9.5	6.0
002892	104	5.1	9.5	6.0
002892	105	5.0	9.4	6.0
002892	106	5.1	9.5	6.0
002892	107	5.1	9.5	6.0
002892	108	5.1	9.5	6.0
002892	109	5.1	9.5	6.0
002892	110	5.2	9.5	6.0
002892	111	5.2	9.5	6.0
002892	112	5.2	9.5	6.0
002892	113	5.2	9.5	6.0
002892	114	5.2	9.5	6.1
002892	115	5.1	9.5	6.0
002892	116	5.2	9.5	6.1
002892	117	5.1	9.5	6.1
002892	118	5.1	9.5	6.1
002892	119	5.1	9.5	6.1
002892	120	5.1	9.5	6.1
002892	121	5.1	9.5	6.1
002892	122	5.1	9.5	6.1
002892	123	5.1	9.6	6.1
002892	124	5.1	9.5	6.1
002892	125	5.1	9.6	6.1
002892	126	5.1	9.6	6.1
002892	127	5.2	9.6	6.1
002892	128	5.2	9.6	6.1
002892	129	5.2	9.6	6.1
002892	130	5.2	9.6	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	131	5.2	9.6	6.1
002892	132	5.2	9.6	6.1
002892	133	5.3	9.6	6.1
002892	134	5.1	9.6	6.1
002892	135	5.3	9.6	6.0
002892	136	5.4	9.6	6.0
002892	137	5.5	9.6	6.0
002892	138	5.5	9.6	6.0
002892	139	5.5	9.6	6.0
002892	140	5.5	9.6	6.0
002892	141	5.5	9.6	6.0
002892	142	5.5	9.6	6.0
002892	143	5.6	9.6	6.0
002892	144	5.4	9.6	6.0
002892	145	5.7	9.6	6.0
002892	146	5.7	9.6	6.0
002892	147	5.7	9.6	6.0
002892	148	5.7	9.6	6.0
002892	149	5.7	9.6	6.0
002892	150	5.7	9.6	6.0
002892	151	5.7	9.6	6.0
002892	152	5.7	9.6	6.0
002892	153	5.7	9.7	6.0
002892	154	5.7	9.6	6.0
002892	155	5.7	9.7	6.0
002892	156	5.7	9.7	6.0
002892	157	5.7	9.7	6.0
002892	158	5.7	9.7	6.0
002892	159	5.6	9.7	6.1
002892	160	5.5	9.7	6.0
002892	161	5.5	9.7	6.0
002892	162	5.5	9.7	6.0
002892	163	5.5	9.7	6.1
002892	164	5.7	9.7	6.0
002892	165	5.5	9.7	6.0

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	166	5.6	9.7	6.0
002892	167	5.6	9.7	6.0
002892	168	5.6	9.7	6.0
002892	169	5.6	9.7	6.0
002892	170	5.7	9.7	6.0
002892	171	5.7	9.7	6.0
002892	172	5.7	9.7	6.0
002892	173	5.7	9.7	6.0
002892	174	5.6	9.7	6.0
002892	175	5.7	9.7	6.0
002892	176	5.7	9.7	6.0
002892	177	5.7	9.7	6.0
002892	178	5.6	9.8	6.0
002892	179	5.6	9.8	6.0
002892	180	5.6	9.8	6.0
002892	181	5.6	9.8	6.0
002892	182	5.6	9.8	6.0
002892	183	5.6	9.8	6.0
002892	184	5.7	9.7	6.0
002892	185	5.6	9.8	6.0
002892	186	5.6	9.8	6.0
002892	187	5.6	9.8	6.0
002892	188	5.6	9.8	6.0
002892	189	5.6	9.8	6.0
002892	190	5.6	9.8	6.0
002892	191	5.6	9.8	6.0
002892	192	5.6	9.8	5.9
002892	193	5.6	9.8	5.9
002892	194	5.6	9.8	6.0
002892	195	5.6	9.8	5.9
002892	196	5.6	9.8	6.0
002892	197	5.5	9.8	6.0
002892	198	5.5	9.8	6.0
002892	199	5.5	9.8	6.0
002892	200	5.5	9.8	6.0

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	201	5.4	9.9	6.0
002892	202	5.4	9.9	6.0
002892	203	5.4	9.9	6.0
002892	204	5.3	9.9	6.0
002892	205	5.3	9.9	6.0
002892	206	5.3	9.9	6.1
002892	207	5.3	9.9	6.0
002892	208	5.3	9.9	6.0
002892	209	5.3	9.9	6.0
002892	210	5.3	9.9	6.0
002892	211	5.3	9.9	6.0
002892	212	5.3	9.9	6.0
002892	213	5.3	9.9	6.0
002892	214	5.3	9.9	6.0
002892	215	5.3	9.9	6.0
002892	216	5.3	9.9	6.0
002892	217	5.3	9.9	6.0
002892	218	5.5	9.8	6.0
002892	219	5.3	9.9	6.0
002892	220	5.3	9.9	6.0
002892	221	5.2	10.0	6.0
002892	222	5.2	10.0	6.0
002892	223	5.2	10.0	6.0
002892	224	5.1	10.0	6.0
002892	225	5.1	10.0	6.0
002892	226	5.1	10.0	6.0
002892	227	5.0	10.0	6.0
002892	228	5.0	10.0	6.0
002892	229	5.0	10.0	6.0
002892	230	4.9	10.0	6.1
002892	231	4.9	10.0	6.1
002892	232	4.8	10.0	6.1
002892	233	4.8	10.0	6.1
002892	234	4.7	10.1	6.1
002892	235	4.7	10.1	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002892	236	4.7	10.1	6.1
002892	237	4.7	10.1	6.1
002892	238	4.7	10.1	6.1
002892	239	4.6	10.1	6.1
002892	240	4.6	10.1	6.1
002892	241	5.2	10.0	6.0
002892	242	4.6	10.1	6.1
002894	5	5.8	9.7	6.0
002894	6	5.8	9.7	6.0
002894	7	3.9	9.0	6.1
002894	8	3.9	9.0	6.1
002894	9	3.9	9.0	6.1
002894	10	3.9	9.1	6.1
002894	11	3.9	9.1	6.1
002894	12	3.9	9.1	6.1
002894	13	3.9	9.1	6.1
002894	14	3.9	9.1	6.1
002894	15	3.9	9.0	6.1
002894	16	4.0	9.1	6.1
002894	17	4.0	9.1	6.1
002894	18	4.0	9.1	6.1
002894	19	4.0	9.1	6.1
002894	20	4.1	9.1	6.1
002894	21	4.1	9.1	6.1
002894	22	4.1	9.1	6.1
002894	23	4.1	9.1	6.1
002894	24	4.0	9.1	6.1
002894	25	4.1	9.1	6.1
002894	26	4.1	9.1	6.1
002894	27	4.1	9.1	6.1
002894	28	4.1	9.1	6.1
002894	29	4.1	9.2	6.1
002894	30	4.1	9.2	6.1
002894	31	4.2	9.2	6.1
002894	32	4.2	9.2	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	33	4.2	9.2	6.1
002894	34	4.2	9.2	6.1
002894	35	4.2	9.2	6.1
002894	36	4.3	9.2	6.1
002894	37	4.2	9.2	6.1
002894	38	4.3	9.2	6.1
002894	39	4.4	9.2	6.1
002894	40	4.4	9.2	6.1
002894	41	4.4	9.2	6.1
002894	42	4.4	9.2	6.1
002894	43	4.4	9.2	6.1
002894	44	4.5	9.2	6.1
002894	45	4.5	9.2	6.1
002894	46	4.5	9.2	6.1
002894	47	4.3	9.2	6.1
002894	48	4.5	9.2	6.1
002894	49	4.6	9.2	6.1
002894	50	4.6	9.2	6.1
002894	51	4.6	9.3	6.1
002894	52	4.7	9.3	6.1
002894	53	4.7	9.3	6.1
002894	54	4.7	9.3	6.0
002894	55	4.7	9.3	6.1
002894	56	4.7	9.3	6.1
002894	57	4.6	9.2	6.1
002894	58	4.7	9.3	6.1
002894	59	4.8	9.3	6.1
002894	60	4.8	9.3	6.1
002894	61	4.8	9.3	6.1
002894	62	4.8	9.3	6.0
002894	63	4.9	9.3	6.0
002894	64	4.9	9.3	6.0
002894	65	4.9	9.3	6.0
002894	66	4.9	9.3	6.0
002894	67	4.8	9.3	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	68	4.9	9.3	6.0
002894	69	5.0	9.3	6.0
002894	70	5.0	9.3	6.0
002894	71	5.0	9.3	6.0
002894	72	5.0	9.3	6.0
002894	73	5.0	9.3	6.0
002894	74	5.1	9.3	6.0
002894	75	5.1	9.3	6.0
002894	76	5.1	9.3	6.0
002894	77	4.9	9.3	6.0
002894	78	5.1	9.4	6.0
002894	79	5.1	9.4	6.1
002894	80	5.1	9.4	6.0
002894	81	5.1	9.4	6.0
002894	82	5.1	9.4	6.0
002894	83	5.1	9.4	6.0
002894	84	5.1	9.4	6.0
002894	85	5.1	9.4	6.0
002894	86	5.1	9.4	6.0
002894	87	5.1	9.4	6.0
002894	88	5.1	9.4	6.0
002894	89	5.1	9.4	6.0
002894	90	5.1	9.4	6.0
002894	91	5.1	9.4	6.0
002894	92	5.1	9.4	6.0
002894	93	5.1	9.4	6.0
002894	94	5.1	9.4	6.0
002894	95	5.1	9.4	6.0
002894	96	5.1	9.4	6.0
002894	97	5.1	9.4	6.0
002894	98	5.1	9.4	6.0
002894	99	5.1	9.4	6.0
002894	100	5.1	9.4	6.0
002894	101	5.1	9.4	6.0
002894	102	5.1	9.4	6.0

