RESTORE

Rehabilitation of the Niagara Thruway (I-190) from Milepost 900.7 to Milepost 904.2

2022 INFRA GRANT APPLICATION

NEW YORK STATE OF OPPORTUNITY. Thruway Authority

INFRA CONNECTING AMERICA

This page intentionally left blank

NEW YORK STATE OF OPPORTUNITY. | Thruway Authority

May 17, 2022

The Honorable Pete Buttigieg, Secretary
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

On behalf of the New York State Thruway Authority, I am pleased to submit our application for a $25 million U.S. Department of Transportation Infrastructure For Rebuilding America (INFRA) Grant. This grant will supplement the cost for rehabilitating a 3.5- mile section of the Niagara Thruway (I-190) in Erie County, New York. This project, which is currently included in our five-year Capital Plan, will have a significant impact on adjacent communities along this corridor.

For more than 60 years, the Governor Thomas E. Dewey Thruway has been essential for commerce and travel in the Northeast. The Thruway spans New York State and serves as a vital link to long distance interstate travel and provides the major route of access for visitors to our state's tourism anchors. It is also a principal artery of commerce and serves as a primary catalyst of the state's economic activity. About one-third of all vehicles using the Thruway are from out of state.

The Niagara Thruway is a 21-mile segment of interstate that connects the City of Buffalo (Erie County) to the City of Niagara Falls (Niagara County). This segment serves as a vital corridor for commerce, connecting points between the United States and Canada, and local communities in between. The project that the INFRA Grant will supplement will take place along a 3.5-mile segment of the I-190.

Each year, there are approximately 33 million trips taken on this section, which spans from exit 1 (South Ogden Street) to just before exit 6 (Elm Street). The pavement along this 3.5-mile stretch is experiencing accelerated deterioration under the weight of large trucks and commercial vehicles and wear from approximately 90,000 vehicles a day. Concrete slab failures are regularly repaired, but additional work needs to be done to stabilize the road surface and prevent further deterioration.

The INFRA grant will help provide for the safe, efficient, and sustainable movement of people, goods, and services, while ensuring that surrounding communities, which includes approximately 67 percent Historically Disadvantaged Communities and/or Areas of Persistent Poverty, benefit from this project. Rehabilitating this section of I-190 will afford long-term improvements to this corridor and more reliable travel by reducing the likelihood of accidents, and traffic delays imposed by frequent maintenance.

These reduced delays and improved road conditions will provide greater reliability and comfort for the movement of people, freight, and services, which directly benefits businesses and the local and regional economy. Rehabilitating this

section of I-190 would enhance safety with a new driving surface, guiderail, repaired lighting, signage and high visibility striping.

This rehabilitation project will provide lasting improvements, maintain community connections across I-190, enhance the overall safety for motorists and importantly, the quality of life for residents along this corridor. It will mitigate air quality concerns, upgrade mobility and community connectivity while decreasing the need for repeated maintenance helping ease traffic disruptions for residents in this very busy corridor.

Thank you for your consideration and support of our application.

Sincerely,

Matthew J. Driscoll

TABLE OF CONTENTS

APPENDICES

SUPPORTING INFORMATION

All supporting information referenced in this application can be found on the New York State Thruway Authority's website at https://www.thruway.ny.gov/oursystem/infra-grant/.

LIST OF EXHIBITS

PROJECT COVER PAGE SUMMARY TABLE

Basic Project Information	
What is the Project Name?	**Rehabilitation of I-190 from Milepost 900.7 (N 0.7) to Milepost 904.2 (N 4.2)**
Who is the Project Sponsor?	**New York State Thruway Authority**
Was an application for USDOT discretionary grant funding for this project submitted previously?	**No**
A project will be evaluated for eligibility for consideration for all three programs, unless the applicant wishes to opt-out of being evaluated for one or more of the grant programs.	**X** Opt-out of Mega? __ Opt-out of INFRA? **X** Opt-out of Rural?
Project Costs	
MPDG Request Amount	Exact Amount in year-of-expenditure dollars: **$25,000,000.00**
Estimated Other Federal funding (excl. MPDG)	Estimate in year-of-expenditure dollars: **$0**
Estimated Other Federal funding (excl. MPDG) further detail	Other Federal funding from Federal Formula dollars: **$0** Other Federal funding being requested from other USDOT grant opportunities? **$0** From what program(s)?:**N/A**
Estimated non-Federal funding	Estimate in year-of-expenditure dollars: **$28,136,000**
Future Eligible Project Cost (Sum of previous three rows)	Estimate in year-of-expenditure dollars: **$53,136,000**
Previously incurred project costs (if applicable)	Estimate in year-of-expenditure dollars: **$500,000.00**
Total Project Cost (Sum of 'previous incurred' and 'future eligible')	Estimate in year-of-expenditure dollars: **$53,636,000**
INFRA: Amount of Future Eligible Costs by Project Type	6) A surface transportation project within the boundaries or functionally connected to an international border crossing that improves a facility owned by fed/state/local government and increases throughput efficiency: **$25,000,000.00**
Mega: Amount of Future Eligible Costs by Project Type	**N/A**
Rural: Amount of Future Eligible Costs by Project Type	**N/A**
Project Location	
State(s) in which project is located	**New York**
INFRA: Small or Large project	**Small**

Urbanized Area in which project is located, if applicable	**Buffalo NY Urban Area**
Population of Urbanized Area (According to 2010 Census)	**1,215,826**
Project Location *(continued)*	
Is the project located (entirely or partially) in Area of Persistent Poverty or Historically Disadvantaged Community?	**Yes.** **2010 Erie County Census Tracts 11, 163, and 164**
Is the project located (entirely or partially) in Federal or USDOT designated areas	Opportunity Zones: **Yes.** Empowerment Zones: **No** Promise Zones: **No** Choice Neighborhoods: **Yes**
Is the project currently programmed in the: • TIP • STIP • MPO Long Range Transportation Plan • State Long Range Transportation Plan • State Freight Plan	TIP: **Yes. Affirmed as qualifying, addition pending**. STIP: **Yes. Affirmed as qualifying, addition pending**. MPO Long Range Plan: Yes. **Affirmed as qualifying, addition pending.** State Long Range Transportation Plan: **Yes. Affirmed as qualifying, addition pending.** State Freight Plan: **Addition pending.**

Project Contact	
Richard W. Lee, P.E. Chief Engineer New York State Thruway Authority 200 Southern Boulevard Albany, NY 12201-0189	Phone: (518) 436-2810 E-mail: Richard.Lee@thruway.ny.gov Unique Entity Identifier (UEI): LVJZN2NUZKK4

1 PROJECT DESCRIPTION

1.1 Transportation Challenges and Solutions

Project Introduction

Built in the early 1950s, the New York State Thruway is one of the oldest components of the National Interstate Highway System and one of the longest toll roads in the nation. Constructed over 570 miles in length, the Thruway System plays a vital role serving major trade international border connections, regional, and state economies. The system connects New York's principal cities, rural areas, and tourist destinations. This system is also a part of the National Highway Freight Network (NHFN) and the New York State Freight Core Highway Network.

Exhibit 1: The New York State Thruway System, with the I-190 New England Thruway segment identified

The Niagara Thruway (I-190), a 28-mile segment of interstate extends from I-90 in the City of Buffalo (Erie County) to its terminus at the Lewiston-Queenston international border crossing in the Town of Lewiston (Niagara County). The New York State Thruway owns and maintains the first 21 miles of the interstate, including the segment of this highway serving another major international border crossing at the Peace Bridge, located within the City of Buffalo. The remaining 7 miles of the interstate, from the City of Niagara to Lewiston-Queenston international crossing, is owned and maintained by the New York State Department of Transportation. Together, these two Buffalo-Niagara border crossings rank second among US-Canada crossings for truck volume.[1]

This project will rehabilitate and strengthen a deteriorated 3.5-mile segment (Milepost 901.7 to MP 904.2) of this critical transportation corridor, ensuring that this portion of I-190 is restored to provide for future safe, efficient movement of people, goods, and services. This environmentally sustainable and equitable project will not only benefit the state and region, but also the communities located closest to I-190, including Historically Disadvantaged Communities, Areas of Persistent Poverty, and a HUD Neighborhood Grantee area.

Transportation Challenges

This segment of I-190 is classified as a Principal Urban Arterial Interstate and is on the National Highway system (NHS). It is typically comprised of three 12-foot mainline lanes in each direction, with 10-foot right shoulders, a variable-width median, and a concrete median barrier running the full length. The estimated two-way Annual Average Daily Traffic (AADT) is about 90,000, with 10% truck volume.

Several transportation challenges along the segment have been identified:

- **Pavement Condition**. The pavement in this highway segment is experiencing accelerated deterioration due to advanced age under heavy loading. Since it was reconstructed in 1987, Thruway Maintenance forces have needed to conduct

[1] New York State Department of Transportation. "New York State Freight Transportation Plan". August 2019. Page 116

corrective repairs at an exponentially increasing rate to retain adequate rideability of roadway pavement for continued use.

In recent years, the corrective repair work to the pavement system has become a near constant need, in addition to continued application of cyclical preventative maintenance activities. The continuous repair cycle has become costly, inefficient, and frequently creates delays for road users.

The structural pavement system has experienced a quantity of design equivalent axle loadings which exceed its design life expectancy, is in poor condition, and all options for repair have been exhausted: structural pavement rehabilitative and strengthening improvements are needed to restore the pavement. The existing pavement conditions will, if unaddressed, become an increasing safety hazard to road users and vehicle occupants, increase congestion due to lower travel speeds, exacerbate air quality concerns related to emissions from slowed or idling vehicles, and negatively impact the movement of people and the delivery of freight goods and services.

Exhibit 2: Examples of pavement deterioration on this segment, with extensive patching and repairs

- **Community Connections**. There are three overhead bridges within the project segment that provide important community and pedestrian connections across I-190. Refer to Exhibit 10 for a list of the bridges and communities they serve. Each of these bridges have pedestrian facilities on them. The Ogden Street bridge also accommodates a dedicated bike lane.

Exhibit 3: Bridges over I-190 provide important multi-modal community connections (Ogden Street Bridge).

To allow for continued safe movement of large vehicles under these structures, reducing the potential for bridge strikes, there are minimum vertical clearance standards for overhead structures on the National Highway System. Raising the pavement profile through application of a structural pavement strengthening improvement has the potential to further reduce the non-standard vertical clearances that exist at these locations. The minimum vertical clearance over I-190 must be maintained for these bridges and improved if feasible.

- **Safety.** In addition to the potential for bridge strikes and safety concerns related to the deteriorating pavement condition, other safety features need to be addressed. The existing linear corridor lighting system on this section of 190, a roadway safety feature, reached the end of its maintainable life and has become dysfunctional. The Authority has recently removed many of the lighting poles due to corrosion. Installation of new poles and luminaries is needed. Additionally, overhead guide signs, critical safety

infrastructure to properly direct system users, exist at what are now non-conforming locations according to standards prescribed by the MUTCD and must be replaced at appropriate positions. Replacement of non-conforming guide rail systems and installation of new pavement markings in the segment is needed as existing markings are worn, with poor visibility or reflectivity.

- **Traffic During Construction**. Moving people and vehicles safely and efficiently through the corridor during construction will present an additional challenge. There are no convenient alternative routes for vehicles going to and from the US/Canadian Peace Bridge border point of entry and from unintentionally diverting traffic to nearby state and local roads to "go around" the construction area would be undesirable. If any overhead bridges are affected by construction, the critical community and pedestrian connections they provide must be maintained, with minimal disruption.

Transportation Solutions

- **Pavement Condition**. The project will rehabilitate the existing deteriorated concrete pavement, replace slabs as needed, and place a strengthening asphalt overlay to restore the pavement system for an anticipated 20-year service life. Refer to Exhibit 4. This 20-year design life restorative treatment will return the structural pavement and riding surface to a state of good repair requiring only routine preventative maintenance and preservation activities. This approach will be far more cost effective, maximizing the service life of the existing pavement, and will have fewer negative impacts on traffic and safety than the current approach of continuous round-the-clock patching and repair measures that are needed. In conjunction with the restorative pavement work, the project will perform the additional safety improvements that are needed, including provision of lighting, upgrade of guiderail, and replacement of pavement markings. Refer to Section 5.1 Safety for a detailed discussion of the project's safety improvements.

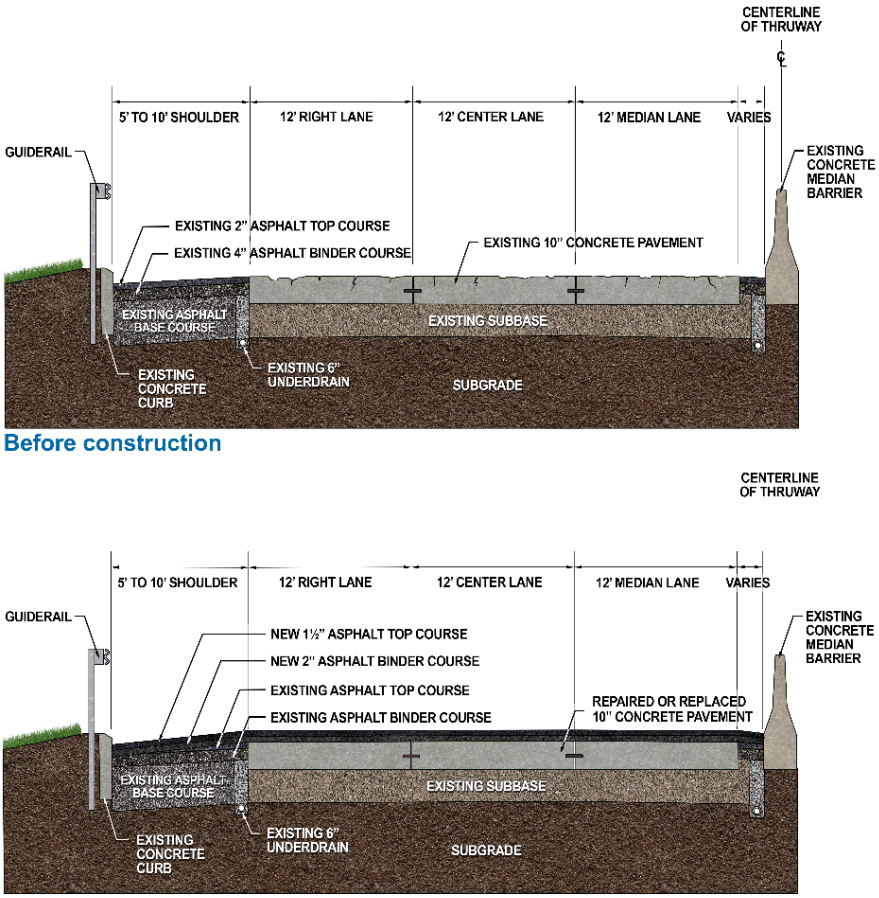


Exhibit 4: Illustrative cross section of pavement before and after construction

- **Community Connections**. The vertical clearance needs of all overhead bridges will be evaluated, and measures will be applied to extents practicable to achieve clearance design standards which will decrease the potential for bridge hits. Bridge superstructure may be adjusted, and/or the profile of the pavement beneath the bridges may be lowered to allow for the added thickness of the pavement strengthening asphalt overlay. Accessible pedestrian connections will be preserved or restored on any bridges where the superstructures are adjusted. Opportunities to enhance accessibility on affected bridges will also be identified if the superstructure is modified.
- **Safety.** In addition to the safety improvements achieved with an improved road surface, worn pavement markings will be replaced and guiderail will be upgraded to Federal standards. This project will restore lighting within this section of highway by installing new poles with highly efficient fixtures and re-energizing the system. Superelevation rates on curves will also be evaluated and corrected, if necessary, to meet current standards for urban interstates.

