REHABILITATION OF THE SOUTH GRAND ISLAND BRIDGES

FY 2022 BRIDGE INVESTMENT PROGRAM (BIP) BRIDGE PROJECTS APPLICATION

Additional project information, including a detailed budget, detailed schedule, maps, and graphics are included in a separate Project Narrative that has been submitted with this application. The grant application materials and for this project can also be found at thruway.ny.gov/oursystem/bridge-investment-grants.

I. BASIC PROJECT INFORMATION

Project Name

Rehabilitation of the South Grand Island Bridges

Project Location

I-190, spanning between Milepost 914.35 to Milepost 914.99
Towns of Grand Island and Tonawanda, Erie County, New York

Latitude 42.990491, Longitude -78.936953

Eligibility Criteria

Project Description

Project Overview

This project will rehabilitate and strengthen deteriorated sections of conditionally at-risk, poor-rated elements of the two South Grand Island Bridges (BIN# 5043981 and BIN #5043982). Both bridges are on the National Bridge Inventory under 23 U.S.C. 144(b).

The project scope includes strengthening and repair of both bridges to address condition issues; improving wearing surface friction on both bridges to improve vehicle safety; safety improvements on both bridges for maintenance personnel; seismic resiliency improvements on one bridge; restoring an unusable sidewalk on one bridge and improving bicycle and pedestrian connectivity between existing shared-use trail systems on both sides of the bridges.

The South Grand Island Bridges

The South Grand Island bridges are twin truss arch bridge spans, each carrying one direction of Interstate 190 over the Niagara River. A maximum vertical clearance of 100 feet is provided over a 400-foot-wide navigation channel below

Construction of the southbound bridge was completed in 1935 and the northbound bridge in 1963. Each structure has a total deck length of 3,437 feet. Both bridges were originally constructed to provide a 24-foot-wide roadway surface. The bridge section is typically comprised of two 10-foot mainline lanes in each direction, with 2-foot shoulders. The two-way Annual Average Daily Traffic (AADT) for 2021 is about 63,000, with 10% truck volume.

The northbound bridge has a 5-foot-wide pedestrian sidewalk on the east side, while the southbound bridge has a 5-foot-wide pedestrian sidewalk (presently closed due to safety concerns) on the west side. Paved shared-use pathways connect both sidewalks to extensive local and regional shared-use trail systems.

The distinctive blue truss bridges are iconic regional landmarks, and they are eligible for listing on the National Register of Historic Places.

Project Description (continued)

Context of Other Infrastructure Investments

In 2021, the Authority substantially completed a $355 million project to convert the entire 575-mile New York State Thruway system to cashless tolling. Prior to this, in 2018, the Authority similarly converted the I-190 toll barriers at the South and North Grand Island bridge crossings into all-cashless highway-speed tolling points. In addition to reducing congestion, these projects also significantly contributed to the Authority's efforts to reduce greenhouse gas emissions from slowed or idling vehicles at toll barriers. For 2021, total annual greenhouse gas emissions were reduced by over 44,000 short tons.

To further modernize the system, improve resiliency, combat climate change, and provide for community connections across the system, the Authority is advancing the following projects:

- Rehabilitation and seismic resiliency improvements on the North Grand Island Bridges, located approximately 5 miles to the north on the same I-190 corridor. This project also includes replacement of deteriorated lighting fixtures on the North and South Grand Island Bridges with energy-efficient LED fixtures to improve safety for both motorized and non-motorized users ($36 million - Scheduled completion in 2024)
- Rehabilitation and strengthening of a deteriorated 3.5-mile segment of I-190, on the same corridor between Milepost 901.7 and Milepost 904.2. ($44.28 million - Scheduled completion in 2025)
- Replacement of the Beaver Island State Parkway Bridge over I-190, located near the north end of the South Grand Island Bridges. The new bridge will meet minimum vertical clearance requirements and provide a sidewalk on the bridge that is complaint with Americans with Disabilities Act (ADA) standards ($9 Million - Scheduled completion in 2023).
- Stabilization of a retaining wall at the Thruway bridge over Scajaquada Creek, approximately 5 miles to the south on the same I-190 corridor, to improve resiliency ($5.5 million - Scheduled completion in 2024)

Transportation Challenges and Solutions

- **Challenge #1: Condition of Fracture-Critical Non-Redundant Members and Pin and Hanger Assemblies**

  Recent inspections have identified substantial accelerated deterioration of fracture-critical non-redundant members of both bridges' original superstructure designs. The failure of one component of a fracture-critical primary support system can result in a catastrophic collapse. Both structures were also designed with pin and hanger assemblies, which are also fracture-critical members. Each of these assemblies connect two plate girders of the bridge, providing a necessary expansion joint in the bridge to accommodate movement. The condition of these components is beyond the capability of maintenance forces to address and must be addressed by a Capital Project to reduce the risk of condition rating flags or failure that could require closure of the bridges.

  Challenge #1 Solution

  This project will complete repairs to all identified conditionally at-risk members. Proposed improvements, such as installing steel plates over areas of section loss and addressing fatigue cracking will restore, and in some instances increase, the full loading capacity of these critical structural elements. With these improvements, the repaired fracture-critical non-redundant steel members will be returned to a state of good repair and require only routine preventative maintenance for the anticipated remaining 75-year service life of the structures.

Project Description (continued)

- **Challenge #2: Condition of Superstructure Structural Steel Members**

  Similar to the fracture-critical non-redundant structural steel members, the remaining superstructure steel elements are experiencing accelerated deterioration. The present asset management cycle for the structures is at a point where a Capital Project is necessary to address steel deterioration to avoid future condition rating flags that would require the structures to have lanes closed or load-rated.

  Challenge #2 Solution

  As part of this project, bridge superstructure steel members which are not fracture-critical non-redundant members will be examined during ongoing in-depth bridge inspections. Areas identified as needing restorative work will be improved using best practices. These superstructure steel members will be returned to a state of good repair and will require only routine preventative maintenance for the anticipated remaining 75-year service life of the structures.