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	103	5.1	9.4	6.0
002894	104	5.1	9.4	6.0
002894	105	5.2	9.5	6.0
002894	106	5.2	9.5	6.0
002894	107	5.1	9.4	6.0
002894	108	5.2	9.5	6.0
002894	109	5.2	9.5	6.0
002894	110	5.3	9.5	6.0
002894	111	5.3	9.5	6.0
002894	112	5.3	9.5	6.1
002894	113	5.3	9.5	6.1
002894	114	5.3	9.5	6.1
002894	115	5.3	9.5	6.1
002894	116	5.3	9.5	6.1
002894	117	5.2	9.5	6.0
002894	118	5.3	9.5	6.1
002894	119	5.2	9.5	6.1
002894	120	5.2	9.5	6.1
002894	121	5.2	9.5	6.1
002894	122	5.3	9.5	6.1
002894	123	5.3	9.5	6.1
002894	124	5.3	9.5	6.1
002894	125	5.3	9.5	6.1
002894	126	5.3	9.5	6.1
002894	127	5.3	9.5	6.1
002894	128	5.3	9.5	6.1
002894	129	5.3	9.5	6.1
002894	130	5.4	9.5	6.1
002894	131	5.4	9.5	6.1
002894	132	5.4	9.6	6.1
002894	133	5.4	9.6	6.1
002894	134	5.4	9.6	6.1
002894	135	5.4	9.6	6.1
002894	136	5.3	9.5	6.1
002894	137	5.4	9.6	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	138	5.5	9.6	6.1
002894	139	5.6	9.6	6.0
002894	140	5.6	9.6	6.0
002894	141	5.6	9.6	6.0
002894	142	5.6	9.6	6.0
002894	143	5.6	9.6	6.1
002894	144	5.6	9.6	6.1
002894	145	5.6	9.6	6.1
002894	146	5.5	9.6	6.1
002894	147	5.6	9.6	6.1
002894	148	5.8	9.6	6.1
002894	149	5.8	9.6	6.1
002894	150	5.8	9.6	6.1
002894	151	5.8	9.6	6.1
002894	152	5.8	9.6	6.1
002894	153	5.8	9.6	6.0
002894	154	5.8	9.6	6.0
002894	155	5.8	9.6	6.0
002894	156	5.7	9.6	6.1
002894	157	5.8	9.6	6.0
002894	158	5.9	9.7	6.0
002894	159	5.9	9.7	6.0
002894	160	5.8	9.7	6.0
002894	161	5.7	9.7	6.0
002894	162	5.7	9.7	6.0
002894	163	5.7	9.7	6.0
002894	164	5.7	9.7	6.1
002894	165	5.7	9.7	6.1
002894	166	5.8	9.6	6.0
002894	167	5.7	9.7	6.1
002894	168	5.7	9.7	6.0
002894	169	5.8	9.7	6.0
002894	170	5.8	9.7	6.0
002894	171	5.8	9.7	6.0
002894	172	5.8	9.7	6.0

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	173	5.8	9.7	6.0
002894	174	5.8	9.7	6.0
002894	175	5.8	9.7	6.0
002894	176	5.7	9.7	6.1
002894	177	5.8	9.7	6.0
002894	178	5.8	9.7	6.0
002894	179	5.7	9.7	6.0
002894	180	5.7	9.7	6.0
002894	181	5.7	9.7	6.0
002894	182	5.7	9.8	6.0
002894	183	5.8	9.8	6.0
002894	184	5.8	9.8	6.0
002894	185	5.8	9.8	6.0
002894	186	5.8	9.8	6.0
002894	187	5.8	9.8	6.0
002894	188	5.7	9.8	6.0
002894	189	5.7	9.8	6.0
002894	190	5.7	9.8	6.0
002894	191	5.7	9.8	6.0
002894	192	5.7	9.8	6.0
002894	193	5.7	9.8	6.0
002894	194	5.8	9.8	6.0
002894	195	5.7	9.8	6.0
002894	196	5.6	9.8	6.0
002894	197	5.6	9.8	6.0
002894	198	5.6	9.8	6.0
002894	199	5.6	9.8	6.0
002894	200	5.6	9.8	6.0
002894	201	5.6	9.8	6.0
002894	202	5.6	9.8	6.0
002894	203	5.5	9.8	6.0
002894	204	5.6	9.8	6.0
002894	205	5.5	9.9	6.0
002894	206	5.5	9.9	6.0
002894	207	5.5	9.9	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	208	5.5	9.9	6.0
002894	209	5.4	9.9	6.0
002894	210	5.4	9.9	6.0
002894	211	5.4	9.9	6.0
002894	212	5.4	9.9	6.0
002894	213	5.4	9.9	6.0
002894	214	5.4	9.9	6.0
002894	215	5.4	9.9	6.0
002894	216	5.4	9.9	6.0
002894	217	5.4	9.9	6.0
002894	218	5.4	9.9	6.1
002894	219	5.3	9.9	6.1
002894	220	5.3	9.9	6.1
002894	221	5.3	9.9	6.0
002894	222	5.3	9.9	6.0
002894	223	5.3	9.9	6.0
002894	224	5.3	10.0	6.0
002894	225	5.3	10.0	6.0
002894	226	5.3	10.0	6.0
002894	227	5.2	10.0	6.0
002894	228	5.1	10.0	6.0
002894	229	5.1	10.0	6.0
002894	230	5.1	10.0	6.0
002894	231	5.0	10.0	6.0
002894	232	5.0	10.0	6.1
002894	233	4.9	10.0	6.1
002894	234	4.9	10.0	6.1
002894	235	4.8	10.0	6.1
002894	236	4.8	10.1	6.1
002894	237	4.7	10.1	6.1
002894	238	4.7	10.1	6.1
002894	239	4.7	10.1	6.1
002894	240	4.7	10.1	6.1
002894	241	4.7	10.1	6.1
002894	242	4.6	10.1	6.1

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
002894	243	4.6	10.1	6.1
002894	244	4.6	10.1	6.1
002894	245	4.6	10.1	6.1
002894	246	5.2	10.0	6.0
002894	247	4.6	10.1	6.1
003432	1	7.0	9.5	4.8
003432	2	7.0	9.5	4.8
003432	3	7.0	9.5	4.8
003432	4	7.0	9.5	4.8
003432	5	7.0	9.5	4.8
003432	6	7.0	9.5	4.8
003432	7	7.0	9.5	4.8
003432	8	7.0	9.5	4.8
003432	9	7.0	9.5	4.8
003432	10	7.0	9.4	4.9
003432	11	7.0	9.4	4.9
003432	12	7.0	9.4	4.9
003432	13	7.0	9.4	4.9
003432	14	7.0	9.5	4.9
003432	15	7.0	9.5	4.9
003432	16	7.0	9.5	4.9
003432	17	7.0	9.5	4.9
003440	1	5.9	8.1	4.5
003440	2	5.9	8.1	4.5
003440	3	5.9	8.1	4.5
003440	4	5.9	8.1	4.5
003440	5	5.9	8.1	4.5
003440	6	5.9	8.1	4.5
003440	7	5.9	8.1	4.5
003440	8	5.8	8.1	4.4
003440	9	5.8	8.1	4.4
003450	1	4.8	8.0	4.8
003450	2	4.8	7.9	4.8
003450	3	4.8	7.8	4.8
003450	4	4.8	7.8	4.8

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
003450	5	4.8	7.8	4.8
003450	6	4.8	7.8	4.8
003480	1	1.8	2.4	2.2
003480	2	1.8	2.3	2.2
003480	3	1.9	2.4	2.2
003480	4	1.9	2.3	2.2
003480	5	1.9	2.6	2.3
003510	1	4.7	8.9	4.4
003510	2	4.7	8.9	4.4
003510	3	4.7	8.9	4.4
003510	4	4.7	8.9	4.4
003510	5	4.7	8.9	4.4
003510	6	4.8	8.9	4.4
003510	7	4.8	8.9	4.4
003510	8	4.8	8.9	4.4
003510	9	4.8	8.9	4.4
003520	1	4.4	9.2	4.3
003520	2	4.4	9.2	4.3
003520	3	4.4	9.2	4.3
003690	1	6.9	9.3	4.9
003690	2	6.9	9.3	4.9
003690	3	6.9	9.3	4.9
003690	4	6.9	9.3	4.9
003690	5	6.9	9.3	4.9
009030	1	2.1	3.9	4.3
009030	2	2.3	3.4	4.5
009030	3	2.4	2.5	4.1
009030	4	2.4	2.3	4.1
009030	5	2.4	2.3	4.1
009030	6	2.4	2.3	4.1
009030	7	2.3	3.2	4.2
009030	8	2.1	3.9	4.2
031755	1	1.4	5.6	3.7
031755	2	1.4	5.5	3.3
031755	3	1.4	5.4	3.6

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
031755	4	1.5	5.2	4.2
031755	5	1.6	5.0	4.5
031755	6	1.7	4.7	4.7
031755	7	1.7	4.5	4.6
031755	8	1.8	4.5	4.6
031755	9	1.8	4.1	5.2
031755	10	1.9	3.8	2.4
031755	11	2.0	2.8	2.3
031755	12	2.0	2.9	2.3
031755	13	2.0	3.0	2.2
031755	14	2.1	3.2	2.2
031755	15	2.1	3.4	2.3
031755	16	2.1	3.6	2.3
031755	17	2.1	4.2	2.4
031755	18	2.2	4.3	3.2
031755	19	2.2	4.7	3.3
031755	20	2.1	5.1	3.9
031755	21	2.1	5.2	4.3
031755	22	2.1	5.3	4.8
031755	23	2.1	5.3	5.1
031755	24	1.9	5.5	5.0
031755	25	1.8	5.4	4.8
031755	26	1.7	5.4	4.7
031755	27	1.6	5.4	4.7
033698	1	2.6	6.8	2.6
033698	2	2.8	7.6	2.7
033700	1	4.1	9.2	3.8
033700	2	4.1	9.4	3.7
033700	3	4.1	9.4	3.7
033700	4	4.0	9.5	3.7
033700	5	4.0	9.5	3.7
033700	6	4.0	9.5	3.7
033700	7	3.9	9.4	3.7
033700	8	3.9	9.4	3.7
033700	9	3.8	9.4	3.7

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
033700	10	3.8	9.3	3.7
033700	11	3.7	9.3	3.7
033700	12	3.6	9.0	3.8
033700	13	3.6	9.2	3.8
033700	14	3.5	9.1	3.7
033700	15	3.6	9.1	3.7
033700	16	3.6	9.1	3.6
033700	17	3.7	9.1	3.6
033700	18	3.7	9.1	3.6
033700	19	3.7	9.1	3.6
033700	20	3.7	9.1	3.6
033700	21	3.7	9.1	3.6
033700	22	3.7	9.1	3.6
033700	23	3.7	9.2	3.6
033700	24	3.7	9.1	3.6
033700	25	3.7	9.1	3.6
033700	26	3.7	9.1	3.6
033700	27	3.7	9.1	3.5
033700	28	3.6	9.1	3.5
033700	29	3.6	9.1	3.5
033700	30	3.6	9.0	3.5
033700	31	3.6	9.0	3.5
033700	32	3.6	9.0	3.5
033700	33	3.6	9.0	3.5
033700	34	3.6	9.0	3.5
033700	35	3.6	9.0	3.5
059482	1	2.0	2.8	2.3
059482	2	2.0	2.8	2.3
059482	3	1.9	3.0	2.3
059482	4	1.7	3.9	2.4
059482	5	1.7	3.1	2.3
059482	6	1.5	2.3	2.2
060360	1	2.4	6.1	5.1
060360	2	2.4	6.1	5.1
060360	3	2.4	6.1	5.2

Bridge Recall Number	Span	Peak Significant Wave Height (ft.)	Associated Storm Water Level (ft-MSL)	Associated Peak Period (sec)
060360	4	2.4	6.1	5.2
060360	5	2.4	6.1	5.2