  Refer to Section 5.1 Safety for a detailed discussion of the project's safety improvements.

- **Traffic During Construction.** The project will be constructed with an emphasis on maintaining traffic flow and safety. Only nighttime lane closures will be used for pavement work to minimize impacts to traffic during peak daytime travel hours.

Particular attention will be paid to community and pedestrian connections provided by the overhead bridges, to avoid or minimize any temporary impacts to these routes.

1.2 Project Development Status

Preliminary Design is currently being advanced for this project. Before design was initiated, the project was incorporated within the Authority's Contract's Program, a listing of funded projects. Incorporation of the project into the Contracts Program was based upon findings from a in-depth asset management analysis. The pavement restorative measures and methods of construction identified in this application have previously been applied successfully on other sections of the Thruway of similar age, condition, and structural pavement section.

1.3 Project Context with Other Transportation Infrastructure Investments

As part of a comprehensive, long-term plan to rehabilitate the Niagara (I-190) corridor, the New York State Thruway Authority (Authority) has recently advanced or completed several other nearby projects which have enhanced the ability for freight to be economically and efficiently transported over this system.

In 2021, the Authority substantially completed a $355 million project to finalize conversion of tolling into a cashless tolling system. This work included conversion of the nearby I-90 Lackawanna and Williamstown toll barriers into a highway speed cashless tolling points. Prior to this contract, in 2018, the Authority converted the I-190 toll barriers at the South and North Grand Island bridge crossings into an all-cashless highway speed tolling points. Together, these projects improved the passage of freight by eliminating traffic bottlenecks. In addition to reduction of congestion, these projects also significantly contributed towards the Authority's efforts to reduce greenhouse gas emissions from slowed or idling vehicles which now efficiently pass through these tolling points at unreduced highway speeds.

To build upon these achievements, the Authority is advancing the following projects with will further improve the resiliency of this system, modify existing features to current design standards, and provide for community connections across this interstate highway:

- $36 million resiliency project to retrofit/repair roller bearings, pins and hangers for all four structures and to complete steel repairs at the North Grand Island Bridges (Scheduled Completion in 2024)
- $5.5 million resiliency project to stabilize a retaining rall at the Thruway Bridge over Scajaquada Creek (Scheduled Completion in 2024)
- $9 Million project to replace the Beaver Island State Parkway Bridge over I-190 Thruway. The new bridge will meet the minimum vertical clearance requirement for a bridge over I-190. Sidewalk, constructed to Americans with Disabilities Act (ADA) standards, will be provided on the bridge.

2 PROJECT LOCATION

The project is located along I-190 in the City of Buffalo, Erie County, New York State. The project begins at Milepost 900.7 (0.7) and runs generally westward to Milepost 904.2 (4.2). See Exhibit 5 for project location.

Geospatial Data

Eastern Project Limit (MP 900.7)
Latitude 42°52'34.60"N
Longitude 78°48'5.58"W

Western Project Limit (MP 904.2):
Latitude 42°52'32.05"N
Longitude 78°51'47.51"W

2.1 Connections to Existing Transportation Infrastructure

Refer to Exhibit 5 for a map locating this segment relative to existing connections surrounding the I-190 corridor.

This segment of interstate is a critical connection for international freight traffic crossing the United States-Canadian point of entry border crossing at the Peace Bridge in Buffalo (Erie County) and at the Lewiston/Queenston Bridge in Lewiston (Niagara County). Regionally, the interstate also serves the Buffalo Niagara International Airport, the Buffalo Exchange Street (Amtrak) Station, the Buffalo Metropolitan Transit Center, the Port of Buffalo, and rail terminals for Class 1 CSX and NS railroads For more information on these transportation facilities, refer to Section 5.3 Economic Impacts, Freight Movement, and Job Creation, The highway is part of the National Highway System and National Highway Freight Network (NHFN),

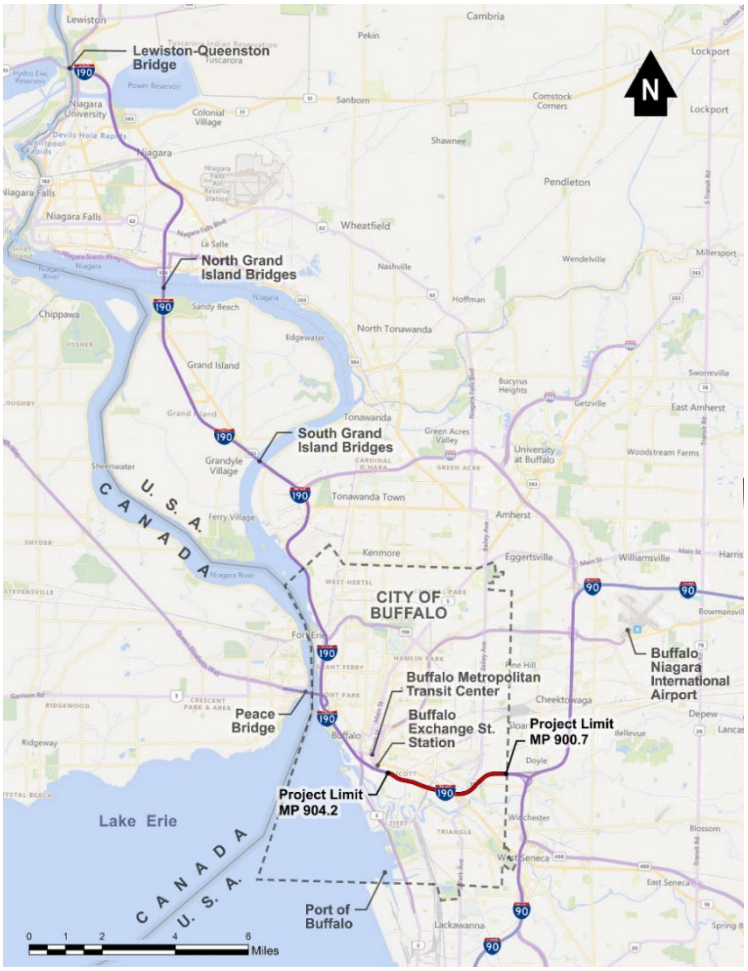


Exhibit 5: Project Location and Local Connections

Along this segment, there are three interchanges, which primarily serve local connections to downtown business areas, commercial/manufacturing areas, and residential areas:

- Exit 1 South Ogden Street - Dingens Street
- Exit 2 Bailey Avenue (US Route 62) - Clinton Street (NY Route 354)
- Exit 3 Seneca Street (NY Route 16)
- Exit 4 Smith Street - Fillmore Avenue
- Exit 5 Hamburg Street - Louisiana Street

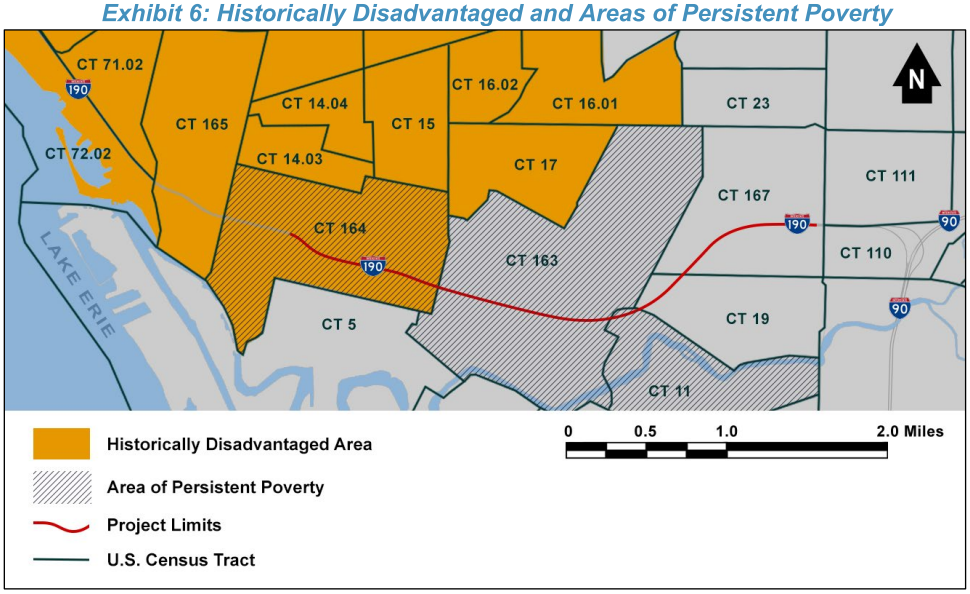
Refer to Exhibit 15 for a map of the interchange locations and the areas they serve.

2.2 Census Information

The project is entirely within the "Buffalo, NY" 2010 Census-designated Urbanized Area (UACE Code 11350).

The project is located within Census Tracts 11, 19, 163, 164, and 167. Approximately one mile (29%) of the total 3.5-mile project length lies within a Historically Disadvantaged Community, associated with Census Tract 164. Approximately 2.3 miles (67%) of the total project length lies within Areas of Persistent Poverty associated with Census Tracts 11, 163, and 164. Refer to Exhibit 6.

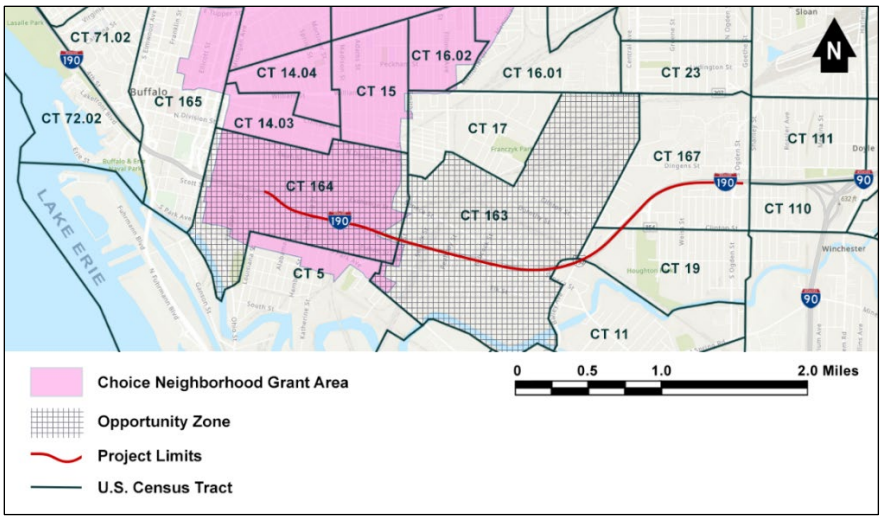
Exhibit 6: Historically Disadvantaged and Areas of Persistent Poverty



The project is partially located within a HUD Choice Neighborhood Grantee area (Grant Number NY2CPH002CNP110 to the Buffalo Municipal Housing Authority, 2010) and is also within 2 U.S. Census tracts (163 and 164) that are designated as Opportunity Zones by the U.S. Department of the Treasury. Refer to Exhibit 6. The project is not located within a US Department of Housing and Urban Development (HUD) Promise Zone or Empowerment Zone. Refer to Exhibit 7

.

Exhibit 7: Choice Neighborhood Grand Area and Opportunity Zones



3 PROJECT PARTIES

As owner of the highway, the New York State Thruway Authority is the lead applicant and will have full responsibility for delivery of the project. Over several decades, the Authority has on numerous instances been a recipient of prior Federal transportation funds and successfully delivered the projects, including a $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 Authority will coordinate with the New York State Department of Transportation and the Greater Buffalo-Niagara Regional Transportation Council (the local Metropolitan Planning Organization) on the development and implementation of the project. Among others, coordination with local communities and transit operators will be conducted, as necessary, for any temporary impacts to their patrons and which affect access within their communities.

As documented within Letters of Support (Supporting Information)[2].key public and private stakeholders endorse this project with recommendation that it be advanced and considered for funding under INFRA.

4 GRANT FUNDS, SOURCES, AND USES OF ALL PROJECT FUNDING

4.1 Budget

The budget for the project was developed using preliminary design information and cost history data of similar work in the same geographic area. A contingency of 20% of project construction costs has been included to conservatively budget for cost increases which may occur due to industry cost escalations or other unknowns. Refer to Exhibit 8 for prior project costs (costs that have been incurred to date) along with funding sources and their shares in each major construction activity. Prior costs are not eligible for INFRA funding. No additional ineligible costs are expected to be incurred prior to obligation.

Also shown in Exhibit 8 tables are future project costs, which are eligible for INFRA funding, along with funding sources and their shares in each major construction activity.

Exhibit 9: Project Costs and Shares (Table 1)

	Project Costs	Non-Federal Funds[1]	INFRA Funds	Other Federal Funds
Corridor studies, scoping activities, and preliminary engineering investigation	$0.50	$0.50	Not eligible	$0.00
Total Prior Project Costs	$0.50	$0.50 (100%)	Not Eligible	$0.00 (0%)

1. Thruway Authority Capital Funds

Exhibit 8: Project Location and Local Connections

[2] Supporting Information: https://www.thruway.ny.gov/oursystem/infra-grant/

Exhibit 10: Project Costs and Shares (Table 2)

FUTURE PROJECT COSTS AND SHARES **$Million** (Eligible for INFRA Funds)				
	Project Costs	**Non-Federal Funds[1]**	**INFRA Funds**	**Other Federal Funds**
Construction	$35.6	$10.6	$25	$0
Mobilization	$1.3	$1.3	$0.	$0
Subtotal: Construction Cost	**$36.9**	**$11.9**	**$25**	**$0**
Contingency (20%)	$7.38	$7.38	$0	$0
Subtotal: Award/ Construction Cost	**$44.28**	**$19.28**	**$25**	**$0**
Preliminary Design	$1.5	$1.5	$0	$0
Final Design	$1.928	$1.928	$0	$0
Quality Control/Admin of Final Design and Contract	$1	$1	$0	$0
Construction Inspection	$4.428	$4.428	$0	$0
Right of Way	$0	$0	$0	$0
Total Future Project Cost	**$53.136**	**$28.136 (53%)**	**$25 (47%)**	**$0 (0%)**

1. Thruway Authority Capital Funds

4.2 Funding Commitments

The Authority has committed $28.1 million in Thruway Authority Capital Funds for the subject project. Authority funding accounts for 53% of the project costs. Refer to Appendix A for documentation of this commitment.

