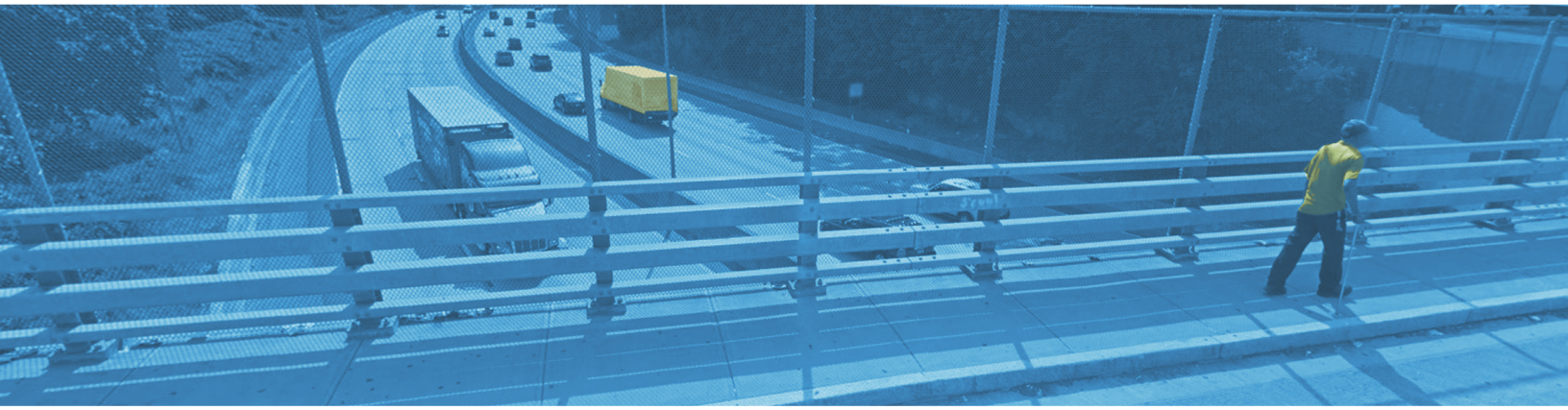

2022 RAISE Grant Application

REVITALIZE 95

Rehabilitation of I-95
from Milepost 604.0 (NE 4.0) to Milepost 608.8 (NE 8.8)

REVITALIZE

INTERSTATE 95

NEW YORK STATE OF OPPORTUNITY. | Thruway Authority

NEW YORK STATE OF OPPORTUNITY. | Thruway Authority

KATHY HOCHUL
Governor

JOANNE M. MAHONEY
Chair

MATTHEW J. DRISCOLL
Executive Director

April 8, 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 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant. This grant will supplement the cost for rehabilitating a 4.8 mile section of the New England Thruway (I-95) in Westchester 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.

This portion of I-95 proposed for rehabilitation, is a vital section for the region. It is classified as a Principal Urban Arterial on the National Highway system and is used by more than 41 million travelers each year, accounting for approximately 14 percent of all Thruway traffic statewide. Approximately 121,000 motorists travel this stretch every day, with 13 percent being large truck traffic, causing continual deterioration to the roadway.

A significant aspect of this project would be the positive impact on Historically Disadvantaged Communities. Roughly 2.9 miles (60 percent) of this 4.8-mile long project is located in Historically Disadvantaged Communities. Rehabilitating this section of I-95 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. At the forefront of this project is environmental sustainability that will help reduce traffic congestion and mitigate air quality concerns that disproportionally impact disadvantaged communities near congested highway corridors such as this.

Rehabilitating this section of I-95 would be constructed with a thick protective asphalt overlay and include the replacement of guiderail and new pavement markings for enhanced safety. This project will also relocate an emergency U-Turn used by local emergency responders to better accommodate their vehicle access, improving safety and response times.

This rehabilitation project will provide lasting improvements, maintain community connections across I-95, 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

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2022 RAISE Grant Application

April 2022

REVITALIZE

INTERSTATE 95

Rehabilitation of I-95 from
Milepost 604.0 (NE 4.0) to Milepost 608.8 (NE 8.8)

Applicant:

New York State Thruway Authority
200 Southern Boulevard
P.O. Box 189
Albany, NY 12201-0189
(518) 436-2810

Unique Entity Identifier (UEI): LVJZN2NUZKK4

Point of Contact:

Richard W. Lee, P.E.
Chief Engineer
New York State Thruway Authority
Richard.Lee@thruway.ny.gov

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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 www.thruway.ny.gov/oursystem/revitalizei95.

LIST OF EXHIBITS

1 PROJECT DESCRIPTION

1.1 Transportation Challenges and Solutions

Project Overview

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. The 570-mile Thruway System plays a vital role in the national, regional, and state economies, as well as connecting New York's principal cities, rural areas, and tourist destinations. About one-third of all vehicles using the system are from out of state, and it is 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-95 New England Thruway segment identified

The New England Thruway (I-95), a 15-mile segment of the New York State Thruway System, runs from New York City (Bronx) to the Connecticut state line. This project will rehabilitate a deteriorated 4.8-mile segment of critical transportation corridor, ensuring that this portion of I-95 provides for the 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-95, including Historically Disadvantaged Communities.

Transportation Challenges

This segment of I-95 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 121,000, with 13% trucks. Several transportation challenges along the segment have been identified:

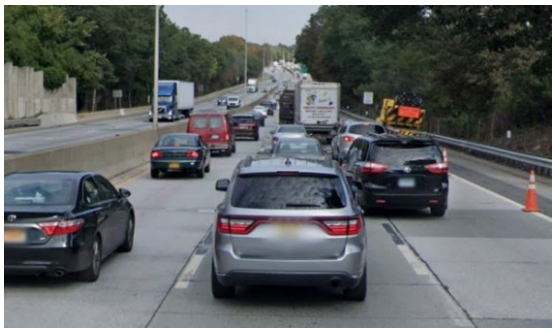

Exhibit 2: Rough pavement and frequent repair work on the segment contribute to congestion.

- **Pavement Condition**. The pavement in this segment is experiencing accelerated deterioration due to advanced age under heavy loading. A 2014 pavement rehabilitation project repaired and replaced many of the existing concrete slabs to extend the service life of the highway, but this work needs to be stabilized and protected to prevent further deterioration.

  In recent years, nearly constant corrective repair work has been needed along with preventative maintenance. The continuous repair is costly, inefficient, and frequently creates delays for road users. The pavement has exceeded its design life expectancy, is in poor condition, and all options for repair have been exhausted: rehabilitative or replacement improvements are needed. The pavement conditions, if unaddressed, will pose a 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 goods and services.

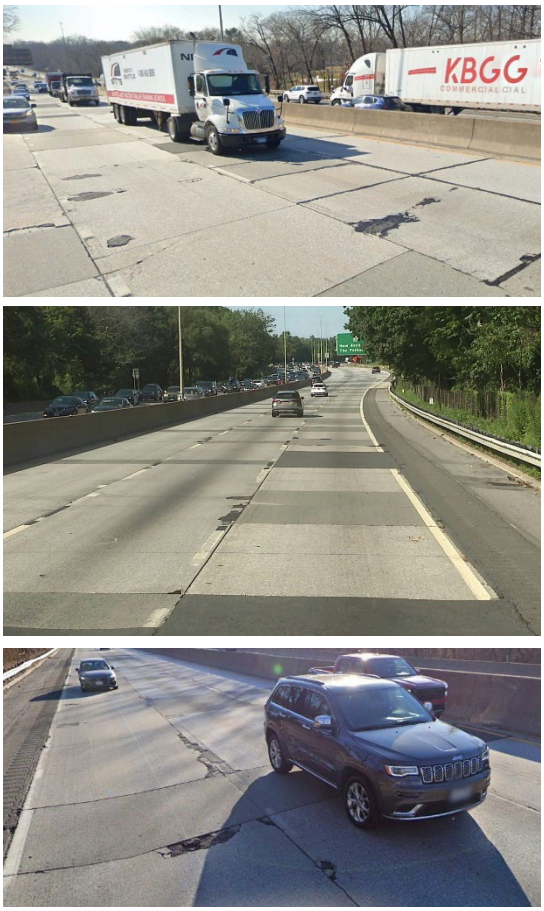

Exhibit 3: Examples of pavement deterioration on this segment, with extensive patching and repairs

- **Community Connections**. There are nine overhead bridges within the project segment that provide important community and pedestrian connections across I-95. Refer to Exhibit 5 for a list of the bridges and communities they serve. Seven bridges have pedestrian facilities on them, and one is a dedicated pedestrian bridge. One bridge, carrying Chatsworth Avenue over I-95, is integrated with the access to the Larchmont Metro-North Train Station, a bus stop, and a vehicle and bicycle parking lot for the station. This facility is known as “Larchmont Station Plaza.”

  Four bridges (Centre Avenue, North Avenue, Larchmont Station Plaza, and Rockland Avenue) have been struck by vehicles in the past. The North Avenue bridge is scheduled to be replaced in a separate Thruway Authority project in 2024, but the three remaining bridges have relatively low vertical clearances above I-95. To allow for the movement of large vehicles, reducing the potential for bridge strikes, there are minimum vertical clearance standards for overhead structures on the National Highway System. Raising the pavement profile with an asphalt overlay has the potential to further reduce vertical clearances that are already at or near the

Exhibit 4: Bridges over I-95 provide important multi-modal community connections (Weaver St. bridge).

minimum. The minimum vertical clearance over I-95 must be maintained for these bridges.

Exhibit 5: Overhead bridges providing community and pedestrian connections over I-95

Feature Carried	Sidewalks	Community	Vertical Clearance	Notes
Centre Avenue	Both sides	New Rochelle	14.44’	Has been struck.
Division Street	Both Sides	New Rochelle	16.42’	
Memorial Highway	Both Sides	New Rochelle	20.25’	
New Rochelle Pedestrian/Utility Bridge	Pedestrian bridge	New Rochelle	16.88’	
North Avenue	Both sides	New Rochelle	14.33’	Has been struck. Scheduled to be replaced by a Thruway Authority project with anticipated completion late in 2024
Potter Avenue	Both sides	New Rochelle	19.88’	
Chatsworth Avenue/Larchmont Station Plaza	Both Sides	Larchmont	14.75’	Metro North Larchmont Station Plaza (Train station access and vehicle/bicycle parking lot) on north side of bridge. Larchmont Station Plaza has been struck.
Weaver Street	Both sides	Larchmont	17.58’	
Rockland Avenue	No	Mamaroneck	14.87’	Has been struck. Flanked by single-family residential neighborhoods; AADT 4354

- **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. Some pavement markings in the segment are worn, with poor visibility or reflectivity, and guiderail needs be upgraded to current Federal standards.

  Emergency responders have indicated that an existing U-turn within the project limits is used to significantly reduce their travel time for some calls. In its present location, it is difficult for them to access, and it would be safer and more functional if it could be relocated further to the south.

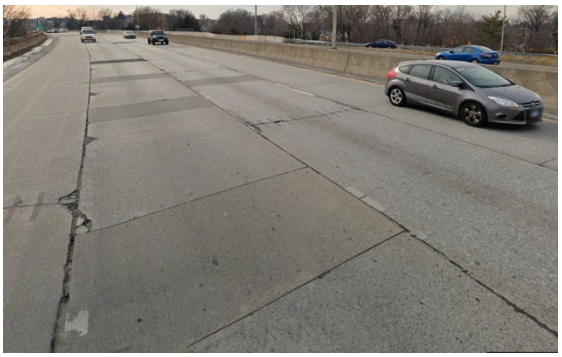

Exhibit 6: Worn pavement markings on this segment of I-95

- **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 New England and 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 and place a thick protective asphalt overlay on it. Refer to Exhibits 7 and 8. With a 20-year design life, the pavement will be kept in a state of good repair with routine preventative maintenance and preservation activities. This approach will be far more cost effective and will have fewer negative impacts on traffic and safety than the current approach of continuous round-the-clock patching and repair. In conjunction with pavement rehabilitation, additional safety improvements will be made, including replacement of guiderail and pavement markings. Refer to Section 3.1 Safety for a detailed discussion of the project's safety improvements.