Detailed Wave Force Results

LADOTD BRIDGE RECALL NO. 002631

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																			
SPAN NUMBER	1	2	3																
CRITICALITY INDEX (defined below)	3	3	3																
VULNERABILITY INDEX (defined below)	1.4	1.3	1.2																

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																			
HYDRAULIC VALUES																			
100-yr Water Surface Elevation (ft - MSL)	8.6	8.6	8.6																
Bed Elevation (ft - MSL)	1	-3	2																
Low Chord Elevation (ft - MSL)	6.1	6.1	6.1																
100-yr Max Wave Crest Elevation (ft - MSL)	12.1	12.3	12.0																
100-yr Wave Height (ft)	5.0	5.3	4.8																
100-yr Wave Period (seconds)	3.9	3.9	3.9																
SPAN PROPERITES																			
Span Length (ft)	20.0	20.0	20.0																
Span Width (ft)	42.8	42.8	42.8																
Deck Thickness (ft)	1.1	1.1	1.1																
Overhang (ft)																			
Number of Beams																			
Beam Dead Weight (lb/lf) - Each																			
Beam Dead Weight (kip/ft) - Total																			
Slab Dead Weight (kip/ft)	7.0	7.0	7.0																
Total Dead Weight (kip/ft)	7.0	7.0	7.0																
Resisting Moment (kft/ft)	149.0	149.0	149.0																
Resisting Vertical Force (kip/ft)	7.0	7.0	7.0																
100-YEAR FORCE-MOMENT VALUES																			
Maximum Vertical Force (kips/span)	72.3	72.8	70.1																
Maximum Vertical Force (kips/ft)	3.6	3.6	3.5																
Maximum Horizontal Force (kips/span)	9.3	12.5	10.2																
Maximum Horizontal Force (kips/ft)	0.5	0.6	0.5																
Maximum Moment (k-ft)	2426.7	2294.9	2099.6																
Maximum Moment (k-ft/ft)	121.3	114.7	105.0																

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-3 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 002632

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																			
SPAN NUMBER	1	2	3																
CRITICALITY INDEX (defined below)	3	3	3																
VULNERABILITY INDEX (defined below)	1.2	1.4	1.2																

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																			
HYDRAULIC VALUES																			
100-yr Water Surface Elevation (ft - MSL)	8.6	8.6	8.6																
Bed Elevation (ft - MSL)	1	-3	2																
Low Chord Elevation (ft - MSL)	6.1	6.1	6.1																
100-yr Max Wave Crest Elevation (ft - MSL)	12.1	12.3	12.0																
100-yr Wave Height (ft)	5.0	5.3	4.8																
100-yr Wave Period (seconds)	3.9	3.9	3.9																
SPAN PROPERITES																			
Span Length (ft)	20.0	20.0	20.0																
Span Width (ft)	42.8	42.8	42.8																
Deck Thickness (ft)	1.1	1.1	1.1																
Overhang (ft)																			
Number of Beams																			
Beam Dead Weight (lb/lf) - Each																			
Beam Dead Weight (kip/ft) - Total																			
Slab Dead Weight (kip/ft)	7.0	7.0	7.0																
Total Dead Weight (kip/ft)	7.0	7.0	7.0																
Resisting Moment (kft/ft)	149.0	149.0	149.0																
Resisting Vertical Force (kip/ft)	7.0	7.0	7.0																
100-YEAR FORCE-MOMENT VALUES																			
Maximum Vertical Force (kips/span)	69.1	73.0	70.1																
Maximum Vertical Force (kips/ft)	3.5	3.6	3.5																
Maximum Horizontal Force (kips/span)	10.7	11.0	10.6																
Maximum Horizontal Force (kips/ft)	0.5	0.6	0.5																
Maximum Moment (k-ft)	2051.8	2306.0	2097.3																
Maximum Moment (k-ft/ft)	102.6	115.3	104.9																

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-3 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 002650

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5													
CRITICALITY INDEX (defined below)	3	3	3	3	3													
VULNERABILITY INDEX (defined below)	0.9	1.5	1.6	1.6	0.9													

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	8.0	8.0	8.0	8.0	8.0													
Bed Elevation (ft - MSL)	3	-2	-4	-2	4													
Low Chord Elevation (ft - MSL)	7.2	5.5	5.5	5.5	7.2													
100-yr Max Wave Crest Elevation (ft - MSL)	11.1	11.6	11.6	11.6	11.1													
100-yr Wave Height (ft)	4.4	5.2	5.2	5.2	4.4													
100-yr Wave Period (seconds)	3.6	3.6	3.6	3.6	3.6													
SPAN PROPERITES																		
Span Length (ft)	17.0	17.0	55.0	17.0	17.0													
Span Width (ft)	28.9	28.9	28.9	28.9	28.9													
Deck Thickness (ft)	1.0	1.0	0.6	1.0	1.0													
Overhang (ft)			4.4															
Number of Beams			4															
Beam Dead Weight (lb/lf) - Each			129															
Beam Dead Weight (kip/ft) - Total			0.5															
Slab Dead Weight (kip/ft)	4.3	4.3	8.9	4.3	4.3													
Total Dead Weight (kip/ft)	4.3	4.3	9.4	4.3	4.3													
Resisting Moment (kft/ft)	62.6	62.6	94.1	62.6	62.6													
Resisting Vertical Force (kip/ft)	4.3	4.3	9.4	4.3	4.3													
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	30.4	42.3	220.5	42.3	30.4													
Maximum Vertical Force (kips/ft)	1.8	2.5	4.0	2.5	1.8													
Maximum Horizontal Force (kips/span)	11.8	14.7	67.8	27.4	11.8													
Maximum Horizontal Force (kips/ft)	0.7	0.9	1.2	1.6	0.7													
Maximum Moment (k-ft)	577.7	925.2	4,664.8	943.7	577.0													
Maximum Moment (k-ft/ft)	34.0	54.4	84.8	55.5	33.9													