INFRA Grant funding will supplement the Authority's funds and ensure that the time sensitive needed improvements discussed in Section 1.1 Transportation Challenges and Solutions are completed as soon as possible. Without INFRA funding, deteriorating conditions of the pavement system will necessitate completion of a much lesser extent of rehabilitative work within the 2024 construction year. This reduced scope of work approach will result in substantial long-term additional cost to the Authority for maintenance of the roadway and for highway passenger and freight users who will experience compounding construction-related traffic and pavement condition related financial and safety impacts.

5 PROJECT OUTCOME CRITERIA

5.1 Safety

This project will deliver multiple safety improvements. Accident data for this segment of I-190 (Mileposts 900.7 [N 0.8] to 904.2 [N 9.2]) for the pre-Covid period of 2017 through 2019 documents a total of 452 crashes, 144 with injuries, and 1 fatality. As reflected in the Benefit-Cost Analysis in Appendix B, the project is expected to result in a reduction of 22 damaged vehicles per year, a reduction of 4 injuries per year, and a reduction of 0.03 fatalities per year.

Pavement Safety

Poor pavement condition can contribute to crashes. From 2017 through 2019, unsafe lane changes were identified as the cause of 22% of crashes (100 crashes) on this segment of I-190. In addition, 31% of crashes (143 crashes) were rear-end collisions and 9% (43 crashes) were side-swipe collisions. A portion of these rear-end and side-swipe collisions may have involved sudden lane changes or braking by drivers who were apprehensive about going over potholes or spalls. An additional crash was attributed to hitting a hole or bump in the pavement and an

additional 7 crashes were attributed to unsafe braking. Pavement replacement is expected to reduce the frequency of unsafe lane changes and sudden braking, reducing crashes that are caused, in part, by poor pavement condition. This supports the *2017 New York State Strategic Highway Safety Plan* (SHSP)[3], which includes a strategy of implementing engineering improvements to mitigate high-risk driver behaviors, including driver decision errors, such as unsafe lane changes and sudden braking.

Reduced pavement friction, i.e., wet, or slippery pavement, was a factor in many crashes along the segment. For example, 36% of the crashes (164 crashes) occurred on wet pavement. Skidding vehicles were involved in less than 1**%** of crashes (4 crashes). Less than 12% of crashes (59 crashes) occurred when surface conditions were identified as snowy or icy; most occurred on wet or dry pavement. Restorative pavement work will increase roadway friction, resulting in fewer friction-related incidents.

Exhibit 11: Recess Triple Drop Pavement Markings

Rough pavement contributes to flat tires, vehicle damage, and breakdowns, sometimes causing vehicles to become disabled. Tire failure was the primary cause of 14 crashes and 33 claims were filed for property damages sustained along this segment of highway between 2017 and 2019. Claims were submitted by both private and commercial vehicle owners, many for flattened tires or other vehicle damage requiring repairs. In addition to causing congestion, motorists with mechanical problems often resort to stopping on a shoulder. Vehicles entering the left or right shoulder caused 8 crashes. Pavement replacement will decrease the likelihood of flat tires, vehicle damage, and breakdowns, resulting in a lower probability of crashes where these are contributing factors.

Worn or damaged pavement markings will also be replaced as part of the project, improving marking visibility. The pavement marking system utilized by the Authority for mainline pavements, known as "Recess Triple Drop" (Exhibit 9) provides distinctly better visibility of markings in all lighting and most weather conditions, making the highway safer throughout the year. Recess Triple Drop also provides far superior nighttime reflectivity than standard highway striping. Refer to Section 5.6 Innovation Areas for additional information on Recess Triple Drop pavement markings.

Wide edge lines will be used and are identified by the Federal Highway Administration (FHWA) as a Proven Safety Countermeasure[4] that can reduce crashes on all facility types in both urban and rural areas. In addition, audible roadway delineators (shoulder rumble strips) will be installed along the full length of the project to notify motorists of unintended lane departures.

Existing runs of existing NCHRP 230 guiderail, and other existing rail systems as needed, will be replaced and brought up to current Federal standards. The existing concrete median barrier will be preserved to the extent practicable. If grade changes necessitate the removal of existing median barrier, it will be replaced. FHWA identifies median barriers as another Proven Safety

---

[3] New York State Department of Transportation. “New York State Strategic Highway Safety Plan 2017”. Page 26. https://www.dot.ny.gov/divisions/operating/osss/highway-repository/NYS_SHSP_TotalReport.pdf. Accessed March 14, 2022

[4] FHWA “Wider Edge Lines” https://safety.fhwa.dot.gov/provencountermeasures/

Countermeasure, stating that, “Median barriers significantly reduce the number of cross-median crashes, which are attributed to the relatively high speeds that are typical on divided highways.[5]

Pavement superelevation rates on curves will also be evaluated and corrected, if necessary, to meet current standards for urban interstates.

Roadway Lighting

Roadway lighting is a proven safety countermeasure. Studies have established that use of nighttime lighting reduces the number of traffic incidents between twenty and thirty percent.

A roadway lighting system, now dysfunctional within the project termini, was installed within the project limits and on both sections of highway adjacent to the project termini. Within the project limits, the poles and foundations are composite with the median barrier. This system was installed consistent with warrants defined in the NYS Department of Transportation’s Policy on Highway Lighting[6]. Basis for restoring a continuous lighting system remain given the close proximity of interchanges and the volumes of daily traffic that this facility carries. Advancing the project without restoration of lighting within the project limits would also be inconsistent with lighting design practices which discourage transitions between lighted and unlighted roadway sections.

To return the lighting system to functionality, the sections of concrete barrier providing foundational support to the lighting system must be replaced and new lighting poles, with either solar or high efficiency fixtures, must be installed.

Overhead Highway Guide Signage

Overhead guide signs provide an effective notification system for high-volume, high-speed motor vehicle traffic on freeways and expressways and is provided primarily for the benefit and direction of highway users unfamiliar with local connections. The signing furnishes road users with clear instructions for orderly progress to their destinations. Sign installation locations are an integral part of a safely operating facility. The Authority has determined that the existing guide signage is not placed correctly and that these non-conforming signs should be replaced with fourteen new signs (overhead, cantilever, and ground mounted). This reconfiguration of guide signage will enhance safety and improve highway operation.

Overhead Bridge Vertical Clearance

Bridges carrying roads over I-190 will be evaluated and measures taken to ensure that the minimum required vertical clearances are achieved. The profile of I-190 below the bridges may be lowered or the bridges may be raised, as practicable. Improving vertical clearances will reduce the risk of bridge strikes that may damage the bridges and/or cause injury to people using them. Refer to Exhibit 10 for a list of overhead bridges that provide community connections.

---

[3] NYSDOT “Roadway Lighting” https://safety.fhwa.dot.gov/roadway_dept/night_visib/lighting_handbook/pdf/fhwa_handbook2012.pdf Accessed May 19, 2022.

Exhibit 12: Overhead bridges providing community and pedestrian connections over I-190

Feature Carried	Sidewalks	Community	Vertical Clearance	Notes
Ogden Street	Both sides	City Buffalo	15.10’	
Weiss Street	Both Sides	City Buffalo	14.57’	
Louisiana Street	Both Sides	City Buffalo	14.57’	Bridge has history of bridge strikes.

5.2 State of Good Repair

Maintaining a state of good repair for this section of I-190 has become extremely difficult. The pavement has exceeded its original design life and has entered a deterioration curve. Maintenance forces continuously patch the pavement, but the condition continues to deteriorate faster than it can be repaired. Application of previous repair strategies will not provide a long-term solution for an acceptable roadway surface, and the ongoing need for frequent maintenance work, which necessitates work zone traffic control and lane reductions, contributes to congestion, and increases the risk of accidents.

Improvements planned under this project will restore and strengthen pavement to “Excellent” condition and will allow this transportation system to be maintained in a state of good repair with a less intrusive routine pavement maintenance schedule, breaking the inefficient, costly, and disruptive cycle of “patchwork” repairs. As summarized in Section 6 Benefit-Cost Analysis, the project will result in significant savings for operations and maintenance, travel time, and crashes for the 12-year analysis period.

5.3 Economic Impacts, Freight Movement, and Job Creation

Local and Regional Economic Impacts

Transportation infrastructure is a fundamental building block required to attract investment and create jobs. Businesses and industries value transportation resources when deciding where to locate and need access to international border crossings. A free flowing, reliable transportation system benefits businesses, and the overall economy, by facilitating the movement of people and goods. Businesses and industries seek locations based, in part, on the convenience and quality of transportation available for employees, business patrons, business partners, and providers of goods and services to the business. The improved segment of I-190 will be an attractive asset to businesses and employers near the project, including those which service the large volume of freight trucks using this corridor. This project will be a supportive action for existing businesses, and an encouraging action for new businesses to open.

Much of the area adjacent to this segment of I-190 and directly served by the five interchanges in the segment, has been locally zoned for business, commercial, manufacturing, or light industrial uses. Improvements to the segment will support local comprehensive and zoning plans that have designated these areas for this type of economic activity and development.

This segment of highway directly serves multiple transportation modes, including transit nodes for buses, trains, and ride-sharing services, supporting the availability of options for mixed-mode trips for local and regional travel. Refer to Section 5.5 Equity, Multimodal Options, and Quality of Life for a discussion of intermodal facilities served by this segment of I-190. Providing a reliable link to a variety of lower-cost travel options can serve to increase the geographic range of accessible, affordable housing by reducing the cost burden of commuting for people who cannot afford the comparatively high costs of living near workplaces in urban centers.

Freight Movement

This portion of I-190 belongs to the larger I-90 corridor and serves as a primary truck freight connector to the trans-Canadian highway system at two point of entry freight border crossings (Refer to Exhibit 11). The Peace Bridge crossing, closest to the project alone carried nearly 1.2 million trucks in 2017. This border point of entry links Buffalo, New York, and Fort Erie, Ontario, and connects I-90/I-190 on the USA side to the Queen Elizabeth Way on the Canadian side, creating a corridor linking Buffalo to Hamilton and Toronto. The Lewiston, New York and Queenston, Ontario, Bridge connects I-190 to Highway 405 and the Queen Elizabeth Way, also serves as a link between Buffalo NY to Hamilton and Toronto in Canada.

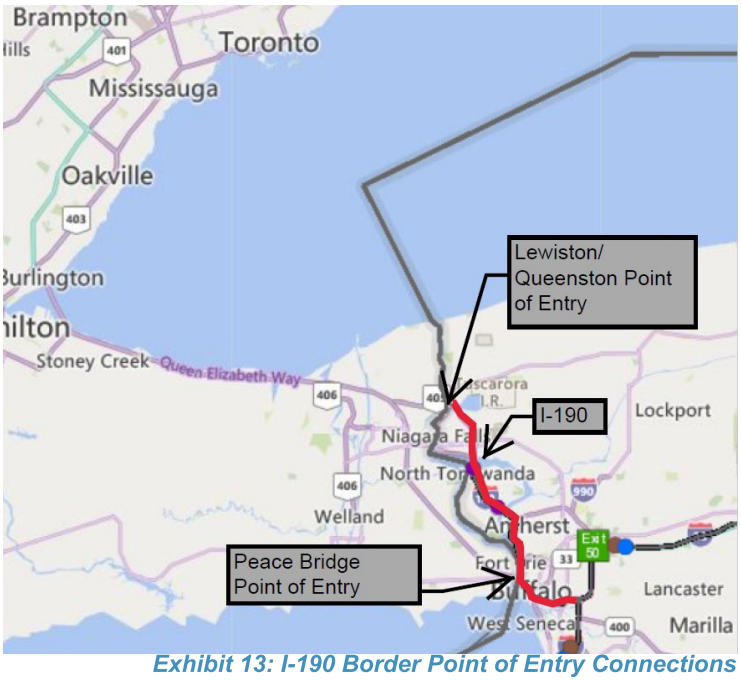


Exhibit 13: I-190 Border Point of Entry Connections

I-90, the United States longest Interstate Highway, extends from Boston, Massachusetts, to Seattle, Washington. This critical link connects markets in the Buffalo metropolitan area, Western New York, the North-East and Mid-West States, to Ontario Canada, a Province which comprises 38% of the total Canadian economy by GDP. The nearest other highway crossings between the USA and Canada are 241 miles to the east at the Thousand Islands Bridge in NY, and 253 miles to the west at the Ambassador Bridge in Detroit MI. The segment within the project area, through its multiple connections to other arterial highways and travel modes, directly serves a variety of populated and economic areas of the Buffalo metropolitan area.

As noted in the 2019 *New York State Freight Transportation Plan*, trucking moves 80% of freight tonnage in the state and is the only mode that can directly serve all statewide origins and destinations. (Refer to Exhibit 12). The Niagara interstate (I-190) is part of the National Highway Freight Network (NHFN) and is included in the State Freight Transportation Plan as a Freight Core Highway Network, but this segment has also been identified by FHWA as freight highway bottleneck. For the year 2020, the FHWA Freight Mobility Tool (FHWA Freight Mobility Tool) adds 1.6 minutes to a 20-minute truck trip, with a delay per mile of 2,097 truck hours. Refer to "FHWA Freight Mobility Tool Exhibits" in the Supporting Information[7] Supporting Information.

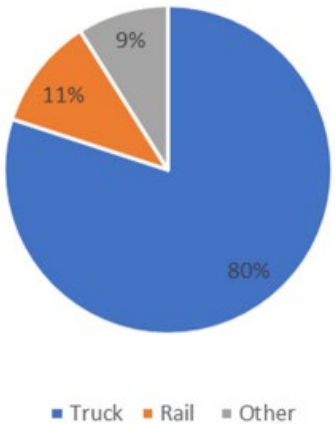


Exhibit 14: Freight Tonnage by Mode of Transport Graphic From New York State Freight Transportation Plan

Also as noted in the 2019 *New York State Freight Transportation Plan*, this segment of I-190 serves the following freight terminals in the Buffalo area:

[7] Project Supporting Information located at: https://www6.thruway.ny.gov/oursystem/infra-grant/index.html

- Air: Buffalo-Niagara International Airport. Ranked in the top 100 nationally for air cargo.
- Maritime: Port of Buffalo.
- Rail: Class 1 Carriers CSX and NS double-stack container intermodal terminals

The FHWA Freight Mobility Tool (https://ops.fhwa.dot.gov/freight/freight_analysis/mobility_trends/index.htm) documents that

The Benefit-Cost Analysis (BCA) that was performed for this project, included in Appendix B, found that the project's most significant benefit is reduced operating costs for passenger vehicles and trucks due to reduction in per mile costs of operating automobiles and trucks over improved driving surfaces. Benefits to freight transport have also been identified within the BCA for related reductions in incidents, including tire failures, and work zone related delays. The frequency and duration of intermittent repairs creates additional, unnecessary delays on this already congested corridor. The project will provide greater reliability and comfort in the movement of people, freight, and service providers, which will help to relieve supply chain issues and benefit businesses and industry on the local, regional, and national levels.