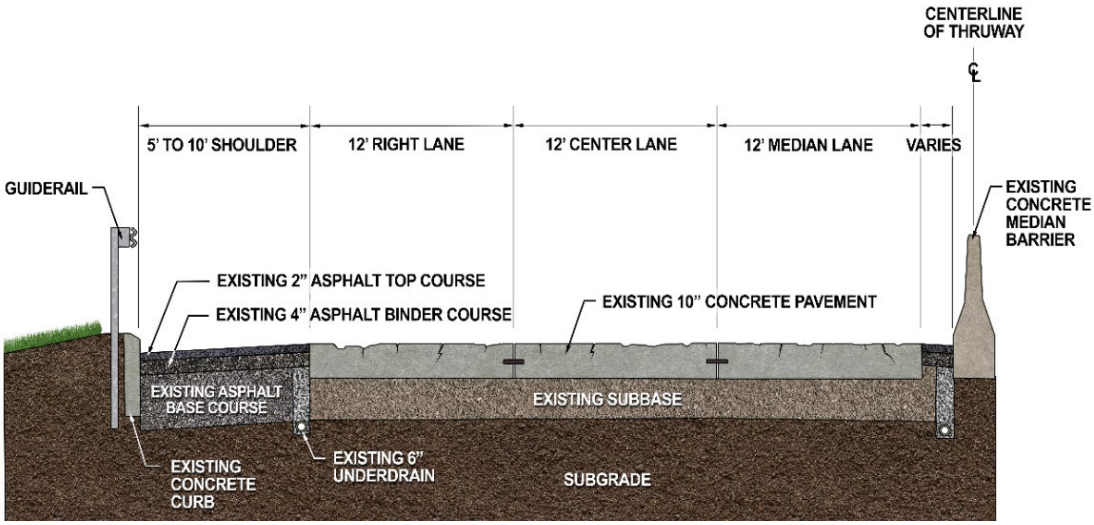

Exhibit 7: Illustrative cross section of deteriorated concrete pavement before construction

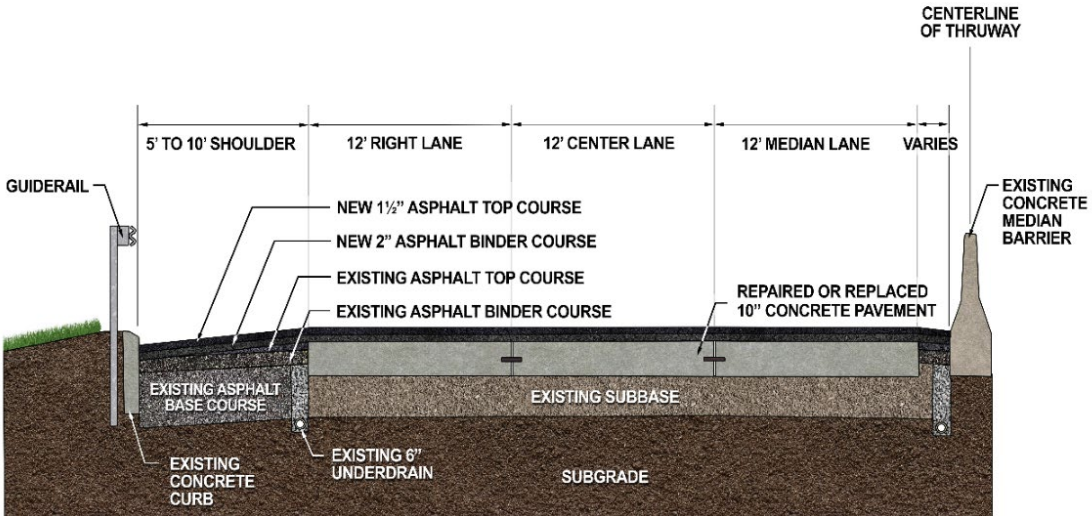

Exhibit 8: Illustrative cross section of repaired concrete with new asphalt overlay after construction

- **Community Connections**. The vertical clearance of all overhead bridges will be evaluated, and measures identified, as needed, to meet minimum clearance standards and decrease the potential for bridge hits. Bridge heights may be adjusted, or the profile of the pavement beneath them lowered, to allow for the added thickness of the asphalt overlay. Accessible pedestrian connections will be preserved or restored on any bridges where the heights are adjusted. Opportunities to enhance accessibility on affected bridges will also be identified. On the Chatsworth Avenue bridge, existing pedestrian and bicycle connections to the Metro-North Larchmont Station, its parking lot, and the existing bus stop will be preserved. Refer to Section 3.4 Improvement to Mobility and Community Connectivity for additional information on community connections across I-95.

Exhibit 9: Accessible pedestrian connections over I-95 will be preserved or restored (Division St. bridge)

- **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 current Federal standards. The superelevation on curves will also be evaluated and corrected, if necessary, to meet current standards for urban interstates.

  The existing U-turn that is used by emergency responders will be relocated to better accommodate their vehicle access, improve safety, and minimize their response times. Refer to Section 3.1 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. Nighttime lane closures will be used to minimize impacts to traffic and avoid impacts that would otherwise be caused by lane reductions 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 Design Status

In 2019, a "Pavement Reconstruction Study" was conducted to evaluate options to address the pavement conditions on the New England Thruway (I-95). The study is included in the Supporting Information.[1] This project is one part of a comprehensive plan, informed by the study, for the rehabilitation of the corridor. The project is in the preliminary design phase.

1.3 Project History

The New England Thruway was originally constructed in the 1950s. The existing concrete pavement on this segment was reconstructed between 1984 and 1992, and last rehabilitated in 2014. That rehabilitation consisted of concrete pavement restoration and the replacement of concrete slabs. However, due to advanced age under heavy loading, this segment is

[1] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

experiencing accelerated deterioration. While every effort is made to keep it in a state of good repair with frequent patching, this is not the most efficient or effective strategy to address the safety, mobility, environmental, and community concerns identified in Section 1.1 Transportation Challenges and Solutions.

1.4 Project Context with Other Transportation Infrastructure Investments

As part of a comprehensive, long-term plan to rehabilitate the New England Thruway (I-95) corridor, the New York State Thruway Authority (Authority) has recently advanced or completed several other projects nearby.

A project to rehabilitate the pavement on the 4-mile segment of I-95 immediately to the south (Milepost 600.0 [NE 0.0] to Milepost 604.4 [NE 4.4]) is in the final stage of design, with completion of construction anticipated in 2023. Another project to rehabilitate the pavement from Milepost 608.8 (NE 8.8) to Milepost 610.8 (NE 10.8) and from Milepost 613.0 (NE 13.0) to Milepost 614.1 (NE 14.1) is in construction, with completion anticipated in 2022. These projects, together, will link the northern and southern segments of I-95 in New York State and further enhance efforts to reduce congestion and reduce greenhouse gas emissions from slowed or idling vehicles along the New England Thruway and the entire Thruway System.

In 2021, the “Last Mile” of the New England Thruway, from Exit 22 (Port Chester-Rye) to the Connecticut border was fully reconstructed. The project included several ramp upgrades for connections to the Cross Westchester Expressway (I-287) and Midland Avenue in the City of Rye and Village of Port Chester in Westchester County. It also included the replacement of two bridges over the Thruway, and the resurfacing of several others.

The North Avenue bridge, which is located in the City of New Rochelle, within limits of this project, is scheduled to be replaced by a separate Thruway Authority project with completion of construction anticipated late in 2024. The new bridge will meet the the minimum vertical clearance requirement for a bridge over I-95. Sidewalks will be provided on both sides, along with Americans with Disabilities Act (ADA) accessibility improvements at nearby signalized intersections and a small public park.

In addition, the New Rochelle toll barrier, which was located within the project limits, was removed in 2018 as part of the New York State Thruway’s system-wide conversion to All-Electronic Toll Collection. The conversion was intended, in part, to eliminate slowed or idling traffic at toll barriers, improving air quality.

Exhibit 10: The New Rochelle toll barrier was removed as part of a system-wide conversion to All-Electronic Toll Collection, eliminating the need for vehicles to slow, stop, and queue at toll barriers.

1.5 Project Location

The project is located along the New England Thruway (I-95) in Westchester County, New York State. The project begins at Milepost 604.0 (NE 4.0), in the Village of Pelham Manor, Town of Pelham, runs north through the City of New Rochelle and Village of Larchmont, and ends at Milepost 608.8 (NE 8.8) in the Town of Mamaroneck.

Exhibit 11: Project location map

Project Coordinates

Southern Project Limit - Milepost 604.0 (NE 4.0): 40°53'27.2"N | 73°48'01.2" W
Northern Project Limit - Milepost 608.8 (NE 8.8): 40°56'51.3"N | 73°44'54.1"W

1.6 Connections to Existing Transportation Infrastructure

This segment of the Thruway lies within the I-95 corridor, which is a major north-south artery from Maine to Florida and a critical part of the national and Northeast regional transportation infrastructure. Refer to Exhibit 12 for a map locating this segment within the greater I-95 corridor.

The New England Thruway portion of I-95, located immediately north of New York City, is 15 miles long, beginning 3.5 miles south of the Bronx/Westchester County line, near Orchard Beach (Pelham Bay Park), New York, and continuing north to the Connecticut state line, near Port Chester, New York.