- **Challenge 3: Structural Seismic Risk**

  The South Grand Island Bridges are considered "Critical" assets by the state. They must provide immediate access after a lower-level seismic event (lesser strength event), and limited access after an upper-level seismic event (higher strength event), to continue to serve as a link for civil defense, police, fire department, and/or public health agencies to respond to a disaster situation. In 2020, the Authority retained the specialized consultant services to conduct a seismic evaluation and recommendations for the southbound bridge. The study determined that the bridge, in its current condition, cannot meet the seismic performance criteria requirements specified for a "Critical" bridge after an upper-level event.

  Challenge #3 Solution

  The 2020 seismic study of the bridge identified retrofit schemes for seismic improvements. This project will complete the recommended repairs (e.g., replacement of crucial bearings and installation of dampers, bearings, shear keys) to the southbound structure. These improvements will help ensure that the structure can serve as part of a functioning emergency corridor following an upper-level seismic event.

- **Challenge #4: Bicycle and Pedestrian Accommodation**

  The sidewalk on the southbound structure has been closed to the public for over a year due to heaving from extensive deterioration of underlying steel members and build-up of pack rust. The paved pathways that connect the sidewalks on both bridges to existing local and regional shared-use trail systems lack wayfinding signs and amenities for trail users. The path surfaces are deteriorated or uneven in places, and geometric deficiencies have been identified, particularly at the connection points to the bridge sidewalks.

  Challenge #4 Solution

  This project will restore and re-open the sidewalk on the southbound bridge, providing a sidewalk that is fully compliant with Americans with Disabilities Act standards. Feasible geometric improvements to the existing paved pathways connecting the bridges to the shared-use trail systems will be identified, and surface repairs will be made to the pathways to improve safety and accessibility. Wayfinding signs will be provided, along with amenities, such as pull-offs and benches, to improve comfort for trail and sidewalk users.

Project Description (continued)

- **Challenge #5: Safety**

  Vehicular Safety: Accident data for this segment of I-190 documents a high incidence of overtaking and rear-end accidents (63% of the recorded crashes). The Authority conducted friction testing in 2018 to measure skid resistance, concluding that skid resistance properties of the existing wearing surface are inadequate. Wearing surface friction properties must be addressed or the prevalence of overtaking and rear-end accidents will remain unacceptably high, resulting in a higher likelihood of injury and vehicle damage for patrons using the bridges.

  Bicycle and Pedestrian Safety: As discussed in Challenge #4, the sidewalk on the southbound bridge was closed for public use due to heaving and safety concerns for pedestrian and cyclists using the sidewalk. The paved pathways approaching the bridge sidewalks also have surface and geometric deficiencies.

  Maintenance Personnel Safety: Both bridges retain the original physical safety features provided for use by maintenance personnel. These include fixed ladders with cages, which are currently being phased out under Occupational Safety and Health Administration (OSHA) Regulation 1910.28, in favor of ladder safety systems and personal fall arrest systems. Conformance with this OSHA standard is mandatory by 2036.

  Challenge #5 Solution

  Vehicular Safety: This project will address the high frequency of overtaking and rear end accidents by improving the wearing surface skid resistance properties. The Authority is currently evaluating the effectiveness, durability, and value of 2 possible methods to address this issue: installing a high-friction overlay material or sawing grooves into the existing wearing surface.

  Pedestrian and Bicyclist Safety: As discussed under Challenge #4, repairs to the heaved areas of sidewalk on the southbound bridge structure will eliminate the safety hazard that required its closure, improving accessibility and connectivity for non-motorized users of the bridge. The approach paths will be evaluated for geometric and surface improvements to further enhance safety.

  Maintenance Personnel Safety: A total of over 100 safety ladder systems, located on both structures, will be improved to meet current Occupational Safety and Health Administration (OSHA) standards.

- **Challenge #6: Traffic During Construction**

  Moving people and vehicles safely and efficiently across the bridges, and through the corridor, during construction will present an additional challenge. There are no convenient access-controlled alternative routes for vehicles going to and from the US/Canadian points of entry, and unintentionally diverting traffic to nearby state and local roads to “go around” the construction area would be undesirable. There are no viable detours for bicycle and pedestrian traffic, with the closest non-motorized crossing 5 miles away, at the North Grand Island Bridges. Any work to the structures must address regional and local transportation needs, and the bicycle and pedestrian connections that the structures provide must be maintained with minimal disruption.

Project Description (continued)

Challenge #6 Solution

The project will be constructed with a Work Zone Traffic Control plan that emphasizes maintaining traffic flow and safety. To minimize impacts to traffic during peak daytime travel, only nighttime lane closures will be used for deck surface work. Particular attention will be paid to community and bicycle/pedestrian connections provided by the bridges to avoid or minimize any temporary impacts to these routes.

Short-term bridge closures will be required to complete bearing replacements. Crossover alignments will be utilized to shift all traffic to the operational bridge while bearing work is being performed on the other structure.

Project History

Preliminary Design is currently being advanced for this project. In-depth asset management analysis of condition and needs has been completed to help define the work scope, including best practices for restoration and resiliency measures and methods of construction. Stakeholder outreach and environmental reviews have been initiated, and a 2020 Seismic Study and Hazard Analysis was competed. Costs incurred for work performed to date total $1.535 million.

Involved Parties

The New York State Thruway Authority will be responsible for the development and delivery of the project.

The Authority will coordinate with the New York State Department of Transportation and the Greater Buffalo-Niagara Regional Transportation Council (the Metropolitan Planning Organization) for the development and implementation of the project. Coordination with local communities and other stakeholders has been initiated and will be ongoing, pursuant to a draft Public Involvement Plan that has been developed for the project.

BIP Request Amount

Exact amount in year-of-expenditure dollars: $23.5 Million

Total Project Cost

Estimate of in year-of-expenditure dollars: $47.0 Million

Applicant

New York State Thruway Authority (A special purpose district or a public authority with a transportation function)

Maintenance Commitment

The completed project will be maintained by the New York State Thruway Authority utilizing its Bridge Asset Management System, a detailed, data-driven, long-range capital and maintenance plan that helps to ensure bridges are maintained in a state of good repair.