Global Competitiveness

The Restore 190 project supports the United States global competitiveness initiatives. More than $117 billion in goods moved across New York's international borders in 2017. Of this amount, $29.6 billion in trade was with New York, while the remaining 75 percent of this trade was unrelated to New York's economy. Refer to Exhibit 12.

One of the pillars of global competitiveness is provision of an appropriate infrastructure that contributes to an enabling environment for domestic businesses and industries to compete internationally. As discussed above, I-190 is specifically purposed to provide crucial connectivity to major international crossings, shipping, and travel hubs. Improving this segment will help to support global competitiveness by contributing to the efficient, uninterrupted, and affordable movement of goods and people along I-190 and to and from these hubs.

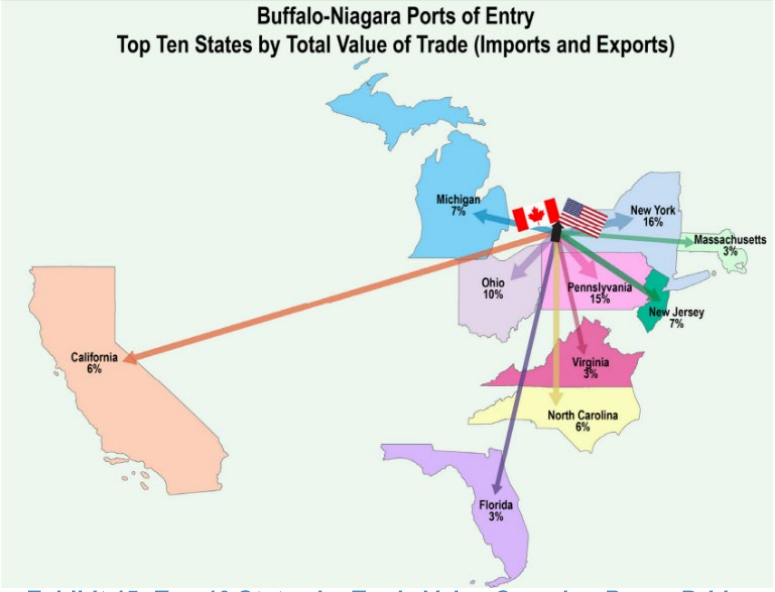


Exhibit 15: Top 10 States by Trade Value Crossing Peace Bridge and Lewiston-Queenston Border Points of Entry Freight Graphic From New York State Freight Transportation Plan

Job Creation

In addition to the economic and employment benefits described above, the delivery of the project itself will directly create high-quality employment opportunities. Historically Disadvantaged Communities, Areas of Persistent Poverty, and HUD Choice Neighborhood Grantee areas exist either within the project limits or in close proximity to its location. It is anticipated that residents of these communities will benefit from the employment opportunities created by the project.

It is the policy of the Authority to ensure equal opportunity and to prevent and eliminate discrimination in all its activities, including the areas of construction, consultants, commodities, and professional services. 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). The Authority is also fully committed to actively promoting Minority and Women-Owned Business

Enterprises (MWBE) and Service-Disabled Veteran-Owned Business (SDVOB) opportunities. Participation goals will be set, results reported, and contracts monitored for this project. 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.

Every Authority-awarded construction contract is subject to the strong and well-established provisions of New York State Labor Law. On contracts financed with Federal Aid, any provisions of the state Labor Law that conflict with mandatory Federal-Aid construction contract compliance requirements, as contained in 23 CFR 635.11, are superseded. To the benefit of workers, state Labor Law provisions that are more restrictive than the Federal-Aid construction contract compliance requirements, or the Davis-Bacon Act, and are not in conflict with them, continue to apply.

Prevailing Wage Schedules, defined for each project based upon County of work, are issued by the New York State Department of Labor for all general construction public works projects. These wage rates are monitored for conformance during construction and strictly enforced.

Workers' rights notices are posted in accordance with State and Federal Law. Before commencing any work on the site, the contractor must post, in a location accessible to all workers, a copy of the New York State Department of Labor schedules of prevailing wages and supplements for the specific contract, a copy of all redeterminations of such schedules for the contract, the Workers' Compensation Law notice, required safety notices, and all other notices required by law. The notices must be maintained in clear, legible condition until all work on the site is complete.

5.4 Climate Change, Resiliency, and the Environment

Environmental Benefits

I-190 is within a mile of numerous areas identified by FEMA as being within 100-year and 500-year flood zones. Refer to Exhibit 14. These include both residential and commercial properties. People living or working in these areas will seek an expedient evacuation route if they need to leave the area quickly due to flooding or severe weather events. Because it is the highest capacity route near these areas, and also serves hubs for intermodal transportation, i.e., bus and rail, this segment of I-190 will be a key component of evacuation routes.

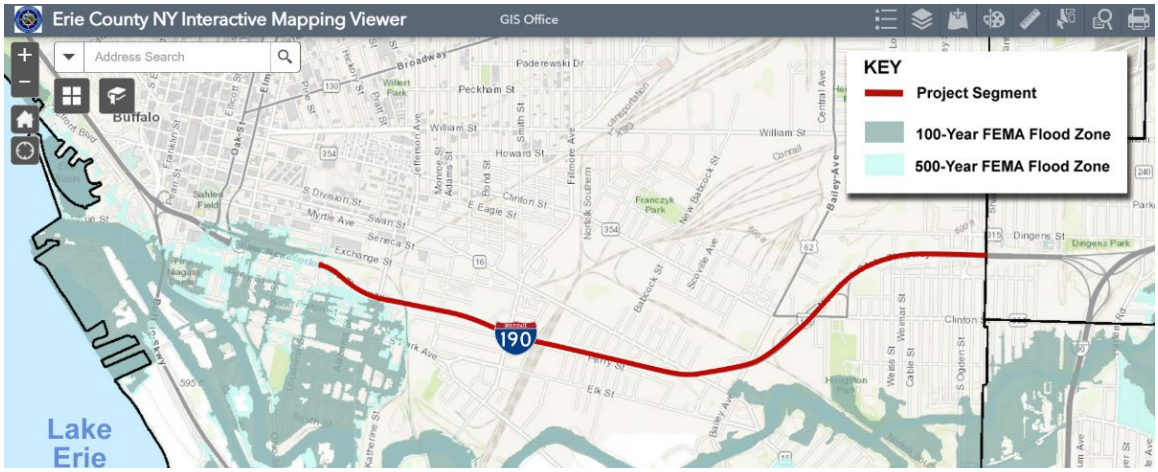


Exhibit 16: This segment of I-190 serves as a logical evacuation route for areas susceptible to flooding and severe weather events

In its *Observed and Projected Climate Change in New York State: An Overview*, the New York State Department of Environmental Conservation states that the "frequency, intensity, and duration

of extreme precipitation events and coastal storms and flooding are increasing"[8] in the state. Ensuring that I-190 is in good condition will facilitate successful evacuations for the people relying on it and improve the likelihood that it will withstand effects of climate change and severe weather, remaining serviceable for emergency response during and after storm events.

Resiliency

Because it is the one of the highest capacity route near these areas, and also serves hubs for intermodal transportation, i.e., bus and rail, this segment of I-190 will be a key component of evacuation routes. In its *Observed and Projected Climate Change in New York State: An Overview*, the New York State Department of Environmental Conservation states that the "frequency, intensity, and duration of extreme precipitation events and coastal storms and flooding are increasing" and that "[a]ny increase in frequency or intensity of coastal storms could result in more frequent coastal flood events" in New York State.[9] Ensuring that I-190 is in good condition will facilitate successful evacuations for the people relying on it and improve the likelihood that it will withstand effects of climate change and severe weather, remaining serviceable for emergency response during and after storm events.

5.5 Equity, Multimodal Options, and Quality of Life

Equity

This project will support equity by promoting safe, affordable, accessible, and multimodal access to opportunities and services while reducing transportation-related disparities.

The Authority routinely engages and coordinates with municipalities and other stakeholders, including disadvantaged and underrepresented communities, as part of the project development process. This project will be undertaken in accordance with the Authority's normal public outreach and coordination guidance, including the New York State Department of Transportation's (NYSDOT) *Public Involvement Manual*. The Authority has contacted a wide range of stakeholders about this transportation investment. These entities and individuals include communities that may be affected by the project, elected officials, business associations, and construction and trucking industry representatives. Letters of support from these stakeholders have been included in the "Partnership and Collaboration" portion of the Supporting Information.[10]

As discussed in Section 5.3 Economic Impacts, Freight Movement, and Job Creation, and below, in this section, the project will enhance the access and reliability of affordable, varied transportation options, and contribute to the economic and physical well-being of those in the communities near and next to the project segment. These include the Historically Disadvantaged Communities located along approximately 29% of the project length and the Areas of Persistent Poverty located along approximately 67% of the project length. Refer to Exhibits 6 and 7 for a map of these communities and their geographic relationship to the project.

Multimodal Options

This segment of I-190 is utilized by the Niagara Frontier Transportation Authority's (NFTA) Metro Bus for four regional commuter bus lines, as well as tour and school buses, providing the necessary infrastructure for these higher-occupancy vehicles to operate effectively and minimize their fuel consumption and emissions. It also serves 2 intermodal facilities, the Buffalo Exchange Street Train Station and Buffalo Metropolitan Transit Center. The Buffalo Exchange Street Station is adjacent to I-190 Exit 6, approximately 0.6 miles from the project segment, and provides

[8] New York State Department of Environmental Conservation. "Coastal Storms". *Observed and Projected Climate Change in New York State: An Overview.* August 2021. https://www.dec.ny.gov/docs/administration_pdf/ccnys2021.pdf.

[10] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/infra-grant/.

connections for NFTA's Metro Bus and Metro Rail, as well regional bus service and Amtrak Train Services. The Buffalo Metropolitan Transit Center, located approximately 0.9 miles from the project segment, is a transportation hub for NFTA Metro Bus routes, as well as intercity bus service, (e.g., Greyhound, Megabus). Improvements to I-190 will help to ensure safe, reliable access for vehicles (including buses and ride service vehicles) to these facilities.

Improvements to the corridor, and resulting reductions in congestion and repair delays, will support the reliability of bus operators' schedules, reduce their fuel consumption, minimize wear and tear on their vehicles, and improve mobility for those who rely on bus transit for local and regional travel. Patrons of ride-sharing services that make use of this key highway segment will also benefit from another affordable mobility option for local and regional travel.

Quality of Life

Quality of life is based on an individual's health, comfort, and ability to participate in or enjoy life events. This project will contribute to the quality of life for those living and working near it, as well as those traveling on the corridor. Safety improvements and a reduction of emissions related to traffic congestion have direct health benefits. Affordable, comfortable, reliable transportation and access to intermodal connection points contribute to people's mobility and economic well-being.

This portion of I-190 supports local and regional mobility and access to goods, services, and recreational opportunities. Regionally, the segment serves the greater Buffalo/Niagara Metropolitan Area and 2 international connections to Canada. Locally, it contains 5 interchanges that connect to local roads, residential areas, business districts, employment centers, open space, and Lake Erie waterfront. Refer to Exhibit 15 for a map of the interchanges and the areas they serve. In addition, the segment serves 2 intermodal facilities, the Buffalo Exchange Street Train Station and Buffalo Metropolitan Transit Center, as discussed above in "Multimodal Options" and shown in Exhibit 5. It is reasonable to assume that ride-sharing services also make heavy use of this highway segment for local and regional trips. Improvements to the roadway and safe, reliable travel for those traveling to intermodal hubs or using lower-cost transportation options, i.e., bus or ride sharing, will provide mobility benefits to the local population, including those who cannot or choose not to own and maintain a personal vehicle.

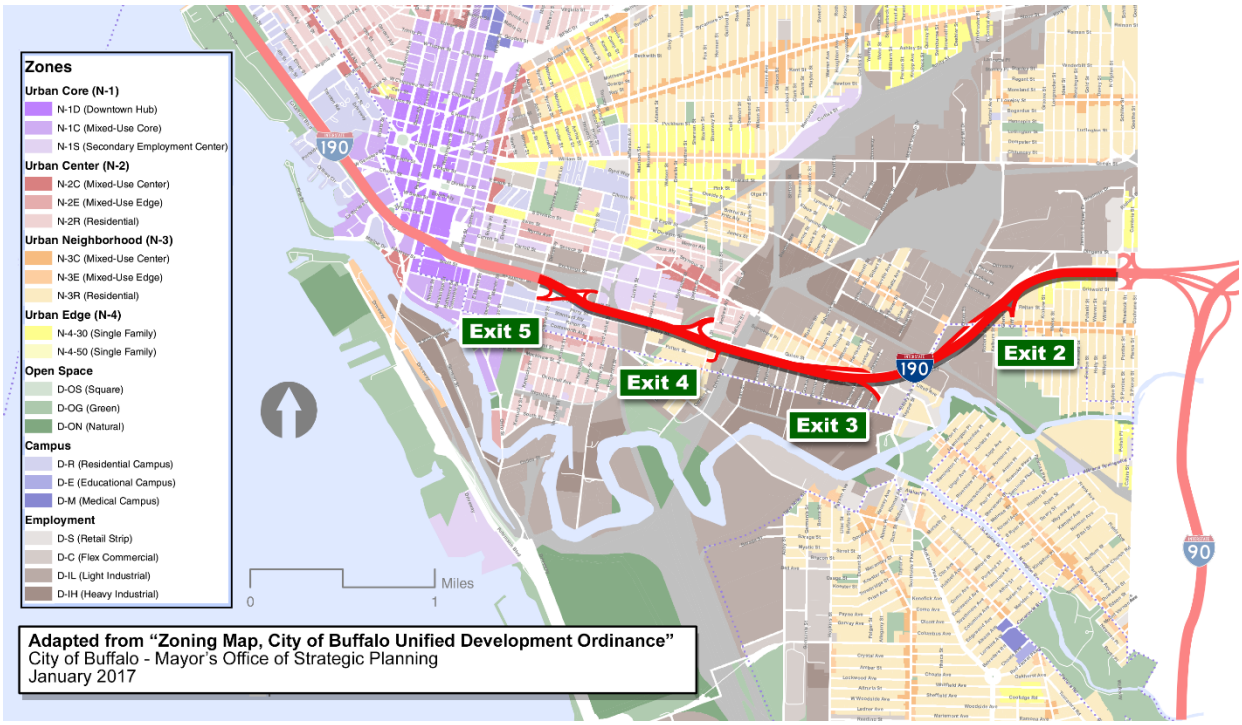


Exhibit 17: Interchanges on the Project Segment Serve Residential, Commercial, and Mixed Use Areas, as Well as Open Spaces and the Lake Erie Waterfront.