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 2-4 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.4	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.0	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Bed Elevation (ft - MSL)	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.1	-0.3	-0.4	-0.3	-0.4	-0.4	-0.5	-0.5	-0.4	-0.5
Low Chord Elevation (ft - MSL)	12.0	12.0	12.2	12.9	13.4	14.2	15.3	16.6	18.1	18.2	19.2	20.4	22.0	23.8	24.8	25.9	27.3	28.3
100-yr Max Wave Crest Elevation (ft - MSL)	13.2	13.2	13.3	13.3	13.3	13.3	13.3	13.3	13.2	13.4	13.4	13.4	13.4	13.5	13.5	13.5	13.5	13.5
100-yr Wave Height (ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.0	6.1	6.2	6.1	6.2	6.2	6.2	6.2	6.2	6.3
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.0	6.1	6.1	6.1	6.1	6.0	6.0	6.1	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	96.2	95.4	74.4	40.6	12.6	5.3	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Vertical Force (kips/ft)	1.5	1.5	1.1	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	56.2	59.5	49.1	27.1	12.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.9	0.9	0.8	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	2032.2	1694.6	836.7	505.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	31.3	26.1	12.9	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.2	9.2	9.2	9.2	9.2	9.2	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Bed Elevation (ft - MSL)	-0.6	-0.6	-0.6	-0.6	-0.7	-0.7	-0.5	-0.7	-0.8	-0.8	-0.8	-0.8	-0.7	-0.9	-0.9	-0.9	-1.0	-1.0
Low Chord Elevation (ft - MSL)	29.0	29.8	30.4	32.3	32.4	30.9	30.5	30.0	29.1	28.3	27.5	26.5	25.6	25.6	25.4	24.5	23.2	22.2
100-yr Max Wave Crest Elevation (ft - MSL)	13.6	13.6	13.6	13.6	13.6	13.7	13.5	13.7	13.7	13.7	13.8	13.8	13.7	13.8	13.8	13.8	13.9	13.9
100-yr Wave Height (ft)	6.3	6.3	6.4	6.4	6.4	6.4	6.3	6.4	6.5	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.6
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	115.0	115.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Vertical Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Bed Elevation (ft - MSL)	-1.0	-1.0	-1.0	-1.1	-0.9	-1.1	-1.1	-1.1	-1.2	-1.2	-1.2	-1.3	-1.3	-1.3	-1.1	-1.3	-1.3	-1.4
Low Chord Elevation (ft - MSL)	22.0	21.7	20.3	19.4	18.2	17.7	16.9	16.9	16.9	16.9	16.2	15.7	15.4	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	13.9	13.9	13.9	13.9	13.8	14.0	14.0	14.0	14.0	14.0	14.1	14.1	14.1	14.1	14.0	14.1	14.2	14.2
100-yr Wave Height (ft)	6.7	6.7	6.7	6.7	6.6	6.7	6.7	6.8	6.8	6.8	6.8	6.9	6.9	6.9	6.7	6.9	6.9	6.9
100-yr Wave Period (seconds)	6.1	6.2	6.2	6.2	6.1	6.2	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	70.0	70.0	69.5	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.0	0.0	0.0	0.0	0.1	0.3	0.8	0.9	0.9	1.0	2.2	3.6	4.9	5.7	4.6	5.8	6.0	6.0
Maximum Vertical Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.3	9.4
Bed Elevation (ft - MSL)	-1.4	-1.4	-1.4	-1.4	-1.5	-1.5	-1.3	-1.5	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.7	-1.5	-1.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.2	14.2	14.2	14.2	14.2	14.3	14.1	14.3	14.3	14.3	14.3	14.3	14.4	14.4	14.4	14.4	14.3	14.4
100-yr Wave Height (ft)	7.0	7.0	7.0	7.0	7.0	7.0	6.9	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.1	7.2
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.0	6.0	6.1	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	6.1	6.3	6.4	6.5	6.7	6.7	5.8	6.9	7.2	7.4	7.7	7.7	7.8	7.8	7.8	7.9	7.1	8.0
Maximum Vertical Force (kips/ft)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Bed Elevation (ft - MSL)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.4	14.4	14.4	14.4	14.4	14.5	14.5	14.5	14.4	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.5
100-yr Wave Height (ft)	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	8.2	8.3	8.3	8.4	8.6	8.6	8.7	8.6	8.2	8.7	8.6	8.7	8.7	8.8	8.9	8.9	8.9	8.9
Maximum Vertical Force (kips/ft)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.4	9.4	9.4	9.4	9.4	9.5	9.5	9.5	9.5	9.5	9.4	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Bed Elevation (ft - MSL)	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.7	-1.8	-1.8	-1.8	-1.7	-1.8	-1.9	-1.9	-1.9	-1.9	-2.0	-2.0
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.5	14.5	14.5	14.5	14.5	14.5	14.5	14.6	14.6	14.6	14.5	14.6	14.7	14.7	14.7	14.7	14.7	14.7
100-yr Wave Height (ft)	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.4	7.4	7.4	7.4	7.4	7.4	7.5
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	8.7	9.1	9.2	9.3	9.3	9.4	9.5	9.7	9.8	10.1	9.2	10.3	10.8	11.1	11.2	11.4	11.5	11.6
Maximum Vertical Force (kips/ft)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6
Bed Elevation (ft - MSL)	-2.0	-2.0	-1.9	-2.0	-2.0	-2.0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.1	-2.1	-2.1	-2.1	-2.2	-2.2
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.7	14.7	14.6	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.9	14.9	14.9	14.9	14.9	14.9
100-yr Wave Height (ft)	7.5	7.5	7.4	7.5	7.5	7.5	7.5	7.5	7.6	7.6	7.6	7.5	7.6	7.6	7.6	7.6	7.6	7.6
100-yr Wave Period (seconds)	6.0	6.1	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	11.8	12.0	10.6	12.2	12.6	12.9	13.1	13.3	13.2	13.3	13.4	12.5	13.4	13.6	13.7	13.9	14.0	14.2
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	1.8	1.7	1.8	1.9	1.9	3.6	3.8	0.0	2.0	3.3	3.6	3.7	3.7	4.3
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.8	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Bed Elevation (ft - MSL)	-2.2	-2.2	-2.2	-2.1	-2.2	-2.2	-2.2	-2.3	-2.3	-2.3	-2.3	-2.3	-2.3	-2.2	-2.3	-2.4	-2.4	-2.4
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.9	14.9	14.9	14.9	14.9	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.1	15.1	15.1	15.1
100-yr Wave Height (ft)	7.6	7.7	7.7	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.8	7.7	7.8	7.8	7.8	7.8
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	14.3	14.6	14.6	13.6	14.7	14.9	14.9	15.2	15.3	15.5	15.8	15.9	16.2	14.8	16.3	16.8	16.9	17.1
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	5.1	7.8	5.1	3.7	5.8	5.8	5.7	6.5	8.1	10.0	8.1	8.1	9.4	5.9	10.5	10.3	12.6	11.7
Maximum Horizontal Force (kips/ft)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.6	9.6	9.6	9.6	9.7	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
Bed Elevation (ft - MSL)	-2.4	-2.4	-2.5	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.3	-2.3	-2.3	-2.4	-2.3	-2.3
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.1	15.1	15.1	15.2	15.2	15.1	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
100-yr Wave Height (ft)	7.8	7.9	7.9	7.9	7.9	7.8	7.9	7.9	7.9	7.8	7.8	7.8	7.8	7.8	7.8	7.9	7.8	7.8
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.1	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	17.4	17.6	17.6	17.7	17.8	16.4	18.0	18.2	18.1	45.0	17.8	17.8	30.5	17.6	17.7	18.2	17.6	17.5
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.7	0.3	0.3	0.5	0.3	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	12.1	12.5	14.8	12.4	12.8	9.4	14.4	14.7	14.3	15.2	14.3	12.6	15.1	12.7	13.0	14.4	12.6	12.7
Maximum Horizontal Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	532.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.8	9.8	9.7
Bed Elevation (ft - MSL)	-2.3	-2.2	-2.2	-2.2	-2.2	-2.2	-2.2	-2.3	-2.2	-2.2	-2.2	-2.2	-2.2	-2.3	-2.3	-2.3	-2.3	-2.2
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.2	15.2	15.1	15.1	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
100-yr Wave Height (ft)	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.7
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	17.4	17.4	17.3	17.3	17.4	17.2	17.3	17.6	17.3	17.4	17.7	18.1	18.4	18.6	19.0	18.8	18.8	17.3
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	12.2	12.4	12.5	12.5	14.7	14.6	12.4	12.6	12.1	12.6	15.4	15.0	13.1	16.9	19.4	18.1	17.0	12.1
Maximum Horizontal Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.9	9.9
Bed Elevation (ft - MSL)	-2.3	-2.2	-2.2	-2.2	-2.2	-2.1	-2.1	-2.0	-2.0	-2.3	-2.0	-1.9	-1.9	-1.9	-1.8	-1.8	-1.7	-1.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.3	15.3	15.3	15.2	15.2	15.2	15.2	15.2	15.2	15.3	15.2	15.2	15.2	15.2	15.1	15.1	15.1	15.1
100-yr Wave Height (ft)	7.8	7.8	7.8	7.8	7.8	7.7	7.7	7.7	7.7	7.8	7.7	7.6	7.6	7.6	7.6	7.5	7.5	7.5
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.9	5.9	6.0	5.9	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	18.9	18.9	18.9	18.6	21.7	18.1	18.0	17.7	17.4	18.9	17.2	17.1	16.8	16.7	16.3	16.3	16.2	16.3
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3
Maximum Horizontal Force (kips/span)	17.2	17.0	17.2	16.9	17.1	12.9	17.0	14.8	13.4	17.0	12.2	11.6	12.4	12.2	11.6	11.9	11.1	11.6
Maximum Horizontal Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.8	9.9	9.9
Bed Elevation (ft - MSL)	-1.7	-1.7	-1.7	-1.6	-1.6	-1.6	-1.6	-1.6	-1.7	-1.7	-1.6	-1.6	-1.6	-1.6	-1.6	-1.8	-1.6	-1.5
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.1	15.2	15.2
100-yr Wave Height (ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.6	7.5	7.5
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	16.1	16.2	16.1	16.1	18.6	16.4	16.3	16.4	16.5	16.6	16.6	16.8	16.7	16.6	18.3	16.5	16.5	16.2
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2
Maximum Horizontal Force (kips/span)	13.5	11.9	11.5	11.8	12.5	12.2	14.0	14.0	14.1	14.0	14.0	13.4	12.8	11.3	14.0	12.0	10.6	13.8
Maximum Horizontal Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0	0.1	0.3	0.5

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1	10.1	10.1	10.1
Bed Elevation (ft - MSL)	-1.5	-1.3	-1.3	-1.3	-1.2	-1.2	-1.1	-1.0	-1.0	-0.9	-0.9	-0.8	-0.8	-0.7	-0.7	-0.6	-0.6	-0.5
Low Chord Elevation (ft - MSL)	15.3	15.3	15.4	15.6	15.9	16.3	16.7	16.5	16.5	16.6	16.5	16.5	16.6	16.0	15.3	14.5	13.8	13.2
100-yr Max Wave Crest Elevation (ft - MSL)	15.1	15.1	15.1	15.1	15.1	15.1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.9	14.9	14.9
100-yr Wave Height (ft)	7.4	7.4	7.3	7.3	7.3	7.2	7.2	7.2	7.2	7.1	7.1	7.1	7.0	7.0	7.0	6.9	6.9	6.9
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	106.9	140.0	113.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6				0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6				6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	INSUFFICIENT DATA			583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5				7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9				148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5				7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	15.9	15.2	13.8	11.8	9.2	6.3	4.0	4.6	4.5				3.7	6.5	12.1	41.6	93.2	135.0
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1				0.1	0.1	0.2	0.6	1.4	2.1
Maximum Horizontal Force (kips/span)	11.3	8.8	4.9	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	4.6	34.2	64.4	89.9
Maximum Horizontal Force (kips/ft)	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.1	0.5	1.0	1.4
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0	0.0	1355.7	1662.3
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0	0.0	20.9	25.6

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002892

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	239	240	241	242														
CRITICALITY INDEX (defined below)	4	4	4	4														
VULNERABILITY INDEX (defined below)	0.6	0.8	0.9	0.8														

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	10.1	10.1	10.0	10.1														
Bed Elevation (ft - MSL)	-0.5	-0.4	-1.4	-0.4														
Low Chord Elevation (ft - MSL)	12.8	12.5	12.4	12.4														
100-yr Max Wave Crest Elevation (ft - MSL)	14.9	14.9	15.1	14.9														
100-yr Wave Height (ft)	6.9	6.8	7.4	6.8														
100-yr Wave Period (seconds)	6.1	6.1	6.0	6.1														
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0														
Span Width (ft)	45.8	45.8	45.8	45.8														
Deck Thickness (ft)	0.6	0.6	0.6	0.6														
Overhang (ft)	3.0	3.0	3.0	3.0														
Number of Beams	6	6	6	6														
Beam Dead Weight (lb/lf) - Each	583	583	583	583														
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5														
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0														
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5														
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9														
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5														
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	177.7	213.4	242.5	217.5														
Maximum Vertical Force (kips/ft)	2.7	3.3	3.7	3.3														
Maximum Horizontal Force (kips/span)	99.8	106.8	131.1	107.8														
Maximum Horizontal Force (kips/ft)	1.5	1.6	2.0	1.7														
Maximum Moment (k-ft)	2330.4	3307.3	3573.8	3441.4														
Maximum Moment (k-ft/ft)	35.9	50.9	55.0	52.9														