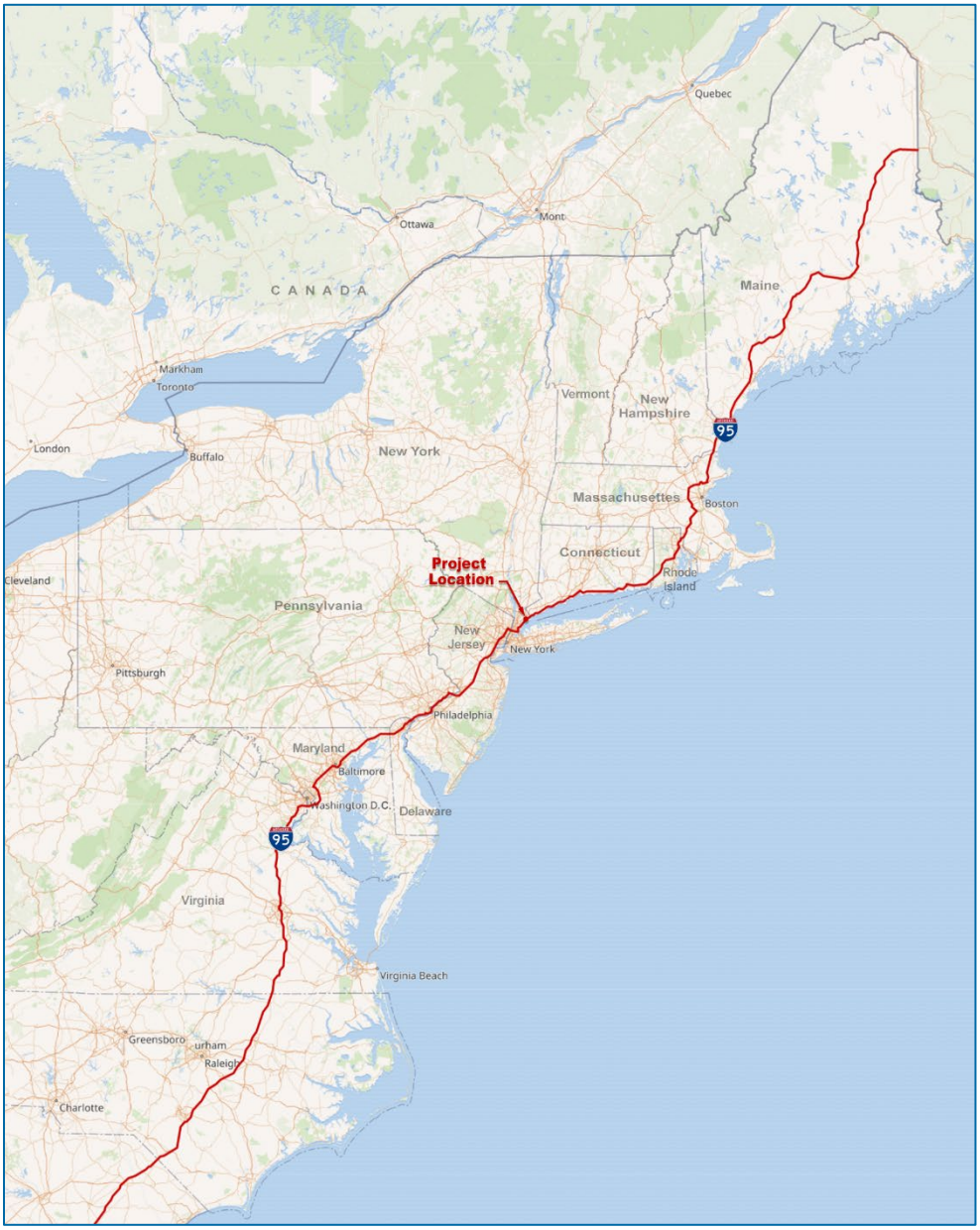

Exhibit 12: Project location within the I-95 corridor

Part of the National Highway System and National Highway Freight Network (NHFN), it is one of the primary routes used to transport people and freight to and from the greater New York metropolitan area, Long Island, New England, and the mid-Atlantic states. It serves the Port of New York and New Jersey, the largest port on the East Coast, as well as John F. Kennedy International Airport and LaGuardia Airport, two of the busiest airports in the nation[2]. Refer to Exhibit 13 for a map showing the geographic relationship of this segment to the port and major airports. For additional information on the role this segment plays in state, regional, and national freight connectivity, refer to Section 3.5 Economic Competitiveness and Opportunity.

[2] Federal Aviation Administration. "Calendar Year 2020 Enplanements at US Airports, by State": John F. Kennedy International ranks 13th and LaGuardia ranks 26th in the nation.

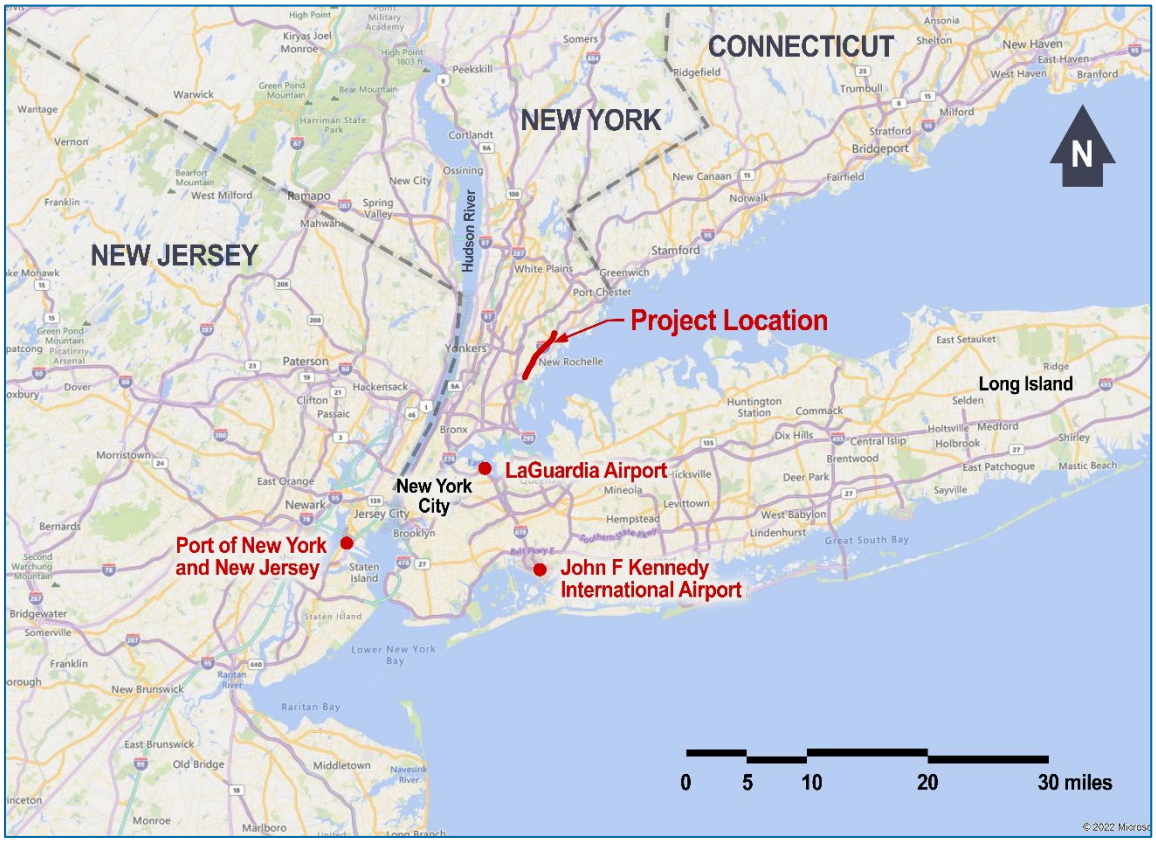

Exhibit 13: Project location relative to the Port of NY and NJ and major airports

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

- Exit 15: New Rochelle - US 1/Main Street
- Exit 16: New Rochelle - North Avenue - Cedar Street
- Exit 17: Larchmont - Chatsworth Avenue

Refer to Exhibit 24 for a map of the interchange locations and the areas they serve.

The segment serves two intermodal transportation facilities: the Larchmont Plaza Train Station and New Rochelle Transit Center. For a discussion about these facilities and their intermodal connections, refer to Section 3.4 Improvement to Mobility and Community Connectivity.

1.7 Census Information

The project is located within Westchester County Census Tracts 55, 57.01, 61, 63, 65, 69, and 70. It is located entirely within the New York--Newark, NY--NJ--CT Urban Area.

Approximately 2.9 miles (60%) of the 4.8-mile-long project are in Historically Disadvantaged Communities, associated with Census Tracts 57.01, 61, 63, and 65. Refer to Exhibit 14 for a map of these communities. Approximately 65% of the project costs will be expended in these areas. Refer to Section 2.1 Budget for additional information on the distribution of expenditures.

It is not located in an Area of Persistent Poverty, nor is it located within a US Department of Housing and Urban Development (HUD) Promise Zone, Empowerment Zone, Choice Neighborhood, or a US Department of the Treasury Qualified Opportunity Zone.

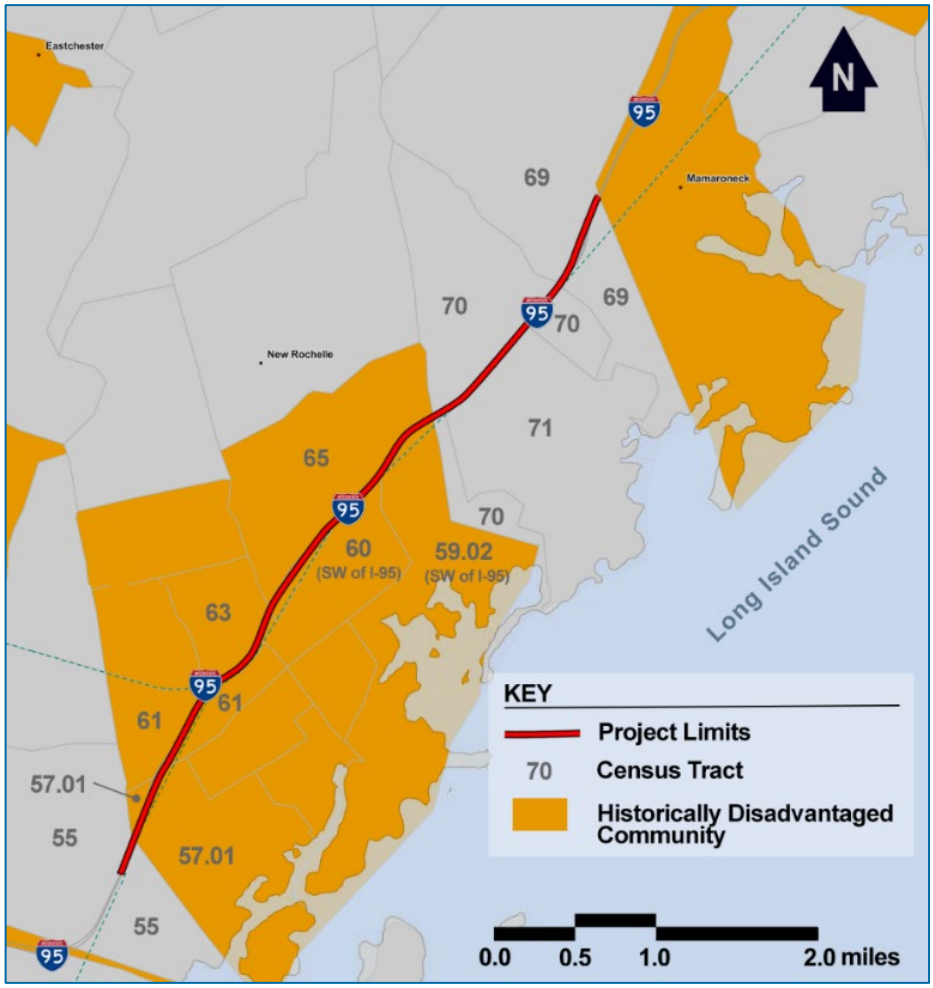

Exhibit 14: Historically Disadvantaged Communities

Source:
https://usdot.maps.arcgis.com/apps/dashboards/d6f90dfcc8b44525b04c7ce748a3674a

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

2.1 Budget

The budget for the project was developed with scoping-level information. Refer to Exhibit 15 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 RAISE funding. No additional ineligible costs are expected to be incurred prior to obligation.

Also shown in Exhibit 15 are future project costs, which are eligible for RAISE funding, along with funding sources and their shares in each major construction activity.