Bike and Pedestrian Accommodation required by 23 U.S.C. 217(e)

This project will not include rehabilitation or replacement of the bridge decks and is not required under 23 USC 217(e) to provide accommodations for bicycles and pedestrians. However, the project will include improvements to bicyclist and pedestrian facilities. There are existing and planned shared-use trail systems on both sides of the bridges, with paved paths connecting to one protected sidewalk on each bridge. As discussed under Challenge #4, a deteriorated and unusable sidewalk on the southbound structure will be rehabilitated and reopened, and geometric, safety, and signing improvements will be made along the shared-use paths connecting the existing trail systems to the bridge sidewalks.

Additional Project Information

State(s) in which project is located	New York
Does the project serve an urban or rural community?	The project serves an urban community. It is entirely within the "Buffalo, NY" 2010 Census-designated Urbanized Area (UACE Code 11350).
List all Project Co-Applicants	None
Identify the Lead Applicant	New York State Thruway Authority
Was an application for USDOT discretionary grant funding for this project previously submitted?	No
Is the project located (entirely or partially) in Federal or USDOT designated areas?	Yes. The project is partially located in: Two Opportunity Zones (ID 36029008300 and 36029008400). Two Areas of Persistent Poverty (associated with Census Tracts 83 and 84, in the Town of Tonawanda)

II. NATIONAL BRIDGE INVENTORY DATA

South Grand Island Bridges (Northbound Direction)	
Identification	
Item 1 – State Code & Name	36 – New York
Item 8 – Structure Number	000000005043982
Item 5A – Record Type	1 – On Structure
Item 3 – County Code & Name	029 – Erie County
Item 6 – Feature Intersected	Stony Point Ext., Shore
Item 7 – Facility Carried	Route I-190
Item 16 - Latitude	42.99606
Item 17 – Longitude	-78.93221
Classification	
Item 112 – NBIS Bridge Length	3437 ft
Item 104 – Highway System of Inventory	1 – On NHS
Item 26 – Functional Classification	11 – Urban Principal Arterial - Interstate
Item 110 – Designated National Network	1 – On National Truck Network
Item 21 – Maintenance Responsibility	31 – State Toll Authority
Item 22 – Owner	31 – State Toll Authority
Age and Service	
Item 27 – Year Built	1963
Item 106 – Year Reconstructed	2008
Item 42 – Type of Service	42A: 5 – Highway-pedestrian; 42B: 6 – Highway-waterway
Item 28A – Lanes on the Structure	2
Item 29 – Average Daily Traffic	34,395 (directional)
Item 109 – Average Daily Truck Traffic	10%
Item 19 – Bypass, Detour Length	"0"
Structure Type and Material	
Item 43 – Structure Type, Main	43A: 4 – Steel Continuous; 43B: 9 – Truss- Deck
Condition (See Section III - Criteria #1 State of Good Repair for listing of "Poor" or "Severe" Condition Members)	
Item 58 – Deck Condition	7 – Good Condition
Item 59 – Superstructure Condition	5 – Fair Condition*
**Structure has existing "Poor" and "Severe" New York State-rated superstructure elements*	
Item 60 – Substructure Condition	7 – Good Condition
Item 61 – Channel and Channel Protection	8 – Channel protection is stable
Item 62 – Culverts	N – Not a culvert

Geometric Data	
Item 49 – Structure Length	3437 ft.
Item 50 – Curb or Sidewalk Widths	50A: 0 ft.; 50B: 4.6 ft.
Item 51 – Bridge Roadway Width, curb-to-curb	31.8 ft.
Item 52 – Deck Width, out-to- out	26.6 ft.
Item 32 – Approach Roadway Width	33.1 ft.
Item 47 – Inventory Route, Total Horizontal Clearance	24.9 ft.
Item 53 – Minimum Vertical Clearance over Bridge Roadway	18.1 ft.
Item 54 – Minimum Vertical Underclearance	19.5 ft.
Item 55 – Minimum Lateral Underclearance on Right	7.5 ft.
Item 56 – Minimum Lateral Underclearance on Left	0 ft.
Load Rating and Posting	
Item 70 – Bridge Posting	5 – Equal to or above legal loads
Item 41 – Structure Open, Posted, or Closed to Traffic	A - Open
Appraisal	
Item 113 – Scour Critical Bridges	5 – Foundations Stable
Inspections	
Item 90 – Inspection Date	November 2020

South Grand Island Bridges (Southbound Direction)	
Identification	
Item 1 – State Code & Name	36 – New York
Item 8 – Structure Number	000000005043981
Item 5A – Record Type	1 – On Structure
Item 3 – County Code & Name	029 – Erie County
Item 6 – Feature Intersected	Stony Point Ext., Shore
Item 7 – Facility Carried	Route I-190
Item 16 - Latitude	42.99577
Item 17 – Longitude	-78.93246
Classification	
Item 112 – NBIS Bridge Length	3437 ft
Item 104 – Highway System of Inventory	1 – On NHS
Item 26 – Functional Classification	11 – Urban Principal Arterial - Interstate
Item 110 – Designated National Network	1 – On National Truck Network
Item 21 – Maintenance Responsibility	31 – State Toll Authority
Item 22 – Owner	31 – State Toll Authority
Age and Service	
Item 27 – Year Built	1935
Item 106 – Year Reconstructed	1988
Item 42 – Type of Service	42A: 5 – Highway-pedestrian; 42B: 6 – Highway-waterway
Item 28A – Lanes on the Structure	2
Item 29 – Average Daily Traffic	34,687 (directional)
Item 109 – Average Daily Truck Traffic	14%
Item 19 – Bypass, Detour Length	"0"
Structure Type and Material	
Item 43 – Structure Type, Main	43A: 3 – Steel; 43B: 10 – Truss-Thru
Condition (See Section III - Criteria #1 State of Good Repair for listing of "Poor" or "Severe" Condition Members)	
Item 58 – Deck Condition	6 – Satisfactory Condition
Item 59 – Superstructure Condition	6 – Satisfactory Condition*
**Structure has existing "Poor" and "Severe" New York State-rated superstructure elements*	
Item 60 – Substructure Condition	7 – Good Condition
Item 61 – Channel and Channel Protection	8 – Channel protection is stable