Improving the surface and rideability of I-190 reflects a commitment to local infrastructure improvement. Access to jobs, educational opportunities, health care, recreation, housing, and numerous other services and life options will be better served. This segment of I-190, in a state of good repair, is an asset for businesses in the vicinity, providing improved travel time reliability, comfort, and safety for employees and patrons of local businesses, as well as the commercial vehicles, e.g., delivery trucks, necessary to support these businesses. In turn, economic opportunities are enhanced for residents. More information on the project's role in the local and regional economies can be found in Section 5.3 Economic Impacts, Freight Movement, and Job Creation.

Exhibit 18: Communities Adjacent to the Project Segment Will Benefit

An improved road surface is expected to reduce noise concerns in adjacent communities, including the Historically Disadvantaged Communities located immediately adjacent to the project segment. The Federal Highway Administration has identified "pavement preservation to minimize cracking, faulting and other surface imperfections that contribute to noise" as a strategy to minimize noise on existing pavement.[11]

The smoother surface provided by the asphalt overlay is also expected to decrease fuel consumption, as well as wear and tear on the vehicles traveling over it, preventing excessive vehicle operating costs that are associated with frequent travel over rough roadways. Vehicle operating costs for individuals and commercial entities, will be lower, as summarized in Section 6 Benefit-Cost Analysis. Operators of buses and other high-occupancy transportation service vehicles are likely to have lower operating and maintenance costs when using roads in good condition, which can be reflected in lower rider fees.

As discussed in Section 5.4 Climate Change, Resiliency, and the Environment, communities immediately adjacent to I-190 will benefit from a reduction in the congestion caused by poor pavement conditions, in the form of reduced emissions from slowed or idling vehicles. All community connections over I-190 will be retained and improved where opportunities are identified, as described in Section 1.1 Transportation Challenges and Solutions.

5.6 Innovation Areas: Technology, Project Delivery, and Financing

Innovative Technologies

The mainline pavement marking system that is used by the Authority, and will be used on this project, is known as "Recess Triple Drop". It utilizes advanced materials and a product installation process that provides more visible markings in all lighting and weather conditions, making the highway safer throughout the year. Recess Triple Drop uses specialized colored ceramic elements, mixed with various sized glass beads. The glass beads supply nighttime reflectivity that is more than twice as bright as standard highway striping. The ceramic element provides wet and fog reflectivity at levels that traditional pavement marking systems cannot.

Exhibit 19: Closeup of Recess Triple Drop Pavement Marking, with Glass Beads and Ceramic Elements

By installing the ceramic elements and glass beads into the paint in a one-tenth inch (0.10 in.) deep recess in the pavement, the stripe is protected from

[11] Federal Highway Administration. "Tire-Pavement Noise". https://www.fhwa.dot.gov/pavement/sustainability/articles/tire_noise.cfm. Accessed April 8, 2022.

snowplow damage during winter months, extending its service life and preserving its reflective properties. This technique provides pavement striping which is much more durable than traditional methods. The Authority invented and patented Recess Triple Drop and was the first superhighway in the country to incorporate use of this new technology systemwide. These pavement markings meet all applicable Federal standards, including those in Part 3 of the 2009 *Manual of Uniform Traffic Control Devices*.

The longer service life of these pavement markings reduces the need to replace worn markings. As a result, there is a reduced need for the frequency of marking replacement activities that can cause traffic delays, congestion, and increased vehicle emissions, contributing to air quality concerns.

Innovative Project Delivery

The Authority is considering use of 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: the bidder who demonstrates the best complete understanding and ability to deliver the best project for the price will.

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

This is particularly important for a project like this one, located in a densely populated urban area, on a high traffic volume freight corridor, where minimizing delays and disruption is critical. .

6 BENEFIT-COST ANALYSIS

6.1 Benefit-Cost Analysis

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 BCA, included in Appendix B, quantifies and monetizes, as thoroughly as possible, the benefits generated under the criteria defined by the INFRA program and compares them against the project's costs. The analysis shows that the project generates benefits that exceed its costs, and therefore results in a quantified net benefit to society.

6.2 Results of the Benefit-Cost Analysis

The monetization of the main benefits resulting from the proposed improvements are summarized in Exhibit 18.

Benefit Categories	7% Discount Rate*
Crash Cost Savings	$10.2 million
Travel Time Savings	$34.1 million
Operations and Maintenance Cost Savings	$1.2 million
Emissions Reduction Benefits	$2.2 million
Vehicle Operating Cost Savings	$3.1 million
Total Estimated Benefits**	**$51.0 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

Exhibit 20: Benefit Estimates, 2020 Dollars

A 15-year period of analysis was used in the estimation of the project's benefits and costs, which includes 3 years of design (preliminary and final) and construction (including quality control and construction inspection services) and 12 years of operation.[12] Annual costs and benefits are estimated through 2041, at which point it is anticipated that additional maintenance will need to be performed.

The project's most significant benefit is travel time savings for passenger vehicles and trucks due to the avoidance of roadway quality related incidents, including tire failures, and work zone related delays. The frequency and duration of intermittent repairs creates additional, unnecessary delays on 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).

Considering all monetized benefits and costs, the internal rate of return of the project is estimated at 10%. With a 7% discount rate, the project would result in a net present value of $3.7 million and a benefit-cost ratio of 1.08. Refer to Exhibit 19

Exhibit 21: Overall Results of the BCA, 2020 Dollars

Project Evaluation Metric	7% Discount Rate*
Total Discounted Benefits**	$43.4 million
Total Discounted Costs	$39.7 million

[12] Project support costs are assumed to be incurred from 2022 to 2025. Benefits are assumed to begin to accrue in 2025. A twelve-year analysis period was conservatively estimated based on the pavement deterioration rate.

Project Evaluation Metric	7% Discount Rate*
Net Present Value	$3.7 million
Benefit-Cost Ratio	1.09
Internal Rate of Return	8.3%

* 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 and patchwork 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.

7 PROJECT READINESS AND ENVIRONMENTAL RISK

7.1 Technical Feasibility

Development of Design Criteria and Basis of Design

As discussed in Section 1.1 Transportation Challenges and Solutions, this project is one part of a comprehensive plan, informed by the Authority's asset management analysis , to maintain this corridor. Other segments of the corridor have been successfully rehabilitated by the Authority using the proposed means and methods.

The cost estimate, included in Section 4.1 Budget, is based on preliminary design information and the cost history of similar projects and work scopes in the same geographic area, and includes a contingency appropriate for this level of design. Details on the proposed work can be found in Section 1.1 Transportation Challenges and Solutions.

The Authority adheres to the FHWA-approved guidance and standards contained in the New York State Department of Transportation's (NYSDOT) Project Development Manual and *Highway Design Manual* . Other FHWA- and State-approved guidance manuals, such as the *Manual of Uniform Traffic Control Devices* , will be applied, as appropriate, to this project.

7.2 Project Schedule

Major project milestones and their anticipated completion dates are identified in Exhibit 20. All necessary activities will be complete to allow INFRA grant funds to be obligated in 2023.

Without INFRA funding, deteriorating conditions of the pavement system will necessitate completion of a less substantial rehabilitative project in the 2024 construction year. This reduced scope project will result in additional cost and construction-related traffic impacts that could be avoided if INFRA funding is received, enabling the Authority to implement a far more comprehensive scope of improvements, including pavement strengthening improvements.

All work will be completed within the existing right-of-way. Public involvement has begun with outreach to stakeholders and will be conducted for the duration of the project, through

construction. Refer to Section 5.5 Equity, Multimodal Options, and the Quality of Life, and "Partnership and Collaboration" in the Supporting Information[13] for additional details.

Exhibit 22: Project Milestones

Project Milestone	Date
Start of NEPA and SEQR (State) Environmental Review Processes	In process
Completion of Preliminary Design	January 2023
Completion of Final Design - Plans, Specifications, and Estimates	September 2023
Completion of NEPA and SEQR (State) Environmental Review Processes	September 2023
Obligation of INFRA Funding	December 2023
Environmental Permitting Complete	January 2024
Project Letting	February 2024
Project Award	April 2024
Start of Construction	May 2024
Completion of Construction	November 2025

7.3 Required Approvals

Environmental Permits and Reviews

National Environmental Policy Act. It is anticipated that this project will be classified as a Class II Action under the National Environmental Policy Act (NEPA) as implemented in 23 CFR 771. The Federal Highway Administration (FHWA) would be the NEPA lead agency. The project will be submitted for approval as a NEPA Programmatic Categorical Exclusion on the basis that it is not an action that will individually or cumulatively have a significant environmental effect. It meets the description in 23 CFR 771.117(c)(22) of "[a project] that would take place entirely within the existing operational right-of-way." The project will result in no significant changes or expansions to the existing infrastructure. The New York State Department of Transportation's "Federal Environmental Approvals Worksheet," which helps to identify any Federal approvals that may be needed, has been completed and is included in the "Environmental Information" portion of the Supporting Information.[14]

New York State Environmental Quality Review Act. The project is expected to meet all criteria to be classified as a Type II project under the New York State Environmental Quality Review Act (SEQRA) in accordance with 6 NYCRR Part 617, meaning it will not have a significant impact on the environment. The Authority plans to declare itself as the lead agency for SEQRA. Since the project is anticipated to qualify as a Type II action, a State Consistency Review by the Authority is not anticipated to be required, and no further environmental review is required under SEQRA.

Topics that have been examined for this project include, but are not limited to:

- **Cultural Resources.** The Advisory Council on Historic Preservation (ACHP) adopted the Section 106 Exemption Regarding Effects to the Interstate Highway System on March 10, 2005. As per the ACHP Section 106 Exemption, Section 106 consultation is not applicable.

- **Protected Coastal Areas.** The project falls partially within New York State Coastal Areas, which are identified by the New York Department of State's (NYSDOS) Coastal Management Program to protect vulnerable natural coastal assets. A portion of the project is located within a New York State Landward Coastal Boundary, and also within the

[13] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/infra-grant/.

boundary of the Coastal Management Program. Refer to "NYS Coastal Atlas Maps" in in the "Environmental Information" portion of the Supporting Information.[19] The project will require a Coastal Consistency Review by the NYSDOS to ensure that it is consistent with State coastal policies and the local waterfront revitalization programs. Since the project will maintain the existing infrastructure, it is anticipated that the Coastal Consistency Review will be accomplished in a timely manner.

- **Stormwater Pollution Prevention.** Depending on the level of disturbance, the project may require coverage under the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination Systems General Permit GP-0-20-001 for Construction Activities. Due to the nature of the project, no additional impervious area is anticipated. A Stormwater Pollution Prevention Plan (SWPPP) will be developed in accordance with the New York State Department of Environmental Conservation's *Stormwater Design Manual*.

- **Wetlands.** The project will have no impacts to Federal- or State-regulated wetlands or waterbodies.

- **Endangered, Threatened, and Protected Species.** A preliminary screening with US Fish and Wildlife Service's Information for Planning and Consultation (IPaC) tool indicates that there are no critical habitat areas in or adjacent to the project area. The Monarch Butterfly, a candidate for listing as a Federal Endangered Species, may be present, but there is no suitable habitat for the species within the project area. It is not anticipated that the species, if present, will be affected by the project activities.

- **Public Involvement.** A description of public engagement that has occurred, as well as plans for continuing public involvement, can be found in Section 5.5 Equity, Multimodal Options, and Quality of Life.

All services, programs and activities associated with this project will comply with the requirements of Title VI of the Civil Rights Act of 1964, ensuring that they are offered, conducted, and administered fairly, without regard to race, color, national origin, sex, age, or disability of the participants or beneficiaries.

State and Local Approvals

As mentioned above, the project may require coverage under the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination Systems General Permit GP-0-20-001 for Construction Activities, in addition to coordination with the New York State Department of State for Coastal Consistency Review.

Federal Transportation Requirements Affecting State and Local Planning

The project will be added to the Greater Buffalo-Niagara Regional Transportation Council's Transportation Improvement Program, the Statewide Transportation Improvement Program, and the New York State Freight Transportation Plan. Refer to Appendix C for documentation of coordination with the New York State Department of Transportation.

7.4 Assessment of Project Risks and Mitigation Strategies

A systematic approach to risk management will be used to help minimize costs and avoid potential contract complications or disputes. The project team and project stakeholders will undertake an identification process of all risks that may affect successful implementation of the project, regardless of when such risks may occur. Once risks are identified, their probability and relative impact will be rated and used to determine an overall risk rating. Strategies to mitigate the potential impacts of the risks will be defined. Priority will be given to the high-risk factors, with appropriate attention also devoted to moderate and low risks.

The results of the risk analysis process will be used in preparing contract provisions and any agreements with stakeholders or other third parties. The analysis will be used to identify the type and extent of engineering for different components of the project to avoid and mitigate high and moderate risk factors.

A preliminary assessment of risks that are known at this time has been developed and is shown in Exhibit 24. As the project is advanced and additional input is received from stakeholders, the assessment will be revised as necessary.

Exhibit 23: Preliminary Risk Assessment

Identified Risk	Probability Rating[1]	Impact Rating[2]	Overall Risk Rating[3] (Probability x Impact)	Mitigation Strategy
Environmental Permits Delay in securing necessary environmental approvals or permits to proceed with letting, award and construction	1	2	2	Identify and perform all necessary consultation with regulatory agencies as early in the project development process as possible to ensure that any issues can be addressed in a timely manner.
Utility Delays Design or construction delays caused by slow utility owner response to requests for information or activities	1	2	2	Identify any utilities that will potentially be affected and engage utility owners as early in the process as possible to maximize time available for responses; maintain positive, proactive contact with utility owners during design and construction.
Completion Time Unseasonable weather, severe weather, or other uncontrollable circumstances have the potential to slow the progress of construction and delay completion of the project	2	3	6	The project schedule includes an allowance of time for weather variations: only limited types of work are planned during winter, when harsh weather is most likely to affect construction activities.
Design Approvals by External Agencies Approval will be required if bridges under other agencies' jurisdiction need to be raised to achieve minimum clearances. Delayed approvals have the potential to delay the completion of design.	1	2	2	Engage other agencies as soon as any bridges that may be affected are identified; coordinate throughout the design process to identify and address their concerns well before the final design is developed.
Community Concerns Community perception of negative environmental impacts has the potential to delay completion of the environmental review process	2	3	6	Continue to communicate openly with stakeholders about impacts and benefits of the project; actively incorporate community feedback into the design and construction processes.