Exhibit 15: Project Costs and Shares

PRIOR PROJECT COSTS AND SHARES $Million (Not Eligible for RAISE Funds)				
	Project Costs	Non-Federal Funds[1]	RAISE 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

FUTURE PROJECT COSTS AND SHARES $Million (Eligible for RAISE Funds)				
	Project Costs	Non-Federal Funds[1]	RAISE Funds	Other Federal Funds
Construction	$40	$15	$25	$0
Mobilization	$2	$2	$0	$0
Subtotal: Construction Cost	**$42**	**$17 (40%)**	**$25 (60%)**	**$0 (0%)**
Contingency	$8	$8	$0	$0
Subtotal: Award/ Construction Cost	**$50**	**$25 (50%)**	**$25 (50%)**	**$0 (0%)**
Preliminary Design	$2	$2	$0	$0
Final Design	$3	$3	$0	$0
Quality Control/Admin of Final Design and Contract	$1	$1	$0	$0
Construction Inspection	$4	$4	$0	$0
Right of Way	$0	$0	$0	$0
Total Future Project Cost	**$60**	**$35 (58%)**	**$25 (42%)**	**$0 (0%)**

1. Thruway Authority Capital Funds

The project crosses boundaries of Historically Disadvantaged Communities and non-Historically Disadvantaged Communities. Refer to Exhibit 14 for a map of these communities and their geographic relationship to the project. Approximately 60% of the project is within Historically Disadvantaged Communities, primarily in the southern part of the project limits. Some pavement toward the northern end of project limits was replaced as part of a 2018 systemwide change to All-Electronic Toll Collection, where the New Rochelle toll barrier and toll plaza were removed. Since the pavement condition toward the southern end of the project limits tends to be worse, more extensive rehabilitation work will be required on this portion of the project. Approximately 65% of the project cost will be expended within the Historically Disadvantaged Communities nearer the southern end of the project limits.

2.2 Funding Commitments

The Authority has committed $35 million in Thruway Authority Capital Funds for the subject project. Authority funding accounts for 58% of the project costs. Refer to Appendix A for documentation of this commitment.

RAISE Grant funding will supplement the Authority's funds and ensure that this project stays on schedule. In addition, it will ensure that the comprehensive plan to rehabilitate the New England Thruway (I-95) corridor, discussed in Section 1.2 Design Status, stays on schedule.

3 MERIT CRITERIA

3.1 Safety

This project will result in multiple safety improvements. Accident data for this segment of I-95 (Mileposts 604.0 [NE 4.0] to 608.8 [NE 8.8]) from 2018 through 2020, records a total of 806 crashes, with 229 injuries. As reflected in the Benefit-Cost Analysis in Appendix B, the project is expected to result in a reduction of 323 damaged vehicles per year, a reduction of 94 injuries per year, and a reduction of 7 serious injuries per year.

Poor pavement condition can contribute to crashes. From 2018 through 2020, unsafe lane changes were identified as the cause of 23% of crashes (188 crashes) on this segment of I-95. In addition, 38% of crashes (303 crashes) were rear-end collisions and 29% (232 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 6 crashes were 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), 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.[3]

Reduced pavement friction, i.e., wet, or slippery pavement, was a factor in many crashes along the segment. For example, 26% of the crashes (211 crashes) occurred on wet pavement. Skidding vehicles were involved in 9% of crashes (73 crashes). Less than 3% of crashes (22 crashes) occurred when surfaces conditions were identified as snowy or icy; most occurred on wet or dry pavement. Pavement replacement will increase roadway friction, resulting in fewer friction-related incidents.

Rough pavement contributes to flat tires, vehicle damage, and breakdowns, sometimes causing vehicles to be disabled. Tire failure was the primary cause of 8 crashes and 86 claims were filed for property damages sustained along this segment of highway between 2018 and 2021. 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 59 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," provides better visibility of markings in all lighting and most weather conditions, making the highway safer throughout the year. Recess Triple Drop also provides better nighttime reflectivity than standard highway striping. Refer to Section 3.8 Innovation for additional information on Recess Triple Drop pavement markings.

[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.

Wide edge lines will be used and are identified by the Federal Highway Administration (FHWA) as a Proven Safety Countermeasure that can reduce crashes on all facility types in both urban and rural areas.[4] 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.

Exhibit 16: Recess Triple Drop pavement markings

Guiderail will be replaced and brought up to current Federal standards, as necessary. 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 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]

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

Bridges carrying roads and pedestrian facilities over I-95 will be evaluated and measures taken to ensure that the minimum required vertical clearances are achieved. The profile of I-95 below the bridges may be lowered or the bridges may be raised. This will reduce the risk of bridge strikes that may damage the bridges and/or cause injury to people using them. Refer to Exhibit 5 for a list of overhead bridges that provide community connections, identifying those that have been struck in the past, including several with pedestrian facilities on them. Ensuring that minimum vertical clearances are provided under the bridges will improve safety for vehicle operators and occupants traveling over and under the bridges, as well as pedestrians or cyclists using the bridges.

The Thruway Authority is working with the Town of Mamaroneck Fire Department to fulfill their request to move an existing U-turn near Exit 17 to a location approximately 550 feet south. Refer to Exhibit 17 for a map of the existing and proposed U-turn and vehicle paths. The location of the existing U-turn makes it difficult for emergency responders to enter the southbound side of I-95, safely cross three lanes of traffic in a short distance and enter the U-turn to respond to incidents on the

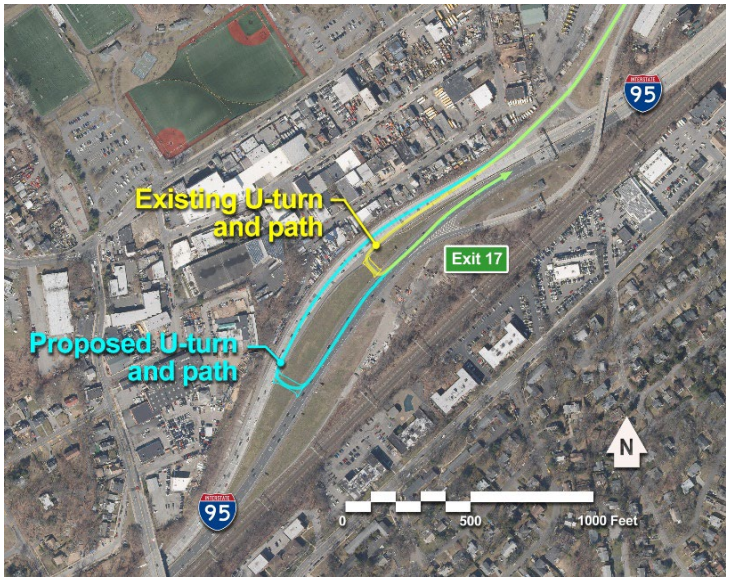

Exhibit 17: Existing and proposed U-turns and vehicle paths for emergency response vehicles

[4] FHWA. "Wider Edge Lines". https://safety.fhwa.dot.gov/provencountermeasures/wider-edge-lines.cfm. Accessed March 14, 2022.

[5] FHWA. "Median Barriers". https://safety.fhwa.dot.gov/provencountermeasures/median_barrier.cfm. Accesssed March 31, 2022.

northbound side of I-95. If they cannot safely cross traffic to access the existing U-turn, emergency vehicles are forced to go to the next exit, get off I-95 and re-enter on the northbound side, adding 2.4 miles to the distance they must travel and up to 10 minutes to their response time.

In addition to being better located for emergency responders to access it, the new U-turn will be wider to better accommodate the large turning radius of fire trucks. The new U-turn will not only minimize emergency response times for incidents on I-95 but decrease the likelihood of an emergency response vehicle being directly involved in an accident while trying to access and navigate the U-turn. Refer to "Partnership and Collaboration" in the Supporting Information[6] for additional information on the relocation of the U-turn.

3.2 Environmental Sustainability

Environmental Benefits

The rehabilitation of I-95 will reduce fuel consumption by improving the riding surface. Reduced congestion and traffic backups related to traffic incidents and frequent pavement repairs will further reduce fuel consumption and reduce greenhouse emissions from slowed or idling vehicles. Net reductions in greenhouse gasses from congestion are estimated to be over 40 tons from the anticipated start of construction in 2024 through 2033.[7] This will reduce impacts to the communities near the project, including the disproportionate impacts typically experienced by Historically Disadvantaged Communities located near highways. As depicted in the map in Exhibit 14, Historically Disadvantaged Communities are located immediately adjacent to I-95 along 60% of the project length.

This segment of I-95 is utilized by transit buses for local and regional routes, 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 two intermodal facilities, Larchmont Plaza Train Station and New Rochelle Transit Center, providing a connection for commuters and other travelers to opt for mixed-mode trips that include lower-carbon modes of travel such as trains and buses.

The project will incorporate Warm Mix Asphalt (WMA), which allows the producers of asphalt pavement material to lower the temperatures at which the material is mixed and placed on the road. According to the Warm Mix Asphalt Technical Working Group, reductions of 50° to 100° Fahrenheit have been documented and have the benefits of cutting fuel consumption and decreasing the production of greenhouse gases.[8] It also makes night paving more feasible, which enhances the ability to minimize traffic impacts and emissions by completing paving work at off-peak hours when temperatures are typically cooler.

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[6] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

[7] Greenhouse gas reductions were estimated for the Benefit-Cost Analysis and include Carbon dioxide (CO2), Nitric oxide (NOx), Particulate matter (PM2.5), and Sulfur dioxide (SO2).

[8] Warm Mix Asphalt Technical Working Group. "Warm Mix Asphalt Takes Off". http://www.warmmixasphalt.org/Default.aspx. Accessed March 20, 2022.

Resiliency

The project is within or adjacent to numerous areas identified by Westchester County as being susceptible to hurricanes (Hurricane Planning Zones). Refer to Exhibit 18. People living or working in these areas are advised to have an evacuation plan, including an evacuation route to use, if they need to leave the area quickly due to the approach of a hurricane or other severe weather.

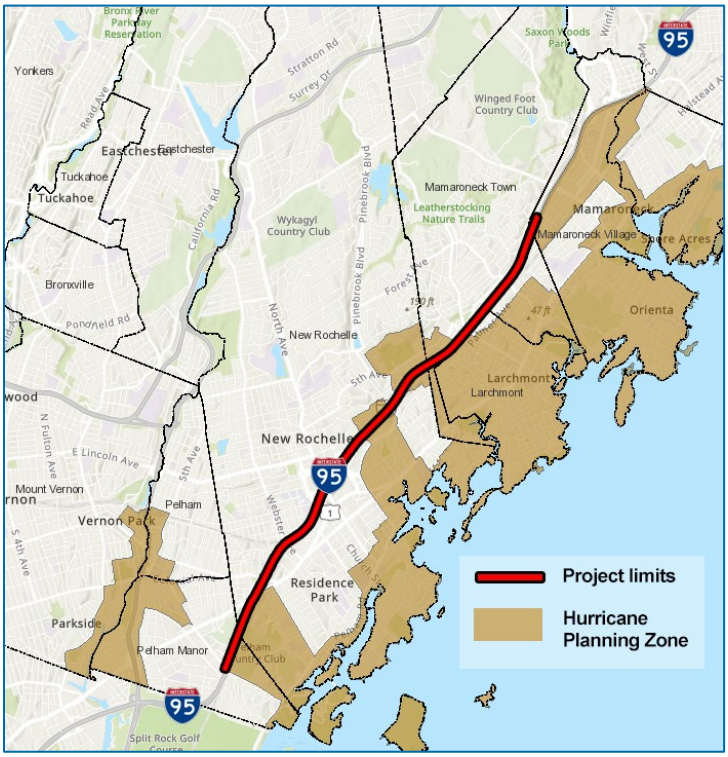

Exhibit 18: Proximity of the project to hurricane-susceptible evacuation areas

Source: giswww.westchestergov.com/Hurricane/index.html

Because it is the highest capacity route in close proximity to these areas, and also serves hubs for intermodal transportation, i.e., bus and rail, this segment of I-95 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 observes 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. However, even absent changes in storm frequency or intensity, sea level rise alone will result in an increase in coastal floods of any particular depth" in New York State.[9] Ensuring that I-95 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.