Item 62 – Culverts	N – Not a culvert
Geometric Data	
Item 49 – Structure Length	3437 ft.
Item 50 – Curd of Sidewalk Widths	50A: 4.3 ft.; 50B: 0 ft.
Item 51 – Bridge Roadway Width, curb-to-curb	24.9 ft.
Item 52 – Deck Width, out-to- out	31.8 ft.
Item 32 – Approach Roadway Width	36.1 ft.
Item 47 – Inventory Route, Total Horizontal Clearance	24.9 ft.
Item 53 – Minimum Vertical Clearance over Bridge Roadway	17.7 ft.
Item 54 – Minimum Vertical Underclearance	19.3 ft.
Item 55 – Minimum Lateral Underclearance on Right	7.5 ft.
Item 56 – Minimum Lateral Underclearance on Left	“000” ft.
Load Rating and Posting	
Item 70 – Bridge Posting	5 – Equal to or above legal loads
Item 41 – Structure Open, Posted, or Closed to Traffic	A - Open
Appraisal	
Item 113 – Scour Critical Bridges	5 – Foundations Stable
Inspections	
Item 90 – Inspection Date	November 2020

III. PROJECT SELECTION CRITERIA

More detailed information is included in the separate Project Narrative.

Criteria #1: State of Good Repair

This project contributes to the State of Good Repair criteria by:

Improving the condition of a bridge in poor condition or in fair condition and at risk of falling into poor condition within the next three years

Although rigorously maintained, the South Grand Island structures are vulnerable to accelerated deterioration due to their advanced age, original design details, and marine environment location. The condition of these components is beyond the capability of maintenance forces to address and must be addressed by a Capital Project.

The Authority routinely performs inspections to obtain a comprehensive and intensively detailed state-of-repair examination for an entire bridge structure. The last inspection of both South Grand Island Bridge structures was completed in November 2020, identifying numerous critical bridge condition issues. The inspections for both structures identified:

- 5,653 linear feet of "Poor" and 31 linear feet of "Severe" condition-rated steel elements
- 195 fracture-critical steel gusset plates rated in "Poor" condition
- 25 fracture-critical pin and hanger assemblies rated in "Poor" condition
- 31 bearings rated in "Poor" condition
- 14,838 square feet of sidewalk rated in "Poor" condition

Failure of one component of a fracture-critical primary support system can result in bridge closure or a catastrophic collapse. Some of the members on these structures are similar in design to the I-35 Mississippi River Bridge that collapsed in Minnesota in August 2007. Other critical condition issues could lead to lane or load restrictions, which would severely impact mobility and freight along I-190.

Because of the 2020 inspection findings, in-depth bridge inspections are currently underway to supplement the data previously gathered for the structural condition of fracture-critical non-redundant members, pin and hanger assemblies, and other bridge members. This project will complete repairs to all identified conditionally at-risk members. Proposed improvements, such as installing steel plates over areas of section loss and addressing fatigue cracking will restore, and in some instances increase, the full loading capacity of these critical structural elements. With these improvements, the structures will be returned to a state of good repair and require only routine preventative maintenance for the anticipated remaining 75-year service life of the structures.

Improving seismic protection to provide long-term resiliency to extreme weather events, flooding, or other natural disasters

These structures are classified as "Critical" bridges. The Authority retained specialized consultant services in 2020 to analyze the effect that a seismic event would have on the southbound Grand Island Bridge, and to identify retrofit schemes to mitigate an event's detriment to the structure. It was determined that, without recommended seismic improvements, a vital regional emergency-response transportation corridor is at risk of being severed following an upper level (2500-year) seismic event. This project will incorporate the study's recommended substructure resiliency improvements, including replacement of dampers, bearings, shear keys, and widening joints, to ensure that the bridge will be capable of meeting or exceeding seismic performance thresholds, allowing the bridge to serve as part of a lifeline for emergency response following an upper-level seismic event.

Reducing maintenance costs

As demonstrated in the Benefit Cost Analysis, maintenance cost savings for the 20-year analysis period will be $8.5 Million (present worth value).

Condition based on the NBI data

South Grand Island Bridge - Northbound

Item 58 – Deck Condition	7 – Good Condition
Item 59 – Superstructure Condition	5 – Fair Condition*
Item 60 – Substructure Condition	7 – Good Condition

South Grand Island Bridge – Southbound

Item 58 – Deck Condition	6 – Satisfactory Condition
Item 59 – Superstructure Condition	6 – Satisfactory Condition*
Item 60 – Substructure Condition	7 – Good Condition

**Both structures have existing "Poor" and "Severe" New York State-rated superstructure elements*

Are the bridge(s) on the project in Fair condition? Yes.

Despite the current NBI ratings for these structures, they are at risk of falling into poor condition within the next 3 years. These structure types are highly susceptible to ratings that are rapidly reduced from "Satisfactory" or "Fair" to "Poor" condition because the bridges were constructed with superstructures containing fracture-critical non-redundant members. Some of the members on these structures are similar in design to the I-35 Mississippi River Bridge that collapsed in Minnesota in August 2007.

To safely manage risk for structures of this type, New York State requires more rigorous qualifications for bridge inspectors, as well as more analysis and information for bridge inspection reports, than is required under the NBI inspection protocols. This data collection process serves to provide a more comprehensive understanding of the existing bridge condition and future needs than an NBI inspection provides. With this additional level of scrutiny, the Authority is able develop and apply a highly accurate systemwide bridge asset management plan to maintain non-redundant fracture-critical elements. As discussed above, this process has revealed numerous critical bridge condition issues on both bridges.

Criteria #2: Safety

This project contributes to the Safety criteria by:

Reducing the number of crashes on or near the bridge

Accident data for this segment of I-190 (Mileposts 914.3 [N 14.3] to 915.0 [N 15.0]) for the pre-Covid period of 2017 through 2019 documents a total of 112 crashes, 22 with injuries. Of these incidents, overtaking and rear-end accidents occurred in 63% of the recorded crashes. Given the high prevalence of these accident types, the Authority conducted friction testing in 2018 to measure skid resistance, which is the force that prevents a non-turning (i.e., locked-up) tire from sliding on the pavement's surface. This analysis concluded that skid resistance properties of the existing wearing surface are inadequate (FN < 40) at 19 test locations on the northbound bridge and 23 locations on the southbound bridge. To address the identified friction deficiency, the Authority will evaluate two options for effectiveness, durability, and value. One alternative is to install longitudinal or transverse cuts (grooves) into the surface to increase pavement skid resistance properties. The second alternative is to install a durable high-friction overlay wearing course.