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	1.2	1.2	0.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.7	9.7	9.0	9.0	9.0	9.1	9.1	9.1	9.1	9.1	9.0	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Bed Elevation (ft - MSL)	-2.5	-2.5	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5	-0.3	-0.5	-0.5	-0.5	-0.6	-0.6	-0.7	-0.7
Low Chord Elevation (ft - MSL)	12.0	12.0	12.2	12.2	13.3	14.1	15.2	16.4	17.9	18.0	18.0	19.9	21.9	23.5	25.4	26.6	27.0	28.9
100-yr Max Wave Crest Elevation (ft - MSL)	15.3	15.3	13.3	13.3	13.3	13.4	13.4	13.4	13.4	13.4	13.3	13.4	13.5	13.5	13.5	13.6	13.6	13.6
100-yr Wave Height (ft)	8.0	8.0	6.1	6.1	6.1	6.1	6.2	6.2	6.2	6.2	6.1	6.2	6.3	6.2	6.3	6.3	6.4	6.4
100-yr Wave Period (seconds)	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	331.1	324.3	81.2	81.3	29.3	6.5	2.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Vertical Force (kips/ft)	5.1	5.0	1.2	1.3	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	171.6	169.9	52.8	51.3	17.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	2.6	2.6	0.8	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	5367.4	5198.5	1677.2	805.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	82.6	80.0	25.8	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 5-6 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.1	9.1	9.1	9.1	9.1	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2
Bed Elevation (ft - MSL)	-0.7	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.9	-0.9	-0.9	-1.0	-1.0	-1.0	-1.1	-0.9	-1.1	-1.1	-1.2
Low Chord Elevation (ft - MSL)	30.0	30.9	31.5	33.5	33.8	32.3	32.1	31.6	31.1	30.3	29.7	29.0	28.2	27.9	26.8	26.2	25.1	24.8
100-yr Max Wave Crest Elevation (ft - MSL)	13.6	13.5	13.6	13.6	13.7	13.7	13.7	13.7	13.7	13.7	13.8	13.8	13.8	13.9	13.8	13.9	13.9	13.9
100-yr Wave Height (ft)	6.4	6.3	6.4	6.4	6.4	6.5	6.5	6.5	6.5	6.5	6.6	6.6	6.6	6.7	6.6	6.7	6.7	6.7
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	92.5	92.5	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Vertical Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.3	9.3	9.3	9.3	9.3	9.3	9.2	9.3
Bed Elevation (ft - MSL)	-1.2	-1.2	-1.2	-1.3	-1.3	-1.3	-1.1	-1.4	-1.4	-1.5	-1.5	-1.5	-1.6	-1.6	-1.6	-1.6	-1.4	-1.7
Low Chord Elevation (ft - MSL)	24.0	23.3	22.6	22.1	21.4	20.8	20.3	19.4	18.6	17.9	17.2	16.4	16.4	16.6	16.9	16.5	15.9	15.6
100-yr Max Wave Crest Elevation (ft - MSL)	13.9	14.0	14.0	14.0	14.0	14.0	13.9	14.1	14.1	14.1	14.1	14.2	14.2	14.2	14.2	14.2	14.1	14.3
100-yr Wave Height (ft)	6.8	6.8	6.8	6.8	6.8	6.9	6.7	6.9	6.9	7.0	7.0	7.0	7.0	7.1	7.1	7.1	6.9	7.1
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.0	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	70.0	70.0	69.5	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.8	2.2	2.2	1.9	1.4	2.3	2.9	5.4
Maximum Vertical Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Bed Elevation (ft - MSL)	-1.7	-1.7	-1.7	-1.8	-1.8	-1.8	-1.8	-1.8	-1.7	-1.9	-1.9	-1.9	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Low Chord Elevation (ft - MSL)	15.4	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.3	14.3	14.3	14.3	14.3	14.4	14.4	14.4	14.3	14.4	14.4	14.5	14.5	14.5	14.5	14.5	14.5	14.5
100-yr Wave Height (ft)	7.1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.1	7.3	7.3	7.3	7.3	7.4	7.4	7.4	7.4	7.4
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	6.8	7.3	7.5	7.6	7.8	7.9	8.0	8.2	7.0	8.4	8.7	8.9	9.1	9.1	9.4	9.5	9.6	9.7
Maximum Vertical Force (kips/ft)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Bed Elevation (ft - MSL)	-1.9	-2.0	-2.0	-2.0	-2.0	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.4	14.5	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.5	14.6	14.6	14.6	14.6	14.6	14.6	14.6
100-yr Wave Height (ft)	7.3	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
100-yr Wave Period (seconds)	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	8.6	9.8	10.0	10.1	10.1	10.2	10.2	10.3	10.3	10.3	10.0	10.3	10.3	10.4	10.3	10.5	10.4	10.5
Maximum Vertical Force (kips/ft)	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.5	9.5	9.4	9.5	9.5	9.5	9.5	9.5
Bed Elevation (ft - MSL)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.1	-2.1	-2.1	-2.1	-2.0	-2.1	-2.2	-2.2	-2.2	-2.2
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.6	14.6	14.6	14.6	14.6	14.6	14.7	14.7	14.7	14.7	14.7	14.7	14.6	14.7	14.8	14.8	14.8	14.8
100-yr Wave Height (ft)	7.4	7.4	7.4	7.4	7.4	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4	7.5	7.6	7.6	7.6	7.6
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	10.6	10.7	10.5	10.7	10.9	10.9	11.1	11.2	11.1	11.3	11.5	11.8	10.7	12.0	12.4	12.7	12.9	13.1
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.6	1.8
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Bed Elevation (ft - MSL)	-2.3	-2.3	-2.3	-2.3	-2.2	-2.3	-2.3	-2.4	-2.4	-2.4	-2.4	-2.4	-2.4	-2.3	-2.4	-2.4	-2.4	-2.5
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	14.8	14.8	14.9	14.9	14.8	14.9	14.9	14.9	14.9	15.0	15.0	15.0	15.0	14.9	15.0	15.0	15.0	15.0
100-yr Wave Height (ft)	7.6	7.6	7.7	7.7	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.8	7.8	7.7	7.8	7.8	7.8	7.8
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	13.3	13.6	13.7	13.9	12.1	14.1	14.6	14.9	15.2	15.3	15.4	15.4	15.5	14.5	15.6	15.6	16.0	16.1
Maximum Vertical Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Maximum Horizontal Force (kips/span)	1.8	3.9	3.3	3.7	0.0	3.7	4.3	5.8	6.4	8.1	8.1	8.1	7.9	6.0	7.1	7.1	8.0	8.1
Maximum Horizontal Force (kips/ft)	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.5	9.6	9.6	9.6	9.6	9.5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Bed Elevation (ft - MSL)	-2.5	-2.5	-2.5	-2.5	-2.5	-2.4	-2.5	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.7	-2.5	-2.7	-2.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.0	15.0	15.0	15.1	15.1	15.0	15.1	15.1	15.1	15.1	15.1	15.1	15.2	15.2	15.2	15.1	15.2	15.2
100-yr Wave Height (ft)	7.8	7.8	7.8	7.9	7.9	7.8	7.9	7.9	7.9	7.9	7.9	7.9	7.9	8.0	8.0	7.9	8.0	8.0
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.0	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	16.2	16.3	16.6	16.8	16.8	15.6	17.0	17.1	17.4	17.6	17.7	18.1	18.2	27.2	18.7	17.0	18.8	19.0
Maximum Vertical Force (kips/ft)	0.2	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	7.2	9.1	10.6	10.5	10.5	7.1	10.5	10.5	11.8	14.4	12.8	12.7	15.2	15.7	14.9	9.1	15.2	14.8
Maximum Horizontal Force (kips/ft)	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.6
Bed Elevation (ft - MSL)	-2.7	-2.7	-2.7	-2.8	-2.8	-2.8	-2.8	-2.7	-2.8	-2.8	-2.8	-2.8	-2.7	-2.7	-2.7	-2.7	-2.6	-2.8
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.2	15.2	15.2	15.3	15.3	15.3	15.3	15.2	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Wave Height (ft)	8.0	8.0	8.0	8.1	8.1	8.1	8.1	8.0	8.1	8.1	8.1	8.1	8.1	8.0	8.0	8.0	8.0	8.1
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	19.3	19.6	19.8	20.1	21.2	21.5	21.1	18.9	21.3	21.0	23.2	20.8	21.1	20.8	20.6	20.3	27.6	21.1
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.3
Maximum Horizontal Force (kips/span)	17.5	17.3	17.7	17.8	20.1	18.9	20.1	15.3	20.1	20.0	20.1	19.9	20.0	19.6	20.0	17.6	20.3	20.3
Maximum Horizontal Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8
Bed Elevation (ft - MSL)	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.6	-2.5	-2.6	-2.5	-2.5	-2.5	-2.5	-2.5	-2.6	-2.6	-2.6
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.4	15.4	15.4
100-yr Wave Height (ft)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.9	7.9	8.0	8.0	8.0	8.0	8.0	8.0
100-yr Wave Period (seconds)	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	20.3	20.0	20.0	21.4	19.9	21.0	20.6	20.8	20.8	20.1	20.9	20.4	20.6	23.9	20.9	30.0	21.6	21.9
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.5	0.3	0.3
Maximum Horizontal Force (kips/span)	19.8	19.6	20.0	17.3	17.0	19.4	19.4	19.4	19.4	16.8	19.4	18.4	20.1	19.6	19.7	24.7	21.9	22.6
Maximum Horizontal Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Bed Elevation (ft - MSL)	-2.6	-2.6	-2.6	-2.5	-2.5	-2.5	-2.4	-2.4	-2.3	-2.6	-2.3	-2.2	-2.2	-2.2	-2.1	-2.0	-2.0	-2.0
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.3	15.3	15.4	15.3	15.3	15.3	15.3	15.2	15.2	15.2	15.2
100-yr Wave Height (ft)	8.0	8.0	8.0	8.0	8.0	8.0	7.9	7.9	7.9	8.0	7.9	7.8	7.8	7.8	7.7	7.7	7.7	7.7
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	21.9	28.1	21.9	21.6	29.9	35.1	20.8	20.6	35.5	22.0	20.3	20.5	24.1	19.2	18.4	18.0	17.8	17.7
Maximum Vertical Force (kips/ft)	0.3	0.4	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	22.0	25.5	22.6	22.8	24.5	21.9	21.7	19.7	22.8	21.7	19.4	19.2	19.6	15.7	16.7	16.8	14.6	16.9
Maximum Horizontal Force (kips/ft)	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.3
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.8	9.8	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Bed Elevation (ft - MSL)	-1.9	-2.1	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.9	-1.8	-1.8	-1.8	-1.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.3
100-yr Max Wave Crest Elevation (ft - MSL)	15.2	15.3	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.3	15.3	15.3	15.3	15.3	15.2	15.2	15.2
100-yr Wave Height (ft)	7.7	7.8	7.7	7.6	7.6	7.6	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.6	7.6	7.6	7.6	7.6
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.1	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583	583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	17.8	18.8	17.8	17.8	26.1	17.8	17.9	18.1	18.3	18.2	18.4	18.5	18.3	28.3	18.2	18.1	18.1	17.8
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3	0.3
Maximum Horizontal Force (kips/span)	14.3	17.1	14.3	14.5	16.5	14.5	14.4	13.0	17.6	16.1	18.9	16.7	16.5	16.4	17.5	16.1	16.4	16.0
Maximum Horizontal Force (kips/ft)	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.2
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.9	9.9	9.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.1	10.1	10.1
Bed Elevation (ft - MSL)	-1.7	-1.7	-1.6	-1.6	-1.5	-1.4	-1.3	-1.2	-1.2	-1.1	-1.1	-1.0	-0.9	-0.9	-0.8	-0.8	-0.7	-0.7
Low Chord Elevation (ft - MSL)	15.3	15.3	15.3	15.3	15.3	15.3	15.3	15.4	15.6	15.9	16.3	16.6	16.5	16.5	16.6	16.5	16.5	16.6
100-yr Max Wave Crest Elevation (ft - MSL)	15.2	15.2	15.2	15.2	15.2	15.1	15.1	15.1	15.1	15.1	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
100-yr Wave Height (ft)	7.6	7.5	7.5	7.5	7.4	7.4	7.3	7.3	7.3	7.2	7.2	7.2	7.1	7.1	7.1	7.0	7.0	7.0
100-yr Wave Period (seconds)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	6.1
SPAN PROPERITES																		
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	106.9	140.0	115.0	65.0
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6				0.6
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0				3.0
Number of Beams	6	6	6	6	6	6	6	6	6	6	6	6	6	6				6
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583	583	583	583	583	583	INSUFFICIENT DATA			583
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5				3.5
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0				4.0
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5				7.5
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9				148.9
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5				7.5
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	17.9	17.6	17.3	16.9	16.4	15.7	14.8	13.6	11.5	8.8	6.2	4.3	4.5	4.4				3.6
Maximum Vertical Force (kips/ft)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1				0.1
Maximum Horizontal Force (kips/span)	15.5	12.8	13.8	13.9	12.9	11.4	9.6	7.5	1.7	0.0	0.0	0.0	0.0	0.0				0.0
Maximum Horizontal Force (kips/ft)	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 002894

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																			
SPAN NUMBER	239	240	241	242	243	244	245	246	247										
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4										
VULNERABILITY INDEX (defined below)	0.0	0.0	0.1	0.3	0.5	0.7	0.7	0.9	0.8										