3.3 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-95 contains three interchanges that connect to local roads, business districts and residential areas, while also serving the greater New York Metropolitan Area. In addition, the segment serves two intermodal facilities, the Larchmont Train Station and New Rochelle

[9] 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.

Transit Center. A detailed discussion on the project's role in improved mobility can be found in Section 3.4 Improvement to Mobility and Community Connectivity.

Exhibit 19: Transit bus and delivery truck on I-95 near Exit 15 in New Rochelle

This project will improve critical connections to local and regional goods and services, while serving a significant population traveling to and from New York City from points north and east. This population includes commuters and other travelers who rely upon public transit, such as buses and trains. Westchester County's Bee-Line bus system and school buses regularly use this segment of highway, and nearly 30,000 annual bus trips were recorded in E-ZPass electronic tolling data at the New Rochelle barrier location in 2021. While no specific data can be captured through electronic tolling, it is reasonable to assume that ride-sharing services make heavy use of this key highway segment for local and regional trips. Improvements to the roadway and safe, reliable travel for those using these lower-cost transportation options will provide mobility benefits to the local population, including those who cannot or choose not to own and maintain a personal vehicle.

Improving the surface and rideability of I-95 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-95, 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 3.5 Economic Competitiveness and Opportunity.

An improved road surface is expected to reduce noise concerns in adjacent communities. The Authority has received complaints from residents in the project area, specifically citing the disruptive noise generated by vehicle tires encountering rough pavement. 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.[10]

Exhibit 20: Communities adjacent to I-95 will benefit from reduced tire-pavement noise and reduced vehicle emissions caused by traffic congestion (Crescent Ave., New Rochelle).

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

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

operating costs for individuals and commercial entities, will be lower, as summarized in Section 5 Benefit-Cost Analysis. Operators of buses and other high-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 3.2 Environmental Sustainability, communities immediately adjacent to I-95 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-95 will be retained and improved where opportunities are identified, as described in Section 3.4 Improvement to Mobility and Community Connectivity.

3.4 Improvement to Mobility and Community Connectivity

There are nine overhead bridges within the project segment that provide important community connections across I-95. Seven bridges have pedestrian facilities on them, and one, in New Rochelle, is a pedestrian and utility bridge. Refer to Exhibit 5 for a list of these bridges. One bridge, carrying Chatsworth Avenue over I-95, is integrated with the Metropolitan Transit Authority (MTA) Metro-North Larchmont Plaza, which provides train station access, a bus stop, and parking for transit users. The plaza is served by I-95, and the parking lot, which accommodates both cars and bicycles, is located above I-95. Refer to Exhibit 21.

Exhibit 21: The Chatsworth Avenue bridge is integrated with the Metro-North Larchmont Station Plaza, which provides parking and access to the train station, as well as a bus stop.

The New Rochelle Transit Center, an intermodal hub, is also served by I-95. In addition to accommodating local buses, taxis, and airport limousine service, the Transit Center is integrated with the New Rochelle Train Station, which serves both the MTA Metro-North railroad line and the regional Amtrak line, with connections to Boston, New York, and Washington, D.C. In 2018, the New Rochelle Station ranked 5th of Metro-North's 109 stations with 6,145 weekday boardings. The Larchmont Station ranked 9th, with 4,104 weekday boardings.[11] Refer to Exhibit 22 for a map showing the locations of these intermodal transportation facilities, relative to the project segment.

Improvements to I-95 will help to ensure safe, reliable access for vehicles (including buses and ride service vehicles) to these facilities. All community vehicular and pedestrian

[11] Metro-North Operations Planning and Analysis Department. "2018 Weekday Boardings - Station Rankings". April 2019.

connections, and connections to the intermodal facilities will be preserved or fully restored. If any bridges will be raised to provide minimum vertical clearances above I-95, opportunities to improve pedestrian facilities and their Americans with Disabilities Act (ADA) accessibility will be identified.

This segment of I-95 is utilized by bus systems, including Westchester County's Bee-Line system and school buses. Nearly 30,000 annual bus trips were recorded in E-ZPass data at the New Rochelle barrier location in 2021. 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.

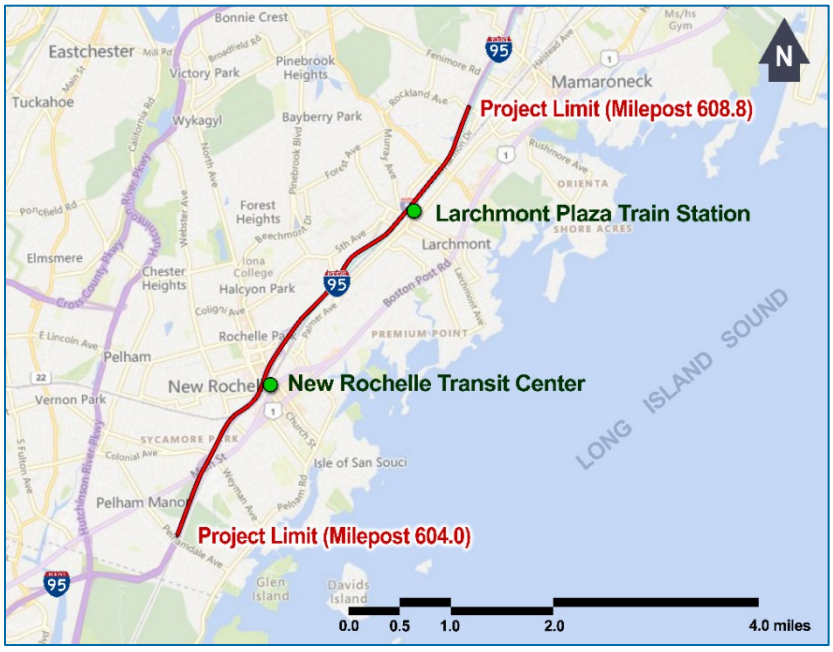

Exhibit 22: Intermodal facilities served by this segment of I-95

Freight mobility will be improved by the project. As detailed in Section 3.5 Economic Competitiveness and Opportunity, this segment is part of a core freight corridor and trucks will experience the same benefits as other users: improved safety, more predictable travel times, and reduced fuel consumption.

3.5 Economic Competitiveness and Opportunity

This project will contribute to economic opportunity and competitiveness on the local, regional, and national levels.

Freight and Freight Connectivity

This portion of I-95 belongs to the larger I-95 corridor, which runs more than 1,925 miles from Maine to Florida and is the major North-South landside freight corridor on the East Coast. The segment within the project area, through its multiple connections to other arterial highways and travel modes, serves a variety of populated areas and major economic markets in the New York City metropolitan area, New England, and the Mid-Atlantic States.

This segment of I-95 is located 25 miles from the Port of New York and New Jersey, which is the busiest East Coast port, handling more than 7.5 million Twenty Foot Equivalent Units (TEUs) in 2020, ranking 3rd in North America.[12] The segment connects this high cargo

[12] Container News. "Top 10: The busiest container ports in the United States". https://container-news.com/top-10-the-busiest-container-ports-in-the-united-states/. Accessed March 23, 2022.

volume port with the Northeast and Canada. Similarly, the segment serves as a critical link to and from John F. Kennedy International airport, which was ranked 12th in the nation for landed cargo weight in 2020.[13] Refer to Exhibit 13 for a map showing the geographic relationship of this segment to the port and major airports.

Exhibit 23: Trucks on this segment of I-95

As noted in the 2019 *New York State Freight Transportation Plan*, trucking moves 84% of freight tonnage in the state and is the only mode that can directly serve all statewide origins and destinations. The New England Thruway (I-95) 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 (https://ops.fhwa.dot.gov/freight/freight_analysis/mobility_trends/index.htm) indicates that congestion adds 2.4 minutes to a 20-minute truck trip, with a delay per mile of 6,497 truck hours. Refer to "FHWA Freight Mobility Tool Exhibits" in the Supporting Information.[14]

The Benefit-Cost Analysis that was performed for this project, included in Appendix B, found that 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 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. An improved road surface will also reduce fuel consumption and freight operators' vehicle operating costs, which are typically higher as a result of routine travel on rough roads.

Global Competitiveness

One of the pillars of global competitiveness is an appropriate infrastructure that contributes to an environment that enables domestic businesses and industries to compete internationally. As discussed above, I-95, including this segment, provides crucial connectivity to major international 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-95 and to and from these hubs.

Local and Regional Economic Competitiveness and Opportunity

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. A free flowing, reliable transportation system benefits businesses, and the

[13] Federal Aviation Administration. "CY 20 all-Cargo Landed Weight Percent Change from CY 2019". https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy20-cargo-airports.pdf.

[14] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

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-95 will be an attractive asset to businesses and employers near the project, encouraging existing businesses to stay, and new businesses to open.

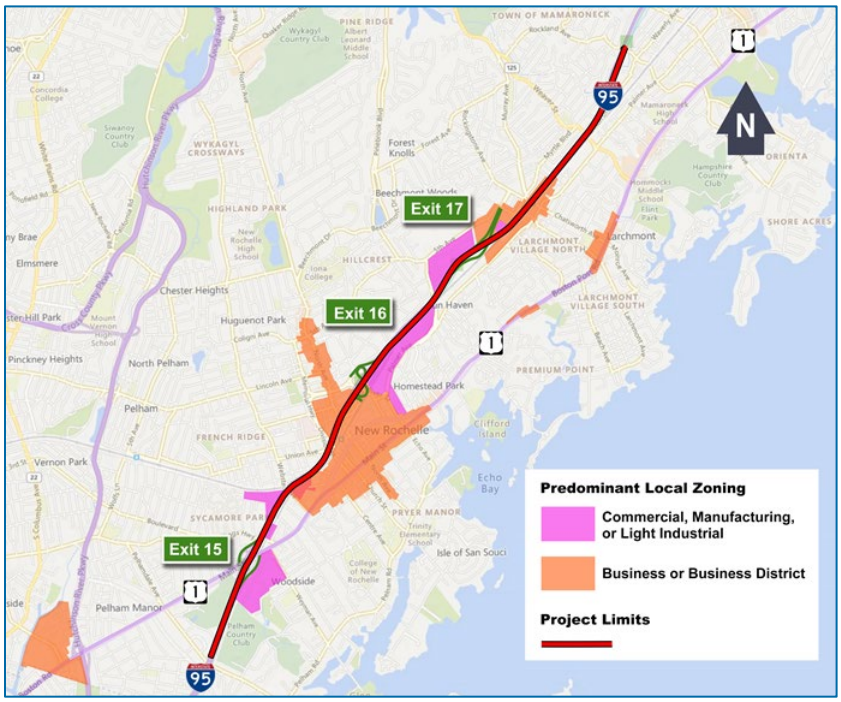

Exhibit 24: Areas zoned for business, commercial, manufacturing, and light industrial uses are directly served by the three interchanges in this segment of I-95.

Much of the area adjacent to this segment of I-95, and directly served by the three interchanges in the segment, has been locally zoned for business, commercial, manufacturing, or light industrial uses. Refer to Exhibit 24 for a map of these areas and their proximity to I-95. 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 3.4 Improvement to Mobility and Community Connectivity for a discussion of intermodal facilities served by this segment of I-95. 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, particularly in the metropolitan New York City area.

Labor and Employment

In addition to the economic and employment benefits described above, the delivery of the project itself will directly create high-quality employment opportunities. Two hundred sixty-three (263) Historically Disadvantaged Communities, accounting for 13% of the Historically Disadvantaged Communities in New York State, are located within a 5-mile radius of this project: 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.