NOTES:

1. Rated on a scale of 1 to 3, with 3 representing the highest probability
2. Rated on a scale of 1 to 3, with 3 representing the highest impact
3. Overall risk rating ≤3 is low
   >3 or <6 is moderate
   ≥ 6 is high

8 SMALL PROJECT REQUIREMENTS

The project is in a single state with a total project cost under $100 million/less than 30% of New York State's FY 2021 apportionment; therefore, it is considered a small project for purposes of the INFRA grant program. The project qualifies for award as a small project since it is cost-effective and has a positive effect on mobility in the state and region. These qualifications are summarized in Exhibit 22.

Exhibit 24: Small Project Selection Requirements and Project Qualifications

Small Project Requirement	Project Qualification Summary
Cost-effectiveness of the project	A benefit-cost analysis shows that the project generates benefits that exceed its costs, and therefore results in a quantified net benefit to society. Considering all monetized benefits and costs, the internal rate of return of the project is estimated at 8.3%. With a 7% discount rate, the project would result in a net present value of $3.7 million and a benefit-cost ratio of 1.09. Refer to Section 6 Benefit-Cost Analysis and Appendix B for additional information.
Effect of the project on mobility in the state and region	This project reduces congestion and improves reliability and safety for people and goods moving along a critical segment of I-190, the freight corridor for two critical international freight crossings between the United States and Canadian and also locally serves the Buffalo/Niagara region industrial areas as well as Historically Disadvantaged Communities, Areas of Persistent Poverty, and HUD Neighborhood Grantee areas. Refer to Section 2.1 Connections to Existing Transportation Infrastructure and Section 5 Project Outcome Criteria for additional information.

APPENDIX A
Funding Documentation

NEW YORK STATE OF OPPORTUNITY. | Thruway Authority

May 16, 2022

The Honorable Pete Buttigieg, Secretary
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

I am writing regarding the New York State Thruway Authority's application for a $25 million U.S. Department of Transportation Nationally Significant Multimodal Freight & Highway Projects (INFRA) Grant. This grant will supplement the cost for rehabilitating a deteriorated 3.5-mile segment of the Niagara Thruway (I-190) in Western New York.

In support of this project, the Authority has committed $28.1 million in Thruway Authority capital funds within our five-year Capital Plan. With this, the Authority funding would account for 53 percent of the project costs. This funding was included in the 2022-2026 multi-year capital program that was approved by the Thruway Authority Board of Directors on December 6, 2021.

Please accept this correspondence as fulfilling the INFRA grant application requirement that documentation of funding commitments be provided for the non-Federal funds to be used for eligible project costs. Further documentation of the Thruway Authority's commitment to this project has been submitted in support of the application.

This rehabilitation project will provide lasting improvements, will enhance the overall safety for motorists and enrich the quality of life for residents along this corridor. It will improve mobility and decrease the need for repeated maintenance which increase traffic disruptions.

Thank you for your consideration and support of our application.

Sincerely,

Matthew A. Howard
Chief Financial Officer

APPENDIX B
Benefit-Cost Analysis

BENEFIT-COST ANALYSIS
Rehabilitation of I-190 from MP 900.7 to MP 904.2

May 23, 2022

Prepared for:
New York State Thruway Authority

Prepared by:
Stantec Consulting Services, Inc.

Project Number:
192810422

The conclusions in the Report titled Benefit-Cost Analysis are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from New York State Thruway Authority (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

1 Table of Contents

2 List of Tables

Benefit-Cost Analysis Technical Memorandum

1 Executive Summary

The net benefits of the RESTORE 190, H152.1 Pavement Rehabilitation Project on I-190 from MP 900.7 to MP 904.2 ('Project') were estimated through a comprehensive Benefit-Cost Analysis (BCA) as per U.S. Department of Transportation (USDOT)'s Benefit-Cost Analysis Guidance for Discretionary Grant Programs (March 2022 update). This BCA quantifies and monetizes the Project's benefits and compares them against the Project's costs. The analysis makes evident that Project benefits exceed Project costs, meaning that its completion results in a net benefit to society relative to taking no action.

Over the lifecycle of the project, it is expected to result in $43.4 million in total benefits, and a benefit-cost ratio of approximately 1.09.

Table 1 summarizes the changes expected from the project and the associated benefits. The project is expected to start generating benefits when the corridor restoration work is complete in the fall of 2024. The 15-year period of analysis used in the estimation of the project benefits and costs includes 3 years of project development and construction (2022-2024) and 12 years of benefits.[1] Total project capital costs are $53.1 million in undiscounted 2020 dollars. The breakdown of project costs by element is presented in Table 2.

A summary of the relevant data and calculations used to derive the benefits and costs of the project are shown in the BCA workbook (in 2020 dollars) and detailed throughout this report. In summary, the project is expected to generate $43.4 million in discounted benefits and $39.7 million in discounted costs using a 7 percent real discount rate for all benefit categories except CO_2 for which a 3 percent discount rate was used in accordance with USDOT BCA guidance. Overall, the project is expected to generate a Net Present Value of $3.7 million and a Benefit-Cost Ratio of 1.09. In other words, for each dollar spent in project costs, approximately $1.09 worth of benefits will be generated by project improvements.

A sensitivity analysis was conducted on travel time savings, discount rate, and project costs. The conservatively low travel time delay avoidance used in the analysis illustrates that increases in travel time savings would increase the Benefit-Cost Ratio as would a lower discount rate. Specifically, a 25% increase in avoided delay would result in a 1.12 Benefit-Cost ratio, and a 3% discount rate would yield a 1.45 Benefit-Cost ratio. However, should project costs increase 30% before the calculated contingency cost is applied, the Benefit-Cost Ratio would decrease to less than 1.0.

[1] Note that benefits are conservatively estimated only for a period of 12 years, at which point pavement would have deteriorated from "very good" to "good" or "fair" condition. The BCA model allows for an extension of benefit years that includes conducting future emergency repairs to maintain pavement status.

Table 1 – Summary of Improvements and Associated Benefits					
Current Status or Baseline & Problems to be Addressed	**Changes to Baseline/ Alternatives**	**Types of Impacts**	**Benefits**	**Summary of Results (Discounted 2020 $)**	**Calculations Workbook Tab Reference**
MP 900.7 to MP904.2 of I-190 in Buffalo NY is in need of restoration. Pavement condition is rated "poor" or "very poor" along the segment. The deteriorated condition results in the need for frequent emergency patch repairs.	The project will restore this segment of I-190, complete various safety improvements and install lighting along the segment. Pavement conditions will return to "very good" status upon project completion and emergency repairs will no longer be required.	Improved travel times along the segment from avoiding future work zones from scheduled and emergency repair work.	Travel Time Savings	$4,243,587	Delay
		Improved safety and crash avoidance by reducing the number of pavement condition related incidents.	Improved Safety and Reduced Accident Costs	$8,444,490	A-Crashes
		Improved safety and crash avoidance by reducing the number of poor nighttime visibility related incidents.	Improved Safety and Reduced Accident Costs		
		Reduce vehicle operator costs of fuel, maintenance/repair, tires and depreciation costs related to poor road pavement condition	Reduced Vehicle Operation Costs	$22,091,701	Vehicle Op Costs
		Decrease pavement management costs by avoiding the need for emergency pavement repairs.	Reduction in emergency repairs. (See note.)	$2,304,296	A- Repair Costs
		Reduction in Greenhouse Gas (GHG) Emissions and CO2, due to reduced travel time and congestion.	Reduced in Emissions Costs	$1,586,124	Emissions
		Reduced preparation for future capital investments through realization of a residual value of the investment at the end of analysis period	Residual Value of Capital Investment	$7,009,954	Construction - Residual

Note: Benefits in this table include the benefit of reduced maintenance which is actually an off-setting component of costs (i.e., it reduces costs and is a negative "cost" and not a "benefit" element in the BCA analysis calculations).

Table 2 – Summary of Project Costs, by Element	
Cost Category	**Undiscounted 2020 $**
Preliminary / Final Design	$4,428,000
Construction	$44,280,000
Construction Inspection	$4,428,000
Total (Undiscounted)	**$53,136,000**
Total (Discounted)	**$41,984,925**

2 Introduction

This document describes the analytical methods and findings of the economic analysis conducted in support of the grant application for the Project. The remainder of this document is structured as follows:

- **Section 3**, Methodological Framework, describes the conceptual framework in which the Benefit-Cost Analysis is performed.
- **Section 4**, Project Overview, summarizes the project, including a brief narrative of existing conditions; a summary of estimated project cost and schedule; and a description of the types of effects that the project is expected to generate.
- **Section 5,** Methodology and Assumptions, provides a narrative of the general assumptions underlying the analysis including projected traffic volume growth through the impacted segment.
- **Section 6**, Economic Benefits, describes data and assumptions used in quantifying and monetizing benefits from each category of benefits.
- **Section 7,** Summary of Findings and BCA Outcomes**,** summarizes results of the Benefit-Cost Analysis (BCA) including the metrics of Net Present Value (NPV), Benefit-Cost Ratio (BCR).
- **Section 8**, BCA Sensitivity Analysis, provides the outcomes of the sensitivity analysis. Additional data tables are provided within the BCA model including annual estimates of benefits and costs to assist the U.S. Department of Transportation (USDOT) in its review of the application.[2]
- **Section 9**, Schedule of Estimated Benefits and Costs, provides results for estimated project costs and benefits for each analysis year.

3 Methodological Framework

A benefit-cost analysis (BCA) is an economic tool used to evaluate the economic justification of capital-intensive projects. A BCA describes, quantifies, and monetizes the social benefits and social costs generated by a particular project. A project's net benefit is estimated by subtracting the project's costs from the project's benefits. According to the USDOT (2022), "The goal of a BCA is to provide an objective assessment of a project that carefully considers and measures the outcomes that are expected to result from the investment in the project and quantifies their value."

The benefits of any project are equal to the sum of expected beneficial impacts to society, (i.e., both users and non-users of the facility) over the life of the project, properly discounted and monetized in a common metric (typically U.S. dollars from a specified year). Similarly, the costs of the project are based on the expected negative impacts to society over the life of the project, properly discounted and monetized in the same common units. While benefits generally consist of a wide potential range of project specific positive impacts, costs typically primarily consist of increased capital spending to implement the project and also to maintain the project.

The BCA produces several related measures to assess the economic rationale of a proposed project. The benefit-cost ratio (BCR) is calculated by dividing the project's present value of social benefits by the project's present value of social costs. A BCR greater than 1.0 indicates that undertaking project activities as specified yields more benefits to society than costs to society and is therefore deemed economically

[2] The BCA model is provided separately as part of the application.

justified. The net present value (NPV), calculated by subtracting the discounted project costs from the discounted project benefits, measures the net benefit in present value that society would accrue as a result of the project implementation relative to the no-build scenario.

The general methodology for the Project was developed using the BCA guidance published by USDOT in March 2022. In particular, the major methodologic steps consist of the following:

- Specifying existing and future conditions in each future year for both the build and no-build scenarios.
- Identifying non-overlapping categories of social costs and social benefits over which to account.
- Quantifying changes in cost and benefit categories between build and no-build scenarios in each year of the analysis employing those assumptions and methodologies outlined in Sections 5 and 6.
- Monetizing changes from the previous bullet in 2020 dollars.
- Discounting future monetized benefits and costs with a real discount rate of 7 percent for all categories except CO_2 emissions, which is discounted at 3 percent rate (USDOT (2022)).
- Conducting a sensitivity analysis to assess the impacts of changes in important analytical inputs and assumptions.

This analysis seeks to avoid overestimation of benefits as well as underestimation of costs. The strategy of tending to understate benefits and tending to overstate costs as adopted in this analysis is considered a conservative approach and lends greater credibility to any affirmative finding of economic justification (if applicable). Categories of benefits that may accrue to society but have not been captured through monetization include:

- Improved safety and crash severity reduction by replacing the existing “jersey” shape median barrier with single-slope barrier. Single-slope barrier reduces the risk for potential vehicle rollover, inherently decreasing the likelihood of a more severe injury crash, reducing the cost of crashes.
- Improved safety and crash avoidance by replacing overhead sign structures and signs to be compliant with current MUTCD guidance. The project will provide more standard sign spacing, increasing the advanced notification of the approach to interchanges and directing vehicles into appropriate lanes in advance of diverging or merging movements, resulting in a reduction in late lane changes due to driver inattention or unfamiliarity with the project area.
- Improved vehicle passenger comfort from a smoother pavement surface.
- Reduced ambient noise levels from a smoother pavement surface.
- Reduced emissions of various pollutants not included in this analysis like volatile organic compounds (VOCs) and carbon monoxide.
- Travel Time Reliability - additional time savings stemming from a vehicle operators’ experiencing a relatively higher certainty of arrival times. This higher certainty allows users to optimize travel behavior especially to time-critical destinations (e.g. doctors’ appointments, workplace, airport) by including a smaller contingency buffer.

If these uncaptured categories were included in the monetization process, net project benefits would further increase.

4 Project Overview

4.1 Base Case and Alternatives

Base Case – The No-Build condition assumes that pavement restoration work does not occur, and emergency repairs continue to be conducted at an increasing rate to maintain the roadway. Under this scenario, the pavement remains in a state that is consistent with "very poor" condition. Traffic volumes increase over time according to NYSTA projections. Other than changes to traffic volumes, traffic patterns, including diurnal and intra-week variation, remain materially similar to those patterns in recent historical years.

Build Case – The pavement and corridor pavement is restored with safety infrastructure being improved according to the timing and cost schedules laid out herein. The pavement is initially in "very good" condition after project completion and deteriorates gradually over the analysis period with no emergency repairs necessary for the first 6 years. As in Base Case, traffic volumes continue to grow alongside population growth in adjacent communities. Other than changes to traffic volumes, traffic patterns in future years are generally similar to those patterns in recent historical years.

Unless otherwise noted, for all benefit and cost categories monetized values presented in this analysis represent the difference in that category between the Base and Build Case.

4.2 Categories of Impacts

The Project is expected to significantly improve pavement condition, which will reduce the frequency of emergency repairs, the frequency of delays for motorists, the severity and number of crashes, the emissions of harmful air pollutants, and aggregate vehicle operating costs.

These impacts are described in more detail below:

- **Reduction in Emergency Repairs:** The project will reduce the frequency of emergency repairs and the associated direct costs in labor, equipment and materials to perform them.
- **Travel Time Savings:** A reduction in emergency repair frequency will reduce the frequency of necessary lane closures and resulting traffic delays and lower average travel speeds that would result. This is partially offset by increases in travel time during the construction period.
- **Improved Safety and Avoided Accident Costs:** Improving the pavement condition to "very good", as well as improving lighting conditions and signage will reduce the number of incidents for which pavement condition, poor lighting and/or signage were contributing factors.
- **Reduction in Emissions:** The project will reduce emissions of air pollutants produced by vehicles by reducing delays related to emergency work zones. As vehicles brake and reduce travel speeds through the emergency work zones, they emit several pollutants such as carbon dioxide (CO_2), nitrogen oxides (NO_x), particulate matter ($PM_{2.5}$), and sulfur dioxide (SO_2) at higher rates per mile due to less efficient vehicle operation. This is partially offset by increased emissions resulting from delays associated with project construction.
- **Reduced Vehicle Operating Cost:** The project will decrease vehicle operating cost along the Thruway by decreasing additional vehicle wear and vehicle maintenance requirements associated with poor pavement conditions.
- **Residual Value of Capital Investment:** The project analysis period focuses on the useful life of the top wearing course of the overlay, but several project elements will retain value throughout their useful lives which is calculated and accounted on the final year of analysis.