As reflected in the Benefit Cost Analysis**,** the project is expected to result in a reduction of 4.68 damaged vehicles per year, a reduction of 2.86 injuries per year, and is projected to provide a systematic reduction of 0.04 fatalities per year.

Targeting known and documented safety problems with the bridge and protecting motorized and non-motorized travelers or communities from health and safety risks

Improvements to the friction of the wearing surface of the bridge decks will improve safety for motorized users by reducing the likelihood of crashes, as discussed above.

This project will not include rehabilitation or replacement of the bridge decks and does not require bicycle and pedestrian accommodations pursuant to 23 USC 217(e). However, there are existing sidewalks on the bridges and paved pathways connecting the bridges' sidewalks to existing local and regional shared-used trail systems on both ends of the bridges. The Authority has examined opportunities to improve the safety of these accommodations within the project scope. Bicycles and pedestrians are currently accommodated on one protected 5-foot-wide sidewalk on each bridge, which is less than the 10-foot width desirable for a shared-use path. Due to the age and original design of the bridges, the bridge sections are very narrow: they only allow for the 5-foot sidewalks and two 10-foot mainline lanes in each direction, with 2-foot shoulders. Given the available space, there is no opportunity to safely allot additional width to accommodate non-motorized modes of travel. However, the project will restore the sidewalk on the southbound bridge, which has been closed due to heaving and safety concerns, to a safe and accessible condition. Concerns with the safety of the paved paths connecting to the bridge sidewalks, i.e., the alignment of the connection points, will be addressed, as will any irregularities in the surface of the paths. Wayfinding signs, benches and pull-offs will also be added to improve navigation and comfort for non-motorized users.

Safety for maintenance personnel will be improved by replacing over 100 existing non-conforming fixed ladders with cages with ladder safety systems and personal fall arrest systems. This will bring the structures into compliance with the Occupational Safety and Health Administration's regulation 1910.28(b)(9).

Criteria #3: Mobility and Economic Competitiveness

This project contributes to the Mobility and Economic Competitiveness criteria by:

Improving the mobility, efficiency, and reliability of the movement of people and freight

The project will improve reliable movement of freight and people by eliminating the risk of load restrictions or full closure of a critical local, state, and regional interstate link. It will also reduce the frequency of maintenance activities requiring work zone restrictions that contribute to congestion.

The bridges are located on I-190, serves as a primary truck freight connector to the trans-Canadian highway system, providing direct interstate access to the Lewiston-Queenston Canadian border crossing, one of only two point-of-entry freight border crossings in the region. Two million trucks crossed at these points in 2017, making them both vital to freight movement and the supply chain.

This segment of I-190 is part of greater 570-mile New York State Thruway System (Thruway). The Thruway is one of the oldest components of the National Interstate Highway System (NHS) and is part of the National Highway Freight Network (NHFN) and the New York State Freight Core Highway Network. In addition, it is the only system in the state that permits tandem trucks (a.k.a, Longer Combination Vehicles or LCVs) to operate on it. The mainline of the Thruway extends 426 miles, from New York City to Buffalo (I-87 and I-90). Other elements of the Thruway System include the New England Thruway (I-95), the Cross Westchester Expressway (I-287), the Garden State Parkway Connector, the Berkshire Connector (I-90), and the Erie Section (I-90s). The Thruway is essential for commerce and travel in the state and region: it connects New York's principal cities, rural areas, and tourist destinations, and one-third of all vehicles using the Thruway are from out of state.

On a local level, this portion of I-190 is part of the most direct interstate connection between I-90 and Niagara Falls, a major tourist destination visited by 9.5 million people annually. The bridges are one of only two connections between Grand Island, with a population of 21,389, and mainland New York. They provide the most direct connection from the island and Niagara Falls to the City of Buffalo, which serves as a regional metropolitan center for employment, shopping, and necessary services.

Restrictions or closure of the bridges would impair mobility and damage the local, regional, and international economies. The Benefit Cost Analysis indicates that, should an event occur without the proposed retrofits being completed, the impacts would be devastating to the corridor and surrounding communities as well as the local

and regional economies. The estimated replacement cost of the bridges is nearly $1 billion, and during the 2 years required for inspection and construction, traffic accessing Grand Island would be forced to use a detour that would add approximately 13 miles to their trip. Through-traffic would also need to detour around the island on non-interstate routes in surrounding communities. Non-motorized traffic would have no viable detour, with the closest bicycle and pedestrian crossing from the Grand Island to the mainland located approximately 5 miles away at the North Grand Island Bridges. Detours that would be necessary during repair and/or replacement of the structures would add 0.683 hours of travel for southbound vehicles and 0.583 hours of travel for northbound vehicles, in a calculated economic impact of over $455 million in transportation costs.

Criteria #4: Climate Change, Resiliency, and the Environment

This project contributes to the Climate Change, Resilience, and the Environment criteria by:

Improving resiliency of at-risk infrastructure

As discussed under Criteria #1, this project will address critical condition issues on fracture-critical non-redundant members and other bridge components. The bridge will be strengthened against the weathering effects and stresses of storm events of increased frequency and intensity, including extreme lake effect snow from Lake Erie. According to a 2021 NYS Department of Environmental Conservation study[1], "The probability of extreme lake-effect snows, such as those that affected western New York in 2014[2], is likely to increase in the near future. Models suggest the decreasing trend in ice cover on the Great Lakes will lead to increased lake-effect snow in the next several decades through greater moisture availability." Seismic resiliency improvements will also be made to ensure that the bridge will remain serviceable as an emergency response route following an upper-level seismic event.