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																			
HYDRAULIC VALUES																			
100-yr Water Surface Elevation (ft - MSL)	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.0	10.1										
Bed Elevation (ft - MSL)	-0.6	-0.6	-0.5	-0.5	-0.4	-0.4	-0.3	-1.3	-0.3										
Low Chord Elevation (ft - MSL)	16.0	15.3	14.5	13.8	13.2	12.8	12.5	12.4	12.4										
100-yr Max Wave Crest Elevation (ft - MSL)	14.9	14.9	14.9	14.9	14.9	14.9	14.9	15.1	14.8										
100-yr Wave Height (ft)	7.0	6.9	6.9	6.9	6.8	6.8	6.8	7.4	6.8										
100-yr Wave Period (seconds)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.0	6.1										
SPAN PROPERITES																			
Span Length (ft)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0										
Span Width (ft)	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8	45.8										
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6										
Overhang (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0										
Number of Beams	6	6	6	6	6	6	6	6	6										
Beam Dead Weight (lb/lf) - Each	583	583	583	583	583	583	583	583	583										
Beam Dead Weight (kip/ft) - Total	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5										
Slab Dead Weight (kip/ft)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0										
Total Dead Weight (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5										
Resisting Moment (kft/ft)	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9	148.9										
Resisting Vertical Force (kip/ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5										
100-YEAR FORCE-MOMENT VALUES																			
Maximum Vertical Force (kips/span)	6.3	11.8	41.2	84.0	131.1	184.0	208.7	244.1	223.1										
Maximum Vertical Force (kips/ft)	0.1	0.2	0.6	1.3	2.0	2.8	3.2	3.8	3.4										
Maximum Horizontal Force (kips/span)	0.0	3.3	30.5	60.4	83.0	104.7	106.7	130.0	110.9										
Maximum Horizontal Force (kips/ft)	0.0	0.1	0.5	0.9	1.3	1.6	1.6	2.0	1.7										
Maximum Moment (k-ft)	0.0	0.0	71.0	885.8	1302.0	2626.0	3245.5	3741.0	3715.1										
Maximum Moment (k-ft/ft)	0.0	0.0	1.1	13.6	20.0	40.4	49.9	57.6	57.2										

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 003432

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
VULNERABILITY INDEX (defined below)	22.4	2.2	3.4	3.0	2.9	18.5	17.4	7.0	21.9		3.3	2.3	2.5	2.7	3.2	2.4	31.4	

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	
Bed Elevation (ft - MSL)	5	3	3	3	3	3	3	1	-1	-3	-8	-7	-6	-4	-3	0	5	
Low Chord Elevation (ft - MSL)	8.1	8.8	9.5	10.2	10.9	11.6	12.3	13.0	10.4	10.4	10.5	12.1	11.4	10.7	10.0	9.3	8.6	
100-yr Max Wave Crest Elevation (ft - MSL)	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	17.5	17.0	16.8	16.8	16.8	16.6	16.4	
100-yr Wave Height (ft)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	11.4	10.7	10.5	10.5	10.4	10.2	9.9	
100-yr Wave Period (seconds)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	135.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
Span Width (ft)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	
Deck Thickness (ft)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	6.3	1.1	1.1	1.1	1.1	1.1	1.1	1.1	
Overhang (ft)																		
Number of Beams										SWING								
Beam Dead Weight (lb/lf) - Each										SPAN								
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		4.9	4.9	4.9	4.9	4.9	4.9	4.9	
Total Dead Weight (kip/ft)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		4.9	4.9	4.9	4.9	4.9	4.9	4.9	
Resisting Moment (kft/ft)	73.1	73.1	73.1	73.1	73.1	73.1	73.1	73.1	73.1		73.1	73.1	73.1	73.1	73.1	73.1	73.1	
Resisting Vertical Force (kip/ft)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9		4.9	4.9	4.9	4.9	4.9	4.9	4.9	
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	527.7	121.9	192.1	168.2	163.0	741.1	970.8	170.5	585.9		181.1	129.5	138.9	151.4	176.8	132.6	741.2	
Maximum Vertical Force (kips/ft)	26.4	6.1	9.6	8.4	8.1	37.1	48.5	8.5	29.3		9.1	6.5	6.9	7.6	8.8	6.6	37.1	
Maximum Horizontal Force (kips/span)	12.7	8.5	7.9	16.7	17.6	40.7	76.2	47.9	28.3		31.5	28.0	6.4	7.0	7.6	8.1	32.2	
Maximum Horizontal Force (kips/ft)	0.6	0.4	0.4	0.8	0.9	2.0	3.8	2.4	1.4		1.6	1.4	0.3	0.3	0.4	0.4	1.6	
Maximum Moment (k-ft)	18748.5	1629.0	1688.3	1564.9	2167.2	15431.9	12644.5	5846.1	18283.3		1901.3	1846.2	1508.8	1562.1	1664.3	1643.5	26236.5	
Maximum Moment (k-ft/ft)	937.4	81.5	84.4	78.2	108.4	771.6	632.2	292.3	914.2		95.1	92.3	75.4	78.1	83.2	82.2	1311.8	

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-9, 11-17 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003440

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8	9									
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3	3									
VULNERABILITY INDEX (defined below)	0.8	1.3	1.1	1.2	1.3	1.2	1.1	1.3	1.1									

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1									
Bed Elevation (ft - MSL)	-4	-17	-27	-31	-33	-32	-28	-18	-6									
Low Chord Elevation (ft - MSL)	10.2	10.4	10.6	10.5	10.5	10.5	10.6	10.4	10.2									
100-yr Max Wave Crest Elevation (ft - MSL)	13.6	14.8	14.8	14.8	14.8	14.8	14.8	14.8	14.6									
100-yr Wave Height (ft)	7.8	9.5	9.5	9.5	9.5	9.5	9.5	9.4	9.2									
100-yr Wave Period (seconds)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.4	4.4									
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	35.0	20.0	20.0	20.0	20.0									
Span Width (ft)	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0									
Deck Thickness (ft)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1									
Overhang (ft)																		
Number of Beams																		
Beam Dead Weight (lb/lf) - Each																		
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1									
Total Dead Weight (kip/ft)	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1									
Resisting Moment (kft/ft)	157.3	157.3	157.3	157.3	157.3	157.3	157.3	157.3	157.3									
Resisting Vertical Force (kip/ft)	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1									
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	69.4	109.3	91.8	98.3	181.4	96.7	93.9	103.4	89.3									
Maximum Vertical Force (kips/ft)	3.5	5.5	4.6	4.9	5.2	4.8	4.7	5.2	4.5									
Maximum Horizontal Force (kips/span)	21.1	15.9	9.9	10.5	12.4	9.9	8.3	14.2	24.7									
Maximum Horizontal Force (kips/ft)	1.1	0.8	0.5	0.5	0.4	0.5	0.4	0.7	1.2									
Maximum Moment (k-ft)	1,219.3	2,042.5	1,428.6	1,426.4	2,677.4	1,376.4	1,441.1	1,680.3	1,732.7									
Maximum Moment (k-ft/ft)	61.0	102.1	71.4	71.3	76.5	68.8	72.1	84.0	86.6									

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 2-9 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003450

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6												
CRITICALITY INDEX (defined below)	3	3	3	3	3	3												
VULNERABILITY INDEX (defined below)	1.5	1.2	2.7		2.7	1.2												

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.3	9.3	9.3	9.3	9.3	9.3												
Bed Elevation (ft - MSL)	8	5	-3	-13	3	7												
Low Chord Elevation (ft - MSL)	10.7	10.9	8.0	8.0	8.0	10.9												
100-yr Max Wave Crest Elevation (ft - MSL)	14.0	14.0	14.0	14.1	14.1	14.1												
100-yr Wave Height (ft)	8.6	8.6	8.6	6.8	8.7	8.7												
100-yr Wave Period (seconds)	4.8	4.8	4.8	4.8	4.8	4.8												
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	180.0	20.0	20.0												
Span Width (ft)	27.0	27.0	27.0	27.0	27.0	27.0												
Deck Thickness (ft)	1.0	1.0	1.0	1.0	1.0	1.0												
Overhang (ft)																		
Number of Beams				SWING														
Beam Dead Weight (lb/lf) - Each				SPAN														
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	4.1	4.1	4.1		4.1	4.1												
Total Dead Weight (kip/ft)	4.1	4.1	4.1		4.1	4.1												
Resisting Moment (kft/ft)	54.7	54.7	54.7		54.7	54.7												
Resisting Vertical Force (kip/ft)	4.1	4.1	4.1		4.1	4.1												
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	68.1	54.9	124.9		125.5	56.7												
Maximum Vertical Force (kips/ft)	3.4	2.7	6.2		6.3	2.8												
Maximum Horizontal Force (kips/span)	9.4	17.0	19.4		19.1	17.8												
Maximum Horizontal Force (kips/ft)	0.5	0.9	1.0		1.0	0.9												
Maximum Moment (k-ft)	849.6	613.2	1204.9		1199.2	651.8												
Maximum Moment (k-ft/ft)	42.5	30.7	60.2		60.0	32.6												

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-3 and 5-6 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003480

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5													
CRITICALITY INDEX (defined below)	3	3	3	3	3													
VULNERABILITY INDEX (defined below)	0.7	1.2	1.3	1.1	0.9													

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	8.1	8.1	8.1	8.1	8.1													
Bed Elevation (ft - MSL)	4	0	-7	-15	-6													
Low Chord Elevation (ft - MSL)	7.6	5.9	5.9	5.9	7.6													
100-yr Max Wave Crest Elevation (ft - MSL)	9.7	9.8	9.8	9.8	9.9													
100-yr Wave Height (ft)	3.3	3.3	2.4	2.5	3.4													
100-yr Wave Period (seconds)	2.2	2.2	2.2	2.2	2.3													
SPAN PROPERITES																		
Span Length (ft)	20.0	20.7	55.0	20.7	20.0													
Span Width (ft)	27.0	27.0	27.0	27.0	27.0													
Deck Thickness (ft)	1.1	1.1	0.7	1.1	1.1													
Overhang (ft)			2.4															
Number of Beams			4															
Beam Dead Weight (lb/lf) - Each			129															
Beam Dead Weight (kip/ft) - Total			0.5															
Slab Dead Weight (kip/ft)	4.4	4.4	9.7	4.4	4.4													
Total Dead Weight (kip/ft)	4.4	4.4	10.2	4.4	4.4													
Resisting Moment (kft/ft)	59.2	59.2	112.9	59.2	59.2													
Resisting Vertical Force (kip/ft)	4.4	4.4	10.2	4.4	4.4													
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	30.2	50.9	270.2	50.8	36.6													
Maximum Vertical Force (kips/ft)	1.5	2.5	4.9	2.5	1.8													
Maximum Horizontal Force (kips/span)	1.2	2.3	15.8	2.5	1.3													
Maximum Horizontal Force (kips/ft)	0.1	0.1	0.3	0.1	0.1													
Maximum Moment (k-ft)	463.5	863.1	4655.6	805.9	599.4													
Maximum Moment (k-ft/ft)	23.2	41.6	84.6	38.9	30.0													