4.3 Project Cost and Schedule

The construction of the Project is expected to occur in years 2023 and 2024 with project completion expected in the fall of 2024 and a full year of operation beginning in 2025. Costs associated with design, construction, and inspection are expected to be incurred between 2022 and 2024. The breakdown of project costs by year is presented in Table 3. Capital expenditures of the project will total approximately $53.1 million (undiscounted). All costs in this section are in 2020 dollars, with future dollars discounted according to USDOT BCA guidance.

Table 3 – Summary of Project Costs, By Year

Calendar Year	Capital Expenditures (2020 $)	Discounted Capital Expenditures (2020 $)
2022	$4,428,000	$3,867,587
2023	$17,943,640	$14,647,355
2024	$30,764,360	$23,469,983
Total	**$53,136,000**	**$41,984,925**

5 Demand Projections

The projected future traffic demand is a key factor in calculating travel time savings and emissions for the No-Build and Build scenarios. The volumes and delays for vehicles on the corridor are based on the hourly traffic data.

NYSTA estimated daily traffic data in vehicle miles traveled (VMTs) over the analysis period. These figures include projections for 2025 and 2037. This analysis uses this implied growth rate between these two dates to calculate traffic demand along the thruway for each year of the analysis period. Conservatively, the project is not assumed to increase capacity, and thus daily traffic volumes are consistent between the No-Build and Build scenarios. The primary difference in hourly traffic volumes results from changes in delays associated with emergency repairs and lane closures due to accidents associated with no-build and build scenarios.

Resulting projections for daily VMT by highway segment and year of occurrence are presented in Table 4.

Table 4 – NYSTA Daily Traffic Forecasts

Segment	Description	Daily VMT, (2025)	Daily VMT, (2037)
N1 – N2	Niagara Thruway MP 900.7 - MP 901.56, S. Ogden St - Clinton St	66,391	72,338
N2 – N3	Niagara Thruway MP 901.56 - MP 902.22, Clinton St - Seneca St	49,043	53,436
N3 – N4	Niagara Thruway MP 902.22 - MP 903.14, Seneca St - Smith St	80,596	87,814
N4 – N5	Niagara Thruway MP 903.14 - MP 903.79, Smith St - Hamburg St	58,695	63,952
N5 – N6	Niagara Thruway MP 903.79 - MP 904.56, Hamburg St - Michigan Ave	65,351	71,203

6 Estimation of Economic Benefits

This section describes the measurement approach used for each benefit and cost category identified in Section 4.2 and provides an overview of the associated methodology, assumptions, and estimates. Table

5 outlines general assumptions used in the BCA.

The BCA measures benefits against costs throughout a period of analysis beginning at the preliminary design and the start of construction including 2 years of construction costs and a 12-year benefits period. All monetized benefits and costs are estimated in 2020 dollars with future dollars discounted according to USDOT BCA guidance. The benefits and costs have been discounted to a base year of 2020.

Table 5 – BCA General Assumptions

Variable Name	Unit	Value	Source
Construction Start Year	year	2023	NYSTA Project Schedule
Construction Duration	years	1.3	
Project Open Year	year	2024	
Benefits Period	years	12	Anticipated pavement condition life before significant repairs are due (NYSDOT CPDM Ch 5)
Extended Benefits Period	years	0	Extended analysis period assumption. Assumes additional maintenance expenditures will be incurred to maintain pavement condition for a longer timeline.
Emergency Repair Start year (Build)	Year	2030	
General Discount Rate	Percent	7%	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised)
Environmental Discount Rate (CO_2)	Percent	3%	
Annualized Factor (weekdays)	Days/Year	261	Considers only weekdays in a year.
Annualization Factor - Full Week	Days/Year	365.25	Known
Commercial Vehicle Percentage	percent	11.3%	Calculated based on NYSTA observed data

6.1 Travel Time Savings

Travel time savings are estimated using AADT projections by year, distance calculations, and USDOT travel time recommended values. The build scenario initially creates negative time travel savings during the construction period. However, after construction, the build scenario generates positive travel time savings as the incidence of emergency repairs and the associated delay causing lane closures are greatly reduced.

6.1.1 Methodology

Estimation of travel time savings is based on calculated VMT that is applied to the projected work zone activity along the project corridor, and the relative average vehicle speeds during the different work zone periods. In the no build scenario, an estimated 808.5 hours of emergency work zones occur during 2022, resulting in an average vehicle speed of 35 mph. The BCA assumes that the number of emergency work zones will continue to increase on an annual basis over time. The project will avoid the need to conduct emergency repairs over the first 6 years of the analysis period. The BCA assumes after this point that emergency work zones will begin to occur but at a lower frequency and grow over time through the useful 20-year life of the top wearing course of pavement.

In the build scenario, an estimated 250 work days will occur during the construction period. An estimated 168 scheduled work zones (two-thirds of the available work days) occur during the construction period. One- and two-lane closures produce average vehicle speeds of 55 mph. The average free flow speed without work zones along the segment, based on data from NYSTA, is 63 mph. All emergency work zones are estimated to last 5 hours per occurrence. Scheduled work zones during the construction period for the build scenario occur as dictated by NYSTA lane closure allowances for the corridor.

6.1.2 Assumptions

Assumptions used in the estimation of travel time savings are summarized in Table 6.

Table 6 – Travel Time Savings Assumptions			
Variable Name	**Unit**	**Value**	**Source**
Value of Time (All Purpose) – auto	2020 $/person-hour	$17.80	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs – March 2022 (Revised), Table A-3
Average Vehicle Occupancy	Persons/ vehicle	1.67	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs – March 2022 (Revised), Table A-4
Value of Time (All Purposes)	2020 $/vehicle	$29.726	Calculation
Value of Time (Trucks)	2020 $/vehicle-hour	$32.00	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs – March 2022 (Revised), Table A-3
Commercial Vehicle Percentage	percent	11.3%	Calculated based on NYSTA observed data for commercial vehicles
Annual Percent Growth in Maintenance Requirements in Future Years (No-Build)	percent	1.54%	Ahmed, A., Bai, Q., Lavrenz, S. and Labi, S., 2015. Estimating the marginal cost of pavement damage by highway users on the basis of practical schedules for pavement maintenance, rehabilitation and reconstruction.Structure and Infrastructure Engineering,11(8), pp.1069-1082
Project Length	miles	3.5	NYSTA
Duration of Pothole Repairs	hours	5	Based on maintenance logs; Average duration of pothole repairs (2020)
Duration of All Emergency Repairs	hours/year	808.5	Based on maintenance logs; Total duration of emergency repairs (2020)
Duration of Emergency Repairs	hours/year	243	Assumption; 30% of No-Build Emergency Repairs
Duration of Scheduled Repairs	hours/day	8	Hours in average workday during construction
Frequency of Scheduled Repairs (2023)	days	111	NYSTA; Considers only available construction days in 2023 (July 1 – Nov 15)
Frequency of Scheduled Repairs (2024)	days	139	NYSTA; Considers only available construction days in 2024 (Apr 1 – Oct 31)

6.1.3 Benefit Estimates

Table 7 outlines the monetized net benefits of travel time over the project lifecycle between Build and No-Build scenarios. They account for $4.2 million in net benefits over the life cycle, with constant dollar benefits discounted at 7 percent in accordance with USDOT BCA guidance.

Table 7 – Travel Time Cost Savings		
Benefit Type	**Constant 2020 $**	**Discounted 2020 $**
Travel Time Savings	$8,183,974	$4,243,587

6.2 Accident Cost Savings

The proposed project would result in significant accident cost savings to society by reducing the number of

incidents for which pavement condition, lighting, and signage conditions were a contributing factor.

6.2.1 Methodology

NYSTA provided existing crash data which were used to forecast the number of crashes for the No-Build scenario. FHWA Crash Modification Factors #1284 and #9289, related to lighting and pavement condition respectively, were utilized to estimate predicted crashes in the build scenario. The data are provided in three crash severity categories: crashes resulting in property damage only, injury, and fatality. Reduction in crashes from the No-Build to Build scenarios are applied to USDOT recommended monetization values.

6.2.2 Assumptions

Assumptions used in the estimation of vehicle operating costs are summarized in Table 8.

Table 8 – Safety Benefit Assumptions

Variable Name	Unit	Value	Source
Cost of Damaged Vehicle (PDO)	2020 $/vehicle	$4,600	USDOT BCA Guidance Table A-2
Cost of Damaged Vehicle	2020 $/vehicle	$4,600	USDOT BCA Guidance Table A-1
Cost of Injury Crash	2020 $/crash	$302,600	
Cost of Fatal Crash	2020 $/crash	$12,837,400	

6.2.3 Benefit Estimates

Table 9 outlines the safety benefits due to improvements in pavement condition and upgrades to lighting and signage over the project lifecycle. These benefits amount to $8.4 million over the 12 year operation period, with constant dollar benefits discounted at 7 percent in accordance with USDOT BCA guidance.

Table 9 – Safety Benefit Cost Savings

Benefit Type	Constant 2020 $M	Discounted 2020 $
Crash Avoidance Benefits	$16,820,760	$8,444,490

6.3 Emissions Cost Savings

The BCA estimates the reduction emissions by pollutant type and monetizes the cost of emissions using values provided in the USDOT's BCA Guidance.

6.3.1 Methodology

The primary air quality impact associated with the project is decreased link emission rates post-project due to a reduction in delays and lower speeds caused by emergency repairs – No emergency repair events are anticipated for at least six years after project completion.

The BCA estimates included herein monetize reductions of emissions from this effect. The reduction in tons of emissions by pollutant type was estimated based on the difference in total emissions rates (g/hr) between the build and no-build scenarios for three analysis years: base year 2022 (using 2020 monitoring data from NYSTA and NYSDOT) versus ETC year 2024, 2034 (ETC+10), and 2039 (ETC+15). Using per-hour emission rates for carbon dioxide ($CO2$), nitrogen oxides (NOx), particulate matter ($PM2.5$), and sulfur dioxide ($SO2$) from the Environmental Protection Agency (EPA)'s Motor Vehicle Emission Simulator (MOVES), the default MOVES3-based Erie County, NY fleet were modeled based on an average congested

and free-flow speeds for each no-build and build scenario, respectively.

6.3.2 Assumptions

Assumptions used in the estimation of vehicle operating costs are summarized in Table 10.

Table 10 – Emissions Model Assumptions

Analysis Year	Model Input Parameter	Existing/No-Build Input Description	Build Input Description
2022 (existing) / 2024 (ETC)	Model Scale	Project Scale	Project Scale
	Analysis Year	2022 (using 2019 data as the basis for MOVES3 input development.	2024 (run as 2022 in MOVES3 to provide consistent basis for comparison of existing vs. build conditions.
	Representative Day Type	Weekdays	Weekdays
	Representative Month	April	April
	Representative Hour of Day	10-11 am	10-11 am
	Geographic Location	Erie County, NY	Erie County, NY
	Road Type	Urban Restricted Access (Freeway)	Urban Restricted Access (Freeway)
	Pollutants Modeled	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2
	Link Average Speed	50 mph - Assumed based on FHWA 2017 Guidance on Setting Work Zone Speed Limits (MOVES3 Speed Bin 11 - 50-55 mph)	63 mph - Calculated using 2019 NYSDOT Data for the I-190 Corridor (MOVES3 Speed Bin 14 - 65mph)
	Link Average Traffic Volume	Average of 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor - Since this analysis is not being performed for peak traffic hours, a reduction in link average speed is not assumed to impact vehicle throughput	Average of 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor
	Link Designations	Entire 3.5 mile Corridor defined as a Single Link	Entire 3.5 mile Corridor defined as a Single Link
	Lane Closure Assumption during Emergency Repair Events	1 lane closed out of 3 lanes in each direction leading to slower link average speed and volume during emergency repair events	No lane closures since project build will negate need for repairs
	Total Duration of Existing Emergency Repair Events	2019 NYSDOT/ NYSTA Maintenance Data	It is assumed that post-build, emergency repairs will not be required.
2034 No-Build / 2034 Build	Model Scale	Project Scale	Project Scale
	Analysis Year	2034	2034
	Representative Day Type	Weekdays	Weekdays
	Representative Month	April	April
	Representative Hour of Day	10-11 am	10-11 am

Table 10 – Emissions Model Assumptions			
Analysis Year	**Model Input Parameter**	**Existing/No-Build Input Description**	**Build Input Description**
2034 No-Build / 2034 Build	Geographic Location	Erie County, NY	Erie County, NY
	Road Type	Urban Restricted Access (Freeway)	Urban Restricted Access (Freeway)
	Pollutants Modeled	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2
	Link Average Speed	50 mph - Assumed based on FHWA 2017 Guidance on Setting Work Zone Speed Limits (MOVES3 Speed Bin 11 - 50-55 mph)	63 mph - Calculated using 2019 NYSDOT Data for the I-190 Corridor (MOVES3 Speed Bin 14 - 65mph)
	Link Average Traffic Volume	Projected 2034 volumed based on 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor - Since this analysis is not being performed for peak traffic hours, a reduction in link average speed is not assumed to impact vehicle throughput	Projected 2034 volumed based on 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor
	Link Designations	Entire 3.5 mile Corridor defined as a Single Link	Entire 3.5 mile Corridor defined as a Single Link
	Lane Closure Assumption during Emergency Repair Events	1 lane closed out of 3 lanes in each direction leading to slower link average speed and volume during emergency repair events	No lane closures since project build will negate need for repairs
	Total Duration of Existing Emergency Repair Events	2019 NYSDOT/ NYSTA Maintenance Data	It is assumed that post-build, emergency repairs will not be required.
2039 No-Build / 2039 Build	Model Scale	Project Scale	Project Scale
	Analysis Year	2039	2039
	Representative Day Type	Weekdays	Weekdays
	Representative Month	April	April
	Representative Hour of Day	10-11 am	10-11 am
	Geographic Location	Erie County, NY	Erie County, NY
	Road Type	Urban Restricted Access (Freeway)	Urban Restricted Access (Freeway)
	Pollutants Modeled	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2	NOx, SO2, PM2.5 exhaust, brake wear and tire wear, GHGs: CH4, N2O, CO2
	Link Average Speed	50 mph - Assumed based on FHWA 2017 Guidance on Setting Work Zone Speed Limits (MOVES3 Speed Bin 11 - 50-55 mph)	63 mph - Calculated using 2019 NYSDOT Data for the I-190 Corridor (MOVES3 Speed Bin 14 - 65mph)
	Link Average Traffic Volume	Projected 2039 volumed based on 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor -	Projected 2039 volumed based on 2019 NYSDOT Hourly Traffic Count Data for the I-190 Corridor

Table 10 – Emissions Model Assumptions			
Analysis Year	Model Input Parameter	Existing/No-Build Input Description	Build Input Description
2039 No-Build / 2039 Build		Since this analysis is not being performed for peak traffic hours, a reduction in link average speed is not assumed to impact vehicle throughput	
	Link Designations	Entire 3.5 mile Corridor defined as a Single Link	Entire 3.5 mile Corridor defined as a Single Link
	Lane Closure Assumption during Emergency Repair Events	1 lane closed out of 3 lanes in each direction leading to slower link average speed and volume during emergency repair events	No lane closures since project build will negate need for repairs
	Total Duration of Existing Emergency Repair Events	2019 NYSDOT/ NYSTA Maintenance Data	It is assumed that post-build, emergency repairs will not be required.