Resulting in a reduction of air pollution or greenhouse gasses

The project will contribute to efforts to combat climate change by reducing vehicle emissions (NOx, Sox, PM2.5, and C02) attributed to work zone-related congestion and lane closures. As shown in the Benefit Cost Analysis, a net reduction of over 180,000 metric tons in greenhouse gasses is anticipated over the 20-year analysis period.

Criteria #5: Equity, Partnership, and Quality of Life

This project contributes to the Equity, Partnership, and Quality of Life criteria by:

Engaging diverse people and communities

The Authority has developed a draft Public Involvement Plan, identifying a wide range of potential stakeholders and methods of outreach, including in-person and internet-based communication, to share information about the project, encourage discussion, and gather input from affected or interested groups and individuals. The Authority has already engaged numerous stakeholders, including:

- Nearby municipalities
- Entities with jurisdiction over adjacent trail systems
- Local and regional business organizations
- Regional infrastructure and transportation coalitions
- Local bicycle advocacy organizations
- Local and regional economic development groups
- Freight and motorist representative organizations
- Local and regional trade organizations
- State and local elected officials

The Authority will work with these stakeholders to identify other groups and individuals with a potential interest in the project, treating the plan as a "living document" to be revised as new stakeholders, points of contact, or methods of communication are identified. This will include working with elected officials and the municipalities to identify the best mode of outreach to communicate with residents of Opportunity Zones, Areas of Persistent Poverty, and Potential Environmental Justice Areas located within the towns.

[1] "Observed and Projected Climate Change in New York State: An Overview", New York State Department of Environmental Conservation, August 2021

[2] In November 2014, a lake-effect snow event deposited nearly 7 feet of snow in areas near Buffalo over several days, resulting in 13 fatalities, hundreds of major roof collapses and structural failures, 1000s of stranded motorists, and scattered food and gas shortages due to impassable roads. "Lake Effect Summary: November 17-19, 2014", National Weather Service:

The Authority ensures its compliance responsibility in meeting the requirements for federal Civil Rights law on its Federal Aid-funded transportation projects, including requirements for the participation of Disadvantaged Business Enterprises (DBEs). Further, the Authority incorporates targeted training provisions within its contracts to provide a mechanism which allows for underrepresented groups to become skilled in the various construction trades.

Using planning and engagement in the project design phase to mitigate and prevent physical and economic displacement

While negative physical or economic impacts of the project are expected to be minimal and temporary, consisting primarily of minor nighttime disruptions to motorized and non-motorized traffic during construction, the Authority will use information gathered from public outreach to identify, avoid, or minimize any impacts to people, homes, or businesses that were not previously identified.

Incorporating nonvehicular transportation into the project and providing quantifiable benefits to the quality of life of the users

Nonvehicular transportation is a key component of the project, which includes the full restoration of a closed sidewalk on the southbound structure, and improvements to the shared-use paths connecting the sidewalks to adjacent trail systems to enhance safety, comfort, and navigation for non-motorized users. Improved access and connectivity are expected to more than triple the estimated daily bike trips from 36 to 133. The improved connection to and from the Empire State Trail (EST), which crosses the state and passes along the south end of the bridges, will present both recreational and economic opportunities to residents of the region. A 2018 user projection report developed for the recently completed 750-mile EST estimated that annual trail users on the segment closest to the bridges, would be 126,434 (44,252 bikes and 82,182 peds)[3].

Advancing equitable access to housing and transportation

Maintaining the vehicular access and improving bicycle and pedestrian access for the bridges will increase the likelihood that people can - and will - choose non-motorized or public transit options to get to work, recreation, and services.

In addition to the two Opportunity Zones and Areas of Persistent Poverty identified in Section I, the project is located in and near multiple Potential Environmental Justice Areas, which are defined, in part, by a comparatively high percentage of the population (22.82%) with household incomes below the federal poverty level. In 2016, the Institute for Transportation & Development Policy (IDTP) found that lower-income households paid a larger portion of their income on transportation expenses than households with higher incomes. IDTP states that "the lowest earning 20% of the population earned an average of $11,933 and spent an average of $3,497 (29%) on transportation costs." Providing safe, accessible non-motorized transportation options can help alleviate some of the transportation cost inequity that exists for lower-income households.

In addition, 3 Niagara Frontier Transportation Authority (NFTA) Metro Bus transit routes use the bridges. NFTA reports that, within .25 miles of stops on these routes, up to 37% of the population lives in poverty and up to 58% is non-white or of Hispanic/Latino origin. Ensuring that these routes over the bridges are maintained helps to ensure that public transit will remain a viable option for lower-income and historically underserved populations that rely on these routes.

Providing congestion reduction and improved reliability in the project corridor

As demonstrated in the Benefit Cost Analysis, the travel time savings that will be achieved by the project are estimated to be 3.995 million Personal Vehicle Hours and 0.367 million Truck Hours, a $44 million present-worth benefit.

[3] "Trail User Projections", Empire State Trail, July 2018 https://empiretrail.ny.gov/sites/default/files/2021-09/EST%20Trail%20User%20Projections%20July%202018.pdf

Criteria #6: Innovation

This project contributes to the Innovation criteria by:

Using innovative financing

Within the parameters permitted for the Bridge Investment Program, the Authority may use a Best Value bidding procedure for this project. The Best Value process has been used successfully for several Thruway projects in the past.

Traditional bidding procedures award the contract to the lowest responsible bidder. The Best Value bidding procedure is an innovative process that considers quality and efficiency in addition to cost. While price is still a major factor, a bidder with the lowest overall price may not necessarily be awarded the project: it will be awarded to the bidder who demonstrates the best complete understanding and ability to deliver the best project.

Competitive bids are solicited through a two-part process:

- Part one consists of traditional construction plans, proposal, bid items and quantities.
- Part two consists of a description of technical evaluation factors specific to the project, their relative weights, the weighting of price vs. technical evaluation factors, and instructions to the bidders.

Bidders submit a price proposal and a separate technical submission. The technical submissions are not publicly opened or read. Instead, they are reviewed and scored, based on defined project-specific criteria related to quality, schedule, experience, capability, traffic impacts, and the bidder's overall understanding of the project. The technical evaluation scores are combined with the price proposals to determine the Best Value Bidder. All Best Value Submissions are reviewed and scored by an Evaluation Committee, under the direction of the Authority's Office of Capital and Contracts Management.