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 2-4 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003510

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8	9									
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3	3									
VULNERABILITY INDEX (defined below)	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0									

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9									
Bed Elevation (ft - MSL)	6	-2	-7	-7	-6	-2	3	6	9									
Low Chord Elevation (ft - MSL)	14.0	14.1	14.3	14.4	14.4	14.4	14.3	14.1	14.0									
100-yr Max Wave Crest Elevation (ft - MSL)	13.5	13.9	14.7	14.7	14.7	14.1	13.5	13.5	13.4									
100-yr Wave Height (ft)	6.5	7.1	8.2	8.3	8.3	7.4	6.5	6.5	6.4									
100-yr Wave Period (seconds)	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4									
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0									
Span Width (ft)	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7									
Deck Thickness (ft)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1									
Overhang (ft)																		
Number of Beams																		
Beam Dead Weight (lb/lf) - Each																		
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5									
Total Dead Weight (kip/ft)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5									
Resisting Moment (kft/ft)	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3	62.3									
Resisting Vertical Force (kip/ft)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5									
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	2.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5									
Maximum Vertical Force (kips/ft)	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2									
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003520

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3															
CRITICALITY INDEX (defined below)	3	3	3															
VULNERABILITY INDEX (defined below)	2.0	2.0	2.0															

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.2	9.2	9.2															
Bed Elevation (ft - MSL)	2	-1	2															
Low Chord Elevation (ft - MSL)	5.7	5.7	5.7															
100-yr Max Wave Crest Elevation (ft - MSL)	14.7	14.7	14.7															
100-yr Wave Height (ft)	7.9	7.9	7.9															
100-yr Wave Period (seconds)	4.3	4.3	4.3															
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0															
Span Width (ft)	27.0	27.0	27.0															
Deck Thickness (ft)	1.1	1.1	1.1															
Overhang (ft)																		
Number of Beams																		
Beam Dead Weight (lb/lf) - Each																		
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	4.4	4.4	4.4															
Total Dead Weight (kip/ft)	4.4	4.4	4.4															
Resisting Moment (kft/ft)	59.2	59.2	59.2															
Resisting Vertical Force (kip/ft)	4.4	4.4	4.4															
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	69.6	69.2	70.7															
Maximum Vertical Force (kips/ft)	3.5	3.5	3.5															
Maximum Horizontal Force (kips/span)	6.6	6.6	6.6															
Maximum Horizontal Force (kips/ft)	0.3	0.3	0.3															
Maximum Moment (k-ft)	1352.6	1354.2	1378.9															
Maximum Moment (k-ft/ft)	67.6	67.7	68.9															

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-3 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 003690

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5													
CRITICALITY INDEX (defined below)	3	3	3	3	3													
VULNERABILITY INDEX (defined below)	14.1	13.4	13.4	14.9	13.6													

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.5	9.5	9.5	9.5	9.5													
Bed Elevation (ft - MSL)	1	-1	-2	-2	0													
Low Chord Elevation (ft - MSL)	1.8	1.8	1.8	1.8	1.8													
100-yr Max Wave Crest Elevation (ft - MSL)	16.8	16.8	16.8	16.7	16.4													
100-yr Wave Height (ft)	10.4	10.4	10.4	10.3	9.9													
100-yr Wave Period (seconds)	4.9	4.9	4.9	4.9	4.9													
SPAN PROPERITES																		
Span Length (ft)	18.5	14.5	15.0	14.6	19.5													
Span Width (ft)	26.8	26.8	26.8	26.8	26.8													
Deck Thickness (ft)	1.1	1.1	1.1	1.1	1.1													
Overhang (ft)	0.8	0.8	0.6	0.9	0.8													
Number of Beams	18	18	18	18	18													
Beam Dead Weight (lb/lf) - Each	13	13	13	13	13													
Beam Dead Weight (kip/ft) - Total	0.2	0.2	0.2	0.2	0.2													
Slab Dead Weight (kip/ft)	0.7	0.7	0.7	0.7	0.7													
Total Dead Weight (kip/ft)	0.9	0.9	0.9	0.9	0.9													
Resisting Moment (kft/ft)	11.4	11.4	11.6	11.3	11.4													
Resisting Vertical Force (kip/ft)	0.9	0.9	0.9	0.9	0.9													
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	105.0	80.6	84.1	83.2	106.6													
Maximum Vertical Force (kips/ft)	5.7	5.6	5.6	5.7	5.5													
Maximum Horizontal Force (kips/span)	16.7	13.1	13.6	15.9	17.0													
Maximum Horizontal Force (kips/ft)	0.9	0.9	0.9	1.1	0.9													
Maximum Moment (k-ft)	1702.2	1268.8	1331.6	1403.3	1731.1													
Maximum Moment (k-ft/ft)	92.0	87.5	88.8	96.1	88.8													

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-5 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 009030

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8										
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3										
VULNERABILITY INDEX (defined below)	7.9	8.0	7.9	7.9	8.0	8.0	8.0	8.0										

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6										
Bed Elevation (ft - MSL)	7	3	-1	-3	-3	-2	0	5										
Low Chord Elevation (ft - MSL)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9										
100-yr Max Wave Crest Elevation (ft - MSL)	8.6	8.7	8.7	8.7	8.6	8.6	8.6	8.6										
100-yr Wave Height (ft)	3.8	4.2	4.3	4.3	4.3	4.4	4.1	3.7										
100-yr Wave Period (seconds)	4.3	4.5	4.1	4.1	4.1	4.1	4.2	4.2										
SPAN PROPERITES																		
Span Length (ft)	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0										
Span Width (ft)	25.2	25.2	25.2	25.2	25.2	25.2	25.2	25.2										
Deck Thickness (ft)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1										
Overhang (ft)																		
Number of Beams	18	18	18	18	18	18	18	18										
Beam Dead Weight (lb/lf) - Each	19	19	19	19	19	19	19	19										
Beam Dead Weight (kip/ft) - Total	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4										
Slab Dead Weight (kip/ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6										
Total Dead Weight (kip/ft)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0										
Resisting Moment (kft/ft)	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4										
Resisting Vertical Force (kip/ft)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0										
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	69.4	70.5	69.8	69.9	70.5	70.1	70.1	69.9										
Maximum Vertical Force (kips/ft)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7										
Maximum Horizontal Force (kips/span)	8.0	7.9	7.9	7.9	7.9	7.8	7.6	7.6										
Maximum Horizontal Force (kips/ft)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4										
Maximum Moment (k-ft)	1066.8	1079.8	1064.6	1065.0	1078.5	1081.7	1081.9	1079.0										
Maximum Moment (k-ft/ft)	56.1	56.8	56.0	56.1	56.8	56.9	56.9	56.8										

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-8 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 031755

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
VULNERABILITY INDEX (defined below)	1.9	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Bed Elevation (ft - MSL)	1.3	0.8	0.3	-0.3	-0.8	-1.4	-1.9	-2.3	-3.0	-3.7	-4.4	-5.1	-5.9	-6.6	-6.6	-7.4	-12.0	-13.4
Low Chord Elevation (ft - MSL)	3.9	6.4	7.6	9.1	10.8	12.5	14.1	15.4	16.7	17.7	18.6	19.4	20.0	20.5	20.8	21.0	20.8	20.5
100-yr Max Wave Crest Elevation (ft - MSL)	7.5	7.6	7.6	7.7	7.7	7.7	7.7	7.8	7.8	7.9	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.2
100-yr Wave Height (ft)	2.5	2.5	2.5	2.7	2.8	3.0	3.1	3.2	3.2	3.4	3.6	3.6	3.6	3.6	3.8	3.3	3.3	3.4
100-yr Wave Period (seconds)	3.7	3.3	3.6	4.2	4.5	4.7	4.6	4.6	5.2	2.4	2.3	2.3	2.2	2.2	2.3	2.3	2.4	3.2
SPAN PROPERITES																		
Span Length (ft)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
Span Width (ft)	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Overhang (ft)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Number of Beams	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Beam Dead Weight (lb/lf) - Each	384	384	384	384	384	384	384	384	384	384	384	384	384	384	384	384	384	384
Beam Dead Weight (kip/ft) - Total	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Slab Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
Total Dead Weight (kip/ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Resisting Moment (kft/ft)	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Resisting Vertical Force (kip/ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	244.3	58.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Vertical Force (kips/ft)	4.9	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	21.9	8.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	5755.1	1418.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	115.1	28.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge span 1 is potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 031755

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	19	20	21	22	23	24	25	26	27									
CRITICALITY INDEX (defined below)	3	3	3	3	3	3	3	3	3									
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8									
Bed Elevation (ft - MSL)	-9.3	-5.0	-4.1	-3.1	-2.1	-1.5	-0.9	-0.4	0.1									
Low Chord Elevation (ft - MSL)	20.0	19.5	18.8	17.7	17.5	15.4	14.1	12.5	11.0									
100-yr Max Wave Crest Elevation (ft - MSL)	8.2	8.2	8.2	8.2	8.2	8.1	8.1	8.0	7.9									
100-yr Wave Height (ft)	3.4	3.9	3.8	3.8	3.7	3.5	3.2	3.1	2.9									
100-yr Wave Period (seconds)	3.3	3.9	4.3	4.8	5.1	5.0	4.8	4.7	4.7									
SPAN PROPERITES																		
Span Length (ft)	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0									
Span Width (ft)	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3	43.3									
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6									
Overhang (ft)	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9									
Number of Beams	5	5	5	5	5	5	5	5	5									
Beam Dead Weight (lb/lf) - Each	384	384	384	384	384	384	384	384	384									
Beam Dead Weight (kip/ft) - Total	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9									
Slab Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1									
Total Dead Weight (kip/ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0									
Resisting Moment (kft/ft)	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2	106.2									
Resisting Vertical Force (kip/ft)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0									
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Vertical Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 033698

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2																
CRITICALITY INDEX (defined below)	3	3																
VULNERABILITY INDEX (defined below)	2.3	2.3																

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	8.3	8.3																
Bed Elevation (ft - MSL)	-2	-2																
Low Chord Elevation (ft - MSL)	2.7	2.7																
100-yr Max Wave Crest Elevation (ft - MSL)	11.0	11.2																
100-yr Wave Height (ft)	4.7	5.1																
100-yr Wave Period (seconds)	2.6	2.7																
SPAN PROPERITES																		
Span Length (ft)	19.0	19.0																
Span Width (ft)	28.0	28.0																
Deck Thickness (ft)	0.8	0.8																
Overhang (ft)																		
Number of Beams																		
Beam Dead Weight (lb/lf) - Each																		
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	3.5	3.5																
Total Dead Weight (kip/ft)	3.5	3.5																
Resisting Moment (kft/ft)	49.0	49.0																
Resisting Vertical Force (kip/ft)	3.5	3.5																
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	54.8	57.2																
Maximum Vertical Force (kips/ft)	2.9	3.0																
Maximum Horizontal Force (kips/span)	6.5	4.7																
Maximum Horizontal Force (kips/ft)	0.3	0.2																
Maximum Moment (k-ft)	1236.7	1216.1																
Maximum Moment (k-ft/ft)	65.1	64.0																