6.3.3 Benefit Estimates

Emissions reductions from avoiding emergency repairs are higher than emissions increase from the construction period.

Table 11 outlines the emission benefits for this project for Nitrogen Oxides (NOx), Particulate Matter ($PM_{2.5}$), and Sulfur Dioxide (SO_2) discounted at 7 percent. CO_2 emissions are also presented in Table 11 and discounted at 3 percent in accordance with USDOT BCA guidance.

Table 11 – Emissions Benefit Cost Savings		
Emissions Type	Constant 2020 $	Discounted 2020 $
Carbon Dioxide (CO_2)	$410,764	$274,256
Nitrogen Oxides (NO_x)	$680,369	$293,588
Particulate Matter ($PM_{2.5}$)	$3,102,364	$1,017,633
Sulfur Dioxide (SO_2)	$1,682	$647
Total	**$4,195,179**	**$1,586,124**

6.4 Pavement Maintenance Savings

The BCA estimates savings related to pavement maintenance by calculating the benefit of improving the pavement to a “very good” condition, thus reducing costs directly related to performing future emergency repairs.

6.4.1 Methodology

The project will restore the segment of roadway on I-190 between MP 900.7 and MP 904.2. The current pavement condition is “poor” to “very poor”. The BCA assumes that regular emergency repairs are required to maintain the stretch of roadway at a functioning level, and that the number of repairs will continue to increase on an annual basis over time. The project will raise the pavement condition to “very good” and avoid the need to conduct emergency repairs over the first 6 years of the analysis period. At this point that pavement is assumed to be in “good” to “fair” condition and begin to require emergency repairs, but at a lower frequency than the No-Build scenario, in order to maintain the pavement condition.

6.4.2 Assumptions

Assumptions used in the estimation of pavement maintenance cost savings are provided in the Table 12.

Table 12– Pavement Maintenance Assumptions			
Variable Name	**Unit**	**Value**	**Source**
Starting Year for Emergency Repairs (No Build)	Year	2022	NYSTA project assumptions
Annual Duration of Emergency repairs per Year	Hours/Year	808.5	Based on NYSTA maintenance logs
Annual Percent Growth in Maintenance Requirements in Future Years for No-Build Scenario	Percent	1.54%	Ahmed, A., Bai, Q., Lavrenz, S. and Labi, S., 2015. Estimating the marginal cost of pavement damage by highway users on the basis of practical schedules for pavement maintenance, rehabilitation and reconstruction. *Structure and Infrastructure Engineering*,*11*(8), pp.1069-1082

6.4.3 Benefit Estimates

Table 13 outlines the pavement maintenance cost savings for this project. Pavement maintenance cost savings will total $2.3 million, discounted in accordance with USDOT BCA guidance.

Table 13 – Summary of Pavement Maintenance Cost Savings		
Benefit Type	**Constant 2020 $**	**Discounted 2020 $**
Pavement Maintenance Cost Savings	$3,976,444	$2,304,296

6.5 Vehicle Operating Cost Savings

The project will improve pavement condition and decrease vehicle operating costs. The model calculates the change in various vehicle operating costs as a function of pavement condition and vehicle type. Lower operating costs in more favorable pavement conditions arise from lower vehicle maintenance costs, lower depreciation, and lower tire wear, among other factors.

6.5.1 Methodology

Vehicle operating cost savings are calculated based on the improvement in roadway pavement quality. First, the annual average daily traffic (AADT) is applied to the length of the corridor pavement improvements and an Annualization factor to estimate the annual vehicle miles traveled (VMT) in the no build case. VMT in the no build case is monetized using an estimate of total vehicle operating cost per mile.

In the build scenario, a lower vehicle operating cost is applied. This percent reduction is due to the improved pavement quality. The extent to which operating costs are lower per vehicle mile in the build compared to no build scenarios are assumed to decline over time based on the useful life of a roadway.

6.5.2 Assumptions

Assumptions used in the estimation of travel time savings and vehicle operating cost savings are summarized in Table 14.

Table 14 – Vehicle Operating Cost Savings Assumptions			
Variable Name	Unit	Value	Source
Average Passenger Vehicle Costs for New (Good) Condition Highway	cents/mile	24.15	Barnes, G. and Langworthy, P., 2004. Per mile costs of operating automobiles and trucks. Transportation Research Record, 1864(1), pp.71-77.
Average Passenger Vehicle Costs for Poor Condition Highway	cents/mile	27.93	
Commercial Truck Costs for New (Good) Condition Highway	cents/mile	60.76	
Commercial Truck Costs for Poor Condition Highway	cents/mile	68.46	
New Pavement Good-to-Poor Degradation Period	years	20	NYSTA
2003 $ to 2020 $ Adjustment Factor	factor	1.38	USDOT (2022)

6.5.3 Benefits Estimate

Table 15 outlines the vehicle operating cost savings for this project. The vehicle operating cost savings will total $22.1 million (discounted).

Table 15 – Summary of Vehicle Operating Cost Savings		
Benefit Type	Constant 2020 $	Discounted 2020 $
Vehicle Operating Cost Savings	$40,867,400	$22,091,701

6.6 Residual Value

The project analysis period was chosen to reflect the primary useful pavement rehabilitation life of the project, but several project elements will retain value beyond this primary analysis period. This residual or salvage value was estimated and accounted as a project benefit at the end of the analysis period.

6.6.1 Methodology

Construction costs were disaggregated into elements and assigned useful lives of between 12 and 65 years. The top, wearing course of the pavement was assumed to have 12 years of useful life, while the underlying binder course and repaired concrete slabs would remain useful through a 20-year useful life. Similarly, the median barrier, guide rail, and lighting would have a much longer useful life of 65 years, and overhead signage structures would remain useful for 50 years. Initial investments by element were adjusted to 10% of their value over their respective useful lives using a straight-line depreciation curve, with residual values at the end of the 12-year analysis period accounted as a benefit to the project.

6.6.2 Assumptions

Assumptions used in the estimation of residual value are summarized in Table 16.

Table 16 – Assumptions for Residual Value			
Variable name	Unit	Value	Source
Useful Life - Pavement Binder and Concrete Repairs	Years	20	NYSTA
Useful Life - Median Barrier / Guide Rail / Lighting	Years	65	NYSTA
Useful Life - Overhead Signage	Years	50	NYSTA
Residual Value at end of useful life	Percent of Investment	10%	NYSTA
Depreciation Method	Method	Straight Line	

6.6.3 Benefit Estimates

Table 17 summarizes the residual value benefits discounted at a 7 percent discount rate, in accordance with USDOT BCA guidance.

Table 17 – Residual Value Estimate		
Benefit Type	Constant 2020 $	Discounted 2020 $
Residual Value	$20,694,532	$7,009,954

7 Summary of Findings and BCA Outcomes

Table 18 and Table 19 summarize the BCA findings. Annual costs and benefits are computed over the lifecycle of the project, in constant dollars and discounted to year 2020 in accordance with USDOT BCA guidance.

Table 18 – Economic Benefit Estimate		
Benefits	Constant 2020 $	Discounted 2020 $
Reduced Travel Time Costs	$8,183,974	$4,243,587
Improved Safety and Avoided Accident Costs	$16,820,760	$8,444,490
Reduction in Emissions Costs	$4,195,179	$1,586,124
Reduction in Pavement Maintenance Costs	$3,976,444	$2,304,296
Reductions in Vehicle Operating Cost	$40,867,400	$22,091,701
Residual Values	$20,694,532	$7,009,954
Total Benefits	**$94,738,290**	**$45,680,175**

Note: Benefits in this table include the benefit of reduced maintenance which is actually an off-setting component of costs (i.e., it reduces costs and is a negative "cost" and not a "benefit" element in the BCA analysis calculations).

Table 19 – Overall Benefit-Cost Analysis Results		
Project Evaluation Metric	Constant 2020 $	Discounted 2020 $
Total Benefits	$90,761,846	$43,375,856
Total Costs	$49,159,556	$39,680,629
Net Present Value	$3,695,228	
Benefit-Cost Ratio	1.09	

Note: Benefits in this table include the benefit of reduced maintenance which is actually an off-setting component of costs (i.e., it reduces costs and is a negative "cost" and not a "benefit" element in the BCA analysis calculations).

With a 7 percent general discount rate and 3 percent discount rate for CO_2, the $41.98 million investment would result in $47.28 million in total benefits and a benefit-cost ratio of approximately 1.26:1.00.

8 BCA Sensitivity Analysis

The BCA outcomes presented in the previous sections rely on a large number of assumptions and long-term projections, both of which are subject to considerable uncertainty.

The primary purpose of the sensitivity analysis is to help identify the variables and model parameters whose variations have the greatest impact on the BCA outcomes: the “critical variables.”

The sensitivity analysis can also be used to:

- Evaluate the impact of changes in individual critical variables – how much the final results would vary with reasonable departures from the “preferred” or most likely value for the variable
- Assess the robustness of the BCA and evaluate, in particular, whether the conclusions reached under the “preferred” set of input values are significantly altered by reasonable departures from those values.
- In the sensitivity analysis, only one assumption from the baseline model is changed to see the effect of that assumption on initial results. The cases presented in the sensitivity analysis are the following:
  - Maintenance and Construction Delay: increasing delay by 25% above assumptions.
  - Discount Rate: Reducing discount rate to 3%.
  - Project Costs: increasing and decreasing the total project cost of the project by 30%.

The sensitivity results are presented in Table 20.

Table 20 – Sensitivity Analysis Summary				
Parameters	**Change in Parameter Value**	**Current Net Present Value**	**New Net Present Value**	**New B/C Ratio**
Maintenance and Construction Delay	Increasing Delay Time by 25%	$3,695,228	$4,756,125	1.12
Discount Rate	Reducing the general discount rate to 3 percent		$20,290,187	1.45
Project Cost	Increasing the total project cost by 30%		-$7,172,183	0.86

Note: For the increased cost analysis, total cost was increased by 30% before the already calculated contingency was added.

9 Schedule of Estimated Benefits and Costs

Table 21 presents the present value costs and present value benefits of the project.

Table 21 – Summary of Benefits and Costs[9]

Discount Year	Year	Travel Time Savings	Emissions	Accident Savings	Vehicle Operating Cost Savings	Total Capital Residual Value	Total Benefits	Total Costs	Net Present Value
2	2022	$0	$0	$0	$0	$0	$0	$3,629,363	-$3,629,363
3	2023	-$5,045	-$975,690	$0	$0	$0	-$980,735	$14,421,288	-$15,402,023
4	2024	$178,326	-$1,013,774	$0	$1,192,774	$0	$357,325	$23,255,451	-$22,898,126
5	2025	$480,520	$441,023	$959,920	$3,189,199	$0	$5,070,662	-$203,585	$5,274,246
6	2026	$462,263	$411,304	$903,670	$2,835,456	$0	$4,612,693	-$193,196	$4,805,889
7	2027	$444,720	$382,655	$850,717	$2,514,348	$0	$4,192,439	-$183,338	$4,375,777
8	2028	$427,755	$356,178	$800,867	$2,223,118	$0	$3,807,918	-$173,982	$3,981,900
9	2029	$411,361	$330,653	$753,937	$1,959,233	$0	$3,455,184	-$165,104	$3,620,288
10	2030	$395,612	$306,713	$709,758	$1,720,359	$0	$3,132,442	-$156,679	$3,289,121
11	2031	$266,107	$280,037	$668,167	$1,504,355	$0	$2,718,666	-$103,996	$2,822,663
12	2032	$255,767	$255,393	$629,014	$1,309,251	$0	$2,449,424	-$98,690	$2,548,114
13	2033	$245,760	$232,643	$592,155	$1,133,235	$0	$2,203,793	-$93,654	$2,297,447
14	2034	$236,153	$211,658	$557,456	$974,647	$0	$1,979,913	-$88,875	$2,068,787
15	2035	$226,805	$192,316	$524,790	$831,958	$0	$1,775,869	-$84,340	$1,860,208
16	2036	$217,485	$175,018	$494,038	$703,767	$7,009,954	$8,600,262	-$80,036	$8,680,298
12-Year Anal.		$4,243,587	$1,586,124	$8,444,490	$22,091,701	$7,009,954	$43,375,856	$39,680,629	$3,695,228

[9] Most categories are discounted at 7 percent, while CO_2 emissions are discounted at 3 percent per USDOT's BCA guidance.

U.S. DOT. *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*. March 2022. Available at: Benefit-Cost Analysis Guidance for Discretionary Grant Programs | US Department of Transportation

APPENDIX C
Coordination with New York State Department of Transportation

NEW YORK STATE OF OPPORTUNITY. Department of Transportation

KATHY HOCHUL
Governor

MARIE THERESE DOMINGUEZ
Commissioner

JANICE A. McLACHLAN
Chief of Staff and General Counsel

May 23, 2022

Matthew J. Driscoll
Executive Director
New York State Thruway Authority
200 Southern Boulevard
P.O. Box 189
Albany, New York 12201-0189

Dear Executive Director Driscoll:

The New York State Department of Transportation affirms that the New York State Thruway Authority's request for the rehabilitation of Interstate 190, (between milepost 900.07 and milepost 904.2) in Erie County meets the eligibility requirements under Title 23, of United States Code.

The State acknowledges that the requested $25 million toward this $51.136 million project will be incorporated into the Transportation Improvement Program (TIP) and Statewide Transportation Improvement Program (STIP) when federal funding is allocated for this purpose. Furthermore, the New York State Thruway Authority acknowledged that it is solely responsible for demonstrating the availability of the remaining non-federal share to complete the project.

Thank you for your consideration of the Interstate 190 Restorative Project in the Buffalo/Niagara Region. If I can be of additional assistance regarding this request, please contact me at 518-457-4422 or jan.mclachlan@dot.ny.gov.

Sincerely,

Janice A McLachlan

Janice A. McLachlan
Chief of Staff and General Counsel