This innovative procurement process reduces risk to the Authority. A contractor is selected based, in part, on their complete and written understanding of all critical aspects of the project rather than just price alone. This increases the potential for selecting and awarding to the contractor with the ability to deliver the best overall project. Contractors can propose the use of innovative approaches or techniques that will offer significant benefits in terms of:

- lower costs
- shorter timeframes to complete work
- less disruption to neighboring communities
- less disruption to the movement of people, goods, and services
- improved work quality
- improved safety

Two recent Authority projects that used Best Value bidding, both with project costs of over $50 million, benefitted from construction time savings of up to 37% and price savings of up to 20%.

IV. PROJECT COSTS

BIP Request Amount	**Exact Amount in year-of-expenditure dollars:** $23.5 million
Estimated Total of Other Federal funding (excluding BIP Request)	**Estimate in year-of-expenditure dollars:** $0
Estimated Other Federal funding (excluding BIP) **further detail**	None
Estimated non-Federal funding	**Source:** New York State Thruway Capital Funds **Amount:** $23.5 million
Future Eligible Project Cost (Sum of BIP request, Other Federal Funds, and non-Federal Funds, above)	**Estimate in year-of-expenditure dollars:** $47.0 million
Previously incurred project costs (if applicable)	**Estimate in year-of-expenditure dollars:** $1.535 million
Total Project Cost (Sum of 'previous incurred' and 'future eligible')	**Estimate in year-of-expenditure dollars:** $48.535 million
If more than one bridge, will bridge bundling be used to deliver the Project?	No. While this project will technically rehabilitate 2 structures, they are side-by-side structures in the same location.
If proposed project utilizes bundling, Cost of Unbundled Projects	**Estimate in year of expenditure dollars:** Not applicable
Amount of Future Eligible Costs by Project Type	**Bridge Rehabilitation Str. 001, South Grand Island Bridge (Northbound):** $14,500,000 **Bridge Rehabilitation Str. 002, South Grand Island Bridge (Southbound):** $32,500,000 Will request **$0** of the amounts awarded to the entity to pay subsidy and administrative costs necessary to provide to the entity Federal credit assistance under 23 U.S.C. Chapter 6.

V. BENEFIT COST ANALYSIS

The full Benefit Cost Analysis is included in the appendices of a separate Project Narrative that has been submitted with this application.

The benefit cost analysis demonstrates that:

The project generates benefits that exceed its costs, and therefore results in a quantified net benefit to society.

The cost effectiveness and net benefits of the project were estimated through a complete Benefit-Cost Analysis (BCA) as per U.S. Department of Transportation's (USDOT) *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* (March 2022). The monetization of the main benefits resulting from the proposed improvements are summarized below:

Benefit Estimates, 2020 Dollars

Benefit Categories	7% Discount Rate*
Reduced Travel Time Costs	$44.0 million
Improved Safety and Avoided Crash Costs	$10.2 million
Reduction in Emissions Costs	$18.1 million
Reduction in Pavement Maintenance Costs	$8.5 million
Seismic Event Travel Time Savings and Reduced Construction Cost	$0.4 million
Ped/Bike Facility Improvements & Mortality Reduction	$3.1 million
Residual Values	$6.3 million
Total Estimated Benefits**	**$90.6 million**

* 7% Discount Rate with the exception of CO2 emissions, which are discounted at 3% per USDOT Guidance.
** Total may not sum due to rounding

A 20-year period of analysis was used in the estimation of the project's benefits and costs, which includes 2 years of construction (including quality control and construction inspection services) and 18 years of operation.[4] Annual costs and benefits are estimated through 2043, in accordance with USDOT BCA Guidance for projects addressing deficiencies. Beyond this point, it is anticipated that additional maintenance will need to be performed.

The project's most significant benefit is travel time savings and emissions reduction for passenger vehicles and trucks due to the avoidance of work zone related detours and delays. The frequency and duration of intermittent repairs creates additional, unnecessary delays and subsequent emissions release along this already congested corridor. The project will also generate a significant improvement in crash cost savings. Historic crash data was provided by the Authority, and future savings were calculated using the Highway Safety Manual (HSM) Predictive Model and applying crash modification factors (CMFs).

The monetized value of seismic retrofit benefits is relatively small due to the low probability of a significant event occurring in the project area. However, should such an event occur without the proposed retrofits being completed, the impacts would be devastating to the bridge and surrounding communities. The estimated replacement cost of the bridges is nearly $1 billion and would result in up to 2 years of bridge closure for inspection and replacement. During this time, traffic would be required to detour to the southbound North Grand Island Bridge to access Grand Island, adding approximately 13 miles to their trip. Through traffic would also need to detour around the island on non-interstate routes to reach their destination.

Considering all monetized benefits and costs, the internal rate of return of the project is estimated at 18.1%. With a 7% discount rate, the project would result in a net present value of $54.7 million and a benefit-cost ratio of 2.53.

[4] Project support costs are assumed to be incurred from 2022 to 2025. Benefits are assumed to begin to accrue in 2026. A twenty-year analysis period was conservatively estimated based on USDOT BCA suggested service life assumptions for transportation infrastructure projects.

Overall Results of the BCA, 2020 Dollars

Project Evaluation Metric	7% Discount Rate*
Total Discounted Benefits**	$90.6 million
Total Discounted Costs	$35.9 million
Net Present Value	$54.7 million
Benefit-Cost Ratio	2.53
Internal Rate of Return	18.1%

* 7% Discount Rate with the exception of CO2 emissions, which are discounted at 3% per USDOT Guidance

The project will generate an additional benefit that has not been monetized due to lack of guidance/ methodology from the US Department of Transportation. This benefit is travel time reliability. The reduction in unscheduled closures for emergency deck repairs will reduce the overall number of incidents along the corridor and improve general travel time reliability. While the travel time savings estimated in the BCA do include time savings from reduced delays from intermittent closures, the BCA does not consider the additional benefit of increased reliability beyond that of its incremental time value. In other words, just the fact that travel along the route is more reliable, and thus a traveler has a lower chance of experiencing a delay during a particular trip, has an intrinsic value to many. Travel time reliability is important for firms that depend on just-in-time deliveries as well as for individuals who need to be on time for work or other appointments. Improved reliability allows drivers to reduce the amount of "buffer" time they need to budget in order to account for unexpected delays. The inclusion of this benefit would increase the overall benefit-cost ratio.