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-2 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 033700

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CRITICALITY INDEX (defined below)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
VULNERABILITY INDEX (defined below)	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
Bed Elevation (ft - MSL)	-8.9	-9.3	-9.7	-9.9	-10.0	-10.1	-10.2	-6.7	-8.1	-6.7	-6.2	-5.7	-3.2	-1.6	-5.5	-3.6	-2.1	-1.2
Low Chord Elevation (ft - MSL)	13.6	14.1	14.6	15.1	15.6	16.0	16.4	17.1	17.8	18.4	16.3	16.3	16.3	18.3	17.8	16.7	16.7	16.0
100-yr Max Wave Crest Elevation (ft - MSL)	14.8	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.5	14.4	14.3	14.1	14.0	14.0	14.1	14.1	14.2	14.2
100-yr Wave Height (ft)	7.4	7.4	7.3	7.3	7.2	7.1	7.1	7.0	6.9	6.8	6.7	6.4	6.5	6.4	6.5	6.6	6.6	6.7
100-yr Wave Period (seconds)	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.7	3.7	3.6	3.6	3.6
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	40.0	40.0	40.0	40.0	204.0	40.0	40.0	40.0	40.0	20.0	20.0
Span Width (ft)	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Deck Thickness (ft)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	1.0	1.0
Overhang (ft)								3.3	3.3	3.3	3.3	3.6	3.3	3.3	3.3	3.3		
Number of Beams								4	4	4	4	SWING	4	4	4	4		
Beam Dead Weight (lb/lf) - Each								98	98	98	98	SPAN	98	98	98	98		
Beam Dead Weight (kip/ft) - Total								0.4	0.4	0.4	0.4		0.4	0.4	0.4	0.4		
Slab Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	7.1	7.1	7.1	7.1		7.1	7.1	7.1	7.1	4.1	4.1
Total Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	7.5	7.5	7.5	7.5		7.5	7.5	7.5	7.5	4.1	4.1
Resisting Moment (kft/ft)	54.7	54.7	54.7	54.7	54.7	54.7	54.7	77.2	77.2	77.2	77.2		77.2	77.2	77.2	77.2	54.7	54.7
Resisting Vertical Force (kip/ft)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	7.5	7.5	7.5	7.5		7.5	7.5	7.5	7.5	4.1	4.1
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	9.4	3.7	2.2	1.2	0.7	0.4	0.2	0.1	0.0	0.0	0.2		0.1	0.0	0.0	0.2	0.1	0.5
Maximum Vertical Force (kips/ft)	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/span)	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft)	67.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Maximum Moment (k-ft/ft)	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0

Vulnerability Index Legend		
		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

LADOTD BRIDGE RECALL NO. 033700

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	19	20	21	22	23													
CRITICALITY INDEX (defined below)	4	4	4	4	4													
VULNERABILITY INDEX (defined below)	0.0	0.0	0.0	0.0	0.1													

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	9.6	9.6	9.6	9.6	9.6													
Bed Elevation (ft - MSL)	-0.7	-0.3	0.1	0.5	0.9													
Low Chord Elevation (ft - MSL)	15.6	15.0	14.6	14.1	13.6													
100-yr Max Wave Crest Elevation (ft - MSL)	14.2	14.1	13.9	13.7	13.5													
100-yr Wave Height (ft)	6.5	6.4	6.2	5.9	5.6													
100-yr Wave Period (seconds)	3.6	3.6	3.6	3.6	3.6													
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	20.0													
Span Width (ft)	27.0	27.0	27.0	27.0	27.0													
Deck Thickness (ft)	1.0	1.0	1.0	1.0	1.0													
Overhang (ft)																		
Number of Beams																		
Beam Dead Weight (lb/lf) - Each																		
Beam Dead Weight (kip/ft) - Total																		
Slab Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1													
Total Dead Weight (kip/ft)	4.1	4.1	4.1	4.1	4.1													
Resisting Moment (kft/ft)	54.7	54.7	54.7	54.7	54.7													
Resisting Vertical Force (kip/ft)	4.1	4.1	4.1	4.1	4.1													
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	0.9	1.4	1.7	2.0	2.4													
Maximum Vertical Force (kips/ft)	0.0	0.1	0.1	0.1	0.1													
Maximum Horizontal Force (kips/span)	0.0	0.0	0.0	0.0	0.1													
Maximum Horizontal Force (kips/ft)	0.0	0.0	0.0	0.0	0.0													
Maximum Moment (k-ft)	0.0	0.0	0.0	0.0	0.0													
Maximum Moment (k-ft/ft)	0.0	0.0	0.0	0.0	0.0													

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans are not potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 2 of 2

LADOTD BRIDGE RECALL NO. 059482

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5	6												
CRITICALITY INDEX (defined below)	3	3	3	3	3	3												
VULNERABILITY INDEX (defined below)	1.7	0.2	0.5		1.3	0.6												

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	6.7	6.7	6.7	6.7	6.7	6.7												
Bed Elevation (ft - MSL)	-3	-19	-28	-23	-9	0												
Low Chord Elevation (ft - MSL)	6.1	7.3	7.1	7.1	6.1	6.8												
100-yr Max Wave Crest Elevation (ft - MSL)	8.5	8.5	8.5	8.3	8.1	8.0												
100-yr Wave Height (ft)	3.5	2.6	2.6	2.3	2.0	2.8												
100-yr Wave Period (seconds)	2.3	2.3	2.3	2.4	2.3	2.2												
SPAN PROPERITES																		
Span Length (ft)	51.0	51.0	51.0	240.0	51.0	51.0												
Span Width (ft)	37.7	37.7	37.7	37.7	37.7	37.7												
Deck Thickness (ft)	0.6	0.6	0.6	0.6	0.6	0.6												
Overhang (ft)	2.8	2.8	2.8		2.8	2.8												
Number of Beams	5	5	5	SWING	5	5												
Beam Dead Weight (lb/lf) - Each	384	384	384	SPAN	384	384												
Beam Dead Weight (kip/ft) - Total	1.9	1.9	1.9		1.9	1.9												
Slab Dead Weight (kip/ft)	3.5	3.5	3.5		3.5	3.5												
Total Dead Weight (kip/ft)	5.5	5.5	5.5		5.5	5.5												
Resisting Moment (kft/ft)	87.3	87.3	87.3		87.3	87.3												
Resisting Vertical Force (kip/ft)	5.5	5.5	5.5		5.5	5.5												
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	129.8	30.9	58.6		115.4	68.3												
Maximum Vertical Force (kips/ft)	2.5	0.6	1.1		2.3	1.3												
Maximum Horizontal Force (kips/span)	7.5	3.0	3.6		4.1	2.3												
Maximum Horizontal Force (kips/ft)	0.1	0.1	0.1		0.1	0.0												
Maximum Moment (k-ft)	4302.6	461.4	1188.6		3364.9	1601.1												
Maximum Moment (k-ft/ft)	84.4	9.0	23.3		66.0	31.4												

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1 and 5 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

LADOTD BRIDGE RECALL NO. 060360

SUPERSTRUCTURE WAVE ENERGY EXPOSURE

BRIDGE VULNERABILITY SUMMARY																		
SPAN NUMBER	1	2	3	4	5													
CRITICALITY INDEX (defined below)	1	1	1	1	1													
VULNERABILITY INDEX (defined below)	6.1	6.1	6.0	6.1	6.0													

SURGE/WAVE LOAD COMPUTATION INPUT VALUES																		
HYDRAULIC VALUES																		
100-yr Water Surface Elevation (ft - MSL)	6.5	6.5	6.5	6.5	6.5													
Bed Elevation (ft - MSL)	-3.4	-3.5	-3.6	-3.7	-3.6													
Low Chord Elevation (ft - MSL)	-2.3	-2.3	-2.3	-2.3	-2.3													
100-yr Max Wave Crest Elevation (ft - MSL)	9.4	9.4	9.4	9.4	9.4													
100-yr Wave Height (ft)	4.4	4.4	4.4	4.4	4.4													
100-yr Wave Period (seconds)	5.1	5.1	5.2	5.2	5.2													
SPAN PROPERITES																		
Span Length (ft)	20.0	20.0	20.0	20.0	20.0													
Span Width (ft)	21.0	21.0	21.0	21.0	21.0													
Deck Thickness (ft)	0.8	0.8	0.8	0.8	0.8													
Overhang (ft)																		
Number of Beams	14	14	14	14	14													
Beam Dead Weight (lb/lf) - Each	19	19	19	19	19													
Beam Dead Weight (kip/ft) - Total	0.3	0.3	0.3	0.3	0.3													
Slab Dead Weight (kip/ft)	0.4	0.4	0.4	0.4	0.4													
Total Dead Weight (kip/ft)	0.7	0.7	0.7	0.7	0.7													
Resisting Moment (kft/ft)	7.0	7.0	7.0	7.0	7.0													
Resisting Vertical Force (kip/ft)	0.7	0.7	0.7	0.7	0.7													
100-YEAR FORCE-MOMENT VALUES																		
Maximum Vertical Force (kips/span)	66.0	66.3	66.1	66.3	66.2													
Maximum Vertical Force (kips/ft)	3.3	3.3	3.3	3.3	3.3													
Maximum Horizontal Force (kips/span)	7.2	7.1	7.1	7.1	7.1													
Maximum Horizontal Force (kips/ft)	0.4	0.4	0.4	0.4	0.4													
Maximum Moment (k-ft)	848.4	850.9	843.9	846.0	845.3													
Maximum Moment (k-ft/ft)	42.4	42.5	42.2	42.3	42.3													

Vulnerability Index Legend		Not Vulnerable
		Potentially Vulnerable

Notes:

1 - Bridge spans 1-5 are potentially subject to wave energy.

2 - Bridge Vulnerability Rating is defined as the greater value between the Ratio (Max Vertical Force / Resisting Vertical Force) and Ratio (Max Moment / Resisting Moment)

Criticality Index	Multiplier	Description
1	1	Minor impact to economy or emergency needs if closed (alternative routes exist)
2	1	Medium impact if closed - may lead to a barrier island but an alternative route exists
3	1.75	Major impact if closed - only road to a barrier island, evacuation route with no reasonable alternatives
4	1.75	Extreme impact if closed - Interstate or major economic connector (detour very long)

Table 1 of 1

This public document is published at a total cost of $250
42 copies of this public document were published in this first printing at a cost of $250. The total cost of all printings of this document including reprints is $250. This document was published by Louisiana Transportation Research Center to report and publish research findings as required in R.S. 48:105. This material was duplicated in accordance with standards for printing by state agencies established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.