Project Labor Agreements (PLAs) are utilized by the Authority on select projects. Before advancing a project under the PLA process, an independent analysis is undertaken to determine whether the use of a PLA will best serve the Authority's interest in obtaining the best work at the lowest possible price, preventing favoritism, fraud, and corruption, and to what extent other considerations such as the impact of delay, the possibility of cost saving advantages, and any local history of labor unrest may have upon the project.

3.6 State of Good Repair

Maintaining a state of good repair for this section of I-95 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. Repair strategies will not provide a long-term solution for an acceptable roadway surface, and frequent maintenance work, which typically requires work zone traffic control and lane reductions, contributes to congestion, and increases the risk of accidents.

Exhibit 25: Upon completion, the project segment will be in the same condition as another segment of I-95 that was addressed as part of a comprehensive plan to rehabilitate the New England Thruway (I-95) corridor.

Improvements to restore the pavement to "Excellent" condition will allow it to be maintained in a state of good repair with a planned, routine pavement maintenance schedule, breaking

the inefficient, costly, and disruptive cycle of "patchwork" repairs. As summarized in Section 5 Benefit-Cost Analysis, the project will result in significant savings for operations and maintenance, travel time, and crashes for the 12-year analysis period.

3.7 Partnership and Collaboration

The Authority routinely coordinates with local 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*. In addition, the Authority will partner with NYSDOT and the New York Metropolitan Transportation Council (the local Metropolitan Planning Organization) on the development and implementation of the project. Coordination with Metropolitan Transit Authority (MTA), Amtrak, and transit operators will be conducted, as necessary, for any temporary impacts to the access to their facilities.

The Authority has contacted a wide range of stakeholders about this transportation investment. These entities and individuals include municipalities 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.[15]

As discussed in Section 3.1 Safety, the Authority is working with the Town of Mamaroneck Fire Department to fulfill their request to relocate a U-turn near Exit 17 to provide better and safer access for emergency services responding to incidents on the northbound side of I-95. Refer to the Supporting Information, "Partnership and Collaboration," for additional information on the U-turn and coordination with the fire department.

3.8 Innovation

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 26: 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 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

[15] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

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, including one on the northern portion of the same I-95 corridor, near the Connecticut border.

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.

4 ENVIRONMENTAL RISK AND PROJECT READINESS

4.1 Project Schedule

Major project milestones and their anticipated completion dates are identified in Exhibit 27. All necessary activities will be complete to allow RAISE grant funds to be obligated sufficiently in advance of the statutory deadline of June 30, 2026.

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 3.7 Partnership and Collaboration for more information.

Exhibit 27: 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
Environmental Permitting Complete	January 2024
Project Letting	February 2024
Project Award	April 2024
Start of Construction	May 2024
Completion of Construction	November 2025

4.2 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.[16]

[16] Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

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. The Authority plans to declare itself as the lead agency for SEQRA. Since the project is anticipated to qualify as a SEQRA 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 boundary of the Long Island Sound Coastal Management Program. It is located within the Town of Mamaroneck and Village of Larchmont Local Waterfront Revitalization Program (LWRP) boundary and the Village of Mamaroneck LWRP boundary. Refer to "NYS Coastal Atlas Maps" in in the "Environmental Information" portion of the Supporting Information.[17]

  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 3.7 Partnership and Collaboration.

[17]Supporting Information for the project is located at www.thruway.ny.gov/oursystem/revitalizei95.

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 New York Metropolitan 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.

4.3 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 28. As the project is advanced and additional input is received from stakeholders, the assessment will be revised as necessary.

Exhibit 28: 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

5 BENEFIT-COST ANALYSIS

5.1 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 quantifies and monetizes, as thoroughly as possible, the benefits generated under the criteria defined by the RAISE 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.

5.2 Results of the Benefit-Cost Analysis

The monetization of the main benefits resulting from the proposed improvements are summarized in Exhibit 29.

Exhibit 29: Benefit estimates, 2020 Dollars

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

A 12-year period of analysis was used in the estimation of the project's benefits and costs, which includes 4 years of design (preliminary and final) and construction (including quality control and construction inspection services) and 8 years of operation.[18] Annual costs and benefits are estimated through 2033, 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).

[18] Project support costs are assumed to be incurred from 2022 to 2025. Benefits are assumed to begin to accrue in 2026. A ten-year analysis period was conservatively estimated based on the pavement deterioration rate.

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 $7.9 million and a benefit-cost ratio of 1.18.

Exhibit 30: Overall results of the BCA, 2020 Dollars

Project Evaluation Metric	7% Discount Rate*
Total Discounted Benefits	$51.0 million
Total Discounted Costs	$43.1 million
Net Present Value	$7.9 million
Benefit-Cost Ratio	1.18
Internal Rate of Return	10%

* 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 Benefit-Cost Analysis (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.

APPENDIX A
Funding Documentation

NEW YORK STATE OF OPPORTUNITY. Thruway Authority

KATHY HOCHUL
Governor

JOANNE M. MAHONEY
Chair

MATTHEW J. DRISCOLL
Executive Director

April 11, 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 Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant. This grant will supplement the cost for rehabilitating a 4.8-mile section of the New England Thruway (I-95) in Westchester County, New York.

In support of this project, the Authority has committed $35 million in Thruway Authority capital funds within our five-year Capital Plan. With this, the Authority funding would account for 58 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 RAISE 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 Supplementary Documentation

RAISE Program

REVITALIZE 95: Rehabilitation of I-95 from MP 604.0 to 608.8

New York State Thruway Authority (NYSTA)

April 14, 2022

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List of Tables

Benefit-Cost Analysis Supplementary Documentation

1. Executive Summary

The cost effectiveness and net benefits of the REVITALIZE 95: Rehabilitation of I-95 from M 604.0 to 608.8 Project were estimated through a complete Benefit-Cost Analysis (BCA) as per U.S. Department of Transportation (USDOT)'s *Benefit-Cost Analysis Guidance for Discretionary Grant Programs* (March 2022). The BCA quantifies and monetizes, as thoroughly as possible, the benefits generated under the criteria defined by the RAISE 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.

The REVITALIZE 95 project is anticipated to have substantial impacts, which include the following:

- Provide travel time savings by maintaining the pavement in a minimum of fair or better condition and avoiding emergency work zone related lane closures and delays.
- Decrease the number of crashes and crash related costs by decreasing the number of roadway quality related incidents.
- Reduce emissions for pollutants, such as nitrogen oxides (NO_x), fine particulate matter ($PM_{2.5}$), sulfur dioxide (SO_2), and carbon dioxide (CO_2), due to reduction in delays along the thruway
- Provide pavement management benefits by avoiding incurring the cost of emergency pavement maintenance projects across the analysis period
- Decrease the frequency of bridge strikes by conducting vertical adjustments to frequently struck bridges
- Decrease vehicle operating cost along the thruway by decreasing the relative fuel costs related to the pavement condition.

Table ES-1 summarizes the changes expected from the project and the associated benefits.

Table ES-1: Merit Criteria and Cost-Effectiveness - Summary of Infrastructure Improvements and Associated Benefits, Millions of 2020 Dollars

Current Status or Baseline & Problems to be Addressed	Changes to Baseline/Alternatives	Types of Impacts	Benefits	Summary of Results (Discounted 2020 $)	Page #
MP 604.0 to 608.8 of I-95 in NY are in need of resurfacing. Pavement condition is rated "poor" or "very poor" along the segment, according to the FHWA IRA categories of pavement roughness. The deteriorated condition results in the need for frequent emergency patch repairs.	The project will resurface this segment of I-95, and will conduct vertical adjustments to frequently struck bridges 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 emergency work zones	Reduced Travel Time Costs	$34,130,779	11
		Improved safety and crash avoidance by reducing the number of pavement condition related incidents	Improved Safety and Avoided Accident Costs	$10,254,337	12
		Reduction in Greenhouse Gas (GHG) Emissions and CO_2, due to reduced travel time and congestion	Reduction in Emissions Costs	$1,585,614	13
		Decrease pavement management costs by avoiding the need for emergency pavement repairs	Reduction in Pavement Maintenance Costs	$1,159,951	14
		Decrease the frequency of bridge strikes by conducting vertical adjustments to frequently struck bridges	Reduced Bridge Strike Repair Costs	$92,796	15
		Decrease vehicle operating costs by improving pavement condition	Reduced Vehicle Operating Cost	$3,146,144	15

The project is expected to start generating benefits when the resurfacing is complete in 2026.

The 12-year period of analysis used in the estimation of the project's benefits and costs includes 4 years of project development and construction (2022-2025) and 8 years of benefits.[1] The total project capital costs are $57.6 million in undiscounted 2020 dollars. The breakdown of project costs is presented in Table ES-2.

Table ES-2: Summary of Project Costs, Undiscounted 2020 Dollars

Cost Category	Constant 2020 $
Preliminary Design	$1,920,216
Final Design	$2,880,324
QC/Admin	$960,108
Construction Inspection	$3,840,433
Construction	$48,005,407
Total	**$57,606,488**

[1] Note that benefits are conservatively estimated only for a period of 8 years, at which point pavement would deteriorate 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.

A summary of the relevant data and calculations used to derive the benefits and costs of the project are shown in the BCA model (in 2020 dollars[2]). Based on the analysis presented in the rest of this document, the project is expected to generate $51.0 million in discounted benefits and $43.1 million in discounted costs using a 7 percent real discount rate for most benefit categories and a 3 percent real discount rate for CO_2 emissions. Therefore, the project is expected to generate a Net Present Value of $14.1 million and a Benefit-Cost Ratio of 1.18. In other words, for each dollar spent in project costs, approximately $1.18 worth of benefits will be generated by the improvements.

A summary table of annual monetized benefits and costs is provided in Section 10.

[2] The benefits and costs in this Technical Appendix are expressed in constant dollars of 2020 and have been discounted to the year 2020 as recommended by the USDOT Guidance.

2. Introduction

This document provides detailed technical information on the economic analyses conducted in support of the grant application for the REVITALIZE 95 project:

- Section 3, Methodological Framework, introduces the conceptual framework used in the Benefit-Cost Analysis.
- Section 4, Project Overview provides an overview of the project, including a brief description of existing conditions; a summary of cost estimates and schedule; and a description of the types of effects that the project is expected to generate.
- Section 5, General Assumptions, discusses the general assumptions used in the estimation of project costs and benefits, while estimates of travel demand and traffic growth can be found in Section 6.
- Specific data elements and assumptions pertaining to the long-term outcome selection criteria are presented in Section 7, Estimation of Economic Benefits, along with associated benefit estimates.
- Estimates of the project's Net Present Value (NPV), its Benefit-Cost Ratio (BCR) and other project evaluation metrics are introduced in Section 8, Summary of Findings and BCA Outcomes.
- Next, Section 9, 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.[3]
- Section 10, Summary of Benefits and Costs, provides results for project costs and benefits for each analysis year.

3. Methodological Framework

A benefit-cost analysis (BCA) is a conceptual framework that can be used to evaluate the cost-effectiveness of transportation infrastructure projects. A BCA attempts to describe, quantify, and monetize the societal benefits and costs generated by a particular project. A project's societal return-on-investment is estimated by comparing the monetized benefits against the project's total costs.

The benefits of the project are based on the expected impacts on both users and non-users of the facility. In addition, a BCA evaluates the benefits and costs over the entire life cycle of the project. Therefore, all benefits and costs that occur in future years need to be discounted to present values in order to be compared equitably. A real discount rate based on U.S. Department of Transportation (USDOT) BCA guidance has been identified for this purpose.