VI. PROJECT READINESS AND ENVIRONMENTAL RISK

Other Federal Funding and Non-Federal Funding Secured	Yes
NEPA Status Indicate if the determination will likely be the result of a Categorical Exclusion (CE), Environmental Assessment (EA), or Environmental Impact Statement (EIS)	**Planned or Actual Start of NEPA Date:** May 2022 **Planned or Actual Completion of NEPA Date:** January 2023 **Final NEPA Determination or current status of NEPA process:** The project is likely to be a Categorical Exclusion. No need for environmental permits is anticipated. However, consultation has been, or will be, required with: ▪ The State Historic Preservation Office (SHPO) for potential effects to the National Register-Eligible southbound bridge. Consultation with the SHPO has been completed, with the finding that the project will have No Adverse Effect on the bridges. ▪ The New York State Department of State for consistency with State Coastal Management policy. The project is located within protected coastal areas. Given the limited potential for the work scope to impact the protected areas, and the potential to improve recreational non-motorized access to and across the Niagara River, it is anticipated that the project will be found consistent with the policy. ▪ The US Fish & Wildlife Service and New York State Department of Environmental Conservation for Federally- and State-listed threatened or endangered species that are either known to exist or have the potential to exist in the project limits. It is anticipated that the project may affect, but is not likely to adversely affect, them. All consultation is expected to be complete by January 2023.
Is the project currently programmed in the:	**TIP:** The State DOT has agreed the project is eligible and will be added when Federal funding is allocated. **STIP:** The State DOT has agreed the project is eligible and will be added when Federal funding is allocated.
Is right-of-way acquisition necessary?	No
Right-of way acquisition considerations	None
Design Status	**Planned or Actual Start of Preliminary Design Date:** October 2022 **Planned or Actual Completion of Preliminary Design Date:** January 2023 **Planned or Actual Start of Final Design Date:** January 2023 **Planned or Actual Completion of Final Design Date:** September 2023
Anticipated Construction Start Date:	May 2024
Anticipated Project Completion Date:	November 2025

The summary on project readiness and environmental risk demonstrates that:

The New York state Thruway Authority is capable of delivering the project in a manner satisfying Federal Requirements.

The Authority is familiar with all Federal standards and procedural requirements for developing and delivering a Federally-funded project. Over several decades, the Authority has, on multiple occasions, been a recipient of Federal transportation funds and has successfully delivered the projects, including a 2013 $1.6 Billion loan grant for the Governor Mario M. Cuomo Bridge (Tappan Zee Bridge Replacement) under the Transportation Infrastructure Finance and Innovation Act (TIFIA).

The project's funding sources are fully committed and there is demonstrated funding to cover contingency/cost increases.

The Authority has previously expended $1.535 million on preliminary design (pre-BIP grant application) and is committed to expending an additional $23.5 million in Thruway Authority Capital Funds for the project. Cumulatively, Authority funding accounts for 53% of the overall project costs.

As shown in the Project Budget, included in the separate Project Narrative submitted with this project, an allowance of 20% of the Construction cost ($6.6 million) has been made for contingencies and cost increases. The funding committed by the Authority is adequate to cover these costs.

It is highly likely that NEPA and other environmental reviews will be complete in time to meet the project schedule.

As discussed in Section VI, and in more detail in the separate Project Narrative, the Authority has identified all potential environmental concerns for this project. While no need for environmental permits is anticipated, the Authority has initiated necessary consultation to satisfy State (New York State Environmental Quality Review Act) and Federal (National Environmental Policy Act) requirements. A draft Public Involvement Plan has been developed and includes specific outreach to communicate with residents of underserved communities and Potential Environmental Justice Areas in and near the project area. Stakeholder outreach has been initiated and will be ongoing throughout the project.

It is anticipated that a NEPA determination will be complete by January 2023, and all other environmental requirements will be satisfied no later than September 2023, when Final Design for the project is scheduled for completion.

VII. PROJECT PRIORITY CONSIDERATIONS

This application supports the following priority considerations:

The project will be ready to proceed to final design within 12 months of a Categorical Exclusion Determination, Finding of No Significant Impact, or Record of Decision.

A Categorical Exclusion Determination is anticipated by the completion of Preliminary Design in January 2023, when the project is scheduled to enter Final Design. Please refer to the project schedule in Section VI and the detailed project schedule in the separate Project Narrative.

The project schedule and budget demonstrate that a two-phased BIP funding approach is feasible, with an initial obligation of BIP funds to complete final design and proceed to the construction phase within 12 months of the initial award of FY 2022 BIP funds. The second obligation of BIP funds for construction will be, based upon the results of preliminary engineering and FHWA approval of the plans, specifications, and estimate for the project, reasonably expected to begin construction within 18 months of the first obligation of BIP funds

Final Design is scheduled to be completed in September 2023, with Construction scheduled to start 6 months later, in May 2024. Please refer to the project schedule in Section VI, and the detailed project schedule and budget in the separate Project Narrative.

No right-of-way acquisition will be necessary.

Without a FY 2022 BIP grant, construction of the project is unlikely to commence before September 30, 2025.

BIP Grant funding will supplement the Authority's funding to ensure that the time-sensitive and necessary improvements identified in Sections I and III are completed by November 2025. Without BIP funding, limited available funds will require that deteriorating conditions of the bridge are addressed only an emergency-need basis to avoid imminent condition-related flags that may cause bridge closure or load posting. Seismic resiliency improvements will be delayed by at least 10 years, with completion no sooner than 2035. Improvements to accommodations for non-motorized users will be delayed indefinitely, and the southbound bridge sidewalk will remain closed. A reduced-scope-of-work approach will result in greater impacts to bridge users, including freight, public transportation, and non-motorized users, who will experience compounding impacts in service as the bridge conditions continue to deteriorate.