The BCA produces several important measures to assess the cost-effectiveness of a proposed project. The benefit-cost ratio (BCR), calculated by dividing the project's discounted societal benefits by its discounted costs, measures the societal return on each dollar spent in project costs.

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

In other words, a BCR greater than 1.0 indicates that for every dollar spent in project costs, more than one dollar will be generated in benefits. The net present value (NPV), calculated by subtracting the discounted project costs from the project's discounted societal benefits, measures the total benefit that society enjoys as a result of the project improvements.

The specific methodology for REVITALIZE 95 project was developed using the BCA guidance published by USDOT in March 2022.[4] In particular, the methodology involves:

- Establishing existing and future conditions under the build and no-build scenarios.
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement.
- Using USDOT guidance for the valuation of travel time savings, safety benefits and reductions in air emissions, while relying on industry best practice for the valuation of other effects.
- Discounting future benefits and costs with the real discount rate of 7 percent for most categories and using the real discount rate of 3 percent for CO_2 emissions, as recommended by USDOT.
- Conducting a sensitivity analysis to assess the impacts of changes in key estimating assumptions.

4. Project Overview

4.1 Base Case and Alternatives

Base Case – The No Build condition assumes that resurfacing does not occur, and emergency repairs are conducted to keep the pavement in the current "very poor" condition.

Build Case – Includes pavement resurfacing and bridge vertical adjustments. The pavement is in "very good" condition after project completion and deteriorates over the analysis period with no emergency repairs necessary for the first 8 years. Sensitivity analyses allow for the extension of benefits by incurring additional future maintenance costs.

4.2 Types of Impacts

The proposed REVITALIZE 95 project is expected to significantly improve pavement condition, which will reduce the number and frequency of delays for motorists, the severity and number of crashes and bridge strikes, harmful environmental emissions, and vehicle operating costs. These impacts are described in more detail below:

- **Travel Time Savings:** The project will reduce the need to conduct emergency repairs, which cause lane closures and delays.
- **Improved Safety and Avoided Accident Costs:** Improving the pavement condition to "very good" condition will reduce the number of pavement condition related incidents.
- **Reduction in Emissions:** The project will reduce the number of excess emissions produced by vehicles by reducing delays related to emergency work zones. As vehicles are delayed passing through the emergency work zones, they emit several pollutants

[4] 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

such as carbon dioxide (CO_2), nitrogen oxides (NOx), particulate matter ($PM_{2.5}$), and sulfur dioxide (SO_2), volatile organic compounds (VOC) and carbon monoxide (CO)[5]. By reducing the amount of time that vehicles spend in work zones along the project segment, the Build alternative will result in fewer emissions relative to the No Build scenario (even after accounting for the initial scheduled work zones for construction in the Build scenario).

- **Reduced Pavement Maintenance Costs:** The project will reduce the need to conduct costly emergency repairs**.**
- **Reduced Bridge Strike Repair Costs:** The project will conduct vertical adjustments to bridges along the segment, which will reduce the number of bridge strikes.
- **Reduced Vehicle Operating Cost:** The project will decrease vehicle operating cost along the thruway by decreasing the relative fuel costs related to the pavement condition.

4.3 Project Cost and Schedule[6]

The construction of the REVITALIZE 95 project is expected to occur in years 2024 and 2025 with completion in late 2025 and full operations available in 2026. The costs associated with design, construction, and inspection are expected to be incurred between 2022 and 2025. The breakdown of project costs is presented in Table 1. The capital expenditures of the project will add up to $57.6 million (undiscounted).[7]

Table 1: Project Cost Summary, 2020 Dollars

Calendar Year	Capital Expenditures (2020 $)	Discounted Capital Expenditures (2020 $)
2022	$2,640,297	$2,306,138
2023	$2,880,324	$2,351,203
2024	$26,042,933	$19,868,029
2025	$26,042,933	$18,568,251
Total	**$57,606,488**	**$43,093,621**

5. General Assumptions

The BCA measures benefits against costs throughout a period of analysis beginning at the preliminary design and the start of construction and including 2 years of additional construction costs and an 8 year analysis period. A secondary scenario, accounting for 20 years of operations with additional future maintenance costs, is also considered.

[5] Note that VOC and CO are quantified but not monetized as no dollar values are recommended by USDOT.

[6] All cost estimates in this section are in millions of 2020 dollars, discounted to 2020 using a 7 percent real discount rate.

[7] Based on USDOT's BCA guidance, increases in Operating and Maintenance costs are treated as a disbenefit in the numerator of the calculation rather than as a cost, in the denominator.

The monetized benefits and costs are estimated in 2020 dollars with future dollars discounted in compliance with USDOT BCA requirements using a 7 percent real rate for most categories and a 3 percent rate for CO_2 emissions. The benefits and costs have been discounted to year 2020.

The methodology makes several important assumptions and seeks to avoid overestimation of benefits and underestimation of costs. Specifically:

- Input prices are expressed in 2020 dollars.
- The base period of analysis begins in 2022 and ends in 2033. It includes project development and construction years (2022 - 2025) and 8 years of operations (2026 – 2033). A secondary scenario includes 20 years of operations from 2026 – 2045.
- A constant 7 percent real discount rate is assumed throughout the period of analysis for most categories.
- A constant 3 percent real discount rate is assumed for CO_2 emissions.

6. Demand Projections

The projected future traffic demand is a key component 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.

6.1 Methodology and Assumptions

NYSTA provides hourly and daily traffic data in volumes and VMTs. These figures include projections for 2026 and 2036. The model uses this implied growth rate to calculate traffic demand along the thruway for the forecast period. The project does not increase capacity, and thus traffic volumes are consistent between the No Build and Build scenarios. The primary difference is due to changes in delays associated with emergency repairs and lane closures due to vehicular incidents.

6.2 Demand Projections

The resulting projections for daily VMT are presented in Table 2.

Table 2: NYSTA Daily Traffic Forecasts (2026-2036)

Segment	Description	Daily VMT, 2026	Daily VMT, 2036
NE14 - NE15	New Rochelle - Boston Post Rd - US 1	87,154	104,430
NE15 - NE16	New Rochelle - North Ave. - Cedar St.	180,282	216,019
NE16 - NE17	Larchmont - Chatsworth Ave.	143,382	171,805
NE17 - NE18A	Mamaroneck - Fenimore Rd.	179,878	215,535

7. Estimation of Economic Benefits

This section describes the measurement approach used for each benefit or impact category identified in the Executive Summary and provides an overview of the associated methodology, assumptions, and estimates.

outlines general assumptions used in the BCA.

Table 3: General Assumptions Used in the Benefit-Cost Analysis

Variable Name	Unit	Value	Source
Construction Start Year	years	2024	NYSTA Project Schedule
Construction Duration	years	2	
Project Open Year	year	2026	
Benefits Period	years	8	Duration based on anticipated pavement condition life before next significant repairs will be required.
Extended Benefits Period	years	0	Assumption for extended analysis period. Assumes that additional maintenance expenditures will be incurred to maintain pavement condition for a longer timeline
Year Emergency Repairs (Build) Start	years	2030	
General Discount Rate	percent	0.07	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised)
Environmental Discount Rate (CO2)	percent	0.03	
Annualization Factor (Weekdays)	days/year	260	Used to annualize; value of 260 = weekdays only
Annualization Factor (Full Week)	days/year	365.25	Known
Commercial Vehicle Percentage	percent	12%	Calculated based on NYSTA observed data for commercial vehicles

7.1 Travel Time Savings

Travel time savings are estimated using the VMT projections and USDOT travel time recommended values.

7.2.1 METHODOLOGY

Estimation of travel time savings are based on VMT information from NYSTA forecasts outlined in the Demand Projections section. The VMT information 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 50 emergency work zones occur during daytime hours each year, resulting in an average vehicle speed of 35 mph. In the build scenario, an estimated 188 scheduled work zones occur during the construction period. One-lane closure and two-lane closures produces average vehicle speeds of 45 and 42 mph, respectively. The average free flow speed without work zones along the segment is 55 mph. All emergency work zones are estimated to last 4 hours per occurrence. Scheduled maintenance for the build scenario occurs as dictated by NYSTA lane closure allowances for the corridor.

7.2.2 ASSUMPTIONS

The assumptions used in the estimation of travel time savings are summarized in Table 4.

Table 4: Assumptions Used in the Estimation of Travel Time Savings

Variable Name	Unit	Value	Source
Value of Time (All Purpose) - auto	2020 $/person	17.8	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised), Table A-3
Average Vehicle Occupancy	persons	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	32	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised), Table A-3
Commercial Vehicle Percentage	percent	12.2	Calculated based on NYSTA observed data for commercial vehicles
Project Length	miles	4.8	NYSTA
Duration of Emergency Repairs	hours	4	HDR assumption based on NYSTA maintenance logs
Duration of Scheduled Repairs	hours	11.4	Average allowable duration of overnight lane closures of at least one lane
Frequency of Emergency Repairs	number	50	HDR assumption based on NYSTA maintenance logs
Frequency of Scheduled Repairs	number	188	Estimated allowable construction days per year
Frequency of Extended Emergency Repairs (Build)	number	25	Estimated allowable construction days per year

7.2.3 BENEFIT ESTIMATES

Table 5 outlines the benefits of travel time over the project lifecycle. They account for $34.1 million in benefits over the life cycle, discounted at 7 percent.

Table 5: Estimates of Travel Time Savings, Millions of 2020 Dollars

Benefit Type	Constant 2020 $	Discounted 2020 $
Travel Time Savings	$71.9	$34.1

7.2 Accident Cost Savings

The proposed project would result in significant accident cost savings to society by reducing the number of pavement condition related accidents.

7.2.1 METHODOLOGY

NYSTA provided existing crash data which was used to forecast the number of crashes for the no build scenario. FHWA Crash Modification Factors #9288 and #9299, which are related to pavement condition, were utilized to estimate predicted crashes in the build scenario. The data is provided in three crash severity categories: crashes resulting in property damage, injury, and severe injury. The reduction in crashes from the no build to build scenarios are applied to USDOT recommended monetization values.

7.2.2 ASSUMPTIONS

The assumptions used in the estimation of vehicle operating costs are summarized in Table 6.

Table 6: Assumptions Used in the Estimation of Safety Benefits

Variable Name	Unit	Value	Source
Cost of Damaged Vehicle (PDO)	2020 $/vehicle	$4,600	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised), Table A-2
Cost of Damaged Vehicle	2020 $/vehicle	$4,600	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised), Table A-1
Cost of Injury Crash	2020 $/injury	$151,100	
Cost of Serious Injury Crash	2020 $/injury	$554,800	

7.2.3 BENEFIT ESTIMATES

Table 7 outlines the safety benefits due to the pavement improvements over the project lifecycle. Vehicle operating costs will total $10.3 million in benefits over the 8 year operation period, discounted at 7 percent.

Table 7: Estimates of Safety Benefits, Millions of 2020 Dollars

Benefit Type	Constant 2020 $	Discounted 2020 $
Crash Avoidance Benefits	$19.4	$10.3

7.1 Emissions Cost Savings

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

7.3.1 METHODOLOGY

The project has two opposite impacts on emissions:

- Decreased emissions due to a reduction in delays and lower speeds caused by emergency repairs lowers emissions from vehicles that no longer experience travel delays due to emergency closures
- Increased emissions due to delays caused by work zones for scheduled construction.

The BCA estimates and monetizes the additions and reductions of emissions from both of these effects. The reduction in tons of emissions by pollutant type was estimated based on the reduction in hours of vehicle delay from the No Build to Build alternatives and vice versa. Using per-mile emission rates for carbon dioxide (CO_2), nitrogen oxides (NO_x), particulate matter ($PM_{2.5}$), and sulfur dioxide (SO_2) from the Environmental Protection Agency (EPA)'s Motor Vehicle Emission Simulator (MOVES), hourly emission rates for passenger vehicles and trucks were calculated based on speeds of 35, 40, 45, and 55 miles per hour.

The emissions cost savings were then monetized according to the damage cost values provided USDOT's Guidance. The difference between reduction in emissions (due to emergency repair avoidance) and increases in emissions (due to project construction) was then estimated.

7.3.2 ASSUMPTIONS

The assumptions used in the estimation of emissions cost savings are provided in the BCA model. See *Emissions Cost Lookup* worksheet.

7.2.4 BENEFIT ESTIMATES

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

Table 10 outlines the emission cost savings for this project with Criteria Air Contaminant emissions (Nitrogen Oxides (NO_x), Particulate Matter ($PM_{2.5}$), and Sulfur Dioxide (SO_2)) discounted at 7 percent and Greenhouse Gas emissions (CO_2) discounted at 3 percent. The emissions cost savings will total $2.2 million (discounted).

Table 8: Estimates of Emissions Cost Savings, Millions of 2020 Dollars

Emissions Type	Constant 2020 $	Discounted 2020 $
Carbon Dioxide (CO_2)	$2.3	$1.6
Nitrogen Oxides (NO_x)	$0.4	$0.2
Particulate Matter ($PM_{2.5}$)	$0.9	$0.4
Sulfur Dioxide (SO_2)	$0.02	$0.01
Total	**$3.7**	**$2.2**

7.2 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 avoiding future emergency repairs.

7.4.1 METHODOLOGY

The project will resurface the stretch of pavement on I-95 between MP 604.0 and 608.8. According to the FHWA IRI Categories of Roughness, the current pavement condition is “poor” to “very poor”. The BCA assumes that regular emergency repairs are required to maintain the stretch of Thruway at a functioning level. The project will boost the pavement condition to “very good” and will avoid the necessity to conduct emergency repairs over the analysis period.

7.4.2 ASSUMPTIONS

The assumptions used in the estimation of pavement maintenance cost savings are provided in the Table 9.

Table 9: Assumptions Used in the Estimation of Pavement Maintenance Benefits

Variable Name	Unit	Value	Source
Starting Year for Emergency Repairs (No Build)	years	2024	NYSTA; project assumptions
Frequency of Emergency repairs per Year	number	50	HDR assumption
Bridge Strike Repair Cost	2020 $/occurrence	$10,000	HDR assumption

Benefit Estimates

Table 10 outlines the pavement maintenance cost savings for this project. The pavement maintenance cost savings will total $1.2 million (discounted).

Table 10: Estimates of Pavement Maintenance Cost Savings, Millions of 2020 Dollars

Benefit Type	Constant 2020 $	Discounted 2020 $
Pavement Maintenance Cost Savings	$2.1	$1.2

7.3 Bridge Strike Maintenance Cost Savings

The project will conduct vertical adjustment to bridges between NY I-95 MP 604.0 and 608.8. These bridges have been struck by over-height vehicles causing damage and requiring emergency repair.

7.5.1 METHODOLOGY

The reduction in emergency bridge repair costs along the project segment from conducting vertical adjustment was monetized with the assumption that the vertical adjustments will eliminate the necessity to make future emergency repairs.

7.5.2 ASSUMPTIONS

The BCA assumes that the vertical adjustments will eliminate future bridge strike occurrences, and that each emergency bridge repair costs $10,000 in constant 2020$.

7.5.3 BENEFIT ESTIMATES

The aggregated bridge strike maintenance cost savings are presented in Table 11 discounted at 7 percent. The project would total approximately $100,000 in avoided bridge strike costs over the analysis period.

Table 11: Estimates of Bridge Strike Maintenance Cost Savings, Millions of 2020 Dollars

Benefit Type	Constant 2020 $	Discounted 2020 $
Bridge Strike Maintenance Cost Savings	$0.2	$0.1

7.4 Vehicle Operating Cost Savings

The project will improve pavement condition and decrease vehicle operating costs. The model calculates the change in fuel consumption based on the pavement condition and applies this figure to calculate the marginal cost of fuel per VMT.

7.5.4 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 average dollar-per-mile fuel cost estimates.

In the build scenario, a percent reduction in fuel costs is applied to the no build case cost estimates. This percent reduction is due to the improved pavement quality.

Fuel cost savings are assumed to decline over time based on the useful life of a roadway.

7.5.5 ASSUMPTIONS

The assumptions used in the estimation of travel time savings and vehicle operating cost savings are summarized in Table 12.

Table 12: Assumptions Used in the Estimation Vehicle Operating Cost Savings

Variable Name	Unit	Value	Source
Cost of Fuel - auto	2020 $/mile	$0.12	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised) and VOT recommendations
Cost of Fuel - truck	2020 $/mile	$0.43	USDOT Benefit-Cost Analysis Guidance for Discretionary Grant Programs - March 2022 (Revised) and VOT recommendations - ATRI Values
Adjustment factor on fuel cost (savings)	percent savings	-6%	HDR Calculation

7.5.6 BENEFIT ESTIMATES

Table 13 summarizes the vehicle operating cost savings. The project is expected to generate approximately $3.1 million in vehicle operating cost savings at a 7 percent discount rate.

Table 13: Estimates of Vehicle Operating Cost Savings, Millions of 2020 Dollars

Benefit Type	Constant 2020 $	Discounted 2020 $
Vehicle Operating Cost Savings	$5.4	$3.1

8. Summary of Findings and BCA Outcomes

Table 12 and

Table 13 summarize the BCA findings. Annual costs and benefits are computed over the lifecycle of the project.

Table 12: Estimates of Economic Benefits, Millions of 2020 Dollars

Benefits	Constant 2020 $	Discounted 2020 $[8]
Reduced Travel Time Costs	$71.89	$34.13
Improved Safety and Avoided Accident Costs	$19.35	$10.25
Reduction in Emissions Costs – Non-Carbon	$1.34	$0.6
Reduction in Emissions Costs – Carbon	$2.31	$1.63
Reduction in Pavement Maintenance Costs	$2.13	$1.16
Reduction in Bridge Strike Repair Costs	$0.17	$0.09
Reductions in Vehicle Operating Cost	$5.42	$3.15
Total Benefits	**$102.61**	**$50.97**

Table 13: Overall Results of the Benefit-Cost Analysis, Millions of 2020 Dollars

Project Evaluation Metric	Constant 2020 $	Discounted 2020 $
Total Benefits	$102.61	$50.97
Total Costs	$57.6	$43.1
Net Present Value	$7.3	
Benefit-Cost Ratio	1.17	

With a 7 percent general discount rate and 3 percent discount rate for CO_2, the $43.1 million investment would result in $51.0 million in total benefits and a benefit-cost ratio of approximately 1.17.

[8] Most categories were discounted at 7 percent real rate, while CO_2 emissions were discounted at 3 percent real rate as recommended by USDOT's BCA guidance.

9. 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:

- Benefits Period: assume that in the build case, maintenance extends the lifecycle of the pavement. The maintenance starts in 2030 in order to keep the pavement in "fair" condition. The analysis period is extended to 20 years.
- Discount Rate: reducing the general discount rate to 3 percent
- Value of Time: increasing the value of time by 25% for passenger vehicles and trucks
- Project Costs: increasing and decreasing the total project cost of the project by 30%.

The sensitivity results are presented in Table 14.

Table 14: Quantitative Assessment of Sensitivity, Summary

Parameters	Change in Parameter Value	Current NPV	New NPV	New B/C Ratio
20-year Benefits Period	Assume repairs and maintenance begin in 2030 to keep pavement in fair condition	$7.88	$54.97	2.28
Discount Rate	Reducing the general discount rate to 3 percent		$26.76	1.53
Value of Time	25% Increase in Value of Time for Passenger Vehicles and Trucks		$15.81	1.37
Project Cost	Increasing the total project cost by 30%		($5.65)	0.90
	Decreasing the total project cost by 30%		$20.20	1.67

10. Summary of Benefits and Costs

Table presents the benefits and costs of the project in 2020 dollars discounted.

Table 15: Summary of Benefits and Costs, Discounted[9]

CY	Pavement Management Benefits	Total Annual Safety Benefits	Total Travel Time Savings	Emission Benefits	Bridge Strike Savings	Vehicle Operating Cost Savings	Total Benefits	Total Capital Costs	Net Present Value
2022	$0	$0	$0	$0	$0	$0	$0	$2,306,138	-$2,306,138
2023	$0	$0	$0	$0	$0	$0	$0	$2,351,203	-$2,351,203
2024	$0	$0	-$6,980,933	-$639,315	$0	$0	-$7,620,248	$19,868,029	-$27,488,277
2025	$0	$0	-$6,681,474	-$604,825	$0	$0	-$7,286,299	$18,568,251	-$25,854,551
2026	$222,006	$1,541,296	$7,032,507	$433,319	$17,760	$893,562	$10,140,450	$0	$10,140,450
2027	$193,909	$1,459,363	$6,702,571	$405,620	$15,513	$696,434	$9,473,409	$0	$9,473,409
2028	$169,367	$1,381,553	$6,388,114	$382,831	$13,549	$531,717	$8,867,132	$0	$8,867,132
2029	$147,932	$1,307,679	$6,088,409	$357,368	$11,835	$394,682	$8,307,904	$0	$8,307,904
2030	$129,210	$1,237,557	$5,802,766	$333,258	$10,337	$281,245	$7,794,373	$0	$7,794,373
2031	$112,857	$1,171,013	$5,530,524	$319,616	$9,029	$187,885	$7,330,924	$0	$7,330,924
2032	$98,573	$1,107,880	$5,255,032	$305,585	$7,886	$111,231	$6,886,188	$0	$6,886,188
2033	$86,098	$1,047,995	$4,993,263	$292,157	$6,888	$49,388	$6,475,789	$0	$6,475,789
2034	$0	$0	$0	$0	$0	$0	$0	$0	$0
2035	$0	$0	$0	$0	$0	$0	$0	$0	$0
2036	$0	$0	$0	$0	$0	$0	$0	$0	$0
2037	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	**$1,159,951**	**$10,254,337**	**$34,130,779**	**$1,585,614**	**$92,796**	**$3,146,144**	**$50,369,621**	**$43,093,621**	**$7,276,000**

Note: CY = Calendar Year

[9] Most categories were discounted at 7 percent real rate, while CO_2 emissions were discounted at 3 percent real rate as recommended by USDOT's BCA guidance.

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

RONALD L. EPSTEIN
Executive Deputy Commissioner
Chief Financial Officer

April 6, 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:

Pursuant to the Congressional Community Project Funding Requests process, the New York State Department of Transportation affirms that the New York State Thruway Authority's request for the rehabilitation of Interstate 95, (between milepost 604.0 and milepost 608.8) in Westchester County meets the eligibility requirements under Title 23, of United State Code and that the project is scheduled to be obligated within the time period set forth under Transportation and Infrastructure request form.

The State acknowledges that the requested $25 million toward this $60 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 95 Rehabilitation Project in the Mid-Hudson Region. If I can be of additional assistance regarding this request, please contact me at 518-457-6700 or Ron.Epstein@dot.ny.gov.

Sincerely,

Ronald L. Epstein
Executive Deputy Commissioner